

The influence of work arrangements on occupational health and safety: a study of Australian and United Kingdom horticulture

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**The influence of work arrangements on occupational health
and safety: a study of Australian and United Kingdom
horticulture**

Annabelle Bamford

A thesis in fulfilment of the requirements for the degree of Doctor of Philosophy



School of Management
Australian School of Business

April 2015

Originality Statement

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Abstract

There is a rich literature on the role that precarious work situations (including subcontracting and temporary labour) play in health disparities, but research on occupational health outcomes and work arrangements in horticulture is limited, and few studies in the wider literature have explored whether these arrangements affect hazardous substance exposures. This study assists in filling this gap by describing how work arrangements, particularly subcontracting and temporary employment, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure in two countries with similar regulatory regimes: Australia and the United Kingdom. Data are drawn from 67 semi-structured interviews with horticultural fieldworkers, employers, labour providers, and industry, union and government representatives. The regulatory frameworks were compared and real or perceived impacts of regulations on occupational health and safety (OHS) outcomes were examined. The research design allowed the reporting of perceived exposure and potential sources of pesticide exposure.

A number of conclusions are drawn. Subcontracting and temporary work arrangements appeared to affect OHS, including pesticide exposures. Factors explaining this include economic pressures, worker mobility and the fracturing of tasks into separate contractual units that contributed to hazardous forms of work disorganisation, and regulatory failure. Financial pressure was accentuated by the subletting of work under a subcontracting system; employment and income insecurity as well as intense competition for work contributed to a range of hazardous practices amongst labour subcontractors, including accepting hazardous tasks. The critical factor seemed to be that the work was temporary and itinerant. Workers did not appear to consider long term health but rather immediate safety issues, and because the work was itinerant it would have been difficult to track the outcomes of any exposures if this was considered desirable. Reactive and infrequent government inspection further complicates the tasks of identifying, monitoring and addressing the insidious health risks associated with pesticide exposure. This research focussed on work organisation rather than ethnicity and the findings tend to suggest that it is not just the vulnerability of foreign-workers, which exacerbated problems but is also a part of the way work is being organised. Indeed, the use of foreign workers can itself be seen as a conscious form of work organisation. The precariousness arising from work organisation seemed to be the most fundamental problem, especially in such a highly competitive industry. Despite differences in the regulatory frameworks and temporary labour migration mechanisms, the cross-national findings were very similar.

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Acronyms and Abbreviations

Agvet Code	Agricultural and Veterinary Chemicals (Code) Act 1994
AWB	Agricultural Wages Board
EU	European Union
GLA	Gangmasters Licensing Authority
HSE	Health and Safety Executive
MRL	Maximum residue limit
NSW	New South Wales
OHS	Occupational health and safety
PDR	Economic and Reward Pressure, Disorganisation and Regulatory Failure
PPE	Personal protective equipment
REACH	Regulation of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals
REI	Re-entry interval
Robens Report	Report of the Committee on Safety and Health at Work (1972) chaired by Lord Robens
SAWS	Seasonal Agricultural Workers Scheme
SDS	Safety data sheet
UK	United Kingdom
US	United States (of America)
WHM	Working Holiday Maker
WHP	Withholding period
WHS	Work health and safety
WHSQ	Workplace Health and Safety Queensland

Definitions

Active constituent	The portion of the pesticide formulation which is biologically active and kills or controls the target organism.
Agricultural chemical	See Pesticide
Downstream user	Any natural or legal person established within the Community, other than the manufacturer or importer, who uses a substance in the course of their industrial or professional activities.
Dislodgeable foliar residue	The amount of pesticide residue that can be dislodged from the two-sided foliar surface of a plant during a well-defined procedure.
Exposure scenario	The set of conditions, including operational conditions and risk management measures, that describe how the substance is manufactured or used during its life-cycle, and how the manufacturer or importer controls or recommends downstream users to control exposures of humans and the environment.
Foreign-born worker	See A Note on Terminology
Gangmaster	An individual or business that: supplies labour to agriculture, horticulture, shellfish gathering and food processing and packaging; uses labour to provide a service in the regulated sector; or uses labour to gather shellfish.
Harvest trail	The sequential movement of horticultural work across Australian States.
Hierarchy of controls	A list of control measures, in priority order, which can be used to eliminate or minimise exposure to a hazard (i.e. eliminate, substitute, isolate, engineering controls, administrative controls, and personal protective equipment).
Labour hire	See Temporary agency labour
Maximum residue limit	The maximum concentration of a residue, resulting from the registered use of an agricultural chemical, that is recommended to be legally permitted or recognised as acceptable in or on a food or agricultural commodity.
Migrant worker	See A Note on Terminology
Minimum labour standards	State-regulated social protections specifically addressed to setting an irreducible floor for working conditions. These include the most fundamental procedural rights such as workers' rights to organise

	collectively, bargain and take industrial action, and substantial conditions including wages and hours of work, and health and safety standards.
Pesticide	Any substance used to destroy, suppress or alter the life cycle of any pest, including herbicides, insecticides, fungicides, bactericides, baits, rodenticides and repellents.
Pesticide Metabolite	A compound or substance formed during the course of metabolism, which is the overall set of chemical reactions that occur in an organism or cell.
Plant protection products	See Pesticide
Precautionary principle	Consists of four central components: people have a duty to take preventative or anticipatory action to prevent harm in the face of uncertainty; the burden of proof of harmlessness lies with the proponent of an activity; people have an obligation to explore alternatives to possibly harmful actions; and increase public participation in the decision-making process.
Re-entry interval	The period of time after a field is treated with a pesticide during which restrictions on entry are in effect to protect persons from potential exposure to hazardous levels of pesticide residues.
Safety data sheet	Describes the physical and chemical properties of a substance and provides information on safe use and handling (formerly MSDS).
Seasonal worker	Someone employed in horticultural work where, ordinarily, the employment pertains to or is of the kind exclusively performed at certain seasons or periods of the year and which, from its nature, may not be continuous.
Temporary agency labour	Labour with a contract of employment or an employment relationship with a temporary labour agency with a view to being assigned to a user undertaking to work temporarily under its supervision and direction.
Withholding period	The minimum time that must elapse between the last application of a pesticide and harvest.

A Note on Terminology

It is important to be aware of some substitutable and non-substitutable definitions. International migration has historically been associated with permanent relocation. However temporary or circular migration has become a distinctive phase of international movement of labour over the past 15-20 years (Hugo 2005; Toh & Quinlan 2009; Walsh 2014). Although the workers under study fit into the category of temporary foreign-born, the word 'migrant' is sometimes used because it is commonly used in the literature. It must be emphasised that in Australia most workers engaged in horticulture (who are not illegal immigrants) only stay in the country on a temporary basis of 1-2 years. Similarly the Seasonal Agricultural Workers Scheme (SAWS) established a pattern of managed circular migration, offering short-term agricultural employment in the United Kingdom (UK) for overseas workers.

The term 'precarious work' is preferred over 'precarious employment' because not all precarious work involves an employment relationship in the legal sense, most obviously self-employment (see Johnstone et al. 2012). Similarly, the term 'worker' captures different types of work arrangements as classified by law with implications for labour standards or rights. Beginning with consignment to exporters, retailers and market agents, the horticultural supply chain enables buyers to assume a dominant market position, dictating cost and timing. Although supply chains typically involve subcontracting, 'contractor' is used throughout the evidentiary chapters to reflect the terminology used by participants. Temporary agency labour can also be viewed as a structured form of subcontracting.

Under occupational health and safety (OHS) harmonisation Australian legislation has been renamed Work Health and Safety (WHS). For the purpose of this thesis when legislation is referred to generally the abbreviation OHS is used for consistency for the reader. When referring to specific Australian Acts the abbreviation WHS is used.

'Agriculture' defines the practice of cultivating the soil, growing crops and raising livestock, within which horticulture comprises fruit, vegetables, nuts, flowers, turf, and nursery products. As principally a study of OHS and labour-intensive fruit crops, preference is for the term 'horticulture'. However, it was necessary to draw on the wider agricultural literature and the terms 'horticulture' and 'agriculture' (and less so 'farmwork') are often used interchangeably due to regional inconsistencies in the literature, and to reflect participants' terminology.

CHAPTER ONE INTRODUCTION

While there is a growing body of research on the association between precarious work (including subcontracting and agency labour) and injury and mental health, relatively few studies have examined whether these arrangements affect hazardous substance exposures (for an exception see Thébaud-Mony 1999, 2000). The organisation of work is concerned with the structure and management of work practices, including work processes, the employment relationship and job security, which are nested within broader social, political and economic contextual factors that shape and drive employment (Landsbergis et al. 2012). This thesis draws on a broader literature on the organisation and regulation of work, which contributes to the occupational health and safety (OHS) literature. There is a rich literature on the role precarious work situations play in health disparities (Benach & Muntaner 2007; Kompier et al. 2009; Bambra 2011; Landsbergis et al. 2012), but research linking occupational health outcomes to work organisation in agriculture/horticulture is limited (notable exceptions include Grzywacz et al. 2013; Quandt et al. 2013). Moreover, despite the plausibility of evidence elsewhere which would suggest several interrelated processes underlying the nature of the employment relationship may contribute to pesticide exposures (Chapter Two), differences in exposure amongst workers in different types of employment have rarely been studied explicitly. This study assists in filling this gap by examining seasonal work in horticulture in two countries. The research design allows the reporting of perceived exposure and potential sources of pesticide exposure. Increasing attention into how work arrangements and work organisation more generally affects OHS, including hazard exposures, represents an important advance.

The purpose of this chapter is to establish the context of the thesis which seeks to describe how work arrangements, especially expanded contractual chains, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. The research compares the Australian and United Kingdom (UK) horticultural industries; two countries with similar but not identical regulatory regimes. Section 1.1 describes the labour market flexibility agenda, which points to wider changes to work organisation and how this helps to explain the motivations and practices of key parties within horticulture. Section 1.2 outlines the reasons for industry selection, and section 1.3 provides the reasons for country selection. Section 1.4 explains the motivation for this research, stating the research aims and research questions. Section 1.5 provides an outline of the thesis.

1.1 *The Pursuit of Labour Market Flexibility*

Work arrangements have undergone extensive change including labour market re-regulation during the past four decades, most notably a shift away from relatively long-term employment arrangements and toward insecure work (Campbell & Brosnan 1999; Burgess et al. 2008). Although the misnomer ‘deregulation’ is widely used to describe an ideal of removing laws protecting labour rights and entitlements, allowing businesses greater flexibility in labour relations, this rhetoric is based on a narrow definition of ‘regulation’ as it applies to the exchange of labour in the economy, and often masks extensive legal re-regulation (Howe 2006). Removing parties from the ‘strictures’ of employment regulation has required considerable and explicit legislative regulation associated with a more diverse set of outcomes dependent upon market power (Howe 2006; Murray 2006; Riley 2006).

The decline in collectivism and rise of individualism are important trends in the employment relations of developed countries in recent decades (Bray & Macneil 2011). The de-collectivising of industrial relations has the potential to undermine formal gains in worker protection secured under OHS laws, affecting the capacity of trade unions to push for higher regulatory standards or to monitor and help enforce existing standards (Johnstone et al. 2005; Quinlan & Johnstone 2009; Scott et al. 2012). The rationale for this regulatory change is that flexible labour markets can meet the economic pressures of globalised competition (Benach & Muntaner 2007; Salanova & Schaufeli 2008; Vives et al. 2010). Just-in-time labour allows employers to reduce recruitment and training expenses (Kalleberg et al. 2000; Virtanen et al. 2003; Hall 2006), and ensure labour’s rapid adaptation to lowering wages, demanding working conditions, and displacement by new technology (Benach et al. 2000). The practice of outsourcing, a key component of this ‘neoliberal’ agenda, is part of a broader trend whereby activities outside the business’ core competence are contracted to outside specialists, compelling workers in outsourced activities to be more entrepreneurial and market-oriented. These factors can promote workers’ continuous pursuit of skills and experiences that cannot be attained by direct ongoing employment (Defillippi & Arthur 1994).

Advocates of free agency have argued flexible work arrangements offer workers greater control over their schedules and variety (Kunda et al. 2002). Evidence in support of this claim comes from some studies of part-time (Houseman 2000) and casual workers (Keuskamp et al. 2013), and self-employed people (Benz & Frey 2004), and further evidence suggests a link between temporary employment status and lower role overload (Parker et al. 2002). The changing nature and distribution of work has also increased labour market success for women (Hall et al. 1998; Quinlan & Mayhew 2001; McDowell 2003). However, whilst women may seek

reduced hours of paid work when they are caring for dependents, there is no evidence of any preference for inferior conditions of casual employment (Pocock 2003). Other positive consequences of labour market changes include departure from the more hazardous manufacturing industry, and improved and often automated production technologies leading to a reduction in manual handling injuries (Quinlan & Mayhew 2001).

The counterargument is that changes to work organisation and re-regulation have been used to weaken labour standards by generating jobs that have historically operated outside the regulatory framework (Burgess & de Ruyter 2000; Mills 2004). Decline in the normative model of 'standard' employment relationships – a permanent, fulltime contract with social benefits – and commensurate growth in 'nonstandard' types of work has been observed (Burgess & Campbell 1998; Facey & Eakin 2010; Vives et al. 2011). The standard employment relationship emerged as the dominant model of employment post-World War Two although temporary work and other precarious work arrangements did not disappear and indeed remained important in seasonal industries and for particular groups of workers, like women (Lowe 2002; Vosko, 2007). Labour legislation was largely framed on the presumption of standard employment. The re-emergence or more accurately re-growth of precarious work after 1975 not only highlighted the historical contingency of the standard employment model but also represented an effort to bypass the regulatory framework which it entailed. Scholars have argued exclusion from rights and conditions attached to permanent employment is a hallmark of flexible employment (Fudge & Vosko 2001; Burgess et al. 2008; Arup et al. 2009).

A driving force in the growth of flexible work has been the increasingly dominant policy discourse of neoliberalism which sees workers as just another commodity, something contrary to the key declaration of the International Labour Organization (ILO) in 1944 (Standing 2008; Quinlan 2012a; Benach et al. 2013). Labour law is increasingly concerned with the re-commodification of labour rather than safeguarding workers (Pocock et al. 2005; Ewing 2008; Quinlan & Sheldon 2011). Although originally bearing favourable connotations, the conception of 'flexibility' is now synonymous with income and job uncertainty, diminished protection and exploitation (TUC CoVE 2008). Workers in insecure labour markets also share a number of labour market characteristics with the unemployed, including lower credentials, low income and vulnerability (often female or foreign) in addition to experiencing bouts of unemployment (Leiva 2000; Benach & Muntaner 2007; Ehlert & Schaffner 2011). They are also more likely to be exposed to physical and chemical hazards in the work environment (Abrahams et al. 2004). The body of research linking precarious work with poor OHS outcomes is substantial, and is examined in Chapter Two.

Reliance on temporary and highly mobile workers, and the concomitant shift of economic risk from employer to worker, is no less evident in agriculture than other industries (Binford 2009; Thomas 2010; Aguiar et al. 2011) where it purportedly

...drives down working conditions for jobs at the bottom of the labour market, while the immigration system creates a pool of precarious labour, desperate enough to fill those positions (Choudry et al. 2009: 59).

Globalisation has intensified rural industrialisation and labour migration. A flexible labour market is able to respond to seasonal demands thereby cushioning against periods of economic downturn, and labour contractors play an important role in meeting surges in labour demand (Dolan & Sorby 2003; Barrientos & Kritzinger 2004). The temporary labour migration phenomenon represents a global response to the changing requirements of social reproduction, combining the distinct cultures of survival and exploitation of sending and host communities (Chapter Three).

1.2 Industry Selection

A number of factors influenced the choice of industry for this thesis. Agricultural workers, together with others like home-based garment workers and merchant seamen, were identified as both precarious and vulnerable in the nineteenth and early twentieth century, and occupy the same situation today (Quinlan 2011a). Seasonal work, especially where it involves an itinerant and vulnerable workforce, can entail arduous, hazardous and relatively poorly remunerated work (ILO 2010a). Increases in intensity of horticultural production and the search for high-yielding crops have had significant impacts on the OHS of horticultural workers (ILO 2003a; Damalas & Eleftherohorinos 2011). The susceptibility of horticultural commodities to pests and diseases requires careful management, and pesticides are often relied upon (Cross & Berrie 2006). By contrast, pesticides are not used as extensively in broad acre cropping (except for cotton) due to the low return per unit area which makes the use of pesticides uneconomical (Wossink & Feitshans 2000). Workers are often geographically remote from regulatory scrutiny, and this complicates identification and monitoring of the insidious health risks associated with pesticide exposure (Quinlan & Mayhew 2000). The dearth of toxicity information allows employers and chemical manufacturers to externalise the potential cost of occupational exposures (Bent 2012).

Horticulture is marked by seasonal, time-bound work pressures, with high demand for workers at peak times of the year, and agriculture (which includes horticulture) has one of the worst OHS records of any major industry in Australia and the UK. Despite accounting for just 3

percent of the Australian workforce, agriculture accounted for 20 percent of worker fatalities in 2012 and was identified as a priority industry for prevention activities (Safe Work Australia 2014). Similarly UK agriculture employed less than 1.5 percent of the working population but accounted for 15-20 percent of workplace fatalities in 2011, with a self-reported illness rate higher than the average for all industries (HSE 2011). Agriculture is characterised by self-employment and family businesses thus, allowing for underreporting, true incidence rates are probably far higher. The next section provides reasons for country selection and introduces the labour market (discussed further in Chapter Three).

1.3 Country Selection

There are an estimated 30,000 Australian horticultural businesses (HAL 2012). According to the Australian Bureau of Statistics (ABS) there was an estimated 57.2 million orchard trees (including nuts) in Australia in 2011/2012, including approximately 7.5 million orange, 2 million mandarin, 11 million apple, 2 million pear, 2.6 million cherry, 2.2 million nectarine, 2.4 million peach, and 1.4 million mango. Additionally, there was an estimated 1,562 hectares of strawberries of bearing age, 15,484 hectares of bananas, and 153,213 hectares of grapes (ABS 2013a). The gross value of agricultural commodities produced in 2011/2012 was approximately \$46.7 billion (ABS 2013b). The major horticultural product groups had the following gross value of production: fruit (including grapes) and nuts \$4.09 billion; vegetables \$3.34 billion; and nursery, flower and turf production \$1.27 billion. Australia is a competitive net agricultural exporter with around two thirds of total production exported, which accounted for 13.8 percent of Australian merchandise exports in 2011/2012 (DFAT 2012).

There are an estimated 14,200 UK horticultural businesses (Lantra 2011). The total area devoted to horticultural crops in 2012 was 172,000 hectares, with orchards occupying 24,200 hectares, strawberries occupying 3,300 hectares, and other small fruit (including gooseberries and blackberries) occupying 6,100 hectares (DEFRA 2012a). Decline in total planted area of UK horticultural crops during the last decade has been offset by improved productivity per unit area. Through the use of protected production systems the soft fruit sector particularly has managed to extend its season in an expanding market. The estimated gross output of agriculture in market prices was approximately £23.9 billion in 2012 (\$43.6 billion at 22 July 2014), with total crop output worth an estimated £8.68 billion (\$15.8 billion), including fresh fruit £555 million (\$1.003 billion) and fresh vegetables £1.3 billion (\$4.2 billion) (DEFRA 2013a).

Australian harvest workers come from a number of domestic and overseas sources: family members; local labour resident in the area; itinerant professional pickers; Working Holiday

Makers (WHMs) (i.e. backpacker tourists) and other eligible aliens; younger Australians and New Zealanders looking for temporary work; older Australians, retirees or people who have been made redundant who travel around in caravans ('Grey nomads' or the 'Grey Brigade'); volunteers through Willing Workers on Organic Farms Australia, and undocumented workers. A report prepared by the Fair Work Ombudsman (2010) estimated 130,000 employees in horticulture, and the National Farmers Federation (2008) estimated there will be need for additional 80,000-100,000 workers in agriculture in coming years. According to Hay and Howes (2012), Australian horticultural workforce estimates vary but a commonly-cited figure is 108,000 including approximately 37,000 backpackers in 2007/2008. Informal estimates must be treated with circumspection as figures may be underestimated or exaggerated depending upon the standpoint of the source of the information.¹

In 2013 there were three main sources of seasonal workers for UK horticulture: Bulgarian and Romanian citizens under the Seasonal Agricultural Workers Scheme (SAWS); A8 countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) and other eligible aliens (gangmastered and directly employed); and British workers (MAC 2013) (see Chapter Three). There is no historical research explaining growth in foreign-born workers and commensurate decline in British-born workers. The argument that British-born workers were unreliable and unwilling to accept and meet the rigours of seasonal horticultural work reflected employers' perspectives (Frances et al. 2005; MAC 2013). The number of temporary workers in UK agriculture in 2003/2004 was between 420,000 and 611,000, including a significant proportion supplied by labour providers (Frances et al. 2005). More recently the Department of Environment, Food and Rural Affairs (DEFRA) (2012a) estimated that the total number of people working on agricultural holding in the UK was 481,000, including 67,000 casual workers (a 7 percent rise in casual workers from the previous year). These estimates captured workers in all sectors of the industry (i.e. not just horticulture) because published sources were not classified into mutually exclusive categories.

A serious limitation of workforce estimates is the exclusion of undocumented workers, and legitimate workers employed under fictitious identities (Ball 2010; David 2010). The legality of a contract of employment has significant ramifications because all employment law, including OHS and workers' compensation, is premised on the basis that a valid contract of, or for services is in place (Guthrie & Quinlan 2005). Undocumented workers may be unwilling or

¹ The aggregate distribution of crop production in space and time underpinning the seasonal cycle of labour mobility in Australian and UK horticulture are described in Chapter Five, subsection 5.4.4.

have difficulty accessing any rights or entitlements afforded to them (Das et al. 2001; Guthrie & Quinlan 2005; Toh & Quinlan 2009). Hay and Howes (2012: 27) claimed

...the use of undocumented workers reflects the nature of the horticulture industry. Pressure on prices, acceptance of low standards, and the ease of sourcing such workers, particularly through contractors, have led to the use of undocumented workers becoming a norm.

The use of undocumented workers, though seemingly important, was beyond the logistical scope of this thesis to explore. Whilst the labour contractor (linking workers to specific production sites as labour demand shifts) and people smuggler (illicitly moving people across borders) networks can be interlinked, often different people operate each although the boundaries become blurred through a complex system of labour subcontracting (Martin 2005; Barrientos 2011).

Australia and the UK have often been seen as similar societies. Both share a common legal history and framework including a long record of respect for individual freedoms and representative democracy (Pencavel 1997). In both countries OHS legislation is based on the Robens model and OHS inspectorates are specialist OHS inspectorates. Both industrial relations and OHS legislation provide mechanisms for collective worker representation at the workplace. In recent years the decline in collectivism (associated with lower union membership and power, and lower coverage and scope of collective bargaining) corresponding with a rise in individualism (associated with direct employer-employee bargaining) has been a common theme in both countries (Brown et al. 2000; Briggs & Cooper 2007; Bray & Macneil 2011). However, there are some important differences. Australia adopted a system of compulsory conciliation and arbitration (since modified to permit enterprise bargaining) whereas the UK opted for a more voluntary collective bargaining framework (McCallum 2011). The UK has a centralised state structure, but Australia represents a federation with States and Territories being largely responsible for enacting and administering OHS and workers' compensation legislation. Unlike Australia, as a member of the European Union (EU) the UK must align its regulation to be consistent with EU directives including those on OHS (although there is still scope for legislative autonomy) (see Chapter Six). Although Australian and UK horticulture face broadly comparable dilemmas, there are many countries whose experiences on the interaction between work arrangements and OHS may and could be called upon. However, to make this study manageable it was restricted to two countries with comparable legal frameworks.

1.4 *Research Project Aims and Research Questions*

Agriculture accounts for a significant component of the workforce globally. Although agricultural employment has been in decline in developed countries during the past two decades, many horticultural producers remain dependent upon temporary labour due to seasonal variations in production or demand (Findeis 2002; Emerson 2007; Hanson & Bell 2007). Dwindling employment security, marked by increasing use of temporary labour is a hallmark of modern horticulture (Chapter Three). The link between employment status and OHS in horticulture or wider agriculture has attracted scant attention in the research literature. Bain (2010) reported Chilean agricultural workers, labour advocates, government representatives and some growers identified labour subcontracting as their principal OHS concern. Another notable exception is Caro and de la Cruz's (2004 cited in Bain 2010) comparison of labour conditions for workers employed directly by growers with those employed by labour subcontractors in the South American fruit export sector. They found subcontract workers were three times more likely to come into direct contact with pesticides. The United States (US) National Agricultural Workers Survey suggested the organisation of work in field agriculture may contribute to poor occupational health outcomes (Grzywacz et al. 2014). Also noteworthy is Das et al.'s (2001) research on pesticide-related illness amongst migrant farmworkers in California, but their observation that worker mobility may be detrimental to health due to unfamiliarity with hazards in their ever-changing workplaces was not followed up.

The dearth of research on subcontracting, employment status and OHS is not confined to agriculture. In part this is because this type of research is difficult. Gunasekara (2011) noted data availability is a significant hurdle encountered in researching subcontracting amongst the low-skilled. There is no systematic data collection on this segment of the workforce, the workers seldom press their cause, and the employers applying the contractual arrangements do not readily grant interviews. In Frances et al.'s (2005) study of employment practices in UK agriculture, a member of the farm administration was present during all the interviews with their workers. The difficulties in gaining access to individual and small group level data are considerable. There are relatively few Australian studies of independent contracting in low-skilled industry sectors (for exceptions see Campbell & Peeters 2008; Holley 2014).

The dependence upon foreign labour, though not unique to horticulture, adds an interesting dimension. Of all economic sectors, agriculture (predominantly horticulture) has the longest history with temporary foreign worker programs (Preibisch 2010). Temporary foreign worker programs create a tractable and self-generating labour pool (Lado 1995; Choudry et al. 2009;

Walsh 2014). Rogaly's (2008) study of British horticulture highlighted increased use of migrant² workers as one element of the intensification of production and concentration of retail power. There appears to be no parallel evidence on supply chains and OHS in Australian horticulture (or agriculture) although there is an awareness of rural OHS more generally (see Fragar 1996; Guthrie et al. 2009; Lower & Fragar 2011). Travel patterns and motives of backpackers on the 'harvest trail' (a term for the sequential movement of horticultural work across Australian States) have attracted attention (Cooper et al. 2004a; Hanson & Bell 2007; Jarvis & Peel 2013). Elsewhere, Anderson et al. (2012) examined horticultural employment in New Zealand involving international students, and Tipples et al. (2013) explored the inflow of Filipino workers into New Zealand dairy farming and reviewed their employment, working and OHS experiences.

Foreign workers are an especially vulnerable group in health-related research. Temporary status exacerbates worker vulnerabilities (Cho et al. 2007; Sargeant & Tucker 2009; Toh & Quinlan 2009; Preibisch & Otero 2014). Systematic literature reviews by Ahonen et al. (2007), Schenker (2010) and Svensson et al. (2013) found that apart from the US few studies have critically assessed OHS risks amongst foreign-born farmworkers, despite the drastic increase of migration flows following the 2005 EU enlargement. McKay et al.'s (2006) study comparing migrant and non-migrant workers in similar jobs is a rare exception. However the implications of the employment relationship for OHS were not explored beyond identifying uncertainty as to whether responsibility for OHS lay with labour provider or user.

This exploratory study seeks to describe how work arrangements, particularly subcontracting and temporary employment, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure.³ The study compares experiences in two countries with similar but not identical regulatory regimes: Australia and the UK. The marked demand for seasonal labour is reflected in the simultaneous expansion in contracted labour and international labour migration. Labour-intensive fruit crops are treated extensively with pesticides, and pesticide exposures due to hand contact with treated foliage can be extensive for hand-harvesters and cultivators (Arcury et al. 2002; Fenske et al. 2003; Bradman et al. 2009). A second broader aim is to describe the effectiveness of OHS regulation in horticulture, including knowledge of rights and responsibilities. Regulatory apparatuses have given limited

² See A Note on Terminology.

³ The present study is confined to work arrangements in primary production to the exclusion of employment practices in processing, distribution and retailing.

recognition to changes in work organisation, with complex networks of work arrangements undermining regulatory coverage and effectiveness, and both fragmenting and obscuring responsibility for OHS (Debrah & Ofori 2001; Loosemore et al. 2003; Quinlan & Sokas 2009).

The thesis poses a primary and subsidiary research question:

1. What effects do subcontracting and temporary work arrangements have on workers' knowledge of, and exposure to agricultural pesticides?
2. How effective is OHS regulation in horticulture?

The research design allows the reporting of perceived exposure and potential sources of pesticide exposure. The methodological issues and methods are fully described in Chapter Five. The research methodology involved the use of multiple case studies based on semi-structured interviews. Research data was gathered from various sources in the Australian States of Queensland, New South Wales (NSW) and Victoria, and across England.

This thesis gives greater understanding of and voice to a group of vulnerable workers. Although this is an exploratory study, there are a number of foreseeable outcomes and benefits of this study to the wider community.

1. The potential for hazardous exposures to impact on the general quality of life must be more broadly communicated, and where this leads to a deterioration of wellbeing this should be more widely perceived as unacceptable.
2. Strategies that have achieved success in communicating and improving OHS standards may be identified as examples for other businesses and regulatory agencies to learn from.
3. Improvements in protection for all workers so that they have more leverage to demand higher labour standards without fear of retribution. Precarious workers typically encounter difficulties in making their voices heard, often resulting in the exclusion from protective legislation by design or by virtue of their invisibility.

1.5 *Outline of the Thesis*

This thesis brings together two bodies of scholarship; that on precarious work and that on agricultural pesticide exposures. Chapters Two to Four provide the context for this empirical research by reviewing relevant literature. Chapter Two is divided into two main parts. The first takes the definition and discussion of precarious work beyond the points made above, and explores the key conceptual debates. The second describes the implications of outsourcing hazardous work activities, and examines some theoretical foundations for conceptualising the

relationship between precarious work and OHS outcomes.

Chapter Three describes increasing use of temporary and foreign-born labour in horticulture. The supply of seasonal labour is driven by the nature and structure of the horticulture industry, especially through the prevailing market prices for horticultural produce determined by the powerful supply chain actors. Formal programs for admitting foreign workers on a temporary basis are described, and the concept of 'layers of vulnerability' is introduced.

Chapter Four introduces OHS in horticulture, with a focus on pesticide exposures. In contrast to sophisticated technologies for use in horticultural production, worker protection often relies upon relatively primitive control measures to eliminate or minimise exposure to a hazard. Moreover, several aspects of the way work is organised may contribute to pesticide exposures.

Chapter Five describes the qualitative research approach, providing an overview of the research design and sampling strategy. Access and execution of interviews are explained, and a description of the data analysis is provided.

Chapter Six provides an overview of the legislative arrangements for OHS generally, and the legislative management of agricultural chemicals specifically, in Australia and the UK. It is argued the extent and means by which the intent of legislative provisions will actually be implemented makes outcomes with regard to workers' protection difficult to predict. Since regulatory failure is a major factor affecting OHS outcomes an understanding of the regulatory framework underpins this thesis.

The evidentiary Chapters Seven and Eight present findings related to induction and training, safety, perceived pesticide exposure and potential sources of exposure, and the regulatory environment in Australia and the UK, respectively, and whether the nature of employment affected workers' reported experiences. Finally, Chapter Nine synthesises the analytic insights of the thesis with theoretic foundations into a set of conclusions relating to the two research questions, and identifies implication of this research.

CHAPTER TWO PRECARIOUS WORK AND OHS OUTCOMES: A LITERATURE REVIEW

2.1 *Introduction*

The growth of flexible work, commonly referred to as precarious work⁴ and to a lesser degree contingent work, has become a focus for those interested in the effects of changing work arrangements on health. However, there are two significant obstacles impeding understanding: inconsistency in the conceptual apparatus for considering these arrangements (with implications for developing information systems necessary for surveillance and cross-national comparison), and the lack of theoretical depth and conceptual clarity regarding how such forms of work might affect health (Facey & Eakin 2010). These two challenges are considered in this chapter.

Section 2.2 introduces conceptions of precarious work and section 2.3 identifies the existing consensus on the OHS effects of precarious work that the combination of hazardous work activities and outsourcing can be particularly detrimental to workers' OHS, especially when such arrangements represent the outsourcing of more hazardous tasks. There is evidence that a disproportionate number of precarious workers are employed in low-skilled hazardous industries, and their employment creates downward pressures on wages and working conditions, safety, and union membership (Cho et al. 2007; Wills 2009; Underhill & Quinlan 2011a). The relationship between precarious work and OHS is complex. Hazards arise not only from the static features of the workplace but also from the way work is organised (Johnstone 2002). Four models are discussed for their contributions to the conceptualisation of the link between precarious work and adverse health outcomes, namely Demand-Control-Support (DCS), Effort-Reward Imbalance (ERI), Employment Strain, and Economic and Reward Pressure, Disorganisation and Regulatory Failure (PDR).

2.2 *Conceptions of Precarious Work*

From the early 1980s the term '*emploi précaire*' was used in France to describe a social status primarily related to employment (Barbier 2002). The term has since grown to prominence. However, the modern nomenclature 'precarious work' actually dates from the early nineteenth century (Johnstone et al. 2012). The concept encompasses forms of work characterised by limited statutory entitlements and social benefits, job insecurity and low wages (Vosko 2006), and reflects an intention to rethink what have come to be normalised

⁴ See A Note on Terminology.

descriptors such as ‘standard’, ‘nonstandard’ and ‘atypical’ (Louie et al. 2006; Vosko 2006). ‘Nonstandard’ and ‘atypical’ are particularly limited in their ability to capture the experiences of all workers considering fulltime work was never ‘standard’ for women and visible minorities (Carre et al. 2000; Cranford et al. 2003; Johnstone et al. 2012). A central feature of precarious work relates to job insecurity (Bartley & Ferrie 2001; Mayhew & Quinlan 2002; Hadden et al. 2007). Limited bargaining power and pressure to earn a liveable wage paves the way for unscrupulous employers to exploit the situation with the threat of loss of employment used as discipline (Brass 2004; Frances et al. 2005). Whilst the expression ‘precarious work’ covers a wide range of work arrangements that can differ significantly in terms of income, continuity and protection, these arrangements are located outside of the collective norms around ‘standard work’ developed over the twentieth century (Burgess & de Ruyter 2000).

Some explanations of frequently used terms are necessary if subsequent discussions are to be well understood. Generally, an ‘independent contractor’ is defined as:

One who is entrusted to undertake a specific project but who is left free to do the assigned work and to choose the method for accomplishing it (Garner 2010: 659).

Independent contractors perform work under a commercial contract for services rather than a contract of employment, relocating the coordination of a business’s activities through a series of contracts rather than vertically integrated bureaucratic structures (MacKenzie 2000). Independent contractors often contribute substantial assets, and bear the costs and risks of maintaining those assets. This can render the worker especially vulnerable (Johnstone et al. 2012).

Changes to the organisation of work have been associated with increased use of extended supply chains that complicate and attenuate webs of legal responsibility (Quinlan 2003). In multi-tiered contracting, the ‘principal’ or ‘original’ contractor is defined as:

One who contracts for the completion of an entire project, including purchasing all materials, hiring and paying subcontractors, and coordinating all the work (Garner 2004: 991).

Through the process of ‘outsourcing’, an individual or business may put tasks out to tender so that the work is performed by some other individual or business (Quinlan & Bohle 2008). It essentially entails the ‘subcontracting’ of tasks, in which the ‘subcontractor’ is

One who is awarded a portion of an existing contract by a contractor... each subcontractor is paid a somewhat lesser sum than the contractor receives for the work (Garner 2004: 4466).

Principal contractors often take to subcontracting to reduce costs, maintain flexibility, and

minimise risks in response to changing market demands (Neo 2010). The practice of subcontracting creates a triangular or tripartite employment relationship comprising the client, the principal contractor, and the subcontractor who may choose to outsource part of the work to another lower tier of subcontractor, creating vertical or pyramid subcontracting structures (Mayhew & Quinlan 1997; Quinlan & Bohle 2008; Amon 2010; Eakin et al. 2010). The tripartite relationship raises questions about rights and responsibility for the protection of workers (Chapter Six).

Frances et al. (2005) described a system of subcontracting in UK horticulture in which the principal labour contractor⁵, who was only able to partially meet a request for workers through their own source, contacts another contractor, who might do the same, thus meeting the full complement of workers required via a complex cascade system of labour supply (visualised in Figure 1, based on the labour contractor typology described by Barrientos 2011: 5). Although, formally, workers arrive through the principal labour contractor, they were brought together through a system of labour subcontracting. Alongside formal recruitment and temporary staffing agencies with established reputations is a myriad of labour contractors operating informally and whilst seemingly invisible are increasingly surfacing with global production (Barrientos 2011). Supermarkets operate a system of centralised procurement, distribution and retailing, and producers are under pressure to supply quality produce at competitive prices according to pre-programmed schedules (Lloyd & James 2008; Rogaly 2008; Barrientos 2011). The role of labour contractors in facilitating the supply of labour to meet production schedules is exemplified in horticulture, as is the role of supermarkets in driving the intensification process (examined in Chapter Three).

⁵ There is no single agreed definition or terminology in horticulture. The terms used vary by country. For example, the UK uses gangmaster and labour provider, Australia uses temporary labour agency and harvest contractor. These terms and the generic labour contractor are used throughout the thesis.

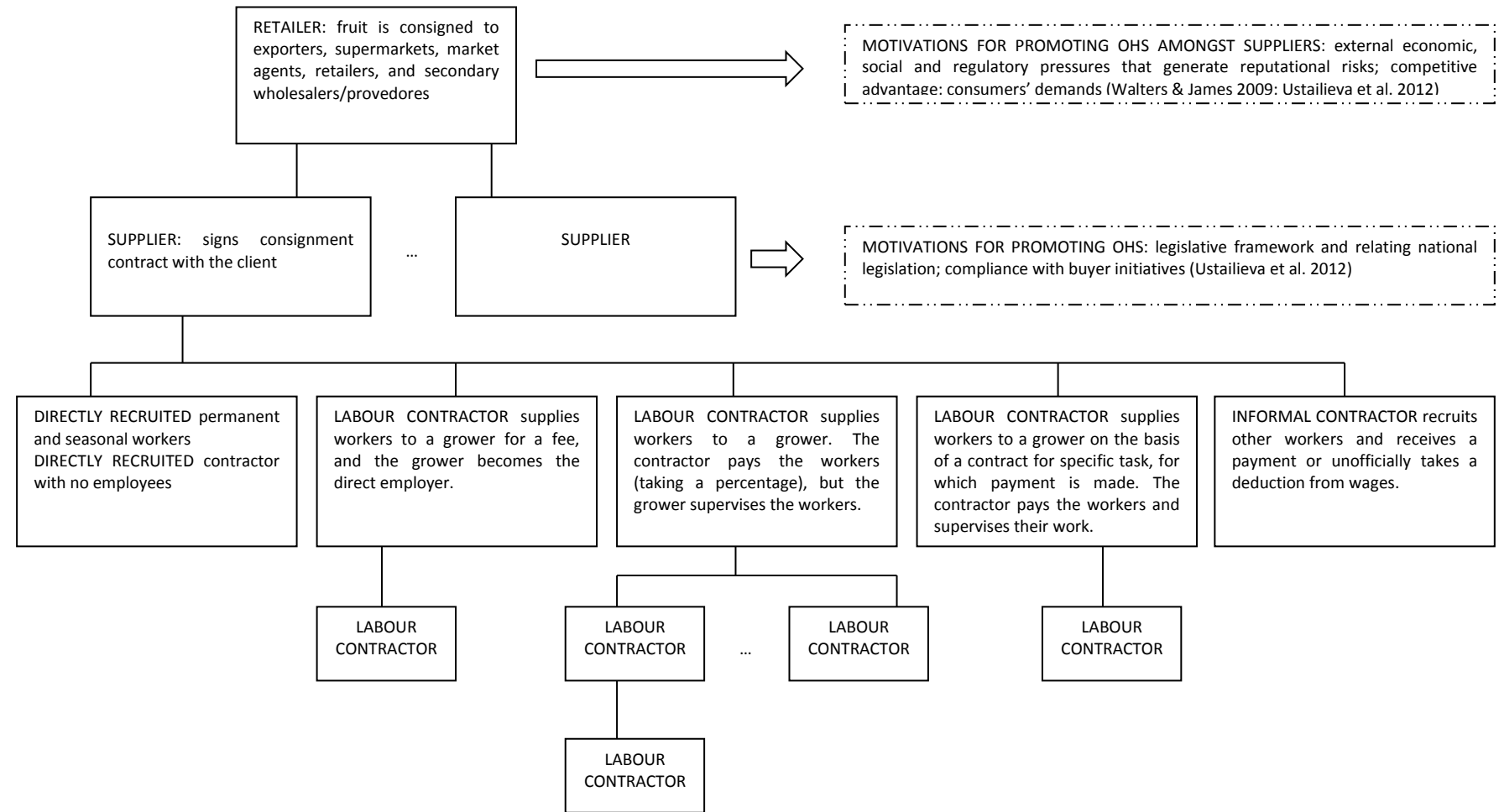


Figure 1: A System of Labour Subcontracting in Horticulture

Whilst the principal parties to a contractual arrangement are bound together in a 'subcontracting chain', the temporary management structure, comprising an amalgam of different businesses, each with its own objectives and pressures, complicates the management of OHS risks (Debrah & Ofori 2001). Additionally, OHS laws can be ambiguous in relation to subcontracting; complicating enforcement and discouraging major contractors from taking responsibility for OHS (Rebitzer 1995; Mayhew et al. 1996; Lobel 2005). Complex work arrangements create jurisdictional and logistical problems for regulators, and inspectorates' capacity to visit small workplaces and transient working populations is negligible (Johnstone 1999; Quinlan & Mayhew 2000; Quinlan 2011b). The challenges of labour market changes have garnered reports by government agencies (HSE 1996; Walters et al. 2011a; Swedish Work Environment Authority 2013), identifying gaps in regulatory coverage and logistical problems relating to compliance. Although subcontracting can be fully above-board, Campbell and Peeters (2008: 42) argued its survival derives from the opportunities it presents for fostering illegal practices such that

...the chain of subcontracting at ever-reduced prices trails away into a shadowy realm of small firms and individuals, where illegal practices can be pursued without much risk of detection or protest.

However, negative indirect effects of supply chains can occur concurrently with attempts by powerful supply chain actors to use their market power to improve OHS management by taking action to monitor and enforce compliance (Walters & James 2011). A range of initiatives have been undertaken at individual and organisational levels and via trade and industry bodies. For example, evidence from building the landworks of the Øresund link (linking Denmark and Sweden) showed that the strategy of including OHS requirements when inviting tenders helped to reduce the number of occupational accidents by 50 percent compared to the building industry average (EU-OSHA 2000). The Hire Association Europe developed an OHS standard and offers a range of training in conjunction with some of the larger tool hire companies aimed at supporting the safe use of equipment in construction (Ponting 2008). Carpenter (2006) outlined existing formal competency schemes for assuring individual competencies and organisational OHS competence in the UK construction industry. These examples, however, have occurred in quite restricted situations. Several researchers have remarked that positive effects are more likely to occur in heavily regulated sectors yet in many sectors (including agriculture) regulatory reach is limited and increasingly so (Belzer 2000; Wright et al. 2005; Quinlan et al. 2006).

It is impossible to be precise about the increasing numbers of precarious workers since reliable estimates for many categories are lacking (Burgess & Campbell 1998; Leiva 2000), and employment situations are not always mutually exclusive (Cranford et al. 2003). Debate about what categories of work arrangement should be included is ongoing. Inclusion of part-time workers can be problematic since not all part-time positions comprise variable hours, job insecurity and lack of benefits, although many part-time jobs have some or all of these characteristics (Louie et al. 2006). There appears to be wide consensus about the inclusion of own account self-employed (i.e. excluding employers) and agency labour (which can be viewed as a structured form of subcontracting) (Mayhew & Quinlan 2002; Johnstone et al. 2004; Louie et al. 2006), although self-employment is a heterogeneous category and not all self-employed are precarious (Rodgers 1989; Carre et al. 2000; Riley 2006).

Work conditions and health should be stratified according to the degree of instability in a temporary job but Virtanen et al.'s (2005) review of temporary employment and health noted lack of specificity in the definition of temporary employment. Few studies recognised or took account of the diversity of temporary employment relations (including fixed-term and subcontracted jobs, seasonal, on-call and temporary agency work). Another issue is the legal framework governing these work arrangements and terminology which varies between countries. To take one example, 'casual' is a generic term for temporary employment in Australia but used elsewhere it generally applies to very short-term work.

There is further concern about the limitation of confining understandings of precarious work to jobs that are formally short-term. For example, casual employment can encompass long-term, regular employment (Campbell & Brosnan 1999; Owens 2001). Defining precarious work in such terms also ignores the effects of downsizing and outsourcing on workers holding nominally permanent jobs (Johnstone et al. 2004). For these workers, job insecurity involves a fundamental and involuntary shift in perception from thinking that their position in the organisation is safe to thinking that it is not (Ferrie 2001; Benach et al. 2014). Research suggests perceived threats concerning the nature and continued existence of employment may be as detrimental as job loss itself (Dekker & Schaufeli 1995; Sverke et al. 2006; Kivimäki et al. 2007; Quinlan 2007; Benach et al. 2014). Although employment has health benefits in comparison with unemployment, any reduction in unemployment due to the shift to flexible employment may be offset by the deterioration in OHS amongst a much larger working population now subject to insecure and precarious work (Vahtera et al. 2005). Additionally, the presence of temporary workers may exert pressures that diminish the working conditions of all workers, including increasing demands on permanent workers to take on additional training,

supervisory and administrative tasks (Bohle et al. 2004; Johnstone et al. 2012; Quinlan 2013a). This may reduce apparent differences between permanent and precarious workers of the same workplace thereby spreading the adverse effects of precarious work to the permanent workforce.

Another concern is determining who the 'legal' employer is. There is little doubt that a temporary agency worker is an employee, but there remains doubt as to who should assume the legal responsibilities as the employer: the labour provider or the labour user (James et al. 2007; Underhill & Rimmer 2009). By using different methods of direction, evaluation and discipline, both are able to control the worker's actions (Davidov 2002, 2004; Zhang et al. 2008). A South Australian case study of agency workers in the power industry revealed a "fundamental mismatch" in the understanding of the nature of the relationship between the agencies, the labour user and the workers (Economic Development Committee 2005: 23). In particular, Gryst (2000) reported that the labour user thought 90 percent of the agency workers were employees of the agency. Yet, according to the agencies who supplied the workers, just 44 percent of the workers were employed by the agency, while 56 percent were independent contractors. On the other hand, 58 percent of the workers thought they were employed by the agency, 32 percent thought they were employed by the labour user, 5 percent thought they were self-employed and the remaining 5 percent reported not knowing. Self-employment and subcontracting arrangements raise similar OHS and regulatory challenges.

Vives et al. (2010) developed a multi-dimensional employment precariousness scale that combined four legal contractual dimensions – temporariness, disempowerment, wages and rights – with two social dimensions of precarious work – vulnerability and capability to exercise rights. In addition to the growing individualisation of employment relations affecting heterogeneity within employment (contract) forms, employment forms are heterogeneous insofar as the various dimensions of precarious work are present and thus the extent to which they are precarious (Vives et al. 2011). The approach proposed by Vives et al. (2010) attempts to overcome the problem of heterogeneity and provides a more accurate assessment of changing contemporary employment relations.

This review of conceptions of precarious work provides a basis for informed discussion on current understandings of the link between precarious work and inferior OHS outcomes. The ambiguities outlined underscore the heterogeneity among, and within, so-called precarious work arrangements. The shift to less secure work does not just encompass those jobs explicitly structured as temporary. The aspects of expanded contractual chains potentially affecting

hazardous exposures will be examined next.

2.3 *Conceptualising the Link between Precarious Work and OHS*

Despite the conceptual disagreement, a substantial body of international research indicates precarious work, especially subcontracting, is deleterious to OHS outcomes (Mayhew et al. 1997; Rousseau & Libuser 1997; Quinlan et al. 2001a; Fabiano et al. 2008; Facey & Eakin 2010; Min et al. 2013). The absence of valid information on exposures and injury and illness rates amongst subcontractors notwithstanding, it is generally accepted that, compared with direct-hire employees in ongoing employment relations, subcontractors (and their workers) face a significantly higher risk of serious injury and illness, and appear less likely to:

- perceive OHS as an issue warranting attention;
- have an OHS program;
- regularly assess OHS risks; and
- undertake OHS induction, training and supervision (Rebitzer 1995; Mayhew et al. 1996).

The combination of hazardous work activities and outsourcing can be detrimental to OHS, especially when this entails the outsourcing of hazardous tasks (Barney et al. 1992; Benach & Muntaner 2007). Investigation of the occurrence and pattern of occupational injuries among contract workers in the Swedish mining industry revealed a considerable proportion of dangerous jobs was contracted out (Blank et al. 1995). Despite an absence of valid exposure data concerning contractors, this category of worker appeared to incur more frequent and more severe injuries, and this may indicate differences in magnitude of risk. Rousseau and Libuser (1997) claimed temporary workers (or ‘temporaries’) and contractors have higher personal risk than permanent workers and that the expansion of contractors into high-risk tasks was exacerbated by an increase in the number of different kinds of contractors used on the same site. Their finding that contract workers in US mining comprise 10 percent of the workforce but average 17 percent of work-related fatalities supported this claim.

Benavides et al. (2006) found temporary workers are exposed to more hazardous working conditions, and showed significantly higher risks than permanent workers in almost all occupations. Similarly, Amuedo-Dorantes’ (2002) data confirmed temporaries endured worse working conditions than permanent workers. In the US, use of contract workers without adequate induction, training or supervision was a contributing factor in petrochemical incidents in the 1980s (Rebitzer 1995). The distance between host managers and contract workers onsite was of particular concern given that contract workers undertook dangerous

tasks during periods of maintenance, often under severe time pressures (Baugher & Roberts 1999).

An unintended organisational consequence of the expanded use of precarious workers is increased exposure to OHS risks, especially when contracting arrangements are elaborate (i.e. multi-tiered), making it increasingly difficult to coordinate activities and implement OHS measures (Papadopoulos et al. 2010). Accident investigators of the 2001 AZF factory explosion in Toulouse, France, deemed subcontracting to be a “determining factor” in the explosion. In particular, the operational subcontracting of the warehouse led to a disengagement of AZF employees for its operational management, including loss of control of some subcontractor activities and inadequate monitoring of safety measures. A key recommendation of the inquiry was to ban multi-tiered subcontracting on so-called Seveso⁶ major-hazard sites (Dechy et al. 2004). Subcontracting has also been linked to both serious incidents and poorer OHS outcomes more generally in the offshore oil industry (see for example Collinson 1999; Woolfson 2013).

Thébaud-Mony’s (2000) study of subcontracting and hazard exposures in the French nuclear industry found subcontractors were exposed to especially hazardous work and received 80 percent of the total workforce radiation exposure despite comprising only a tiny fraction of the workforce. In the US, regulation limits the radiation dosage that employees can receive thus favouring subcontracting. For example, Jensen and Rothwell (1998) found radiation encouraged the use of contractors. Controlling for other influences, they found more of the tasks involving large amounts of radiation exposure went to contractors. They also found the regulatory limits on radiation exposure influenced use of contractors. Hery et al. (1996) similarly spoke of the externalisation of risk to contractors by chemical plant operators.

The effects of elaborate subcontracting chains on OHS are not confined to major-hazard workplaces, although these have garnered the most attention. For example, Salminen et al. (1993) found subcontract workers in the construction industry had an accident risk one and a half times higher than that of main contractors. Additionally, as a consequence of unfamiliarity with site conditions and impaired ability to readily recognise hazards, they more often strayed into dangerous zones by mistake than did the main contractors’ workers (Salminen 1995). Debrah and Ofori (2001) argued the poor job safety record of the Singaporean construction industry was linked to both an over-reliance on labour-only subcontracting and the dominance of foreign-born workers in the subcontract workforce.

⁶ ‘Seveso’ refers to the industrial accident which occurred in 1976 near Seveso in Italy, following which European Directives on prevention, preparedness and response were adopted.

Within the international OHS discourse researchers are giving greater attention to the broader social, economic, and cultural contexts in which OHS issues are embedded. This includes research on the mental health of itinerant and seasonal agricultural workers. Measuring the level of worry or tension experienced because of employment frustration (a term capturing various components of discrimination while job-seeking and subsequent anxiety) amongst agricultural labourers, Finch et al. (2003) found frustrating experiences were significantly related to past-year alcohol abuse/dependence. Bletzer and Weatherby (2009) explored how the structuring of agricultural labour affected drug and alcohol use. They found that harvest workers have higher use levels, and attributed this to the way that accommodations and work was organised over a labour-intensive short season. In other studies itinerant and seasonal agricultural workers experienced overall elevated levels of anxiety and depression (Magaña & Hovey 2003), and endured difficult working conditions, low pay, and precarious living situations (Alderete et al. 2000). Itinerant workers (i.e. those who shuttled from place to place along predetermined migratory streams – known in Australia as the harvest trail) also perceived job insecurity, long working hours and difficulty adjusting to a mobile lifestyle to be particular stressors that placed them at greater mental health risk than, for example, seasonal workers who lived in one location throughout the year (Kim-Godwin & Bechtel 2004). Griffin and Soskolne (2003) found a positive association between psychological distress among Thai agricultural workers in Israel and pesticide exposures. Several authors have remarked on the intrinsic difficulties of the itinerant lifestyle, referencing social marginalisation, physical isolation, discrimination, limited opportunities, and low remuneration (Barger & Reza 1994; Rothenberg 1998; Hovey & Magaña 2002; Hiott et al. 2008).

Most studies have made limited attempts to explain the underlying causal mechanisms linking precarious work to adverse OHS outcomes. However there are notable exceptions. It is important to acknowledge the prominent theoretical developments in work and health and OHS research. It was not possible to test the theoretical models because of the exploratory nature of the study and difficulty gaining access to participants, but risk factors identified in one model appeared to have applicability.

One especially influential model of how work organisation affects health is Robert Karasek's (1979) 'job strain' or Demand-Control model, which postulates a relationship between psychological demands of the job (i.e. high demands and low control) and health outcomes. Johnson and Hall (1988) redefined the Demand-Control model by the addition of work-related social support, which may serve to modify the impact of psychological demands from both within and outside work. According to the Demand-Control-Support (DCS) model, workers

facing high demands, low autonomy and low social support are at most risk of ill-health (Johnson & Hall 1988; Tage & Kristensen 1995). Moss and McGann (2011) explored the implications of precarious work for workers' autonomy, social protection and health in rural and regional Victoria, Australia. Generally, the flexible employment contract was a major source of stress and impediment to workers' freedom and social participation. More 'conventional' workplace exposures such as noise and chemicals have been tested using the DCS model. Grzywacz et al. (2010) studied farmworker pesticide exposures. They hypothesised that increased exposure to psychological demands, physical exertion and hazardous working conditions would be associated with increased detection of urinary pesticide metabolites which indicates pesticide exposure. Analyses revealed evidence that high levels of control may buffer the effects of physical job demands on urinary pesticide metabolite detection. Building on this study Grzywacz et al. (2014) concluded the organisation of work in field agriculture may pose risks of poor occupational health outcomes. The DCS model captures mainly those dimensions associated with production processes without serious consideration to the link between health and the actual employment relationship (Scott 2004; Lewchuk et al. 2006).

Another influential model was developed by Johannes Siegrist. Siegrist (1996) argued that the potentially beneficial effects of the work role on emotional and motivational self-regulatory functions (such as self-esteem and self-efficacy) are contingent upon a basic prerequisite of exchange (i.e. effort is reciprocated by reward in terms of money, esteem and career opportunities including job security). Demanding, unstable employment and achievement without promotional prospects represent stressful working contexts (Niedhammer et al. 2006; Bakker & Demerouti 2007). Triangular employment relations created by temporary, agency and contractual arrangements, in which there is separation of the 'legal employer' from the 'supervising employer' (Córdova 1986), provide interesting examples. These workers are subject to the demands of supervising employers without hope of security or advancement; their pay and benefits are not subject to incentive structures of the supervising employer, while the legal employer is ill-situated and often not inclined to evaluate workers' performance (Kalleberg et al. 2000). The DCS and ERI models are complimentary aspects of a stressful work environment (Dragano et al. 2008). The two different theoretical orientations (control versus reward) have different implications for policy, namely the structure of power and division of labour in the control paradigm, and issues of distributive justice and fairness in the reward paradigm (Siegrist et al. 2004).

A third model more specifically addressing precarious work was developed by Wayne Lewchuk and colleagues. Lewchuk et al. (2008) argued the employment relationship contract is a poor

substitute for employment insecurity, and that a more nuanced analysis that considers the characteristics of the individual employment relationship and their association with health is required. Previous research demonstrated the negative impact of intermittent work and the related experiences of insecurity associated with uncertain work continuity and employment income on workers' mental health (Pedersen et al. 2003; Malenfant 2007). Lewchuk and colleagues developed the Employment Strain model which suggests stress and uncertainty associated with precarious work and limited access to support from formal organisations (such as unions), co-workers, and family and friends, are central and frequent sources of poor health (Clarke et al. 2007).

Facey and Eakin (2010) described a social interactionist framework linking low reciprocity, uncertainty, discontinuity and marginality to ill-health via social, structural, behavioural and meaning-based pathways. They described permanent workers, by virtue of their interactions with co-workers, as having the opportunity to develop shared values, orientations and activities. By contrast, precarious workers might experience social marginalisation and, due to their relatively short tenures, have to continually re-establish and reprove themselves. Although this framework is presently propositional and conjectural, a major strength is inclusion of worker agency. Some risk factors identified in Quinlan and Bohle's (2004, 2009) Economic and Reward Pressure, Disorganisation and Regulatory Failure (PDR) model seemed to have applicability to this study of horticultural workers, discussed below.

2.3.1 Economic and Reward Pressure, Disorganisation and Regulatory Failure Model

Quinlan and Bohle's (2004, 2009) three-factor typology (the PDR model) explains how precarious work in its broadest sense affects OHS. Nichols (1997: 160) spoke of the "economically induced tendency to cut corners" amongst small operators. There are two main options for cutting labour costs: work intensification by cutting hours or worker numbers for the same task, and lowering or bypassing existing standards by shifting workers from awards to alternative industrial instruments, use of labour contractors, and underpayment or hiring workers "off the books" (Brosnan & Wilkinson 1989; Campbell & Peeters 2008). It can be common for those at the lower end of supply chains to concentrate exclusively on completing projects to the required standard with minimum time and cost (Ng et al. 2005). Subcontractors often operate on very small profit margins; a practice that may originate at the top level, where principal contractors may tender at known cost with hopes of financially recovering by subcontracting work to cheaper providers (Ryan & Herod 2006; Wadick 2010). The inexperienced risk falling below minimum safety net provisions (Johnstone et al. 2012), and

commercial pressures exacerbated by delays in progress payments encourage work practice shortcuts including those that put personal safety at risk (Kartam et al. 2000; Lin & Mills 2001; RCBCI 2003). Subcontractors are often economically dependent on the sale of their labour and may feel pressure to accept high-risk activities refused by permanent workers (Quinlan et al. 2001a, 2001b).

Faced with demands of unrealistic targets, workers are more likely to attend to production than adhere to safe practices (Hoffmann & Stetzer 1996; Mearns et al. 2001). Scholars have discussed management attitudes and behaviours, and the balance between production pressures and safety (Flin et al. 2000; Langford et al. 2000). When businesses use temporary workers as a “buffer stock”, production pressures can contribute to longer working hours and increased risk (Amuedo-Dorantes 2002: 264). A study of agency workers in Australian construction revealed workers laboured with expediency and rarely questioned orders for fear this might compromise future earnings (Iaccone 2006). Underhill (2005a) reported temporary agency workers were less able to refuse unsafe tasks.

The presence of subcontractors or temporary labour is conducive to potentially hazardous forms of work disorganisation. Fixed-term work can negatively affect site-specific knowledge (Gochfeld & Mohr 2007; Cummings & Kreiss 2008), inter-worker communication (Hinze & Gambatese 2003), and training and consistent reinforcement of safety behaviours (Quandt et al. 2006). Quinlan et al.’s (2013) examination of serious aviation incidents involving outsourcing revealed a recurring pattern of failures related to communication, training and breakdowns with the safety management system. Subcontracting creates multi-employer worksites involving complicated lines of management control, requiring different groups to perform different but overlapping tasks on the same site (Kartam et al. 2000; Debrah & Ofori 2001). An example is the 2001 AZF factory explosion in Toulouse, France (Dechy et al. 2004). The inquiry recommendation to ban multi-tiered subcontracting on major-hazard sites was not adopted; a decision which may have reflected the pervasive acceptance of subcontracting within the neoliberal policy discourse (Quinlan & Bohle 2008). The 2005 BP Texas City disaster provides another example of the potentially hazardous consequences of multi-tiered subcontracting (Baker et al. 2007).

Another component of work disorganisation is a decline in collective representation. In most industrialised countries, unions make a significant contribution to maintaining OHS standards, although the results of studies examining the relationship between trade union presence and injury rates are often indeterminate (Wooden 1989; Reilly et al. 1995; Robinson & Smallman 2000; Fenn & Ashby 2004). One explanation is that union presence may itself increase

reporting. Adverse working conditions also may be the impetus for union presence in the first place (Nichols 1997). Similar cross-sectional analyses often reveal a positive correlation between inspection by OHS regulators and subsequent injuries, which does not imply that inspections cause injuries but that ongoing safety problems spur inspections (Levine et al. 2012). Growth in precarious work has diminished union membership in a number of countries and affected the quality of union representation (Campbell 1996). Union density is especially low in industries characterised by supply chains, such as agriculture, hospitality and wholesale, which have concentrated segments of the workforce commonly engaged in insecure employment (Kaine & Wright 2013). For example, only approximately 2 percent of the Australian agricultural workforce is unionised (ABS 2013c).

Historically, OHS regulatory regimes have focussed on permanent fulltime employees in large workplaces with resources sufficient to develop formal hazard management and risk control systems (Lamm 1997; Walters 1997; Quinlan et al. 2001a). Regulation has been generally slow to adapt to changing labour markets. The expansion of subcontracting has raised legal questions concerning its impact on worker rights and potential avoidance of OHS responsibilities (Loosemore & Andonakis 2007; Amon 2010). Subcontractors can be unaware of their OHS responsibilities and, despite being the party in the worst position to manage OHS effectually, often bear the risk (Loosemore et al. 2003).

Regulation can fail to protect groups of workers not by explicit design but through ambiguous language, procedural emphasis and weak enforcement mechanisms. It can be difficult to determine the scope of the employment relationship. Workers can be confused about their status and consequently their legal rights and unscrupulous operators can exploit the situation (Bernstein et al. 2006). Where workers believe they have no rights, even if they do, the best protective legislation will fail in its objectives (Mayhew & Quinlan 2002). Despite OHS statutes nominally protecting all workers, inadequate wage and workers' compensation regulation for self-employed contractors and subcontractors undermine worker health (Johnstone 2006). Regulations and codes of practice make use of performance standards (which define the duty in terms of goals to be achieved), and process requirements (which prescribe a series of steps that the duty holder must follow in managing specific risks, or OHS generally) (Johnstone & Jones 2006; Walters et al. 2011b). However, enforcement strategies appear to have created paperwork compliance and minimum compliance (Wadick 2010). Stringent procedural requirements have encouraged adoption of tokenistic approaches to compliance including "paper systems" (Gallagher et al. 2001: 34) and "tick and flick" practices (Saksvik & Quinlan 2003: 47).

The low probability of detection and successful enforcement action for many OHS offenses can make the perception of deterrence less potent (Parker 2006). All workplaces face the threat of enforcement but few face the credible threat of actual inspection because government inspectorates often lack the resources to monitor compliance (Ashby & Diacon 1996; Lobel 2005; Johnstone et al. 2011). Complex and fragmented work arrangements create jurisdictional problems and logistical demands of administering OHS legislation (Lobel 2005; Quinlan et al. 2009). Subcontractors are an especially “invisible” category as far as most OHS agencies are concerned (Mayhew et al 1996; Gunningham & Johnstone 1999), and the body of research on adverse OHS effects of subcontracting has had little influence on regulators and policymakers (Johnstone et al. 2001). Despite changes to OHS standard setting in recent decades, inspection and enforcement remain biased towards traditional physical hazards⁷, enforcement is still dominated by advise-and-persuade strategies, and prosecutions remain primarily a response to reckless misconduct and serious injuries and fatalities thereby institutionalising the event-focussed nature of prosecution (Johnstone 2003; Howe 2006).

Rather than identifying associations between specific risk factors and outcomes, the PDR model theorises that existing risks will be exacerbated and new risks will emerge due to risk factors associated with economic and reward pressure, disorganisation at the workplace, and regulatory failure. The PDR model is in the development stage, and requires rigorous testing and refinement (see Bohle et al. 2014). Already ongoing refinement seeks to incorporate spill-over effects whereby the presence of precarious workers can adversely affect non-precarious workers, and to identify the interconnection between the three broad risk factors (Underhill & Quinlan 2011a). Research on the effects of multi-tiered subcontracting on OHS in the Australian long haul trucking industry identified spill-over effects including competition for jobs and work intensification, and fractured OHS management regimes (Mayhew & Quinlan 2006). Similarly, Underhill and Rimmer (2009: 175) described a “ripple effect” in which a lowering of employment standards by agency work spreads to threaten the employment conditions of direct-hire employees.

2.4 Conclusion

Low earnings, few benefits and high levels of uncertainty regarding terms and conditions of

⁷ Johnstone et al.’s (2011) examination of Australian inspectorates’ activities revealed that whilst inspections continued to devote attention to traditional areas like plant and equipment, attention is also being directed to hazardous substances and changing work arrangements, but psychosocial hazards remain a marginal area of inspector activity.

work and future earnings are categories into which many workers with precarious status fall. The chapter defined precarious work and identified literature on the OHS effects of precarious work. Despite some conceptual difficulties, there can be little doubt the workers examined in the thesis fall within definitions of precarious work. They are temporary and seasonal workers often engaged via an agency in a structured form of subcontracting thereby combining the effects of short-term employment with the pressures found within subcontracting chains. The fact that most of these workers are foreign-born adds an additional level of vulnerability. The chapter identified a number of models which sought to explain how precarious work or work organisation more generally affected OHS. While it is beyond the scope of the thesis to test these models with regard to seasonal horticultural workers, the thesis will try to identify aspects that seem to have explanatory value in this context.

The chapter identified research literature suggesting that precarious workers are more likely to experience inferior levels of regulatory protection or regulatory failure. Locating and regularly inspecting numerous small and sometimes shifting workplaces that use temporary or even itinerant workforces and determining the nature and extent of legislative responsibilities regarding complex forms of work organisation (like multi-tiered subcontracting) represents an enormous logistical challenge to regulators (Walters et al. 2011b). It will take a high level of coordination and mutual effort amongst regulators, employers and workers to achieve the benefits of flexibility espoused by advocates of modern work arrangements (discussed in Chapter One) and avoid systematic disadvantage. The chapter sought to provide an understanding of the main research findings in relation to OHS and precarious workers. The next chapter will apply this understanding to a particular context: the horticulture industry. This is a site of inquiry that must be dislodged from the domain of the strictly biological and medical. Interest in the social and economic contexts noted in this chapter should become apparent.

CHAPTER THREE WORK ORGANISATION IN HORTICULTURE

3.1 *Introduction*

Chapter Two explored several aspects of how the ways in which work is organised could contribute to adverse OHS outcomes. This chapter examines the horticulture industry. Dwindling employment security, marked by increasing use of temporary and foreign-born labour, is a hallmark of labour-intensive horticulture. Section 3.2 restates the argument that a flexible labour market can respond to seasonal demands, thereby cushioning against periods of economic downturn, but also notes the consequent downward pressure on working conditions for all horticultural workers. Section 3.3 discusses growth of contract farming in horticulture. The consumer-driven horticultural supply chain drives down profit margins for producers. Of all economic sectors, agriculture has the longest history with temporary migrant worker programs. Section 3.4 describes a number of temporary seasonal worker schemes. Sargeant and Tucker (2009) suggested layering of vulnerability was a useful framework for understanding the interconnections between precarious work, migrant status and inadequate regulatory protection, presented in subsection 3.4.1. The evidence suggests changes in global production systems have relegated millions of workers from economically poor countries to serving as a source of cheap, flexible and low-skilled labour. Use of foreign-born workers represents an important instance of work intensification through innovation in workplace regimes.

3.2 *Precarious Work in Horticulture*

Across the world, agriculture accounts for 33.5 percent of the 3 billion people comprising the active workforce (ILO 2009). A number of researchers have identified feminisation of the workforce and dwindling employment security, marked by increasing use of temporary labourers, as hallmarks of modern agriculture (Barrientos et al. 2003; Pigott & Demaret 2003; Bain 2010). Women are an especially marginalised group (Jarvis & Vera-Toscano 2004; Tinsmann 2004; Bain 2010). Prices received for agricultural commodities are not keeping pace with prices paid for agricultural inputs (NLWRA 2008; Pollock 2010). Supermarkets have created a situation in which the existence of direct-hire workers is uneconomic (Brass 2004). Variations in bargaining power within the food supply chain and contractual terms between buyers and suppliers create imbalances in the burden of the price increase at each stage of the chain (MAC 2013). Supermarkets have successfully transferred risks and costs down supply chains (Walters & James 2009). Examination of supply chain management within the Australian food and grocery industry revealed prevailing workplace trends that included

increasing casualisation, temporary agency labour, outsourcing and work intensification. The Australian case provides an extreme example of retailer power because of the supermarket duopoly that dominates (Wright & Lund 2003; Wardle & Baranovic 2009; Keith 2012).

Flexible work arrangements are one means of achieving cost savings. The flexible horticultural labour market is able to respond to seasonal variations in production or demand thereby cushioning against periods of economic downturn (Dolan & Sorby 2003; Rogaly 2008). After surveying horticultural farms, Scott (2013a) concluded the demand for labour at peak season is approximately 4.5 times the demand at low season. Generally, handling requirements and grading demands of fruit crops still cannot be handled by machinery, with modes of production more analogous to those of the nineteenth than the twenty-first century. Thus, large numbers of workers are required for hand-harvesting, thinning and pruning (Emerson 2007; Hanson & Bell 2007). Soft and stone fruits are particularly labour-intensive due to the fragility of the fruits and of the plants (Commission of the European Communities 2006; Mares & Maclellan 2006). The regional labour market is rarely sufficient in meeting this demand especially in the context of an ongoing decline in rural populations in many countries. Thus, the seasonal migration of labour in horticulture is one of the most “prominent and enduring” forms of population movement in rural areas (Hanson & Bell 2007: 101). Although seasonal work has been characterised as short-term and of finite duration (Gallagher & McLean Parks; Lautsch 2002), the nature of seasonal demands can result in recurrent employment extended over years (Ainsworth & Purss 2009).

In what Dolan and Sorby (2003: 29) called a “dual employment strategy”, a small nucleus of permanent workers often provides the requisite skill to ensure consistency and quality of output alongside temporary workers employed to complete specific tasks and meet variations in output (Reilly 2001; Moss & McGann 2011; Raess & Burgoon 2013). Relaxation of hiring standards to meet labour shortages, dilution of the skill content of jobs, and deterioration of terms and conditions of employment can reinforce the downgrading of particular jobs (Kitson & Michie 1996).

Harvest work necessitates a relatively short period of intense workdays (Earle-Richardson et al. 2003), and technological advances such as table-top growing and polytunnels allow workers to work at a faster rate. The demands of particular labour processes and seasonal requirements means labour standards are more like a complex tapestry of rules (Murray 2008). While ‘penalty rates’ (i.e. additional pay for working outside standard hours) apply in Australia and the UK, this legislative requirement can be bypassed if hours can be averaged and the effective enforcement of such standards is problematic (Goodwin 2004; Goodwin & Maconachie 2011).

There is a well-established literature that piecework rates increase worker productivity (Lazear 2000; Haley 2003; Gielen et al. 2010). Rogaly (2008) suggested piecework rates were introduced to horticulture to speed up and enhance labour control, with decline in the rates themselves linked to growers' reduced profit margins (Rogaly 2008). In his analysis of structural vulnerability and hierarchies of ethnicity and citizenship in US agriculture, Holmes (2011) noted minimum hourly quotas were stipulated to meet minimum wage requirements. In order to meet this minimum, pieceworkers reported taking fewer or no breaks, with many not eating or drinking before work to avoid having to take time to use the bathroom. Findings of a study of agricultural workers in south central Washington suggested pieceworkers had a greater risk of self-reported heat-related illness symptoms compared to hourly workers, and this increased risk may have been mediated in part by increased exertion at work (Blank 2014).

In UK agriculture the Agricultural Wages Board (AWB) set minimum wage rates and other terms and conditions of employment. The AWB for England and Wales was abolished in 2013 through the expiration of the Agricultural Wages (England and Wales) Order 2012 (the Boards for Scotland and Northern Ireland still exist). The National Minimum Wage (NMW) (under the *National Minimum Wage Act 1998* and Regulations 1999) was introduced to agriculture on 1 October 2013. Since the abolishment of the "fair estimate" agreements for pieceworkers and the related "four-fifths" rule on 1 October 2004 (Scrope & Barnett 2008), pieceworkers must be paid the NMW for every hour worked. Alternatively, pieceworkers must be paid under the "rated output work" system which requires employers to pay each worker for the number of hours that a person working at the "mean hourly rate" takes to produce the number of subject pieces. The employer can average the total earnings over the agreed reference period so that periods of low output can be compensated by periods of high output, ensuring workers do not earn less than the NMW averaged over the agreed pay reference period (Metcalf 1999). From 6 April 2005 the minimum was increased by a multiplier of 120 percent (*National Minimum Wage Regulations 1999 (Amendment) 2004*). Although workers are ostensibly to be paid the government established minimum wage, the union representing these workers (and the UK's largest union) Unite (2013) warned that unscrupulous employers may exploit confusion surrounding the Board's abolition.

In Australia, under the Horticultural Award 2010 any piecework arrangements:

...must enable the average competent employee to earn at least 15% more per hour than the minimum hourly rate prescribed in this award (Award No MA000028 cl 15.2).

Thus the job comes with explicit workloads and norms of performance. These norms

incorporate a dimension of quality but are primarily a constraint serving to mould a high work effort. This is also seen in other sectors such as contract cleaning for which Campbell and Peeters (2008: 37) described the workload norms and expectations as being “slowly ratcheted upwards”. Non-compliance with industrial law is reportedly widespread within Australian agriculture (Goodwin & Maconachie 2011; AWU 2012).

Labour contractors play an important role in meeting surges in labour demand and providing a buffer for growers caught in a “pincer movement” between rising quality standards and falling prices (Barrientos & Kritzinger 2004: 86) (Chapter Two described a system of labour subcontracting in horticulture). The demand for temporary labour is reflected in the simultaneous expansion in contracted labour and international labour migration (ILO 2003a; Anderson et al. 2006).

3.3 Subcontracting in Horticulture

Historically, the process of labour contracting played an important role in the development of more intensive agriculture in the UK, Australia and elsewhere in the nineteenth and twentieth centuries (Brass 2004). It was a source of ‘gangs’ of seasonal labour. The term ‘gangmaster’ has particular and historic association with agriculture in the UK, with their traditional role being the provision of temporary labour at short notice to meet the seasonal demands of production (Collins 1976; Verdon 2001). Labour-intensive agricultural practices yield significant increases in crop production and concomitant demand for workers, affecting the balance between hired labour and family labour (Findeis 2002; Binford 2004; Rao et al. 2004). Horticulture especially has witnessed growth in contract farming in which the contract regulates in advance the supply of a grower’s harvest to a food processor, supermarket or fast food chain (Eaton & Shepherd 2001; Gunningham 2007). Referring to the Canadian experience, Choudry (2009: 59) wrote:

...the portrait of the farmer who relies on his family and neighbours to help bring in the harvest no longer reflects reality for the vast majority of agriculture operations.

The industry is increasingly dominated by retail firms advocating an integrated system of production, distribution and retailing to secure reasonable returns on capital (Frances et al. 2005; Lloyd & James 2008; Rogaly 2008). The result has been a concentration of corporate power presiding over growing numbers of “increasingly ‘squeezed’ subcontractors” (Scott et al. 2012: 16).

The emergence of seasonal workers supplied by labour contractors in the 1990s purportedly

applied downward pressure on working conditions for all agricultural workers, and terms of collective agreements negotiated by unions which represent less than 10 percent of the world's hired agricultural workforce (ILO 2010a). Labour contractors provide labour and are responsible for payment and administration of all employment costs and may provide transport and supervision (NHTWG 2000). The labour user determines the work and often hours of work. Both parties establish general terms and conditions, including those relevant to OHS standards, although seldom in equal measure. These work arrangements can reduce legal clarity around the employment relationship and employment rights (Arif 2008). Workers are particularly vulnerable in these situations.

Subcontracting is intimately linked to the concept of supply chains. Figure 2 (adapted from Meijs et al. 1996: 107) illustrates the horticultural supply chain along which the grower is removed from the final consumer and does not have control over their own product. The succession of contracts is not the result of uncontrolled subcontracting but a network of contract conditions and oversight allowing the principal to retain control of the quality and timeliness of the produce, and where risk and cost are offset down value chains (Barrientos 2011; Quinlan 2011b). The consumer-driven structure of the horticultural supply chain enables retailers to appropriate ever-greater value from producers whilst simultaneously driving down the margins for growers under pressure on quality, volume and price (James et al. 2007; Lloyd & James 2008; Rogaly 2008). This tenuous economic situation limits investment in preventive activities and safety equipment (Frank et al. 2004). Paradoxically, by contracting with growers for a specified annual tonnage of produce, food processors, supermarkets and fast food chains can use their corporate market power to impose quality standards such as measures that guarantee that food is free from contaminants and chemical residues. By imposing standards above those required by regulation, food retail chains can potentially influence growers' pest control practices with implications for horticultural workforce exposure (Gunningham 2007). However, food safety and environmental requirements are neither directed explicitly to OHS nor necessarily suited to achieve improved OHS outcomes (Gunningham & Healy 2004a).

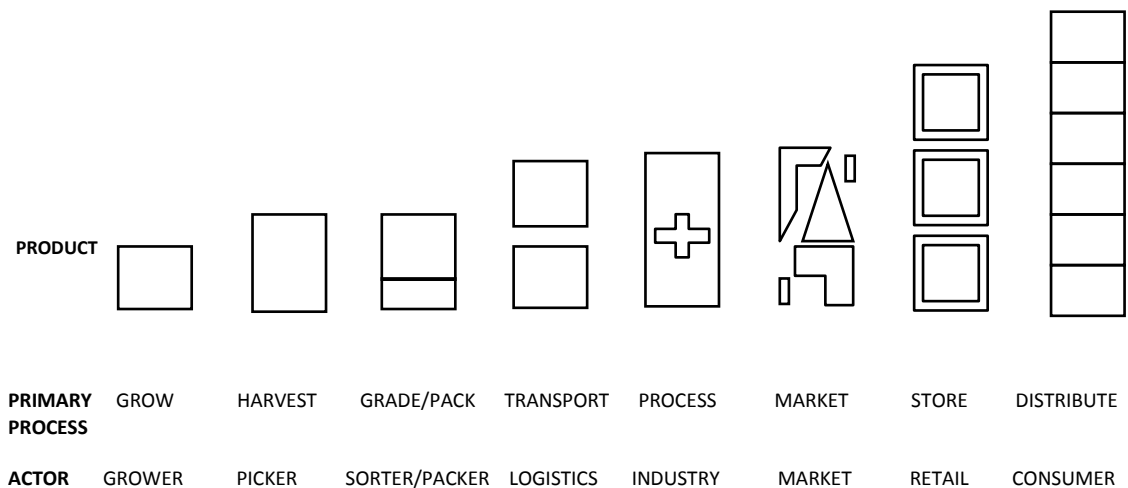


Figure 2: Schematic Diagram of the Horticultural Supply Chain

Civil society organisations have sought to advance worker interests by using supply-chain dynamics in their strategies for improving standards for vulnerable workers. For example, the Ethical Trading Initiative (ETI) is an alliance of companies, trade unions and non-government organisations committed to improving working conditions in global supply chains. Unintended consequences of tightly pre-programmed schedules and price include negative impacts on working conditions, access to representation, OHS and job security (James et al. 2007; Lloyd & James 2008; Walters & James 2009; Johnstone et al. 2012). Companies situated at the apex of supply chains are compelled, through a process of sustainable sourcing, to accept some responsibility for remedying bad practices amongst suppliers from whom they source goods and services, especially those practices that correspond to commercial demands (Kaine & Wright 2013). However, findings from a case study of the impact of the ETI Base Code in UK horticulture revealed compliance was principally measured by self-assessments, the majority of audit visits were made with considerable advanced warning and when buyers visited they only spoke with workers about production-related issues (Smith 2006).

Growth of elaborate supply chains in food production has produced widespread concerns about food safety, food supply chain management and traceability (Lindgreen & Hingley 2003; Beulens et al. 2005; Hammoudi et al. 2009). Fresh fruit and vegetables are vectors for foodborne illness. Outbreak control measures include improved sanitation practices at every stage along the food chain (Luedtke et al. 2003; Moore 2004; Lynch et al. 2009). Growers are motivated to avoid recall campaigns, adverse publicity, loss of sales and food scares, which would reduce profits and export demands (Tauxe et al. 1997; Lynch et al. 2009). Preventative

hazard analysis critical control point (HACCP) based systems safeguard consumers' health and safety (Luedtke et al. 2003). Similarly many aspects of the physical environment and organisation of work for chicken catchers emphasise the health and safety of chickens for human consumption rather than the health of workers (Quandt et al. 2013).

Public health issues are not unique to horticulture. There are other industries where broader community needs affect OHS. In health care, working conditions are related to patient safety as well as occupational safety (Hickam et al. 2003). There is a tendency amongst health care organisations preoccupied with safety to focus on patient safety alone (Cook et al. 1998; Landrigan et al. 2004; Leonard et al. 2004), although the synergies between efforts to improve patient safety and efforts to improve worker safety are being recognised, and consideration for how improvement efforts can be coordinated for the benefit of all is gaining momentum (The Joint Commission 2012). Likewise complex, high-risk industries such as aviation have faced considerable technical and political challenges in pursuit of safe operations and public confidence, and passenger service and safety quality is at the forefront of improvements (Rhoades & Waguespack 2000; Ringle et al. 2011). Regulation of truck drivers' driving and working hours to reduce fatigue and drowsiness is as much about general road safety as driver safety (Jensen & Dahl 2009).

Economic and political changes in recent decades have resulted in a more hostile environment for trade unions. Some Australian unions have developed strategies to accommodate the shifting contours of employment regulation in a climate of increased supply chain pressures. The most prominent examples have emerged through campaigns in the road transport industry through the Transport Workers Union's 'Safe Rates' campaign⁸ (Kaine & Rawling 2010), the cleaning industry with United Voice's 'Clean Start Principles and Responsible Contractor Policy' (Crosby 2009), the textile, clothing and footwear industry (Nossar 2006), and in aged care (Kaine 2012). There is no equivalent campaign for horticulture/agriculture but the Australian Council of Trade Unions' 'Secure Jobs. Better Future' is a national campaign aimed at improving the rights and working lives of the Australian workforce employed in insecure work. With the possible exception of mandatory supply chain regulation in trucking and textile, clothing and footwear, the initiatives just mentioned exert at best an indirect and incomplete effect on the influence of supply chains on OHS. Labour is an often-overlooked element at the bottom of the supply chain despite contractual arrangements playing a pivotal role in affecting working conditions (Ram et al. 2011). Walters and James (2009) found substantial evidence

⁸ This campaign is now in the process of being adopted by the International Transport Federation.

that buyers in a dominant market position dictating cost and timing significantly compromised OHS outcomes amongst suppliers. Although beyond the scope of this study, limitations of both state regulation and market-based private regulation are especially apparent where production is outsourced from highly regulated market economies to under-regulated newly industrialising ones (O'Rourke 2003; Rodríguez-Garavito 2003; Weil & Mallo 2007).

The comparative advantage of neoliberal horticultural practices in global markets rests upon the comparative disadvantage of workers in national labour markets (Preibisch & Grez 2010). A 2007 report on the fruit and vegetable harvesting sector in the Bundaberg-Childers (Queensland) area raised concern about “sham” contracting arrangements that involve a contracting company entering into a contract with individuals, with the former purporting to establish a business-to-business arrangement rather than an employer-employee relationship. The individual is labelled a subcontractor regardless of the truth of the situation (Queensland Workplace Rights Ombudsman 2007). Independent contractors are excluded from the general safety net provisions that ensure decent incomes for workers in the UK and Australia. Eakin et al. (2010) discussed similar situations in the Canadian construction and forestry industries in which the practice of workers owning their own tools can lead workers to assume that they have the health-related role and responsibilities of an owner-operator. Complex contractual chains have provided businesses new opportunities to evade legal responsibility (Lobel 2005). Subcontracting was reportedly “endemic” in UK horticulture, with data from a labour providers’ survey showing that two-thirds of labour providers used subcontractors (Frances et al. 2005: 50).

There are few studies of labour subcontracting and temporary employment and OHS in horticulture. Among these, Das et al. (2001) suggested the itinerant nature of temporary work may be detrimental due to workers’ unfamiliarity with hazards in their ever-changing workplaces. Villarejo and Baron (1999) noted the vulnerability of temporary agricultural workers to adverse conditions of employment given few workers have the protections afforded by union representation. Perry and Bloom (1998) found pesticide applicators perceived time pressure and financial concerns as salient barriers to safe behaviours. They concluded this interplay can force working beyond time limitations resulting in inordinate stress and risk taking behaviours. In Quandt et al.’s (1998) study of farmworkers’ perceptions of pesticide exposure, workers reported field re-entry rules following pesticide application were violated amid time or economic pressures. The ILO (2003b: 4) wrote:

Deficits in social protection for waged agricultural workers are further exacerbated through

the practice of labour contracting, where abusive systems are contributing to the erosion of rights and protection (ILO 2003b: 4).

Subcontractors can work under the illusion of autonomy that both obfuscates their economic subordination and encourages the individualisation of risks (Mayhew & Quinlan 1999). Limited resources and organisational contracts can prescribe their work methods and pace. As typically small businesses, subcontractors may also be vulnerable to hazardous pesticide exposures because they have neither the economic power to exert influence on suppliers nor enough of a profile to be conspicuous to regulators (Walters 2008). Small businesses are also less able to stay abreast with legislative changes compared with large and even medium-sized businesses, and are less likely to have at their disposal resources to implement changes (Nichols 1997; Walters 2001; Vickers et al. 2001).

3.4 Horticulture and International Labour Migration

It is well documented that globalisation has contributed to the expansion of labour migration over the last few decades (ILO 2004; Global Commission 2005; Abella 2006; Deshingkar 2006). While labour migration is not a new phenomenon, improvements in transport, information and remittance technologies have facilitated both more rapid, large-scale and temporary shifts of workers between and within countries (Martin 2005). Foreign temporary workers are often concentrated in insecure and seasonal jobs. The growth of a foreign-born precarious workforce is emblematic of the global shift to more flexible work arrangements – an international dimension of growth in precarious work arrangements (Toh & Quinlan 2009; Lenard & Straehle 2010). Of all economic sectors, agriculture (particularly horticulture) has the longest history with temporary migrant worker programs (Preibisch 2010). Moreover, comparison of employers' use of migrant⁹ labour in five industries in the UK found only in agriculture did employers unequivocally view migrant workers as crucial to their businesses, and agricultural employers were the most hostile to the phasing out of temporary migration schemes (Dench et al. 2006). Similarly, foreign-born workers feature prominently in Australian horticulture through the Working Holiday Maker (WHM) program and the Trans-Tasman Agreement (Ball 2010; Jarvis & Peel 2013), although Australian working class families traditionally provided the peak harvest workforce. As recently as 1999, Victorian orchardists reported 80 percent of casual harvest labour was Australian (DIMA 1999).

The WHM program commenced in 1975 as a temporary migration mechanism to allow people

⁹ See A Note on Terminology.

aged 18-30 years from the UK and Canada to travel, work and study in Australia for up to one year. Over time, the program has expanded to include new participant countries, with the number standing at 28 by 2014. Since 2000, there have been major changes to the WHM program, including the addition of 21 new partner countries and the introduction of a second Working Holiday visa. On 1 November 2005 the second Working Holiday visa was introduced, allowing subclass 417 visa holders who undertake 88 days “specified work”¹⁰ in regional Australia to acquire eligibility to apply for a second such visa. The number of second Working Holiday visa grants has grown rapidly since the program commenced; there were 2692 grants in 2005-2006 compared with 38,862 grants in 2012-2013 (an average growth of over 165 percent per year) (DIBP 2013). Horticulturalists now prefer WHMs for harvest work, finding them more motivated, hardworking and flexible than comparable Australians (Tan et al. 2009).

The Australian labour market is immune neither to the risk of labour shortages nor to industry tolerance of illegal work practices. A significant proportion of Australian horticultural produce is picked by illegal workers who are highly vulnerable to exploitation with some being paid as little as \$3 an hour (Hughes & Schwartz 2004; Hanson & Bell 2007; Underhill & Rimmer 2014). Compliance monitoring can be challenging with the geographic spread, compared to the concentration of employers and workers in a small number of highly productive horticultural regions elsewhere (Reed et al. 2011). During the mid-1990s, a scheme for the introduction of employer-sponsored temporary workers was inaugurated under s457 of the *Migration Act 1958* (Commonwealth). The intent was to address short-term deficiencies of highly skilled workers. A principal enticement for highly skilled personnel was the opportunities for family reunion and permanent settlement (Castles 2006). However, s457 workers’ ignorance of legal entitlements, indebtedness to employer sponsorship and aspirations for permanent residence placed them in positions of acute vulnerability despite monitoring by immigration and labour authorities (Deegan 2008; Toh & Quinlan 2009).

A parallel proposal to introduce lower skilled Pacific Island and East Timorese workers for horticultural work was established through the Pacific Seasonal Worker Pilot Scheme (PSWPS). The PSWPS aimed to create a safe pathway for unskilled or lower skilled Pacific Islanders to work temporarily in Australian horticulture (Ball et al. 2011), and reduce unmet demand for seasonal work (Reed et al. 2011).¹¹ Approved Employers entered into a Special Program Agreement with the Department of Immigration and Citizenship under the *Migration*

¹⁰ Work in the agriculture, mining and construction industries.

¹¹ The Recognised Seasonal Employer is a similar scheme operating in New Zealand.

Regulations 1994, and a Deed of Agreement with the Department of Employment, Education and Workplace Relations (DEEWR 2012). These agreements established a range of employer obligations in terms of worker recruitment, on-arrival assistance, conditions of ongoing employment, and requirements on departing Australia (Hooper & Strasiotto 2009). The Australian Government closely regulated the pilot scheme. In December 2011 it was announced that a Seasonal Worker Program in horticulture would begin on 1 July 2012, building on the three-year PSWPS which concluded on 30 June 2012 (Ministers' Media Centre 2011). A primary objective was to contribute to the economic development of participating countries thereby simultaneously addressing wider policy objectives.

Rarely have the parameters governing temporary labour migration schemes been structured to protect the rights of workers. Ball (2010) and Brickenstein (2012) suggested the Seasonal Worker Program and the New Zealand Recognised Seasonal Employer scheme represented substantial advances in this regard. Optimising the outcomes of seasonal worker schemes requires balance between assigning workers too little rights thus making them prone to exploitation, and creating an over protective system with high financial and administrative burdens for employers (Brickenstein 2012). Despite claims of acute worker shortage, the 1100 Pacific arrivals under the Australian Pilot Scheme were well below the 2500 annual cap (Hay & Howes 2012). It has been suggested that the web of regulatory control and government oversight has made the Scheme unnecessarily rigid and uncompetitive, and unattractive in an industry that has historically been subject to limited regulation (Gibson & McKenzie 2011; Hay & Howes 2012). Limiting the success of the Seasonal Worker Program is the prevalence of alternative sources of cheap labour. The hourly rate (which includes the worker's wage plus the recovery costs for the Approved Employer) is approximately 10 to 20 percent more than the lawful rate. The Government commissioned evaluation of the Pilot Scheme noted:

Convincing growers of the value of seasonal workers and encouraging acceptance of the higher cost per hour balanced with other savings remains a considerable barrier (Reed et al. 2011: 6).

The EU agriculture industry employs almost 4.5 million seasonal workers annually (Renaut 2003), and includes formal programs for admitting foreign-born workers on a temporary basis to be employed on farms producing labour-intensive fruit and vegetable commodities. In 2013 there were three main sources of seasonal workers for UK horticulture, with migrants making up the majority of the workforce: Bulgarian and Romanian citizens under the quota-based Seasonal Agricultural Workers Scheme (SAWS) (arrangements ceased at the end of 2013 – see below); workers recruited from the A8 countries and other eligible aliens (gangmastered and directly employed); and British-born workers (MAC 2013). Since 2013 HOPS Labour Solutions

Ltd and their partners have run a pilot scheme to encourage British-born workers into horticulture, offering training and a guaranteed job in horticulture for 200 workers in its first year. It is too early to tell whether this scheme will be successful, but anecdotal evidence suggested uptake has been far less than originally hoped (Glennie & Pennington 2013). Workers in A8 countries and those from other EU countries like Portugal are either recruited directly (in A8 countries) or through recruitment agencies, and some labour is supplied directly at the farm gate. Although free to change employers, A8 labour remains a major source of seasonal labour in horticulture.

At the end of 2013 the transitional restrictions on access to the UK labour market for Bulgarian and Romanian citizens were removed and SAWS was closed. The SAWS was managed by nine approved Operators on behalf of the UK Border Agency, and each had a fixed number of work cards to issue annually. The scheme allowed for recruitment of foreign-born workers for short-term agricultural work. It originated after World War Two and was designed to facilitate the movement of young people (often students) from across Europe to work in agriculture as an additional source of labour in peak season. The 2013 SAWS quota was 21,250, reserved exclusively for citizens of Bulgaria and Romania, and allowed them to work for a specific employer for a period of up to six months. After this time Bulgarian and Romanian nationals could remain in the UK but, with few exceptions, were not permitted to work as an employee. Individuals could work as self-employed. Growers complained of unfair competition due to use of false self-employment of Bulgarians and Romanians by their competitors. The workers themselves were prone to abuse because of the immigration restrictions imposed upon them (MAC 2011).

Elsewhere in the EU, Austria's Harvest Helper Program admits up to 7000 seasonal workers for up to six weeks. Under bilateral agreements signed with the A8 countries, workers are admitted into Germany for up to 3 months to work in agriculture. Similarly, Spain has signed agreements for temporary worker programs with a variety of countries (OSCE 2009). The French National Immigration Office contracts allow migrants to work for six months in agriculture. de Zulueta (2003) noted migrants routinely declared the official number of hours worked despite often working twice that number without the extra hours being paid.

Similar schemes operate in other countries. A foreign-born workforce is a characteristic of US agriculture (Findeis 2002). Similarly, under the Canadian Seasonal Agricultural Worker Program (CSAWP) workers from Mexico and Caribbean countries are matched with Canadian farmers who need temporary support during planting and harvesting (Basok 2002; Binford 2009). Although the CSAWP has been frequently cited as a reference point for "best practice"

(Martin et al. 2006; Verduzco 2007; Hugo 2008; Hennebry & Preibisch 2010), growing numbers of critical commentaries describe substandard living and working conditions. Basok (2002) exposed the mechanisms that make Mexican workers unfree. Aguiar et al. (2011: 8) similarly argued the CSAWP provides a “docile” and “obedient” workforce. Several researchers remarked temporary migrant workers depress wages and compromise collective representation through division of workers linguistically, racially and nationally (Binford 2002; Butovsky & Smith 2007; Thomas 2010). The United Food and Commercial Workers’ Union (UFCW) of Canada described the exploitation of temporary migrant workers as “Canada’s shameful little secret” (UFCW Canada 2002: 4), and warned of the “evolution of a permanently exploited migrant underclass” on the horizon (UFCW Canada 2011: 6). By focussing on the land-poor or landless in countries with huge wage differentials relative to Canada, recruitment policies construct a vulnerable workforce willing to accept substandard living and working conditions (Binford 2004; Basok 2007; Preibisch 2010).

Employers have the right to terminate employment and so cause premature repatriation on the basis of “non-compliance, refusal to work, or *any other sufficient reason*” (emphasis added) (Basok 2002; Binford 2009). These powers are unchecked by processes of review or appeal (Mares 2005; Preibisch 2010), and workers have purportedly been repatriated for expressing concern over inadequate housing and hours of work contracted for, and following injury or illness (UFCW Canada 2003). Similarly, the final report of the UK Vulnerable Worker Enforcement Forum discussed workers’ unwillingness to report problems directly and reluctance to allow third-party representation for fear of intimidation, discrimination, or job loss (BERR 2008). The CSAWP is inequitable: it is administered by the employer group FARMS, and fails to provide systematic representation of workers’ interests and an institutionalised discrimination-free procedure through which the powers of employers over workers might be checked (Binford 2002, 2009; Gabriel & Macdonald 2011).

Institutional policies in destination countries can impose restrictions on temporary migrants, effectively trapping workers in exploitive or abusive situations with little power to refuse unreasonable demands (Hanson et al. 2006; Mares 2006; Benach et al. 2011; Amnesty International 2014). Vulnerable workers have also reported confusion around the function and powers of government enforcement bodies, and about how to lodge a complaint (BERR 2008). The obscuring, and in some cases absence of legal protection for temporary migrant workers makes them important instruments for maintaining competitive advantage (ILO 2003a; Hanson et al. 2006; Preibisch & Otero 2014). Temporary worker programs create and perpetuate a flexible labour market.

Trade unions have been particularly vocal in highlighting abuses of foreign-born and contract labour (Anderson & Rogaly 2005). Woolfson and Likic-Brboric (2008: 296) wrote:

The migrant stands, more often than not, at the end of a long subcontracting chain in which the burden of risk... is successively offloaded from employer to employee.

Labour shortages in horticulture have reportedly led to increased reliance on labour contractors and temporary labour agencies (Mares 2005). Researchers have described the critical role of labour contractors in setting wages and working conditions in horticulture (Ball 2010; Anderson et al. 2012). Other researchers questioned the truth in the argument that local workers are in short supply; instead suggesting neoliberalism has effectively restructured local workers out of the industry (Binford 2004; Hanson et al. 2006; Choudry 2009; Geddes & Scott 2010). Examining UK horticulture, Smith (2006) found employers considered foreign-born labour critical to business viability but locally-born labour felt discriminated against and believed foreign-born workers undermined their bargaining position (the availability of locally-born labour was not investigated). Replacement of the traditional workforce with temporary migrants and recent immigrants has also been noted in the cleaning industry (Lado 1995; Stasiulis 1997; Aguiar 2000). Protection of foreign-born labour is of special concern in agriculture where it has traditionally been difficult to safeguard workers' rights (ILO 2003a). Layers of vulnerability relating to migrant status are discussed next. There are other factors of vulnerability for temporary workers, including regulatory failure, and these are discussed elsewhere.

3.4.1 *Layers of Vulnerability*

International workforce migration is diverse. It includes documented immigrants with a secure status at one end of the spectrum and undocumented workers employed in the underground economy at the other (Abella 2006; Wills 2009). Cho et al. (2007) claimed temporary foreign-born workers were overwhelmingly found in jobs with sweatshop working conditions. They also tend to be concentrated in hazardous industries, characterised by seasonality of production, competitive global production chains, and low technology (ILO 2004; Lenard & Straehle 2010; Schenker 2010). Changes in global production systems have relegated millions of workers from economically poor countries to serving as a source of cheap, flexible and low-skilled labour (Benach et al. 2011). The UK Health and Safety Executive (HSE) (the national independent regulator for work-related health, safety and illness) (2010: 4) reported:

Migrant workers are a special case of the more general problem associated with managing the

health and safety of casual and temporary labour. In addition to the generic issues, migrants present particular challenges in areas such as language, supervision and safety culture.

‘Vulnerable work’ describes a situation where the risk of being denied employment rights is high and where workers are without means or capacity to protect themselves from abuse (BERR 2008). Several researchers have argued temporary residency can exacerbate OHS and labour standards vulnerabilities (Rogaly 2008; Walia 2010; Benach et al. 2011; Walsh 2014). Rogaly (2008) claimed growth in use of migrant workers was an example of work intensification in UK horticulture. Seifert and Messing (2006) made similar observation on hotel cleaning work. Not coincidentally, low-wage labour migration is concentrated in sectors undergoing restructuring and where basic labour standards are being challenged or exploited (Geddes & Scott 2010; Scott 2013b). Low-wage workers are disproportionately found in service occupations and the lower end of blue-collar and agricultural work (Lovell et al. 2007), within which women, ethnic and minority groups are overrepresented (Kim 2000).

Although expansion of global production systems and liberalisation of trade have provided career development opportunities for some, Sargeant and Tucker (2009) argued many migrants comprise a workforce with common characteristics in its vulnerability. They described three “layers of vulnerability” in OHS for migrant workers: migration factors, including migration security and the role of recruitment agents; characteristics of migrant workers, including socioeconomic conditions in country of origin, education and skill levels and language skills; and receiving country conditions, including mechanisms for collective representation and regulatory protection, and social exclusion relating to language, geographical isolation and hostility from locally-born workers who perceive their job conditions and security as threatened. Similar factors were identified in a report investigating the OHS risks of migrant workers in England and Wales (McKay et al. 2006), and in the psychosocial and cultural problems amongst migrant agricultural workers noted by Habib and Fathallah (2012).

3.5 Conclusion

The chapter reviewed international research on dwindling employment security in horticulture. Work for many has become less obviously physically hazardous but more precarious as the root causes of potential ill-health and injury lie with remote aspects of the way in which work is organised, including price and delivery constraints (Walters et al. 2011b). Labour-intensive horticultural practices yield significant increases in crop production and a concomitant demand for workers, and labour contractors play an important role in meeting surges in labour demand. The small number of studies examining the link between

employment status and OHS in horticulture support the explanatory value of Quinlan and Bohle's (2004, 2009) Economic and Reward Pressure, Disorganisation and Regulatory Failure (PDR) model.

The chapter described sources of seasonal labour and the role of temporary worker schemes within this, but it was beyond the scope of this chapter to summarise the body of literature attempting to explain the expansion of segmented labour markets. To remain competitive and responsive to supply chain demands on the procurement of produce, primary producers employ a highly casualised flexible workforce. These workers are unlikely to know their rights and their lack of job security places them at risk of job loss if they seek to exercise their rights. Moreover, a significant proportion of temporary fieldworkers are paid piecework rates with little or no collusion in setting rates. Foreign-born workers are more willing to engage in this short-term casual work, and be available without notice to work highly flexible days and hours, which are conditions conducive to exploitation. Work organisation in horticulture also has implications for OHS risks, discussed in the next chapter. The nature of employment and pesticide exposures appears almost entirely overlooked, which is the impetus for conducting this research.

CHAPTER FOUR OHS IN HORTICULTURE

4.1 *Introduction*

The thesis describes how subcontracting and temporary work arrangements are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. The previous chapter explained that many horticultural businesses rely on temporary labour supply due to seasonal variations in production or demand, especially where quality grading demands cannot be met by machinery. The purpose of this chapter is to review the literature on OHS in horticulture thereby setting the scene for the field research carried out. The plan for this chapter is as follows. Section 4.2 examines the research literature on OHS in horticulture (also drawing on the wider agricultural literature). Although the focus of the research is on pesticide exposures, for contextual reasons some reference is made to safety more generally because it reinforces observations about the management and regulation of horticultural work. Section 4.3 explains that labour-intensive crops are treated extensively with pesticides to which temporary workers are exposed. Conditions of work cannot be isolated from broader issues of public health. Section 4.4 suggests the health status of itinerant and seasonal workers is compromised by infectious diseases caused by poor sanitation and crowded conditions at work and housing sites. Section 4.5 concludes the chapter by summarising the main findings.

4.2 *Hazardous Exposures*

Many hazards in horticulture are inherent to the way the work is done. Workers live and labour in remote rural areas, they are often paid by the piece which encourages high production with potential negative consequences for safe work practices, they are often foreign-born which limits ability to organise collectively, and tasks generally allow workers little discretion over how their work is performed (Grzywacz et al. 2008, 2013). Whilst research indicates some seasonal work can be relatively stable and not undesirable (see for example Schweder's 2008 study of the processing of primary agriculture products in New Zealand), the bulk of the research into seasonal fieldwork in agriculture paints a more negative picture. Agricultural work has been described as dangerous and physically arduous, requiring long working hours and often offering poor remuneration (Hovey & Magaña 2002; UFCW Canada 2003; ILO 2010a). The work environment is characterised by a variety of chemical, physical and biological hazards, and combines hazardous exposures with low levels of education and literacy, prevention and information. A considerable proportion of the workforce is employed casually or moves regularly from one workplace to another. Accordingly, agriculture is widely acknowledged as a hazardous industry in both developing and industrialised countries

(Schenker 1996; Perry & Bloom 1998; Frank et al. 2004; Gunningham & Healy 2004a).

Traumatic injuries associated with equipment and machinery are major concerns. Common mechanisms of injury include entanglement and being run over or pinned (McCurdy & Carroll 2000). Reasons for these injuries include use of older equipment that lacks safety mechanisms, failure to use or dismantling of protective guards on equipment, and having children perform complex tasks or accompanying adults (Frank et al. 2004; Jawa et al. 2013). Tractors are a significant cause of work-related injury and fatality (Hard et al. 2002; Carlson et al. 2005), although effort has been made to reduce the most serious tractor accidents in recent decades, including rollover protection and the installation of seat belts in all new tractors (Svendsen et al. 2014). All-terrain vehicles are inherently unstable, with a narrow wheel base and high centre of gravity making them likely to tip over on steep, rough or uneven terrain (Moroney et al. 2003). Loss of control events involving mobile equipment occur frequently and are another major cause of injury and death in agriculture (Shulruf & Balemi 2010; Milosavljevic 2011).

Other hazards include noise that accompanies many agricultural tasks (including chainsaw operation, tractors without cabs, manual handling of pigs, sheep sheds during shearing and heavy machinery) can cause the insidious onset of noise-induced hearing loss (McBride et al. 2003; Depczynski et al. 2005). Workers also often experience severe ergonomic conditions. The heavy lifting, awkward body posturing, twisting and repetitive tasks lend themselves to the development of low back, shoulder, and upper extremity disorders (Cameron et al. 2006; Davis & Kotowski 2007). Musculoskeletal disorders may disproportionately affect youth and foreign workers because of the types of tasks performed (Davis & Kotowski 2007; Fathallah 2010). Falls from height especially from ladders represents an injury scenario in orchards. Some orchard ladders have only three legs to enhance stability on uneven ground and improve access to fruit that is located closer to the tree trunk (Wron 2006). Electrocution caused by aluminium ladders used in fruit picking and forestry work coming into contact with overhead lines is another hazard (Fragar 1996; Solomon 2002). Working in isolation under little or no supervision reportedly contributes to increased risk of injury (Fragar & Houlahan 2002; Guthrie et al. 2009).

In addition to chemical, machinery and equipment-related occupational hazards, occupational hazards confronting horticultural workers derive from aspects of the physical environment. Workers employed in outdoor occupations are exposed to hot and humid environments that place them at risk for heat-related illness and death (Luginbuhl et al. 2008). Horticultural workers in New Zealand complained of working in the heat for long hours (Anderson et al. 2012). Similarly, in a survey of farmworkers in North Carolina 94 percent of the surveyed

population reported working in extreme heat, and of those 40 percent reported heat-related symptoms (Mirabelli et al. 2011). Although human beings possess considerable ability to compensate for naturally occurring heat stress, workers exposed to intense heat may be unable to activate compensation mechanisms, in turn putting their health at risk. Cortez (2009) suggested workers motivated to perform hard work may incur losses of 3-4 litres before thirst forces them to stop to drink. High temperatures are magnified by the physical exertion of labour-intensive horticultural work (Arcury & Quandt 2011). Sun exposure in agriculture may also be responsible for observed increases in melanoma of the skin and incidence of lip cancer (Schenker et al. 2002). Additionally, agricultural work includes constant exposure to respiratory irritants, such as dust, plant pollen, moulds and pesticides, and it has been associated with a wide range of respiratory symptoms (wheeze, chronic bronchitis, chronic cough and asthma) (Schenker et al. 2005) and diseases such as small airway disease and pneumoconiosis (Schenker et al. 2009).

Occupational injuries due to animal-related trauma, such as bites and stings, have been described as a major public health problem (Langley & Hunter 2001; Forrester et al. 2012). Individuals bitten, stung or injured by a range of animals, including bees, wasps, hornets, ants, spiders, snakes, rats and other mammals, can develop serious infections as a result of their injuries (Weber & Rutala 1999; McCurdy & Carroll 2000). Snakebite is a worldwide occupational hazard amongst agricultural workers with significant public health importance (Ahmed et al. 2008; Alirol et al. 2010; Fadare & Afolabi 2012). Even bites from non-venomous snakes can result in puncture wounds that require medical evaluation (O'Neil et al. 2007). Although accurate statistics of the incidence of snakebite globally does not exist, it is certain to be higher than what is reported (Ahmed et al. 2008; Langley 2008; Alirol et al. 2010). There are no Australian studies detailing the incidence of snakebite on farms (Shepherd et al. 2006).

Chapter Two presented literature on the psychosocial hazards of the itinerant and pressured work environment (see for example Griffin & Soskolne 2003; Magaña & Hovey 2003; Kim-Godwin & Bechtel 2004; Bletzer & Weatherby 2009). An extensive literature also exists regarding agricultural pesticides and workers' health, examined next.

4.3 *Pesticide Exposures*

Increases in intensity of agricultural production and the search for high-yielding crops have had significant impacts on workers' OHS (ILO 2003a; Damalas & Eleftherohorinos 2011). The increasing use of national and global supply chains has pressured growers to cut labour costs and increase the scale of plantings and thus arises a requirement for more intensive pest and

disease management (Thompson et al. 2012). The susceptibility of horticulture commodities to pests and diseases requires careful management if industry is to profitably produce crops of acceptable quality (Cross & Berrie 2006). Agricultural chemicals comprise a diverse class of substances used to control crop pests (pesticides) and enhance production (fertilisers and ripening agents) (Arcury & Quandt 1998). Designed to have adverse biological effects on organisms, pesticides are a subject of concern (Keifer et al. 2010; Weichenthal et al. 2010). Pesticides and war gases share the dubious honour of being the only chemicals released into the environment with the intent to do harm to other living beings (Keifer 2000). Thus, with the purpose of preventing, destroying or repelling agricultural pests, pesticides are “poisons by design” and can result in substantial human health risks (Ibitayo 2006: 989). Almost as diverse as their targets, pesticides have been used for centuries. The calendar of events below puts the use of pesticides in perspective, assembled from the research of Unsworth 2010, Losey and DiTommaso 2012, Brown et al. 2013 and Holmes 2013 (later developments are Australian and UK-centric).

8000 BCE	Beginnings of agriculture
4700 BCE	Silkworm culture in China
2500 BCE	First records of insecticides (the Sumerians use sulphur compounds to control insects and mites)
1500 BCE	First descriptions of cultural controls, especially manipulation of planting dates
1200 BCE	Biblical armies use salt and ash on the fields of the conquered. At the same time, botanical insecticides are used for seed treatments and as fungicides in China. The Chinese also use mercury and arsenical compounds to control body lice
470 BCE	Democritus controls blight by sprinkling plants with amurca (liquid waste remaining after olive oil is produced), frequently cited thereafter into the sixteenth century
324 BCE	Chinese introduce ants (<i>Acephali amaragina</i>) in citrus trees to manage caterpillars and large boring insects
200 BCE	The Roman, Cato the Censor advocates oil sprays for pest control
13 BCE	First rat-proof granary is built by the Roman architect Marcus Pollio
300 CE	First recorded use of biological controls in citrus orchards to control caterpillar and beetle pests in China – colonies of the predatory ants (<i>Oecophylla smaragdina</i>) are set up in citrus groves with bamboo bridges so they could move between trees
400 CE	Chinese alchemist Ko Hung recommends a root application of white arsenic when transplanting rice to protect against insect pests

1000-1300	Date growers in Arabia seasonally transport predatory ants from nearby mountains to oases to control phytophagous ants that attack date palm. Also at this time, weeds controlled by mechanical removal with a hoe, crop rotations, and cultivation
1476	In Berne, Switzerland cutworms are taken to court, pronounced guilty, excommunicated by the Archbishop, then banished
1485	The High Vicar of Valence commands caterpillars to appear before him; he gives them a defence council and finally condemns them to leave the area
1649	Rotenone used to paralyse fish in South America
1732	Farmers first begin to grow crops in rows to facilitate weed removal
1750-1880	Agricultural revolution in Europe: crop protection becomes more extensive and international trade promotes the discovery of the botanical insecticides pyrethrum and derris
1840s	Potato blight (<i>Phytophthora infestans</i>) outbreak in Ireland, England, and Belgium, leading to widespread famine in Ireland
1880	First commercial pesticide spraying machine
1890s	Introduction of lead arsenate for insect control
1896	First selective herbicide (iron sulphate) found to kill broad leaf weeds
1908	First case of resistance to a pesticide (San Jose scale resistance to lime sulphur)
1921	First aerial application in insecticide against <i>Catalpa sphinx</i> moth in Ohio, US
1930s	Introduction of synthetic organic compounds for plant pathogen control
1939	Recognition of insecticidal properties of chlorinated hydrocarbons (or organochlorines), namely dichlorodiphenyltrichloroethane (DDT), BHC, aldrin, dieldrin, endrin, chlordane, parathion, captan and 2,4-D – synthetic organic pesticides. DDT particularly is hailed as a miracle: broad spectrum yet appeared to have low toxicity to mammals; persistent; insoluble; and inexpensive and easy to apply
1940s	Organophosphates developed in Germany, carbamates in Switzerland
1944	First hormone-based herbicide (2,4-D)
1946	First report of insect resistance to DDT (housefly in Sweden)
1950s	Registration of the organophosphate insecticide malathion. Also, introduction of DDT, aldrin, chlordane, heptachlor and dieldrin into Australia for use in agricultural and pest control industries
1950s-1970s	Widespread development of resistance to DDT and other pesticides

1960	First insect sex pheromone isolated, identified, and synthesised (gypsy moth)
1962	Rachel Carson's Silent Spring (which in retrospect launched the environmental movement)
1960s	First restrictions on organochlorine use is implemented in Australia, banning uses on food-producing animals because of residue concerns
1965	Release of carbamate insecticide pirimicarb and pirimiphos ethyl, and the systemic fungicide dimethirimol for control of mildew on cucurbits
1965	Following concerns over the use of organochlorine insecticides, the UK government begins official surveys of pesticide usage on agricultural and horticultural crops
1966	Release of the systemic fungicide ethirimol for control of mildew on cereals
1967	Introduction of the term Integrated Pest management (IPM) and relevance of IPM through the concept of "life systems"
1970	The Australian Market Basket Survey (now the Australian Total Diet Survey) commences the monitoring of pesticide residues in food
1970s	Widespread banning of virtually all non-medical DDT uses in developed countries
1970-1980s	Introduction of glyphosate and the low use rate sulfonylurea and imidazolinone herbicides, synthesis of a third generation of pyrethroids and the introduction of <i>Bacillus thuringiensis</i> as a spray treatment
1985	Food and Environmental Protection Act is introduced in the UK and the registration and monitoring of pesticides becomes a requirement. Also, by this time deregistration of virtually every agricultural use of organochlorines in Australia has occurred
1985	US Environmental Protection Agency (EPA) names dioxins "the most potent carcinogen ever tested in laboratory animals"
1989	Anyone applying pesticides on a commercial basis in the UK must first gain a certificate of competence in their safe use
1990s	Research activities concentrate on finding new members of existing families which have greater selectivity and better environmental and toxicological profiles. Also the first commercially available neonicotinoid compound, imidacloprid
2000s	Pest management expands to include use of genetically modified crops
2004	Stockholm Convention on Persistent Organic Pollutants (POPs) entered into force (includes nine pesticides – aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex and toxaphene – as well as polychlorinated biphenyls (PCBs),

furans, and dioxins)

2013

Australian Pesticides and Veterinary Medicines Authority cancels selected 2,4-D high volatile ester active constituent approvals, product registrations and associated label approvals

As chronicled, the "first generation" pesticides comprised highly toxic compounds such as arsenic and hydrogen cyanide. Use was largely abandoned owing to their ineffectiveness or high toxicity. From the 1940s chemical pesticides became the most important consciously-applied form of agricultural pest management. The "second generation" pesticides were predominately synthetic organic compounds (Paul 2007).¹² The pest management toolbox expanded to include use of IPM systems which discourage the development of pest populations and reduce agrochemical reliance, and use of plants genetically modified to increase their resistance to broad-spectrum herbicides or capable of producing their own pesticide (which are not without controversy not least surrounding human health, environmental issues and labelling – see for example Runge & Jackson 2000; Marris 2001; Wisniewski et al. 2002; Carolan 2008). The chemical industry too responded to concern over chlorinated hydrocarbons with a new, less persistent generation of pesticides.

However, to compensate for relatively low environmental persistence, many agricultural pesticides have relatively high acute toxicities (Lichtenberg et al. 1993; Busby et al. 2009; Hofmann et al. 2010a). For example, in 1945 DDT was applied at a rate of approximately 2 kg/ha. Present day, comparable insect control is achieved with pyrethroids and aldicarb at 0.1 kg/ha and 0.05 kg/ha, respectively: a ten-fold toxicity increase (Pimentel et al. 1993). The organophosphate pesticide group (the primary pesticide used on fruit crops) is preferred over the more persistent and environmentally damaging organochlorine group (Ecobichon 1996; Jaga & Dharmani 2003; Johnstone et al. 2007), despite association with acute health problems (discussed below). In turn, pyrethrins/pyrethroids are generally less toxic to mammals and are considered good candidates for replacement of organophosphate insecticides in residential areas (US EPA 2009). Both the naturally occurring pyrethrins (derived from the chrysanthemum flower) and their synthetic analogues the pyrethroids are a widely used class of insecticides, and are generally considered to be the safest class of insecticides available (Kolaczinski & Curtis 2004; Ray & Fry 2006).

Widespread use of pyrethroids and the corresponding increase in human exposure have

¹² 'Synthetic' meaning human-made and 'organic' meaning carbon containing. Not to be confused with the popular use of 'organic' as in 'organic farming'.

prompted sustained toxicological interest, with a number of studies suggesting effects that were not considered during original evaluations of pyrethroid toxicity: paraesthesia (Wilks 2000); neuronal death (Abou-Donia et al. 2001); and developmental neurotoxicity (Shafer et al. 2005). Although the evidence for these effects is equivocal, partly because high doses are rarely seen in human exposures, they carry important implications for human health. Additionally, both pyrethrins and pyrethroids are extremely toxic to aquatic organisms, in some cases at levels similar to that of the target of the application (Mueller-Beilschmidt 1990). Nevertheless, growers have often claimed chemicals used today are less toxic than those used in the past (Rao et al. 2004). In the absence of a substantial reason for behaviour change, growers ignore information that does not fit their belief system (Arcury et al. 2001).

Chemicals must be absorbed through body openings or the skin to cause harm. The three routes of exposure for pesticides are inhalation (particularly of fine mists, dusts or fumigants), oral ingestion, and dermal absorption (Dowling & Seiber 2002; Johnstone et al. 2007; Vitali et al. 2009). Exposure may result from: direct contact during manipulation, preparation and application; direct spraying of workers; indirect spray from wind drifts; dermal contact with residues on crops; transfer of residues from contaminated hands while eating, smoking, or defecating; or bathing in, or drinking, contaminated water (Hansen & Donohoe 2003; Jaga & Dharmani 2003; Alavanja et al. 2004). Labour-intensive crops are treated extensively with pesticides (Mills et al. 2009). Contrary to employer opinions (Quandt et al. 1998; Arcury et al. 2001; Rao et al. 2004), pesticide exposure due to hand contact with residues during harvesting, thinning and pruning can be extensive (Simcox et al. 1999; Arcury et al. 2002; Fenske et al. 2003; Bradman et al. 2009). Temporary fieldworkers often lack access to the knowledge required to control their pesticide exposures or the power to implement this knowledge if they do have it (Arcury et al. 2000a), and may be disproportionately affected by the absence of available hand washing, showering and worksite laundering facilities, thus prolonging their exposures (Ward et al. 2001; Gentry et al. 2007). Even when workers have access to hygiene facilities, perceived production pressures may prevent them from taking the necessary time to properly follow safety procedures (Mayer et al. 2010). The erroneous association of pesticide exposure with sensory detection is a further complication. Findings showed some workers believed odour, taste, sight and touch were reliable markers of pesticide exposure (Quandt et al. 1998; Elmore & Arcury 2001; Rao et al. 2004). This observation does not diminish the greater exposure potential amongst people who directly handle pesticides. However, this group conceivably has the highest degree of protection from engineering controls and PPE, and patterns of exposure and the effectiveness of protective measures among applicators

have been examined (Arbuckle et al. 2002; Hoppin et al. 2002; Hines et al. 2011). Duration of exposure during pesticide application is also considerably shorter than for re-entry activities and less frequent (de Cock et al. 1998; Arcury et al. 2000b).

A large number of known immediate and long-term health effects are associated with pesticide exposure. Acute effects are well documented in the literature, especially with respect to organophosphate poisoning, and the immediate response can occur within minutes (Alavanja et al. 2004). Mild cases display a broad range of non-specific symptoms including headache, dizziness, nausea, vomiting, pupillary constriction, cough, and excessive sweating, tearing, and salivation (Alavanja et al. 2004; Kamel & Hoppin 2004; Strong et al. 2004; Johnstone et al. 2007). It can be difficult for workers to effectively discriminate between chemical exposure and other common conditions such as heat stress and reactions to plants because of the non-specific nature of a number of these effects (Arcury & Quandt 1998), and few health care providers are trained to recognise pesticide poisoning (Arcury et al. 2009a). More severe cases develop muscle fatigue, weakness and twitches, tachycardia, bronchospasm, convulsions and loss of consciousness, and death (Kamel & Hoppin 2004; Johnstone et al. 2007). Immediacy of effect can influence individuals' risk judgment. In their study on perceptions of pesticide exposure in North Carolina, Quandt et al. (1998) found most farmworkers were concerned with immediate or acute effects of exposure. Many inferred that symptoms were evidence of exposure, with the temporal association of work and symptoms serving to reinforce the perceived cause-and-effect relationship. Further, few workers were aware of potential long-term effects of pesticide exposure, and held the belief that susceptibility to chemicals is inherent and thus beyond the individual's control. This is consistent with the Health Belief Model by which behaviour is a function of a person's perceived susceptibility to a certain risk (see Janz & Becker 1984).

Events such as the epidemic of Jamaica ginger paralysis in the US in 1930-31 contributed to the discovery of the mechanism of action of organophosphates (Martyn & Hughes 1997); namely, inhibition of carboxyl ester hydrolases (acetylcholinesterase) vital to the transmission of nerve impulses. Under normal conditions, nerve impulses travel along neurons as electrical signals. At a synapse, the impulse is transmitted in the form of a neurotransmitter. In the autonomic nervous system, neuromuscular junctions and parts of the central nervous system, the neurotransmitter operating is acetylcholine (ACh). ACh is released by cholinergic neurons and is broken down and inactivated almost immediately by the cholinesterase (ChE) enzyme. Organophosphate compounds bind with the ChE enzyme at the neuromuscular junction and deactivate or inhibit the activity of the enzyme by irreversible phosphorylation. The result is

elevated levels of ACh, causing interference with nerve impulse transmission at nerve endings (Niesink et al. 1996; Kwong 2002; Jaga & Dharmani 2003). The inhibiting action of organophosphate compounds on ChE explains their homogenous parasympathetic effects on the autonomic nervous system, including muscular fibrillation and motor incoordination (Marieb 2006; NPIC 2009). There is evidence that pesticides pass through the blood-brain barrier and placenta, and have been found in amniotic fluid (Bradman et al. 2003). Foetuses may be more susceptible to potential neurotoxic effects of pesticides because total ChE activity can be lowered during pregnancy (de Peyster et al. 1994), allowing ACh to build up in the neuronal junction (Eskenazi et al. 2007). Foetuses (and young children) also have lower-than-adult levels of detoxifying enzymes that deactivate organophosphates (Furlong et al. 2006; Holland et al. 2006), further increasing vulnerability to exposures.

Research suggests persistent neurobehavioural and peripheral nervous system effects following high-dose exposure but attempts to identify the potential effects of low-level, chronic exposure have yielded inconsistent results (Keifer & Firestone 2007). Outside ChE test results (which are only useful for organophosphate and carbamate insecticides and are challenging to interpret), surveillance efforts for pesticides are impaired by lack of diagnostic tools for confirmation of cause-effect relationships (Keifer et al. 2010). Low level pesticide exposure may go unrecognised in the absence of immediate ill-effects. For decades, studies of endocrine-disrupting chemicals (EDCs) have challenged traditional concepts in toxicology. In particular, proponents of the “low-dose” hypothesis argue traditional “high-dose” toxicity studies fail to adequately assess adverse effects that are occurring at low-doses (Kamrin 2007; Birnbaum 2012). In 2001, a National Toxicology Program expert panel concluded there was evidence for low-dose effects for a number of well-studied EDCs (NTP 2001). A recent review by Vandenberg et al. (2012) focussed on two major issues in the study of EDCs: low-dose exposures and non-monotonic dose-response curves (NMDRCs). Vandenberg and colleagues provided hundreds of examples that suggested NMDRCs and low-dose effects are common in studies of EDCs and hormones. Long-term cumulative effects of such exposure can be subtle such as neurological deficits, non-specific such as dermatitis, or latent such as cancer or sterility (Arcury & Quandt 1998; Quandt et al. 1998). Such findings underscore the need to improve periodic medical surveillance for all agricultural workers (Piktushanskaia & Bykovskaia 2011).

Sanborn et al. (2004, 2012) undertook a systematic literature review of all peer-reviewed studies published between 1992 and 2003 that investigated the human health effects of chronic pesticide exposure. The review excluded the organochlorine literature because use of

this class of pesticides was mostly phased out in the last part of the last century, and it has since been reclassified as a persistent organic pollutant. The review articles were categorised according to health effect¹³, including nine types of solid tumours, non-Hodgkin's lymphoma, leukaemia, genotoxic effects, dermatologic effects, latent chronic neurological effects, and reproductive effects. Also Clapp et al. (2008) have chronicled of recent epidemiological evidence linking occupational and environmental exposures with cancer (including pesticide exposures).

For ethical reasons, randomised controlled trials cannot be carried out when examining potentially harmful chemicals. Thus epidemiological studies are crucial because, unlike extrapolation from animals to humans, they provide data on the relevant species, diseases and exposures. Pesticide metabolism in particular may differ in animals and humans, and human exposure may be intermittent or to a complex formulation (Alavanja et al. 2004). From an epidemiological standpoint, each source of variation (including characteristics of the individual and agricultural system, changes over time in the use and regulation of chemicals, and the nature of exposure) must be controlled if exposure and the effects of exposure are to be accurately estimated, and are dependent upon "herculean record keeping" (Arcury & Quandt 1998: 834). For example, although a 2013 report analysing deaths occurring between 1987 and 2005 amongst pesticide applicators found evidence of excess deaths from multiple myeloma, the limited data available made it impossible to investigate whether deaths were linked with particular jobs, working practices or pesticides (Brown et al. 2013).

The chemical industry has successfully promoted the rich agricultural yields that synthetic pesticides make possible (Cunningham-Parmeter 2004; Walters & Grodzki 2006). However, pesticide opponents have argued that the idea that pesticides are vital to production has led to inattention to increasing pesticide resistance (Busby et al. 2009). Pesticide reliance has created ever-increasing numbers of pesticide-resistant pests. In turn, growers seek to apply more pesticides and more lethal pesticides, placing workers at greater risk of hazardous exposures. Several researchers have remarked on the tension between the short-term cost-benefit of continued use of cheap, convenient but generally more hazardous pesticides and the longer term cost-benefit (including greater safety) of adopting biological control methods and using so-called softer, target-specific but often more expensive chemicals (Radcliffe 2002; Healy & Gunningham 2003; Gunningham & Healy 2004a). From a strictly cost-benefit approach

¹³ Papers were organised according to health effect rather than specific pesticide exposure since most exposures are to cumulative or aggregate pesticide mixtures.

(confined to direct crop returns), pesticide use is beneficial. However, cost-benefit assessments rarely include indirect environmental¹⁴ and public health costs (Pimentel et al. 1992; Pimentel 2005). The main effect of the cost narrative is that it displaces concern about worker safety with concern about farm profitability (Barnetson 2012). Stringent cosmetic standards and quarantine requirements create especially pervasive incentives for growers to pursue chemical pest control (Altieri & Rojas 1999; Radcliffe 2002; Damalas & Eleftherohorinos 2011).

There are international standards on the use of pesticides. The challenge is monitoring their application in practice. A structured strategy for chemical risk assessment in the workplace is low priority, especially in small and medium-sized businesses (Balsat et al. 2003; Laird et al. 2011). Although various control measures are conventionally used to control chemical risks, they are rarely evaluated (Roelofs et al. 2003), and most instructional materials understate residues because of the immediate risk of exposure to the concentrated chemical during mixing or applying (Arcury et al. 2000b).

The primary means of minimising occupational pesticide exposures are PPE (ranging from gloves and a simple face shield to a full-body spray suit) and controlling the time between application and re-entry into the sprayed area by workers – the re-entry interval (REI) (Vaughan 1993; Fenske et al. 2003). Thus, in contrast to sophisticated technologies for use in horticultural production, worker protection often relies upon relatively primitive and low hierarchy of control technologies (Watterson 2009). The practical options for managing re-entry workers' exposures through use of PPE or engineering controls are considerably more limited than for pesticide applicators. Therefore, the establishment of REIs is the primary method for managing post-application exposures (Whitmyre et al. 2005).

The basic principle of the REI is to reduce the risk by separating the worker from the hazardous exposure, either in time or space (Lichtenberg et al. 1993; Sunding & Zivin 2000). The REI is typically based on modelling which combines measurements of pesticide residues on crop surfaces (dislodgeable foliar residue) with worker exposure determinations (Fenske et al. 2003; Korpalski et al. 2005). Re-entry exposure is a function of body immersion in treated foliage and the efficiency of pesticide residue transfer from the treated foliage to a worker's skin

¹⁴ Neonotinoids are now the most widely used insecticides in the world, used as seed dressings for oilseed rape, sunflower, cereals, beets and potatoes. They are generally toxic to insects in minute quantities; for example, the LD₅₀ for ingestion of clothianidin in honeybees is 4 ng per insect, which for comparison is approximately 1/10 000th of the LD₅₀ for DDT (Goulson 2013).

(Whitmyre et al. 2005). The waiting period must be such that exposure of unprotected workers (or bystanders) after pesticide application does not exceed the acceptable operator exposure level established for the active constituent (Directive 91/414/EEC Annex VI Part 2.4.1.4). Since pesticides characteristically decay when exposed to sunlight, precipitation, and other environmental factors, a sufficiently long interval will reduce the pesticide's toxicity (Sunding & Zivin 2000). The REI can range from hours to days (Arcury-Quandt et al. 2011).

There are serious limitations with these estimates. First, biological monitoring has not been routinely employed to estimate exposures in re-entry workers (Fenske et al. 2003). Second, pesticide absorption data across the skin are normally available for the concentrate and for an aqueous dilution therefore estimates of absorption from a dried and diluted residue are unreliable (Belsey et al. 2011). Third, the three routes of pesticide exposure (i.e. inhalation, oral and dermal absorption) appear easily compartmentalised but interactions do not occur in isolation and workers must cope with multiple daily exposures. Most occupational risk assessments for establishing REIs are based on a single confined exposure (the limitations of single-substance regulations are revisited in Chapter Six). By contrast, cumulative effects are considered when setting safe pesticide residue levels for food consumers (Cunningham-Parmeter 2004). The US EPA acknowledged that most REIs are limited to the prevention of acute effects; they are not designed to protect workers from chronic health effects (Reeves et al. 1999). Fourth, workers may hold the false belief that if they enter the field after the REI has elapsed, then they are not exposed to chemicals (Arcury-Quandt et al. 2011). Quandt et al. (1998) found that the cognitive model of chemical exposure amongst farmers and workers was that chemicals only pose a risk when wet. Growers similarly indicated to Rao et al. (2004) that once a pesticide has been diluted, the exposure risk is minimal.

The well-accepted hierarchy of controls for eliminating or minimising hazardous exposures is inverted in agriculture. Despite being regarded as the last line of defence amongst OHS researchers and practitioners, PPE is a principal control method for reducing pesticide exposures (MacFarlane et al. 2008; Garrigou et al. 2011). However, the use of PPE by exposed populations is not tested through mere demonstration that the equipment reduces exposure in a controlled setting (Keifer 2000). A number of researchers have investigated agricultural workers' attitudes and knowledge in relation to PPE and identified several barriers to its use, including time constraints, economic considerations, discomfort (particularly in hot climates) and poor design, (Sivayoganathan et al. 1995; Recena et al. 2006; Matthews 2008; Issa et al. 2010). Garrigou et al. (2011, 2012) suggested the inadequacy of PPE is an example of an ill-conceived technology transfer. They argued PPE used in agriculture has been directly

transferred from industrial processes; such equipment may be acceptable in laboratory conditions but problems arise when conditions are diverse. Moreover, employers are not mandated to provide PPE to workers who enter treated areas once the REI has expired (Strong et al. 2008). Previous work also suggested provision of safety equipment alone does not improve safety performance. Agricultural workers have reported their ability to engage in safe work practices depended on their ability to communicate with their employer, have positive power relationships, and the availability of PPE (Austin et al. 2001). Mayer et al. (2010) reported negative employer and supervisor attitudes toward the validity and value of pesticide safety practices engendered a workplace culture of indifference, with increased risk of exposure. Workers have also justified non-adherence to protective handling of pesticides by perceived inordinate pressures to produce (Perry & Bloom 1998). Akin to viewing immediate gratification from engaging in high risk behaviours (including tobacco, drug taking and unprotected sex) as outweighing long-term costs to health, workers and employers may consider health and wellbeing an acceptable sacrifice for achieving short-term gains in productivity (Zohar & Luria 2003; Reynolds & Schiffbauer 2004). The safety climate within the rural community, the perceived impact of OHS hazards for the agricultural operation, hard evidence of a problem, and the relevance and practicality of legislative requirements all influence OHS decision-making (Fragar 1996; Durey & Lower 2004; ASCC 2006). Evaluation and control of pesticide exposures is also compromised by precarious forms of work, discussed below.

4.3.1 Work organisation

Precarious forms of work often lack the technical sophistication required to support hazardous substance risk management (Walters 2008), and exposures may go unrecognised by monitoring and reporting systems which reflect the needs of traditional employment arrangements (Thébaud-Mony 1999; Cummings & Kreiss 2008; Walters 2008).¹⁵ Rao et al. (2004) noted workers' reluctance to report pesticide-related illness reinforced employers' impressions that workers are not experiencing ill-effects. Subcontracting arrangements can also alter or obstruct the quality of information flow on the safe handling of chemicals from

¹⁵ The idea of a 'pesticide passport' to be held by every agricultural worker listing the type, date, amount and exposure of that worker to pesticides was mooted by the International Federation of Plantation and Agricultural Workers (now the International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations (IUF)); an idea that has since gained credence with epidemiologists (Watterson 1994).

supplier to end user (Walters & Grodzki 2006). García et al. (2009) described additional difficulties in having health problems recognised as work-related due to irregular and precarious work, and employers' and insurance companies' reluctance.

Despite clear legal obligations, workers in precarious forms of work are often insufficiently instructed on the hazardousness of the substances with which they work (Fischer et al. 1998; Arcury et al. 2002). Diminished control and resignation to the existence of risk have implications for behaviours that support or detract from health. When faced with a health risk, people who feel they have control over a health outcome are more likely to adopt preventative behaviours (Janz & Becker 1984; Austin et al. 2001; Cabrera & Leckie 2009). In a sample of agricultural workers in California Vaughan (1993) found feelings of limited control over negative health outcomes of pesticide exposure were associated with failure to adopt precautionary behaviours. Similarly, in their study of farm safety amongst farmers and temporary workers in California Grieshop et al. (1996) found workers attributed control over workplace safety outside of themselves, given over to God, luck, or supervisors. A cognitive strategy of accepting danger amongst workers was evident. Similar findings were reported by Barraza et al. (2011).

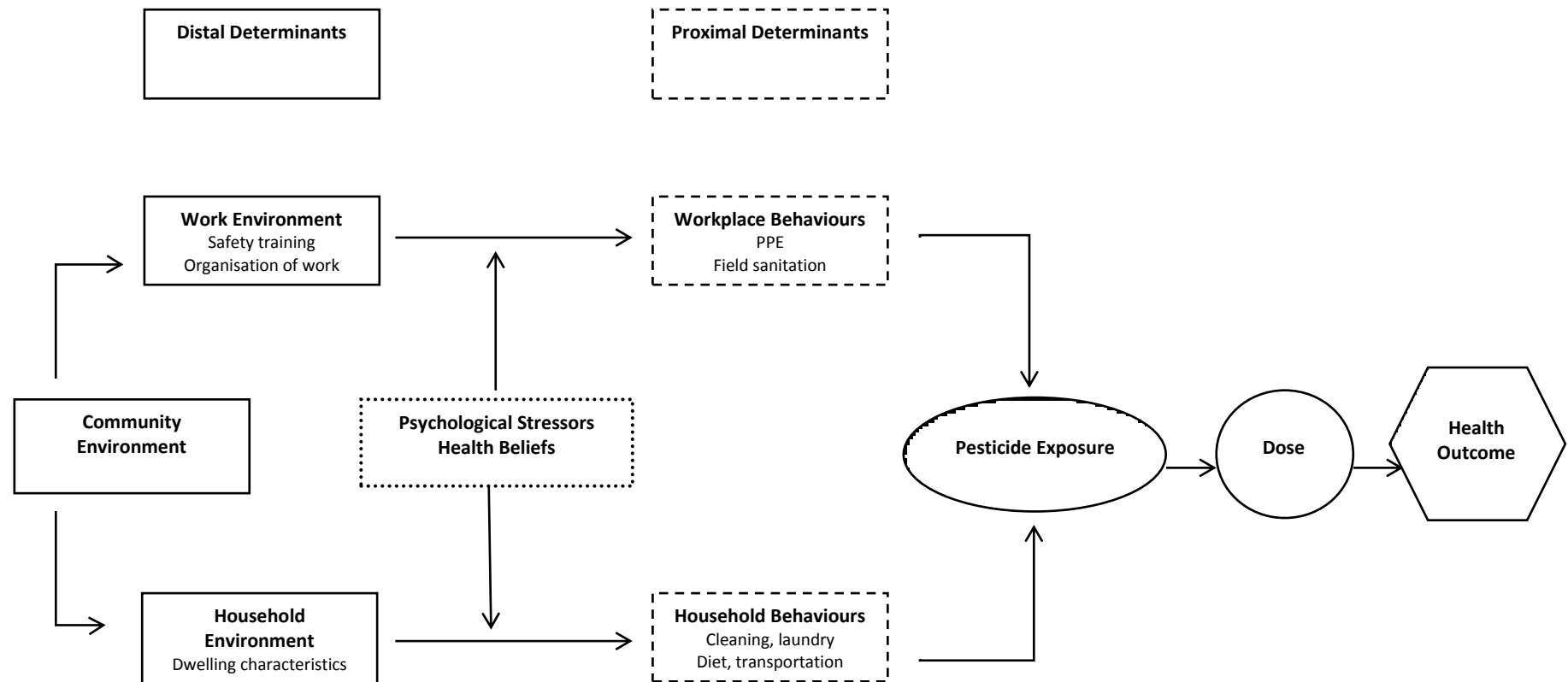
Although wider issues of social welfare are outside the remit of this study, there are some that may impact workers' ongoing health. For example, the proximity of dwellings to horticultural fields treated with pesticide was associated with elevated exposure (McCauley et al. 2001; Fenske et al. 2002; Quandt et al. 2004). Workers exposed, whether as applicators or re-entry workers, can also take home residues on their shoes, clothes and skin, and in their vehicles (Lu et al. 2000; Curl et al. 2002; Coronado et al. 2004; Goldman et al. 2004; Whalley et al. 2009; Fenske et al. 2013).¹⁶ Pesticide residues in the home have been significantly associated with the number of individuals in the home whose work includes high exposure pesticide activities (McCauley et al. 2001, 2003).¹⁷ There is a body of literature on pesticide exposure preventative behaviours, including immediately changing out of work clothes, wearing work clothes only once before washing, and separating work clothes from non-work clothes for laundry (Curwin et al. 2002; McCauley et al. 2003; Thompson et al. 2003; Goldman et al. 2004; Raymer et al.

¹⁶ This includes children accompanying or working with farmworker parents – see Report to Congressional Requesters (US Government Accountability Office 2000).

¹⁷ The consequent higher pesticide exposures of children living with parent(s) who work with agricultural pesticides compared to other children living in the same community has also garnered scholarly attention – see Fenske et al. 2000a, 2000b, 2002; Lu et al. 2000; Mills & Zahm 2001; Curl et al. 2002; Thompson et al. 2003; Arcury et al. 2006a, 2007; Coronado et al. 2006, 2011.

2014). The number of individuals in the household has been negatively associated with adherence to recommended changing, storing and showering behaviours (Rao et al. 2006).

The preceding discussion is well summarised through the conceptual model (Figure 3) developed by Quandt et al. (2006: 944) that contrasts proximal or immediate determinants of pesticide exposure, specifically behaviours practiced by workers in the workplace or at their residence, with distal determinants that actually determine the proximal factors. These predictors include environmental conditions at work (including the organisation of work), at home, and in the wider community. In turn, the association of environmental and behavioural factors is moderated by workers' attitudes, values, beliefs and knowledge. A portion of pesticides to which an individual is exposed is absorbed as the pesticide dose, and this dose can have health effects. According to the model, the amount absorbed is moderated by workplace and household behaviours (in addition to genetic factors, body size, developmental status, and so forth not captured in the model and not covered in this review).



(Adapted from Quandt et al. 2006: 944)

Figure 3: Conceptual Model of the Relationship between the Predictors of Pesticide Exposure among Horticultural/Agricultural Workers and Their Relationship to Health Outcome

4.3.2 Regulatory Environment

One significant challenge for regulating OHS in agriculture is inadequate reporting of injuries and illnesses which makes it harder for regulators, unions and others to assess and target prevention activities. Occupational injuries and diseases are underestimated across all sectors due to inadequate and heterogeneous recoding and notification systems, but underreporting is a particular problem in agriculture (Brower et al. 2009; Busby et al. 2009; Watterson 2009). A large proportion of the agricultural workforce (including family members) in Australia and many other countries is self-employed and therefore excluded from workers' compensation (a principal source of OHS data in many countries) thus there is little official recording of work-related injury and illness for these workers (Gunningham & Healy 2004a; Quinlan 2004a). Family members might not seek to make a compensation claim or be aware they have a remedy at law, or might continue to work despite suffering impairment because of pressures of production (Guthrie et al. 2009), and seasonal and temporary workers may be loath to jeopardise future employment opportunities (Aronsson et al. 2002; Earle-Richardson et al. 2003, 2008). Despite declining trends in compensation claims, some researchers have suggested the actual rates of injury and illness may remain unchanged (or have not changed as much as purported) but reported injuries and illnesses have declined due to the growing fraction of precarious workers (Quinlan & Mayhew 1999; Azaroff et al. 2004; Cox & Lippel 2008). Subtle differences in reporting criteria also result in the under-representation of self-employed workers, contractors, temporary agency labour and other precarious forms of work (Fragar & Franklin 2000; Quinlan et al. 2010; O'Neill et al. 2013).

It has been estimated that only 15 percent of work-related injuries and illnesses in agriculture are the subject of workers' compensation claims in Australia (Fragar 1996). Gross underreporting similarly obscures the UK agriculture industry's health and injury performance. Only an estimated 25 percent of accidents to employees and 5 percent of accidents involving the self-employed are reported under the *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995* (Lantra 2010). The 2008/09 Self-reported Work-related Illness Survey estimated between 10,000 and 22,000 workers (whose current or most recent job was in agriculture) suffered from an illness which they believed was caused or made worse by their work (a prevalence rate of between 2.1 to 4.7 percent) (Lantra 2010). Pesticide Incident Reports provide information on incidents and complaints involving pesticides investigated by the Field Operations Directorate of the HSE. The majority of people involved in reported incidents each year continue to be members of the public. The proportion in employment has

fluctuated over the past ten years but the figure remains small, as summarised in Table 1 (data extracted from the archived annual reports – HSE 2013).

Table 1: Pesticide Incident Reports

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Total number of pesticide incidents investigated	204	150	143	100	94	92	92	79	69	45
Number of allegations of ill-health investigated	62	55	47	38	32	33	41	30	22	15
Number involving employees/self-employed	6	3	1	2	6	4	1	2	2	1
Number of confirmed ill-health incidents involving employees/self-employed	0	0	1	1	0	0	0	0	0	0

Workers' compensation data understate disease and adverse effects of work on mental health and wellbeing (ILO 2000; Quinlan et al. 2010; O'Neill et al. 2013), and fail to accurately measure long latency occupational diseases and injuries (Reeves & Schafer 2003; Gunningham & Healy 2004a; O'Neill et al. 2013). The number of confirmed pesticide poisonings is also potentially low due to low levels of diagnosis (Reeves & Schafer 2003; Garrigou et al. 2011), and claims that do arise relate almost exclusively to acute exposure, rarely capturing work-related disease resulting from chronic exposure (Reeves & Schafer 2003; Gunningham & Healy 2004b; O'Neill et al. 2013). In the UK, what data that do exist are on occasions unacknowledged by HSE (O'Neill et al. 2007). The itinerant nature of horticultural work makes linking exposure to illness extraordinarily difficult (Reeves & Schafer 2003). The International Labour Organization (ILO) (2003a) estimated between three and four million people were affected by pesticides and suffered severe poisoning, work-related cancer or reproductive impairments annually, and Richter (2002) estimated that pesticides were responsible for 26 million cases of acute poisoning annually worldwide. It is likely that the majority of agricultural diseases do not result in workers' compensation claims therefore there is no evidence to drive regulatory action in this regard.

Historically, OHS standards in agriculture and related industries have been poor and improvements slow, and it was often economic and political factors rather than public health concerns that drove regulatory policies (Watterson & Watterson 2003). In many of the struggles between technological developments, market forces and changing community

attitudes toward risk and safety, OHS has been of subordinate importance (Healy & Gunningham 2003). The HSE (2011) identified a number of factors contributing to occupational injuries and ill-health in agriculture, including:

- structural factors, particularly the prevalence of small and family businesses, self-employment, increasing contractorisation of services, and the employment of foreign, casual and itinerant workers;
- economic factors, particularly low productivity, marginal returns, low income, and low investment;
- technological factors, particularly working in natural technologically hazardous environments, poor and obsolete design practices, and inadequate and poor maintenance;
- cultural factors, particularly the deep-seated culture of unwise risk-taking and unsafe practices, the widespread belief that regulation is a burden, and acceptance of poor outcomes linked to the inherently hazardous and pressured environment;
- environmental factors such as daylight hours and weather pressures;
- inadequate training and competency; and
- an historic lack of leadership in the industry on OHS.

These issues are compounded by inadequate regulatory oversight. Against a backdrop of reduced HSE enforcement and inspection activity, especially in the occupational health field (Watterson 2009; James et al. 2013; Watterson & O'Neill 2012) comment on regulation and enforcement is a notable omission. An independent review of OHS legislation commissioned by the UK Government in 2011 similarly failed to consider the problem of under-enforcement (Löfstedt 2011a). By keeping enforcement off the agenda, the government is able to avoid the evidence debunking the myth of over-burdensome OHS regulation enthusiastically voiced for decades (BRTF 2005; Hampton 2005; James et al. 2013),¹⁸ despite no examples of agencies in the public health sector engaging in anything other than minimal inspection and enforcement activities (Watterson & O'Neill 2012). Similar problems have been identified in Australia. For example, Holley's (2014) exploration of the labour standards of NSW school cleaners when services are contracted out revealed minimal monitoring, rare enforcement and therefore rare compliance with prescribed labour standards. Contrary to an image of intrusiveness and omnipresence, budgeting cuts have limited regulators' capabilities and effectiveness (Lobel

¹⁸ Recent US findings overturned conventional wisdom: workplace inspections reduce work-related injuries without compromising companies' performance or profits (Levine et al. 2012).

2005).

4.4 Household Environment

As already suggested, understanding the problems hazardous substances pose for agricultural workers requires taking account of the interaction between working and living conditions. Historical and recent research on the impact of residential factors on overall health pointed to inequalities amongst the precariously employed (Muntaner et al. 2011; Quinlan 2011a, 2013a, 2013b). Itinerant and seasonal agricultural workers share specific key elements related to type of work, duration of employment, and changing residence to engage in work (Arcury & Quandt 2007). Infectious diseases caused by poor sanitation and crowded conditions at work and housing sites, including inadequate washing and drinking water, pose a significant threat to this population (Villarejo 2003; Early 2006; Gentry et al. 2007). The 2001-2002 US National Agricultural Workers Survey revealed a significant proportion of workers reported their employer did not provide, on a daily basis, access to water for washing and access to toilets in the field (US Department of Labor 2005). The prevalence of parasitic infestation reflects the health, social and economic conditions within this population (Bechtel 1998). Crowded and unsanitary conditions also increase workers' exposure to environmental toxins and communicable diseases (Early 2006; Quinlan 2013b). Overcrowding combined with poor ventilation and inadequate, faulty, or non-existent plumbing creates an environment in which infectious diseases such as tuberculosis (TB) spread easily (Hansen & Donohoe 2003).

The conditions of work – including inadequate or unenforced legislation – cannot be isolated from broader issues of public health. Connections between subcontracting and exposure to infectious diseases affecting households and the wider community are not new. In an overview of the regulation of work relationships in an international context, Johnstone et al. (2012) remarked that the modern outsourcing wave represented a return to forms of subcontracting that were pervasive during the early stages of the industrial revolution. Not only were precarious working arrangements common during this period but the adverse effects of these arrangements on the health, safety and wellbeing of workers, their families and the wider community was well documented (Quinlan 2009). Indeed, in 1888 leading medical journal *The Lancet* commissioned its own inquiry into 'sweating'.¹⁹ *The Lancet* described workers as "over-worked" in "dirty and moist", "ill-ventilated" and "over-crowded" conditions (1888a: 37-38),

¹⁹ A practice where work is so poorly paid that even the most arduous and lengthy hours of work barely secures subsistence – often associated with multi-tiered subcontracting.

and provided with “inadequate sanitary accommodation” in which susceptibility to common infectious diseases led to a higher mortality affecting not only workers and their families but also members of the public who purchased infected clothing (1888b: 1210). The sweating system of the nineteenth century exposed garment workers to typhoid and scarlet fever, and other zymotic diseases, in addition to general impairment of health from overexertion, bad housing and undernourishment (Kelley 1893). The findings of historical research are not dissimilar to those documenting the contemporary working conditions of some itinerant and seasonal agricultural workers.

Analyses of existing information and evidence of defined ill-health outcomes in agriculture in the UK showed significant increases in the number of cases of infectious diseases (particularly zoonoses such as anthrax, brucellosis, Hantavirus, hydatid, leptospirosis, Lyme disease, Newcastle disease, orf, chlamydiosis, Q fever, ringworm and *Streptococcus suis*) in agricultural workers compared with all other employment sectors combined (Cowie et al. 2005; Stocks et al. 2010). In the US, the rate of parasitic infection is 11 to 59 times higher than that in the general population and, if left untreated, can lead to chronic anaemia or malnutrition (Sandhaus 1998). Garbage heaps and stagnant water breed rodents and insects, which can further harbour and transmit zoonotic diseases such as tularaemia and rickettsial infections (Hansen & Donohoe 2003).

4.5 Conclusion

Agriculture is widely acknowledged as a hazardous industry; workers are exposed to a variety of chemical, physical and biological hazards. Pesticides have been used for centuries and remain the most toxic substances routinely found in the agricultural work environment. The margin of safety for users is often a function of larger body mass compared with the target organism. Drawing upon the wider agricultural literature, this chapter examined pesticide exposures in labour-intensive horticultural crops. The three routes of exposure – inhalation, oral ingestion and dermal absorption – were discussed with the primary means of minimising hand-harvesters’ occupational pesticide exposures, namely PPE and the re-entry interval. It was also noted that multiple mechanisms of exposure may occur simultaneously, and fieldworkers may be disproportionately at risk from pesticide exposure.

For most countries, labour inspection in agriculture is not a priority, and existing services are crippled by lack of financial resources (see Chapter Six). Pesticide exposures are rarely reported and are remote from regulatory scrutiny, thereby complicating the tasks of identifying, monitoring and addressing the insidious health risks associated with exposure. The

chapter concluded with a discussion of the wider issues of social welfare which may impact on worker health. The next chapter describes the research methods adopted to gather empirical evidence for the research questions stated in Chapter One.

CHAPTER FIVE METHODOLOGY

5.1 *Introduction*

This thesis seeks to describe how work arrangements, particularly subcontracting and temporary employment, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. The research compares experiences in Australia and the UK; two countries with similar but not identical regulatory regimes. Chapters Two to Four established the context by reviewing relevant literature on precarious work, OHS outcomes and pesticide exposures. To demonstrate a thorough grasp of the field of study, this chapter first describes the literature review process. The chapter then describes the methodological approach which was largely exploratory. The discussion attempts to explain the merits of using a qualitative research methodology. Sections 4 to 6 describe the methods used. The decision to use a non-probability sampling method and the strengths and weaknesses of the method of data collection are explained, followed by an outline of the method used to collate and interrogate the data collected during the field research. Chapter Six describes the legislative arrangements governing OHS and agricultural chemicals in Australia and the UK, and reviews research that critically examines different regulatory forms and enforcement regimes. Both the literature and regulatory reviews are critical to providing an overall framework and building a rationale for the problem under study (Boote & Beile 2005).

5.2 *Literature Search*

The literature search identified material on: the relationship between precarious work, elaborate contractual chains and OHS; hazardous exposures in horticulture; and the nature and extent of the effect of precarious work on OHS in horticulture. Five methods were used to identify relevant literature in these areas:

- design and carrying out of searches of appropriate databases of scientific research literature;
- following up potentially relevant references listed in the literature identified through these searches;
- following up potentially relevant references by identifying who had cited the literature identified through these searches;
- retrieving and checking “related articles” in the databases; and
- identification and inspection of relevant sources of so-called grey literature, including material contained in conference proceedings, government and non-scientific or peer-

reviewed reports, theses, surveys, media releases, and publications of professional and industry bodies.

A number of databases from the larger electronic systems were searched from their inception until 2013, abstracting primarily peer-reviewed research journal articles. They included ScienceDirect, Scopus, JSTOR, Web of Science, PubMed, Emerald Fulltext, Academic Research Library, and Applied Social Sciences Index and Abstracts. The websites of the International Labour Organization, the Trades Union Congress, the United Nations Department of Economic and Social Affairs, the European Agency for Safety and Health at Work, the UK Health and Safety Executive, the Australian Department of Education, Employment and Workplace Relations, and the UK Department of Environment, Food and Rural Affairs were also searched.

The search strategy composed complex search expressions using Boolean logic, using the terms “AND” and “OR”. For the first theme (precarious work and OHS), searches were made using the search terms “precarious”, “subcontracting”, “outsourcing” and “supply chains” supplemented by the additional phrases “occupational health”, “health”, “occupational safety”, “safety”, “injury”, “hazard” and “risk”. These terms were used disjunctively (OR) and crossed (AND) to ensure systematic and complete coverage. For the second theme (hazardous exposures in horticulture), searches were made using the search terms “horticulture”, “agriculture”, “farm work” and “field work”, supplemented by the phrases “hazardous exposure”, “hazardous”, “hazard”, “risk”, “occupational health”, “health”, “occupational safety”, “safety”, “chemical” and “pesticide”. Terms were again used disjunctively and crossed. For the third theme (precariousness and OHS in horticulture) these terms were supplemented by the additional phrases “seasonal work”, “harvest work”, “migrant worker” and “labour intensive”. The search was not explicitly restricted to articles published in English but the majority of material retrieved was published in English due to the search terms.

An initial reading of titles, abstracts and key words in each of the databases enabled refinement of the literature search. Relevant material was retrieved and scrutinised in its entirety. Full text was also retrieved where the information in the title, abstract, and key words was insufficient for exclusion. The grey literature was accessed via the internet, especially from the sources identified above, and analysed using the approach just described. Grey literature can contribute substantively to understanding scientific challenges and current policy debates, and can be especially valuable where there is little prior research in an area, as in the case of this research. Although the value of using the grey literature has been increasingly recognised (for example Benach et al.’s 2007 WHO report on employment conditions and health inequalities), it is not subject to peer-review and must be evaluated accordingly. Throughout

the thesis this literature is used in an adjunct capacity and its use clearly identified.

5.3 Qualitative Research Methodology

Knowledge of bottom tier horticultural supply chain populations has typically been a product of secondary sources such as administrative data required of primary producers. These data are limited in scope and infrequently include demographic information (Maizlish et al. 1995). Further, estimates of labour contracting prevalence are difficult to obtain: contract workers frequently fail to show up in national labour market statistics, farms rarely keep records of their use, and they are often absent when labour inspectors or social auditors visit (Barrientos 2011). The qualitative research methodology is particularly useful for understanding the experiences of individuals and groups, and the social, cultural and political factors affecting a phenomenon (Popay et al. 1998; Fossey et al. 2002). Several techniques and methods are used by qualitative researches in their pursuit of generating data, including interviews, participant-observation and case studies. In their investigation of risks to migrant²⁰ workers' health and safety in England and Wales McKay et al. (2006) reflected on the difficulties of conducting large-scale surveys with workers given their high levels of mobility and predominance in temporary and casual employment. They concluded qualitative methods were the most effective route for gathering data in relation to this group. The same conclusion was reached for this research.

A multidisciplinary approach applying a range of research methodologies, including directly measuring and comparing pesticide exposures, would contribute to developments in the OHS field, and findings from different methodologies that reinforce one another would add confidence. The research design allows the reporting of perceived exposure and potential sources of pesticide exposure. Quantifying pesticide exposures may be an area for future research. One research initiative that would help document hazardous exposures is establishment of a longitudinal cohort study, which would allow analysis of causal pathways (Arcury et al. 2009b). The US Agricultural Health Study included limited biological monitoring of pesticide applicators and their spouses to evaluate risk factors for disease. The study was conducted in three phases (1993-1997, 1999-2003 and 2005). Problematically, workers who are occupationally and geographically mobile are poor candidates for longitudinal cohort studies, and prospective monitoring is complicated when workers are resident in communities for short periods of time (Zahm & Blair 1993; Villarejo & Baron 1999; Quandt et al. 2002).

²⁰ See A Note on Terminology.

These difficulties are rarely described in the literature, and follow-up studies that fail to achieve successful follow-up seldom appear in publications at all (McCauley et al. 2006). An exception was Nordstrom et al.'s (2001) study of Wisconsin workers, which attempted to locate 100 randomly selected farmworkers 10 years after their registration in a Wisconsin clinic. Only 6 of the 100 could be located.

5.4 Research Design

The section introduces the case study design. The research design includes industry and country selection. The reasons presented in Chapter One are briefly re-stated, and an account of the aggregate distribution of crop production in space and time underpinning the seasonal cycle of labour mobility leads into a description of participant recruitment.

5.4.1 The Case Study Research Design

The aim of this research is to describe how work arrangements, particularly subcontracting and temporary employment, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. A second broader aim is to describe the effectiveness of OHS regulation in horticulture. One approach might be examination of legal proceedings arising under OHS legislation. However, the challenges to legislative protection for precarious workers are unlikely to be detected by an approach based on an analysis of case law because the most vulnerable among workers and the self-employed are unlikely to file claims and even less likely to persevere to the appeal level (Lippel 2006). A better option is a case study based on interviews and associated data collection. Connections between a putative cause and its effect are often rendered visible upon examination of the motivations of the people involved. A well-constructed case study will reveal the interaction (Gerring 2004). However, some methodologists view case studies with extreme circumspection (Achen & Snidal 1989; Gerring 2007). Critics have argued findings are biased and non-generalisable. In response Eisenhardt and Graebner (2007) argued the qualitative researcher's goal is not to develop statistical generalisations but to expand and generalise theories. Case studies can be time consuming and produce potentially unmanageable amounts of data. This is a practical rather than methodological criticism (Blaikie 2000), and one which may emerge from confusion of the case study strategy with specific data collection methods such as ethnography and participant-observation which indeed require large periods of time in the field (Yin 1989). The wording of a research question can influence the kind of research activity required. Case study research is an appropriate strategy when a 'how' or 'why' question is being asked about a contemporary set of events over which the researcher has little or no control (Yin 2009). The

task of examining whether aspects of expanded contractual chains are associated with factors related to pesticide exposure and to worker perceptions of exposure satisfies this criterion.

5.4.2 Multiple Case Study Design

Examination of supply chain management within the Australian and UK food and grocery industries revealed prevailing workplace trends including increasing casualisation, temporary agency labour, outsourcing and work intensification (Wright & Lund 2003; MAC 2013). Although there are some differences in the extent and functions of OHS legislation in Australia and the UK, both are based on the Robens model. A comparative study was adopted. A comparative study strengthens the credibility and robustness of findings, allowing for use of replication logic to support explanations and illustrations of the phenomenon described (Yin 1989). A properly executed cross-national study offers advantages over a single nation inquiry. For example,

- the outside observer can more easily identify features of debates that are overlooked or underplayed by national participants, illuminating one's own circumstances more clearly by contrast;
- where the context is reasonably similar, cross-national experiences may be treated as quasi-natural experiments by drawing lessons about why some regulatory strategies seem promising and doable and others not;
- comparative studies can serve as an antidote to explanatory provincialism; and
- regardless of whether the policy experiences of different polities are easily transplantable, understanding how others see a problem and evaluate and implement options for action offer learning opportunities (Hantrais & Mangen 1996; Marmor et al. 2005).

Although comparative research can be helpful in identifying good practice, Bernstein et al. (2006) emphasised the importance of understanding the underlying social conditions on which a given practice is based. Discussion on industry and country selection follows.

5.4.3 Industry Selection

The reasons for industry selection are found in Chapter One, section 1.2. To summarise, a characteristic of modern horticulture is dwindling employment security, marked by increasing use of seasonal labour engaged in dangerous and physically arduous work. Increased intensity of horticultural production has driven pesticide dependence with impacts on OHS. The horticulture industry is subject to a complex regulatory framework for agrochemicals in

addition to the full range of OHS legislation. Practically, this complex and fragmented system of production and work organisation has limited regulators' capacity to develop and implement coordinated strategies and reduced regulatory compliance for the safe use of pesticides, and workers are often geographically remote from regulatory scrutiny (Gunningham & Healy 2004b). Preibisch and Otero (2014) explored how precarious legal status circumscribed differential inclusion in the Canadian agricultural labour market, including consequences for OHS. The impact of the work environment, including pesticide exposures, on Latino farmworker health has been studied extensively in the US (see for example Arcury et al. 2001, 2010a; Das et al. 2001; McCauley et al. 2001; Quandt et al. 2006). However, the interplay between the arrangement of work and pesticide exposures has been largely overlooked. One exception is Villarejo and Baron's (1999) review of the OHS status of hired crop farmworkers (principally foreign-born) in the US. Overall, horticulture represented an industry where exposure to hazardous substances was clearly an issue and given evidence pertaining to other industries the influence of subcontracting and temporary work arrangements on this warrants investigation.

5.4.4 Country Selection

The reasons for country selection are found in Chapter One, section 1.3, with further regulatory comparison throughout Chapter Six. While the array of horticultural production is more diverse in Australia (due to climate) both countries produce a comparable range of soft fruit, subject to broadly similar production regimes. Confining the study to two contexts acknowledges the scale and complexity of the task under review, together with time and resource constraints and difficulties involved in gaining access to sufficient numbers of participants to generate rich material. This subsection describes the aggregate distribution of crop production in space and time underpinning the seasonal cycle of labour mobility.

Growing regions in Australia that require seasonal labour are concentrated predominantly in the eastern States, visualised in Figure 4 (adapted from Hanson & Bell 2007: 105). Growing areas in Victoria and NSW are widely scattered although there is a strong concentration following the State border along the Murray River (the Sunraysia district) extending into South Australia (Riverland region), and the Murrumbidgee Irrigation Area in NSW and Goulburn Valley in Victoria (often called Victoria's fruit bowl). Queensland fruit production is concentrated in the east, with northern sites confined increasingly to the coast. Similarly, growing areas in Western Australia are scattered along the coastal fringe, and in the State's south-west. Growing areas in Tasmania are predominantly on the north and south coasts, and

the few growing regions in the Northern Territory are widely scattered (Hanson & Bell 2007; NLWRA 2008). The aggregate distribution of crop production in space and time underpins the seasonal cycle of labour mobility. Due to each crop's unique cultivation and harvest requirements, demand for labour is temporary, varying in duration from weeks to months, and generally occurring around the same time each year.

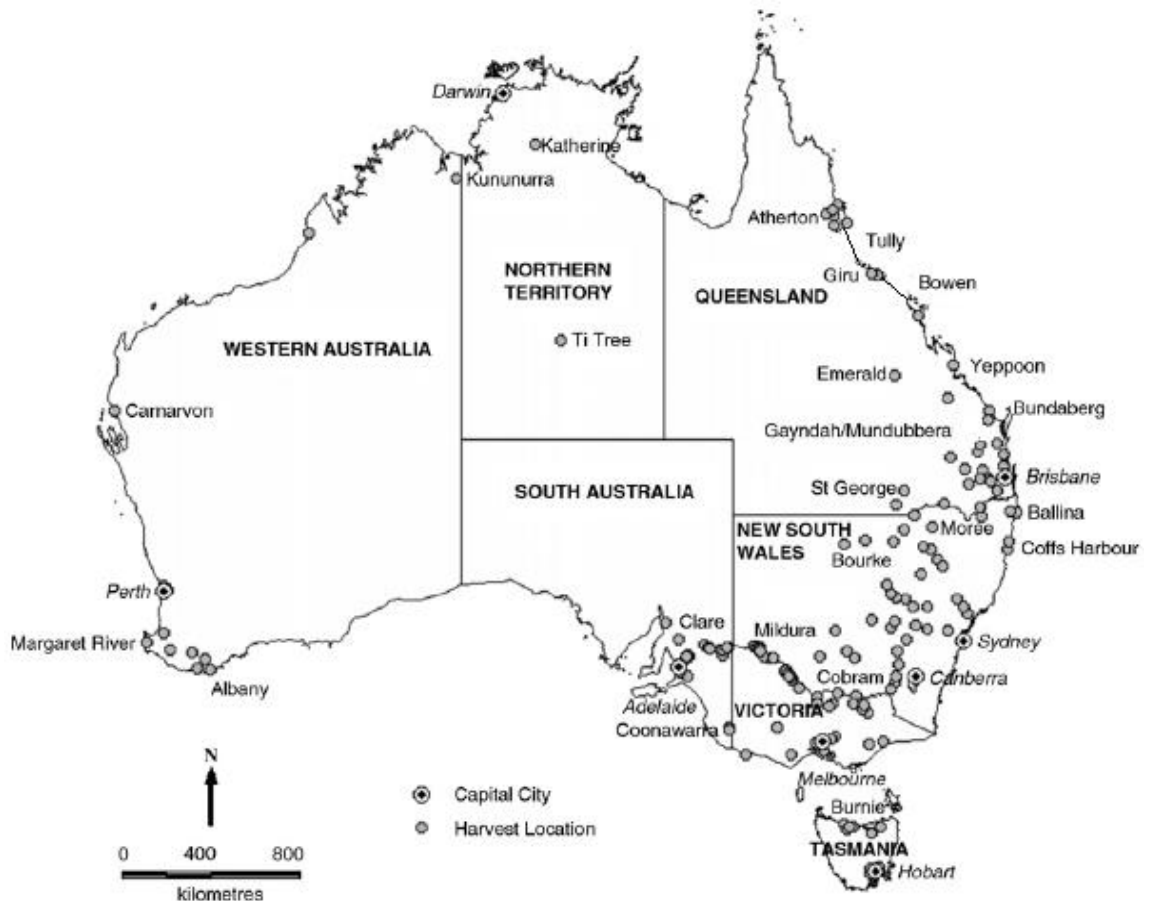


Figure 4: Australian Fruit Regions Requiring Seasonal Labour

Australia's size and environmental diversity allows several crops to be grown at widely dispersed locations and seasonal workers follow a complex network of circuits chasing year-round work. By contrast, the majority of fruit crops in the UK need to be harvested between June and October, although new varieties of plants and improved technology have lengthened the season for some crops. There is a spatial relationship between horticultural crops and the use of temporary workers (see Scott et al. 2008). The concentrations of horticultural crops and concomitant demand for temporary horticultural workers are focussed around nine clusters: Lincolnshire, Cambridgeshire and Norfolk (England); Fife, Perthshire, Kinross and Angus (Scotland); Herefordshire and Worcestershire (England); Kent (England); West Lancashire

(England); Cornwall (England); North Lincolnshire and Humberside (England); West Sussex and Hampshire (England); and Suffolk (England).

Having discussed industry and country selection, the next subsection describes the process of recruitment for the research project.

5.4.5 Participant Selection

The workplace is often the best and most important venue for data collection in studies on factors related to occupational exposures. However the power differential between employer and worker can significantly affect the feasibility of workplace studies. McCauley et al. (2006) described farmworker reluctance to volunteer for a study if participation was perceived as threatening to their employment. Hennebry (2009) made similar remark about temporary foreign workers. Examining international students in New Zealand horticulture Anderson et al. (2012) noted the same problem, compounded by difficulty locating a transient and frequently 'hidden' workforce and potential employer hostility to intrusion. Arcury et al. (2006b) too suggested access to workers may be denied because the employer or supervisor wants to avoid work disruption, or because of concerns about potential liability if the researcher reports that regulations are not being observed.

The HSE commissioned McKay et al. (2006) to undertake research which assessed patterns of employment of migrant workers in England and Wales and the main OHS risks they encountered in six industries, including agriculture. The primarily qualitative study involved face-to-face interviews with migrant workers. Fifteen fieldworkers who could speak a variety of different languages conducted as many of the interviews as possible in their home language. Of the 200 migrant workers interviewed, only 9 were working in agriculture, compared with 67 in processing and packaging, 37 in hotels and catering, 29 in healthcare, 25 in construction, 23 in cleaning, and 10 in other industries. Although McKay et al. (2006) did not explicitly address industry sample size differences, they did state slightly more interviews were conducted in the North-East where they were able to negotiate good access arrangements through local networks. Thus local networks facilitating access arrangements may not have been prevalent in agriculture. Discussion on participant recruitment, including aforementioned issues in recruiting itinerant and often foreign-born workers, follows.

Field research began with invitation emailing potential participants. Eligibility criteria included being a minimum of 18 years of age and direct involvement in horticulture. Eight sampling frames formed the basis for initial contact with potential participants:

1. Supplier websites such as Berry Gardens and association websites such as the NSW Cherry Growers Association and Association of Labour Providers provided contact details for individuals within member organisations.
2. The Gangmasters Licensing Authority (GLA) public register lists the labour providers who are licensed or who have applied for a licence in UK horticulture.
3. The approved Operators of the Seasonal Agricultural Workers Scheme (SAWS) were found on the UK Home Office website.
4. Local harvest labour providers are listed in the Australian Harvest Guide.
5. Review of the publically accessible list of respondents on the future of the Agricultural Wages Board for England and Wales.
6. Regulatory agencies (including Workplace Health and Safety Queensland, HSE and GLA) and trade unions (including The Australian Workers' Union (AWU) and Unite) were approached.
7. Use of search engines. This strategy identified a top tier of visible labour providers and growers. To combat potential bias, workers were generally not accessed through these companies.
8. Capitalise on industry contacts.

In various studies snowball sampling has been employed to obtain information and access to hard to reach populations (such as non-institutionalised drug users: Sifaneck & Neaigus 2001, Gu et al. 2008; lesbian, gay, bisexual and transgendered (LGBT) employees: Creed & Scully 2000; and LGBT Anglican ministers: Creed et al. 2010). The snowball sampling technique requires the researcher to make initial contact with a small group of people who are relevant to the research topic and then use these to establish contacts with others (Bryman 2012). The 'snowball' effect is captured in a metaphor that touches on the central quality of this sampling procedure: its accumulative dimension (Noy 2008). The itinerant nature of harvest work together with geographical remoteness made snowball sampling the most viable sampling strategy for this research. The so-called snowballing resulted from the initial contacts' enlistment of other employers, labour providers and workers (Appendix 1 visualises the snowball effect). To increase representativeness and heterogeneity in the sample, multiple starting points for the snowball chain were used, with just a few links drawn from each chain (Bloch 2007). Although the choice to interview a cross-section of people, and the use of multiple respondents, was important for capturing a variety of viewpoints, participants were

not selected from a sampling frame therefore the sample was potentially subject to numerous biases. A considerable amount of control over the sampling phase was relinquished to the participants; those with many links were more likely to be recruited into the sample. Additionally, as a non-probability sampling method, it is difficult to know how representative the final sample was of the population from which it was drawn (although argued concerns about external validity and the ability to generalise do not loom large within qualitative research – see Bryman 2012). Further problems of representativeness can arise from “gatekeeper bias” (Sixsmith et al. 2003). Thus, which individuals were contacted and the weight of their contribution was at the researcher’s discretion.

In-person worker recruitment took place at camping sites, private caravan parks, working hostels and workplaces. Conversations were frequently opportunistic (especially effective in Australia). The dominance of employer-provided accommodation either onsite or a short distance from the workplace (a requirement of the SAWS) in UK horticulture was problematic to recruitment. Access to workplaces and residential camps was controlled by employers and supervisors, making the task of accessing workers independent of the employer challenging. One business assented to allowing access to their workers; two businesses declined the invitation. Three caravan and camping sites were visited in key fruit growing areas (Herefordshire and Kent). One site was vacant and another stated in the Site Rules that migrant workers were not accepted. The third location was occupied by Eastern Europeans and minor success in recruitment occurred here.

In their examination of the impact of changes in the rural labour market in rural Victoria, Australia on people’s health, McGann et al. (2012) recruited participants with the assistance of unions (advertisements were also placed in local newspapers to ensure that the data sample was not limited to union affiliated workers). Attempts to recruit workers through union and industry associations and advocacy groups for this research were unsuccessful. Advocacy or community groups with access to these workers were not found in Australia (which reinforced the isolation of workers in Australia) and their activities were considerably limited in UK agriculture. Many accounts of horticultural working conditions provided by union officials were anecdotal, and they suggested temporary foreign workers would be fearful of losing their employment by speaking with a researcher, which is consistent with the literature. Similarly, participating employers and labour providers stated they would expect reticence to participate amongst their peers.

‘Legally effective’ informed consent was obtained from all participants (Sedlack & Stanley 1992; Yin 2009) in accordance with the requirements of the University of New South Wales’

Human Research Ethics Advisory Panel (ethics approval was granted on 27 April 2012; Reference No. 126018). All participants were supplied with information about the research in the form of a Participant Information Statement (Appendix 2), and were informed that their participation was voluntary and that they may cease participating at any stage without repercussion. Overall, 40 percent of the organisations and individuals contacted agreed to participate in the research (67 of 165 invitations). Only 10 individuals explicitly refused to participate, and another 4 expressed interest but then ceased communication without explanation. The remaining 51 percent did not respond to the invitation.

Unlike statistical data published across numerous cases, study of a limited number of cases, using excerpts from life histories, can make identifying the person from the contextual information a much simpler task (Flick 2009). All audio files and data gathered were stored securely and only accessible to the researcher, in accordance with protocols established by the University of New South Wales Human Research Ethics Committee. Participants were de-identified in the write-up and care was taken to ensure descriptions could not be used to identify locations. Foreign-born workers are an especially vulnerable population due to their precarious employment and temporary status (Cooper et al. 2004b; Hennebry 2009). Allowing participants to nominate the interview time and location and use of unique identifiers in place of names helped safeguard participants from potential ramifications of participation. Participants were asked to confirm that they were at least 18 years old, since the ILO (2010b) estimated that worldwide 60 percent of all child labourers aged 5-17 years work in agriculture, mostly as unpaid family members. This problem is not confined to developing countries; hundreds of thousands of children are estimated to work as hired labour in US fields and orchards, and are among the least protected of all working children.²¹

Due to the numerous factors that can influence sample size in qualitative studies (including heterogeneity of the population: Ritchie et al. 2003; scope of the study and nature of the topic: Morse 2000; expertise in the chosen topic: Jette et al. 2003; and use of multiple interviews with the same respondent: Lee et al. 2002), researchers are often reluctant to suggest what constitutes a sufficient sample size. The sample size for this research followed the concept of saturation described by Strauss and Corbin (1998: 136) as

...reaching the point in the research where collecting additional data seems

²¹ Federal law sets the standard minimum wage in agriculture at 14 years (the standard age limit in all other sectors of the economy is 16 years), and numerous exceptions enable children as young as 10 years to work legally on farms (Hess 2007).

counterproductive; the “new” that is uncovered does not add that much to the explanation.

In total 67 interviews were undertaken. A summary of participant characteristics with some basic demographic information including the type of participant (worker, labour provider, regulator, etc.), age and workers’ nationality and horticultural experience is presented in Chapters Seven and Eight (Table 7 and Table 8). To generalise, temporary workers in UK horticulture were older and more experienced than temporary workers in Australian horticulture (average age 32 years versus 25 years) which probably reflects differences in the temporary labour migration mechanisms. Nearly 75 percent of the interview sample was male. Recruitment efforts targeted men and women equally. It is unclear whether the gender proportions of the participant sample biased the results, but analysis identified no significant differences in responses between men and women. Although this thesis does not address gender this may be an area for future research. A better understanding of gender-environment interactions dealing with different social-related characteristics of pesticide exposures and related adverse outcomes is needed. It is possible that female farmworkers have different patterns of exposure and different pesticide exposures due to working on different crops than males. Other studies have shown that men and women typically perform different tasks in agricultural operations, which can lead to different levels of pesticide exposure; a higher proportion of females may be involved with activities with direct exposure to crops such as cutting, sorting, and harvesting because they are less likely to operate machinery (Mills et al. 2005; Villarejo & McCurdy 2008). The next section describes the data collection process.

5.5 Data Collection

Data collection occurred in two phases. During phase 1 between June 2012 and March 2013 with eighteen workers on Australia’s harvest trail, together with twenty-three key respondents who employed or provided labour, and industry, union and government representatives. The interviews were undertaken in major fruit growing regions of NSW and Queensland coinciding with the harvest when work availability is high. For the purpose of better understanding the subject matter – the work undertaken, working conditions and exposures, and the arrangement of work – eight days were spent picking cherries and residing at a campground in Orange, NSW. This experience was tangential to the research; it enhanced understanding but at no times was used to substantiate ideas or conclusions. There are many regions that could have been visited. To make the task of data collection manageable, it was natural to restrict the number of regions visited and these regions provided some rich material.

Phase 2 of the study occurred between May and August 2013, consisting of seven interviews

with workers employed in UK horticulture, together with nineteen key respondents who employed or provided labour, and migrant advocate, union and government representatives. The low involvement of workers in UK horticulture in the interviews is a limitation of this research. The interviews were undertaken face-to-face in major fruit growing regions of England. For the purpose of better appreciating the isolation and dependence of workers on their employers to access local conveniences and services, upon arrival at the nearest town centre specific locations were reached by walking (or if necessary cycling). The restriction of participants' locations to England was the outcome of responses to the invitation email. Regulator and trade union activities and some labour providers covered the expanse of the UK.

Semi-structured, face-to-face interviewing suited the mix of questions being asked (Loosemore & Andonakis 2007). Some questions related to an objective awareness of OHS regulation whilst others addressed subjective/experiential understandings. Depending on who was being interviewed and therefore the focus of investigation, questions ranged from micro-level details of daily working lives to questioning on the intent and suitability of regulation, or macro level policies. Due to the possible sensitivity of the data being collected, it was hoped semi-structured interviewing (when compared with an anonymous questionnaire or structured interview) would help establish the rapport and trust with participants needed to reliably obtain it (Douglas 1985; Denscombe 2003). Further, data based on experiences need to be explored rather than simply reported in pre-structured responses. Asking people for their accounts, talking and listening to them, was considered the most feasible way to generate the kind of data desired (Denscombe 2003).

More generally, semi-structured interviewing offers a number of important advantages over other research methods such as anonymous questionnaires or structured interviewing. For example,

- An interview can take into consideration individual and situational factors including cultural and linguistic diversity, immediately resolving confusion therefore improving validity (Douglas 1985);
- Asking people to talk through specific experiences maximises opportunity for the construction of contextual knowledge (Mason 2002), and provides opportunity for participants to free associate thereby allowing the researcher to develop understanding of how issues and concerns are connected in the participants' perceptions. By eliciting this type of narrative, the researcher secures access to the participant's concerns which might not be visible using other research methods (Hollway & Jefferson 2000);

- Participants are able to develop ideas and speak more widely on the issues raised (Noor 2008), allowing the researcher to expand on emerging themes (Tesch 1990);
- A questionnaire can include an unstructured series of items with open-ended responses but an adequately detailed response requires maximum participant motivation. In face-to-face interviewing the interviewer makes the recording (Sedlack & Stanley 1992) (due to time restraints, one participant opted to participate by written response); and
- Greater participant freedom and control may generate a fairer and fuller representation of participants' perspectives (Mason 2002).

Nevertheless, semi-structured interviewing has its limitations. First, the omnipresent power relationship of the interview can impact the findings:

The power of the interviewer rests in his or her authority as a seeker of knowledge and methodological expertise, and that of the interviewee as a more or less privileged knower (Nunkoosing 2005: 699).

This exchange is rarely equal because the researcher interprets the interview transcript. Second, participants' experiences are reconstructed during the interview, which is a construct dependent on the participant's ability to verbalise, conceptualise and remember. The researcher colludes with the participant to create and construct stories that are authentic (Mason 2002). Third, participants' behaviour is measured indirectly as it is reported. Reports may be erroneous due to impression management or the face-saving socially desirable response in which people, either consciously or unconsciously, attempt to enhance their image in the eyes of others (Sedlack & Stanley 1992; Eisenhardt & Graebner 2007).

Scott (2013b) noted a number of unique challenges to researching employers' use of foreign-born labour. Businesses can be fearful of negative consequences if they "tell it like it is". This fear was described as "endemic" in UK food production (2013b: 704). Employers frequently overlook or conceal less savoury aspects of workplace and workforce change. Unmasking the corporate face is another concern, made more difficult as people increasingly perform emotional work and surface and deep acting (see Hochschild 1979; Grandey 2003). This challenge was evident with two government employees. One participant edited their interview transcript, removing off-the-cuff and potentially inflammatory remarks. The second participant assented to sign the consent form but refused audio recording citing views expressed would be personal opinions, which may not accurately reflect the agency's position. Incidentally, three workers in the UK refused audio recording because of fears of harassment from law enforcement agencies and repercussions for ongoing employment.

Copies of the interview guides are provided in Appendix 3. The purpose of the research interview was to explore the views, experiences, beliefs and motivations of individuals on specific matters. The step-by-step process for creating the interview guides follows.

1. Outline the broad areas of knowledge relevant to answering the primary research questions of the study.
2. Develop questions within each of these major areas, shaped to fit particular kinds of participants. The interview guides developed for industry, union and government representatives, employers and labour providers attempted to reveal legislative knowledge, beliefs about pesticide exposures and OHS, and perceived implications of short-term and contracted labour on OHS. According to Arcury et al. (2001), pesticide exposures can be reduced when workers are provided with safety equipment and sanitation facilities, safety behaviour education and training, and a work environment conducive to safety behaviour. This informed the interview guide for workers – the guide investigated workers' beliefs and knowledge of pesticide exposures, pesticide-related practices, and safety training experiences.
3. Adjust the language of the interview according to the participant, using terms that participants can understand given their knowledge and language skills.
4. Develop probes that will elicit more detailed and elaborate responses to key questions.
5. Think about the logical flow of the interview; begin with a 'warm-up' question to help establish rapport and close with a question that leaves the participant feeling empowered or listened to.
6. Personally answer the interview questions and amend if necessary.
7. Pre-test the interview guides with respondents from populations similar to those under study (i.e. foreign-born, small business owner, or industry experience) to determine if there are flaws, limitations or other weaknesses within the interview design (see further discussion below).
8. Refine the interview guides prior to the implementation of the study.

Qualitative data collection and analysis are often progressive; a subsequent interview should be 'better' than the previous one as insights gained from previous interviews can be used to improve specific questions, thereby making pilot or feasibility studies and pre-testing of a particular research instrument not wholly necessary (Holloway 1997). Interview guides were slightly modified in light of emerging findings, where additional clarification was required. Examples include rephrasing enquiry about the employment arrangement by asking workers who employed them rather than their employment status and providing examples of what

might be included in a workplace or task-specific induction, the way of introducing issues such as asking workers whether they could think of any examples of when they might have been exposed to pesticides at work, addition of new topics such as potential advantages/disadvantages of union involvement, and development of separate interview guides for each category of participant. Determining what topics followed more or less 'naturally' also took some adjustment after several interviews. These and other modifications enhanced the inquiry process by providing ongoing focus to the research based on variables that arose during the study.

Although all participants were conversant in English, in some cases it was their second or third language. The level of English comprehension and spoken English seemed clear if somewhat fractured on occasion. The following discussion focusses on the process of interviewing persons from another culture in English, where English was not their first language, borrowing from the strategies of Birks et al. (2007). Assumptions were not made about the level of participants' English proficiency, and it was also important to be aware of the variations in accent and expression. Due to the differences between the participants' communication skills and language ability, the way in which the questions were phrased was tailored to fit the participants' circumstances to help ensure clarity of the information being sought; a practice described by Healey and Rawlinson (1993) and Mikecz (2012). For example, concerning induction some participants were asked "what did he [the employer] tell you?", or concerning workers' perception of their employer some were asked "does he [the employer] care about you?" Conversely, care was taken not to modify communication techniques to the extreme. Overly simplifying statements and labouring the point is a potential outcome of the researcher trying to be understood, but this manner can appear patronising to the participant and can be detrimental to the flow and direction of the interview. The use of probing questions elicited more detailed and elaborate responses. The use of singular, open-ended questions also elicited depth and breadth of information; asking more than one question in any one sentence may have resulted in confusion for the person being interviewed and the possible loss of information.

Birks et al. (2007) suggested a common cause of anxiety when interviewing people when English is their second language is their concerns about their ability to express themselves appropriately and be understood. The perception that they are being indelibly recorded can be an added source of anxiety. Strategies for making the participant feel at ease included reassuring them about their ability to be understood and the confidentiality of their responses. It was felt that interviewing participants in their native language through the use of

interpreters would have introduced an outsider to the research process and potentially undermined the trust and rapport that the researcher must work hard to secure (Usunier 1998). In some cases participants sought assistance in communication from friends due to the (self-admitted) lack of confidence in their English language skills. Lack of familiarity with the language being used resulted in stunted interview responses from a small number of participants. The use of probing questions helped to draw out responses and active listening and eye contact helped establish an atmosphere conducive to unreserved communication. Characteristics of the interviews, including interview length and a subjective assessment of the participants' English proficiency, are presented in Table 2 and Table 3. A unique identifier was recorded in place of participants' names to preserve anonymity; hereafter references to participants are written in the notation form presented in Table 2 and Table 3.²²

On cross-cultural research Temple and Edwards (2002) correctly stated that the same word can mean different things in different cultures. Evaluations of participants' understanding of 'safety' considered responses in the context of the whole interview rather than a specific question and there seemed to be a fairly uniform understanding amongst participants as far as could be determined. Policy concerning OHS in participants' countries of origin was either longstanding or a focus in recent decades due to the process of accession to the EU. The more difficult terms for participants were words like 'chemical residue', but this was a challenging concept even for people from English speaking backgrounds. This problem was less linguistic and more to do with participants not having a base understanding of the fate of chemicals. The present study describes perceptions of pesticide exposure and how work arrangements may be associated with factors related to exposure. Perception is a subjective process. It was through the use of probing questions which elicited more detailed and elaborate responses identifying how participants acquired, interpreted and generally made sense of their work environment that the one native-English speaking interviewer was able to adequately capture the nuanced meaning surrounding the discussions of OHS and pesticide exposure.

Interviews were audio recorded where permission was granted. Although requesting participants' permission to make recordings may have introduced substantial reactivity into the data collection, it was hoped participants would become accustomed to being observed,

²² The first letter denotes context (A: Australia or U: UK), the second letter denotes category (W: worker, G: horticultural business, P: labour provider, R: regulatory agency, U: trade union, T: trade association, or M: miscellaneous), and the number distinguishes participants of the same category. The notation AG1 indicates a representative of an Australian horticultural business. The notation UW1 indicates a worker in UK horticulture.

eventually speaking “naturally” thereby providing “thick descriptions” to give the thesis verisimilitude (Silverman 2000; Flick 2006). Those recorded did not seem to notice the recorder on the table. Only four participants refused to be recorded in which case handwritten field notes on the essentials of the participants’ answers and significant non-verbal cues were recorded during the interview and immediately after when themes were still fresh in the mind. Undertaking the interviews primarily in the participants’ own environment provided additional insight; it was important not to separate what participants said from their context. Participants were provided with a copy of their interview transcript prior to data analysis and were allowed to remove any parts that they did not want included in the analysis. The least vulnerable (i.e. government and union officials) were most likely to edit their transcripts. Participants who were the most vulnerable (i.e. not able to take the time to review their transcripts due to the need to work or fatigue from, or had migrated) were the least likely to edit their transcripts.

Guarantees of anonymity encouraged participation and addressed concerns in relation to potential exposure of employers’ OHS issues to regulatory agencies. Further, emphasising the investigator’s student status probably reassured participants who might otherwise temper their responses because of potential liability or increased regulation. Across the participating businesses, people with different roles and responsibilities participated, from owner-growers and Company Directors through to Human Resource Managers and Team Leaders. Participating labour providers ranged from individuals who ran their own recruitment businesses to large nationwide recruitment agencies with multinational extension offices. Some supplied labour specifically to agriculture whereas others were general labour providers who supplied workers to a range of industries. For larger businesses, getting information relating to every aspect of the interview guide was difficult, especially when participants had specific portfolios such as human resources. In such cases, the interview placed more emphasis on providing information on recruitment and employment practices. It was rare that access to more than one informant in a single business was possible. Responses were more or less candid depending upon the participant’s personal characteristics although as a generalisation participants in Australia were more candid. This observation may be cultural (McAndrew et al. 2000), political (in addition to the recent cessation of the SAWS and the Agricultural Wages Board, the UK food industry has been subject to a number of undercover exposés making employers wary for fear of being portrayed as the main offenders (Scott 2013b)), methodological (different recruitment modes), or coincidence.

Table 2: Worker Interview Characteristics

Code	Nationality	English proficiency	Location	Length (mins.)	Comments
AW1	British	Proficient	Camp site	12	Background in environmental forensics
AW2	British	Proficient	Camp site	20	Described experiences applying pesticides for five continuous months
AW3	British	Proficient	Hostel	12	Recounted exploitation despite English proficiency and education
AW4	British	Proficient	Hostel	11	
AW5	British	Proficient	Hostel	7	Finite window of opportunity to access the participant
AW6	British	Proficient	Camp site	8	Desire to minimise imposition on participant's personal time
AW7	German	Advanced	Camp site	14	Sound understanding of German OHS law
AW8	German	Advanced	Caravan park	13	Sound understanding of German OHS law and workers' compensation
AW9	German	Intermediate	Caravan park	10	Participants' German-speaking friend assisted with communication
AW10	German	Advanced	Caravan park	13	
AW11	French	Elementary	Camp site	7	French-speaking travel companion assisted with translation
AW12	French	Intermediate	Camp site	8	Unreserved communication when explaining negative perception of employer
AW13	French	Elementary	Camp site	7	Participants' French-speaking girlfriend assisted with communication
AW14	French	Proficient	Park	15	Nominated 'spokesperson' for the group based on English proficiency
AW15	French	Intermediate	Caravan park	13	Collaborated with French-speaking friend when describing some experiences

Code	Nationality	English proficiency	Location	Length (mins.)	Comments
AW16	Italian	Elementary	Caravan park	5	Lack of familiarity with the English language resulted in stunted responses
AW17	Canadian	Proficient	Camp site	11	
AW18	Australian	Proficient	Camp site	15	
UW1	Bulgarian	Proficient	Workplace	7	Opportunistic enquiry concerning managing OHS amongst temporary, foreign-born
UW2	Polish	Advanced	Caravan park	NA	Unrecorded conversation lasted approximately 20 minutes
UW3	Polish	Intermediate	Caravan park	NA	Unrecorded conversation lasted approximately 10 minutes
UW4	Polish	Intermediate	Workplace	15	Unfamiliar with expression 'trade union'; translated as <i>solidarnosc</i> /solidarity
UW5	Spanish	Intermediate	Workplace	10	The use of probing questions helped to draw out responses
UW6	Portuguese	Advanced	Workplace	14	
UW7	Lithuanian	Advanced	Caravan park	NA	Unrecorded conversation lasted approximately 10 minutes

Level	Description
Beginner	Very basic knowledge of the language; limited vocabulary with no real understanding of the grammar.
Elementary	Understand and use everyday expressions and basic phrases; simple interaction provided the other person talks slowly and clearly.
Intermediate	Able to describe experiences and events, and briefly give reasons and explanations for opinions.
Advanced	Able to interact with a degree of fluency and spontaneity that makes regular interaction with native speakers possible without strain for either party.
Proficient	Fluent and spontaneous expression for social, academic and professional purposes.

Table 3: Non-worker Interview Characteristics

Code	Category	Region	Location	Length (mins.)	Comments
AG1	Partner-grower	NSW	Workplace	50	
AG2	Owner-grower	NSW	Workplace	75	Also the presider of a member-based industry organisation
AG3	Business Director	NSW	Workplace	22	
AG4	Owner-grower	NSW	Workplace	26	
AG5	Owner-grower	NSW	Email	NA	Email response; poor telephone line
AG6	Owner-grower	NSW	Phone	12	Desire to minimise imposition on participant's personal time (undertaken at 8pm)
AG7	Business partner	Qld	Workplace	22	
AG8	Owner-grower	Qld	Market	12	Opportunistic interview
AG9	Partner-grower	Qld	Workplace	30	
AP1	Labour provider	NSW	Café	20	
AP2	Labour provider	Qld	Phone	32	
AP3	Subcontractor	NSW/ Qld	Café	38	
AR1	WHSQ Inspector	Qld	Phone	27	
AR2	WHSQ Inspector	Qld	Phone	20	
AR3	WHSQ Inspector	Qld	Phone	24	

Code	Category	Region	Location	Length (mins.)	Comments
AR4	WorkCover Inspector	NSW	Workplace	41	Opportunistic interview
AR5	WorkSafe Inspector	Victoria	Phone	25	
AR6	WorkSafe Inspector	Victoria	Phone	11	
AU1	AWU official	NSW	Workplace	29	
AU2	AWU official	Victoria	Phone	38	
AM1	NSW DPI	NSW	Workplace	40	
AM2	NSW EPA	NSW	Library	60	
AM3	Industry rep.	National	Phone	26	
UG1	Farm Director	Essex	Workplace	28	
UG2	Fruit Manager	Herefords.	Workplace	28	
UG3	HR Manager	Herefords.	Family home	35	
UG4	Business partner	Herefords.	Workplace	22	
UG5	Business owner	Kent	Workplace	31	
UG6	HR Manager	Kent	Workplace	29	
UG7	Business Director	Kent	Email	NA	Email response; unable to schedule an interview amid production demands
UP1	Labour provider	UK-wide	Workplace	52	

Code	Category	Region	Location	Length (mins.)	Comments
UP2	Labour provider	UK-wide	Workplace	35	Unrecorded conversation lasted approximately 20 minutes
UP3	Subcontractor	England	Phone	47	
UR1	HSE Inspector	UK-wide	Workplace	NA	
UR2	HSE Inspector	UK-wide	Phone	24	
UR3	GLA	UK-wide	Phone	19	
UU1	Union official	UK-wide	Workplace	60	Informal discussion; no interview guide
UU2	Union official	UK-wide	Workplace	39	
UT1	Trade association	UK-wide	Phone	28	
UM1	Migrant advocate	UK-wide	Workplace	38	
UM2	OHS campaigner	Int'l	Family home	120	
UM3	Photojournalist	England	Phone	23	Informal discussion; no interview guide

5.6 Data Analysis

As the central data upon which findings are based, and the basis of interpretations and medium for communicating findings, this research relied on interpretations of interview transcripts to understand the social reality. Data analysis began with interview transcription, and this text became a substitute for the reality under investigation. Patterns of speech such as meaningful silences, non-lexical utterances like "um" and discourse markers like "y'know", may characterise or signify some importance in the participant's world and were reflected in transcription. The interviewer transcribed all recorded interviews verbatim and reviewed any field notes. This approach strengthened the analysis process by fostering greater familiarity with the text within the context in which it was collected. Interview transcripts provide a descriptive account of the study but do not provide explanations. The process of data analysis is briefly explained below.

5.6.1 Data Coding

Sorting and ordering data appears an entirely practical task which allows the researcher to begin making interpretive sense of data however the process of cataloguing and indexing is not analytically neutral. When devising a particular system the researcher is making assumptions about which phenomena will be catalogued and therefore what counts as data and what does not (Mason 2002). Assumptions were based on what constituted data in the context of this research and were ascertained through the literature review. Although Strauss and Corbin's (1998) three-step coding process is the central process by which theories are built from data – grounded theory – Braun and Clarke (2006) claimed researchers often fail to fully subscribe to the theoretical commitments of grounded theory. Flick (2006: 307) recommended thematic content analysis for

...comparative studies in which the groups under study are derived from the research question and thus defined *a priori*.

The underlying assumption is differing views can be found in different social groups. The process of thematic content analysis involves identifying themes and categories that emerge from the data and attempting to verify, confirm and qualify them. The method of analysis described next involves managing the data using data analysis software.

5.6.2 Computer Aided Qualitative Data Analysis

The task of coding text can be done manually; however, the coding and retrieval process is facilitated by use of computer aided qualitative data analysis (CAQDA). By simply reducing the amount of paper shuffling, the analytic processes become less wieldy and tedious for the analyst, and the mechanics of field research is less likely to obstruct the analytic processes (Lee and Fielding 1991; Basit 2003). Locating different segments of information or the number of times that codes are applied, and coding categories into groups are also much easier with CAQDA (García-Horta & Guerra-Ramos 2009), although the underlying logic remains the same (Coffey & Atkinson 1996; Fossey et al. 2002). However the ability to do complex analysis may lead to a proliferation of codes including false leads. Further, the coding process may become completely removed from the transcription and data entry, thereby undermining the analytical procedure (Lee & Fielding 1995). In choosing CAQDA its impact on the research process and the outcome was carefully weighed.

Interview transcriptions and field notes were imported into the qualitative analysis software package QSR NVivo 10. Each interview was coded using exploratory open coding whereby transcripts were characterised line by line producing an exhaustive list of thematic incidences guided by the literature review, presented in Table 4 below. Next, the codes were grouped into categories by similarity, and sentences, phrases, and paragraphs surrounding coded text were reviewed to identify common themes emerging from the data (presented in Appendix 4). The text was also searched by words and phrases to minimise oversight. Each theme was then rechecked against the data to ensure that the theme reflected the data. Finally, narratives that portrayed each theme were selected for inclusion in the write-up. The empirical core of this research draws directly from the interviews and, wherever possible, presents verbatim text from them to

...enable the reader to “hear” what the researcher heard (Reinharz 1992: 39).

Table 4: Data Analysis Code Definitions

Code	Definition
4th party	Sub-subcontractor, i.e. one under contract to a subcontractor for completion of a portion of the work for which the subcontractor is responsible.
AWB	Reference to the Agricultural Wages Board.
Beliefs	Acceptance that something is true, especially without proof.
Chemicals	Compounds or substances generally, especially those which have been

Code	Definition
	artificially prepared.
Common sense	Sound practical judgment independent of specialised knowledge or training.
Compensation	A form of insurance providing wage replacement and medical benefits to employees injured in the course of employment.
Compliance	A business' adherence to laws, regulations, guidelines and specifications relevant to the business.
Consumer	End purchaser of fresh produce for consumption.
Culture	The values, attitudes and prejudices held by a culture which embody the way a group of people sees the world.
Dependent	Aspect of vulnerability; workers can face an imbalance of power leaving them at the mercy of their employers for risk of not completing visa program requirements.
Disorganisation (D)	Concerns characteristics of organisations lacking commitment to a stable workforce, including weakened inter-worker communication, task coordination and fractured OHS management systems.
Document	Material that provides evidence or that serves as a record.
Enforcement	The act of compelling observance of or compliance with a law, rule, or obligation.
Exposure	Contact or exposure to a chemical substance by touching, breathing, eating or drinking.
Food safety	The handling, preparation and storage of food in ways that prevent foodborne illness.
Fragmentation	Individuals in the same workplace employed on different terms and conditions, with potentially split loyalties across employers and functions and different work cultures.
Hazard	The intrinsic ability of a substance to inflict damage or harm.
Hazardous	Any chemical that is a health hazard (i.e. acute or chronic health effects may occur in exposed workers) or a physical hazard.
Hours	Any of the hours of a day during which work is done.
Hygiene	Conditions or practices conducive to maintaining health and preventing disease, especially through cleanliness.

Code	Definition
Individualisation	The shift from shared responsibility for managing risk to individuals accepting responsibility for managing the risks faced by themselves.
Induction	General inductions allow the employer to discuss with new workers policies and procedures, including drug and alcohol, and bullying and harassment. A site specific induction identifies locations of first aid equipment and first aid trained staff, emergency evacuation procedures and muster points, identified hazards, and locations of all safe operating procedures and SDS. Task specific inductions may include for example, safe use of vehicles, correct operation of plant and product handling techniques.
Inspection	Any type of visit or check conducted by authorised officials on business premises, activities, documents, etc.
Intensification	The increase in workload, often without sufficient resources, time and reimbursement (financial or otherwise).
Language	Linguistic differences which may present significant challenges to communicating OHS information and ensuring safe work practices.
Negative (supply chain)	The effect of retailers appropriating ever-greater value from producers whilst simultaneously driving down the margins for growers under pressure on quality, volume and price.
Outsourcing	The contracting out of a business process to another party.
Payment	Aspect of vulnerability; workers paid cash-in-hand with no clear record of hours worked or pay rate.
Perceptions	The ways in which employers and workers are regarded or understood by participants.
Piecework	Employment in which a worker is paid a fixed piece-rate for each unit produced or action performed regardless of time.
Positive (supply chain)	Attempts by supply chain actors to use their market power to improve OHS management by taking action to monitor and enforce compliance.
Power	The systematic imbalance of power between employers and workers whereby employers use their stronger bargaining power to drive wages to subsistence levels.
PPE	Anything used or worn by a person to minimise risk to their health or safety.
Pressures (P)	Encompasses sources of income insecurity which influence safe work

Code	Definition
	practices; employment/ income insecurity, and intense competition for work can contribute to a range of hazardous practices including work intensification, cutting-corners, accepting hazardous tasks and working when injured.
Racism	The belief that all members of a race possess characteristics, abilities, or qualities specific to that race, especially so as to distinguish it as inferior or superior to another race(s).
Recruitment	The process of finding and hiring someone for a job.
Regulations	Impose mandatory requirements for duty holders to comply with when managing OHS.
Regulators	Government bodies responsible for managing workplace health and safety and labour standards.
Regulatory failure (R)	The extent to which OHS and employment regulation is weakened by precarious employment arrangements.
REI	The period of time after a field is treated with a pesticide during which restrictions on entry are in effect to protect persons from potential exposure to hazardous levels of pesticide residues.
Reporting	Notifying the employer of any injury, illness, or near-hit.
Residue	The pesticides that remain on or in food after they are applied to food crops.
Responsibility	Legal obligation to take action to establish that the workplace and its operations are safe.
Rights	Legal rights having to do with labour relations (pay, benefits, safe working conditions, etc.) between workers and their employers usually obtained under labour and employment law.
Risk	The combination of the probability of a hazard-related incident occurring and the severity of harm or damage that could result.
SAWS	Reference to the Seasonal Agricultural Workers Scheme.
Special population	Describes workers living and labouring in remote rural areas, often paid by the piece with little discretion over how their work is performed. These workers are often foreign-born which limits ability to organise collectively and willingness to report, making a considerable amount of pesticide exposure and illness invisible.

Code	Definition
Supervision	A workplace activity in which a manager oversees the activities and responsibilities of workers.
Support	Resources providing employers with an understanding of their OHS responsibilities and practical guidance on how to manage OHS risks.
Take-home	The take-home exposure pathway involves the transport of contaminants from the workplace to the residence on a worker's clothing or person.
Tracking	The ongoing collection, analysis, and interpretation of health data (occupational injuries, illnesses, hazards and exposures) for purposes of improving health and safety.
Training	The action of teaching someone a particular skill.
Undercut	Offer goods or services at a lower price than a competitor.
Union	An organisation which represents the interests of workers who work in the same or similar industries or jobs.
Vertical integration	An arrangement in which the supply chain of a company is owned by that company; usually each member of the supply chain produces a different product or service, and the products combine to satisfy a common need.
Voice	The ability of the beneficiaries of regulation – workers themselves – to experience meaningful participation in structuring their work environments.
Vulnerability	Workers at risk of having their workplace entitlements denied, and who lack the capacity or means to secure them.
WHP	The minimum time that must elapse between the last application of a pesticide and harvest.
Women	Special vulnerability of women to pesticide exposures.

5.7 Establishing Convincingness

Emphasis on triangulation in qualitative OHS studies (Hannif & Lamm 2005; Porthé et al. 2010) suggests an underlying desire by some researchers to establish the credibility of qualitative data in quasi-positivistic terms. However, Golden-Biddle and Locke (1993) argued it is inappropriate to apply quantitative standards and practices to assess the convincingness of qualitative work when the interpretive perspective of science is adopted. This section describes how this research establishes convincingness.

To establish “authenticity”, the so-called “been-there” quality of field research (Golden-Biddle & Locke 1993: 599), a number of “symbolic markers” (Marcus & Cushman 1982: 33) were used throughout the evidentiary chapters, embedding commonly-used and colloquial words, phrases and syntax. Thus, an appeal is made to the reader to accept the researcher’s presence in the field. Interview audio recordings should also ensure independence in the documentation of data. Data excerpts represented the fieldwork, and underscored the relationship between field data and their theorised significance, contributing to “plausibility” – the second dimension of convincing. A “sandwich structure” whereby a core idea was introduced, followed by the presentation of data and a more abstract explanation of what the data showed was adopted following the suggestion of Golden-Biddle & Locke (2007: 58). Making audio recordings and carefully transcribing them satisfied the criterion of low-inference descriptors, and presenting long extracts of data in the evidentiary chapters indicated the line of questioning that provoked the response (Silverman 2001). As the final dimension of convincing, “criticality” was achieved through the text’s form and rhetorical style, prompting the reader to question taken-for-granted ideas and beliefs, such as the well-chronicled practice of outsourcing the most hazardous tasks.

5.8 Conclusion

This chapter presented the methods used to collect, analyse and interpret data relating to the effect of subcontracting and temporary employment on OHS in Australian and UK horticulture. It was evident from Chapter Two that hazards arise not only from the static features of the workplace but also from the way work is organised. Thus the need for multidisciplinary approaches to OHS research is growing, and qualitative research methods are at the forefront of this evolving field because of their ability to look beyond medical paradigms to consider the broader social, economic, and cultural contexts in which OHS issues are embedded (Gordon et al. 2005). Although selection of the qualitative research methodology was based on careful consideration of the research project aims and questions defined in Chapter One, a multidisciplinary approach applying a range of research methodologies would have reinforced findings and further contributed to developments in this field. By virtue of their tenuous employment status, geographical isolation and frequent migration, researching the OHS implications of precarious work in horticulture can present serious methodological problems, particularly if government does not mandate cooperation. A number of US studies have attempted to characterise work characteristics and pesticide exposures using community-based health projects (Arcury et al. 1998, 2001; Austin et al. 2001; McCauley et al. 2001), and

this would be an area for future research in Australian and UK horticulture.

Data was collected from semi-structured interviews. The qualifications for using semi-structured interviewing were both general and specific to the topic of investigation. The limitations inherent in qualitative analysis, including participant reactivity and the researcher's personal biases and idiosyncrasies (raised in Chapter Nine as a limitation of the research project), were offset by the ability to interpret data relating to the social world and the concepts and behaviours of people within it. The aim was to build an accurate understanding of the real situation, and is an effort to provide new insights and explore a dimension of OHS amongst horticultural workers that has not been the focus of earlier research. The next chapter describes the legislative arrangements for OHS and management of agricultural pesticides in the UK and Australia, where it is argued formal labour market regulation and worker protection normally assume close employer attachment. Workers in precarious work encounter difficulty making their voices heard, often resulting in their exclusion from protective legislation by design or by virtue of their invisibility (Bernstein et al. 2006). The empirical Chapters Seven and Eight apply the methods described and broadly address the aspects of expanded contractual chains that may compromise OHS and undermine regulatory coverage, and note social and institutional factors promoting workforce vulnerability.

CHAPTER SIX LEGISLATIVE ARRANGEMENTS

6.1 *Introduction*

This research aims to describe how work arrangements, particularly subcontracting and temporary employment, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. The study compares two countries with similar but not identical regulatory regimes: Australia and the UK. The literature review examined contours of the changing labour market and the vulnerabilities it is producing generally (Chapter Two) and in horticulture specifically (Chapter Three). Horticulture operates within a complex regulatory web; some regulations relate directly to OHS and agricultural pesticides, but there are also labour standards and food safety regulations. Chapter Three discussed the piecework payment system and temporary labour migration mechanisms. The Working Holiday visa and the Seasonal Agricultural Workers Scheme (SAWS) are revisited in the evidentiary Chapters Seven and Eight as factors exacerbating workforce vulnerability. This chapter looks at areas of common concern within the Australian and UK OHS contexts. In order to examine health and safety in horticulture it is necessary to describe the regulatory frameworks in broad terms. The structure for this chapter is as follows. Section 6.2 describes approaches to OHS regulation. While the Robens Report shaped OHS legislation in the UK and Australia, several key presumptions of the Robens philosophy have been challenged, most notably its unitarist presumption that employers and workers share a common interest with regard to OHS.

The OHS policy environment consists of major actors. Section 6.3 provides an overview of the layers of legislative arrangements operating across the UK and Australia. Employment conditions in both contexts are regulated by means of common and statutory laws and regulations, and in Australia by a mixture of collective bargaining and arbitration tribunals that can make legally binding awards (Bray & Macneil 2011; McCallum 2011; Gahan & Pekarek 2012). Although award regulation comprises minimum labour standards underpinning wages and working conditions, most provisions are couched in terms of continuing, fulltime, waged employment²³ and those clauses specific to casual/temporary workers are generally enforced

²³ Laws based on the taken-for-granted model of employment often fail to reflect the actual labour market. For discussion on formal/*de jure* convergence and functional/*de facto* convergence (Gilson 2004; Gahan et al. 2012), and the way changes in work arrangements have exposed limitations in labour protection laws due to the *de jure* and *de facto* gaps in the regulatory framework see Quinlan (2006) and Carre and Heintz (2008).

in a limited and haphazard fashion by an under-resourced inspectorate (Campbell 1996; Owens 2001; Pocock et al. 2004). There is an extensive body of legislation addressing OHS but further action could be taken to protect vulnerable groups.²⁴ Section 6.4 examines the legislative management of agricultural pesticides, beginning with a description of the EU legal framework within which chemical risk management in the UK operates. The complexity characterising the regulatory framework for pesticides in Australia is described whereby States and Territories have primary responsibility for regulating use.

6.2 Approaches to OHS Regulation

Major reviews of the international literature consistently conclude that legal regulation, backed by credible enforcement, is the primary driver for organisations to initiate changes to improve OHS performance (Wright et al. 2004; Tompa et al. 2007; Walters et al. 2011b). The first attempts to regulate OHS were the early nineteenth century British Factory Acts principally concerned with regulating working hours for children and women, and minimum safety standards (particularly machine guarding). This “traditional model” relied upon detailed and technical specification standards, and was enforced by an independent state inspectorate using an informal advise-and-persuade approach to enforcement coupled with formal prosecution using criminal law in the last resort (Johnstone 2004a; Walters et al. 2011b). This approach was typical of OHS regulation in other parts of the world including Australia (Johnstone 2000, 2009).

A 1972 report by Lord Robens into the state of industrial safety standards in the UK resulted in the enactment of the *Health and Safety at Work etc. Act 1974*. The Act sought to reform existing legislation that was prescriptive, did not apply to all industries, and did not protect all workers (Robens 1972). A significant recommendation was that industry-specific legislation be

²⁴ Some countries have implemented initiatives to address vulnerable groups, including training and awareness raising programs targeting migrants (Austria, Ireland, Belgium), and women and workers with atypical contractual arrangements (Italy, France) (Belin et al. 2011). Although existing regulatory, inspection and enforcement provisions for combating labour exploitation can be found wanting, Clark (2013) revealed how nine EU Member States (France, Germany, Italy, Ireland, Latvia, the Netherlands, Poland, Spain, Sweden) detected and tackled forced labour.

progressively repealed and replaced by a framework statute covering all industries.²⁵ The Robens model required employers to put in place management systems designed to prevent or minimise OHS risks (Johnstone & Jones 2006).²⁶ The new framework also included avenues for worker involvement in OHS. From the mid-1970s onwards, the Robens model of regulation was adopted in Australia, Canada, New Zealand and many other countries (though not the US).

The most remarkable reforms were the adoption of the two basic assumptions of the Robens philosophy: those in industry could themselves undertake responsibility for safety at work – the doctrine of self-regulation²⁷ – and there should be means for workforce involvement in OHS (Dawson et al. 1988; Hutter 1993). Most contemporary OHS frameworks incorporate some arrangement to facilitate worker voice. Legislation in Australia and the UK actually contains an important element of worker involvement not advocated by Robens, namely elected employee/worker health and safety representatives. In a number of jurisdictions, these representatives have the power to issue provisional improvement notices, including suspending work if there is an immediate risk to worker health or safety.

The collaborative approach was predicated on an identifiable and stable workforce, informed workers and a high level of union organisation because, for example, unions provided critical logistical support including training and protection from victimisation for health and safety representatives (Walters et al. 2011b). These preconditions have been seriously undermined since the 1980s. Growth in precarious work has weakened mechanisms for worker involvement and diminished union membership (Johnstone et al. 2005; Benach et al. 2007). In agriculture and indeed other industries dominated by small business these changes were less pronounced because union membership had always been very low (Barrientos et al. 2003; Gunningham & Healy 2004b; Butovsky & Smith 2007). Nonetheless, it is still relevant to acknowledge evidence that temporary employment status weakens workers' capacity to voice

²⁵ Not coincidentally, there was also significant evolution in the style of OHS regulation in Europe and Australia, with most jurisdictions moving from a prescriptive approach to more self-regulatory models, using less direct means to achieve broad OHS objectives (Dawson et al. 1988; Bluff & Gunningham 2003; Vickers et al. 2005).

²⁶ Prescriptive/specification regulatory standards remain in industries where stakeholders (regulators, employers, unions and workers) are not comfortable removing compliance requirements (Cliff 2012).

²⁷ A voluntary, self-regulatory approach actually existed prior to the *Health and Safety at Work etc. Act 1974*. It developed in the nineteenth century as the principal means of regulating the large number of trades and industries which developed from the industrial revolution (Baggott 1989; Bartle & Vass 2005).

OHS grievances and increases the risk of victimisation if concerns are raised (Aronsson 1999; Underhill 2005a; Newman 2011). The informal nature of harvest worker employment frequently leads to an extreme power imbalance between employer and worker (Campbell 1996; Earle-Richardson et al. 2003). Although seasonal workers may be numerically strong, they are itinerant and less concerned about employment conditions attached to a specific employer (Underhill 2005b). Size and other procedural requirements (such as health and safety representative and workplace health and safety committee arrangements) on participatory mechanisms in OHS laws also make participatory structures an unlikely feature (Quinlan & Mayhew 2000; Johnstone & Quinlan 2006).²⁸

Workplace health and safety legislation incorporates internal self-regulation into a broader co-regulatory strategy whereby government prescribes a particular outcome (such as the general duty to take all reasonably practicable steps to ensure health and safety) but does not prescribe the methods industry must adopt to achieve the outcome (Gunningham 2011a). The result is effectively enforced “self-regulation” (a value-laden term – see Watterson & O’Neill 2012) in which organisations are required to address, monitor and self-enforce state constitutive rules (Johnstone & Jones 2006; Gunningham 2011a). This approach is informed by an often uncritical assumption that self-regulating businesses are uniformly honest actors. It also assumes common interest between employers and workers, obscuring the fact that business self-interest and investment in OHS are often in tension²⁹ (Baldwin 2004; Hemphill 2004; Gunningham 2011a; Gallagher & Underhill 2012). The approach fails to understand the inequalities of workplace relations (Gunningham & Johnstone 1999). Although the philosophy and subsequent legislation recognised the possible need to force regulatory compliance upon employers, this responsibility was assigned to regulators (external enforcement) and internal pressure from organised labour, namely trade unions (Hutter 1993). Self-evidently, if any partner is unable to fulfil the role assumed to it, this tripartite system of regulation will descend into a form of *de facto* deregulation (Tombs 2000; Tombs & Whyte 2010).

²⁸ Incidentally, the nature of work in the meat-processing industry for much of the twentieth century was isolated and seasonal yet the historiography of the meat-processing industry is distinguished from most other industries in Australia by militant unionism (see O’Leary 2008). Moreover, although it is a traditional blue-collar union, the Australasian Meat Industry Employees’ Union remains relevant in a climate of increasing decentralisation (Jerrard 2000).

²⁹ The wilful exposure of workers to asbestos and subsequent avoidance of liability for victims’ compensation by James Hardie Industries Limited is one recent example of the dangers of self-management (McCulloch & Tweeddale 2008; Peacock 2009; Holland & Pyman 2012).

The management of risk is the core of regulatory governance (Bartle & Vass 2008). Risk-based regulation emerged alongside concepts such as “responsive” (Ayres & Braithwaite 1992; Baldwin & Black 2008), “smart” (Gunningham & Grabosky 1998) and “light touch” regulation and the “regulatory arrangement approach” (Van Gossum et al. 2010). Concerns have been raised as to the general efficacy of such approaches, particularly “light touch”³⁰ inspection and enforcement regimes: reductions in the official structure aimed at monitoring adoption of good OHS practice may contribute to the perception amongst employers that poor OHS management is acceptable and will not be detected (Vickers 2008; Tombs & Whyte 2012; Croucher et al. 2013); inspectorates move away from random inspections and toward targeted interventions, focussing on the most hazardous industries (Fookes et al. 2007); potential dissonance between regulators’ understanding of risk and that of business and the wider public; and the danger of concentrating efforts on small numbers of high risks to the exclusion or under-enforcement of large numbers of low risks (Black 2006; Gunningham 2011b). The exhortation of risk-based regulation has been endorsed in Australia (see Black 2006) and the UK (see Hampton Review 2005), and is central to the so-called “better regulation” policy agenda that emerged in the late twentieth century (Wilkinson et al. 2005; Gunningham 2011b; Watterson & O’Neill 2012).³¹ This approach has been applied to resource allocation and targeting, and to intervention strategies, in which the level of risk determines the compliance or enforcement action to be taken (for further detail see Watterson and O’Neill’s (2012) report on occupational and environmental health in Scotland).

There is a vast literature on inspection and enforcement (see for example Johnstone 2004a; Maconachie & Goodwin 2010; Quinlan & Sheldon 2011; Tombs & Whyte 2012; Holley 2014). For most countries, labour inspection in agriculture is not a priority and labour inspection activities in this area are seriously under-resourced (Hurst 2000; Guthrie & Quinlan 2005; Watterson 2012). Watterson (2012) remarked that the Health and Safety Executive (HSE) will only engage in reactive inspections in agriculture (except for their commitment to the program of inspection of liquefied petroleum gas installations – an extraordinary strategy given mortality from liquefied petroleum gas explosions on farms is nil, see Watterson & O’Neill 2012), with proactive inspection no longer assessed as an effective use of resource. Similarly,

³⁰ A subtle form of regulation that attempts to influence the behaviour of labour market players, with less reliance on state imposition of legal standards as a means of regulating behaviour (Howe & Landau 2007).

³¹ Regulation in Australia has been influenced by the UK better regulation initiative and by the complimentary views of Sparrow (2000).

Healy and Gunningham (2003) noted the low probability of detection and prosecution for OHS contraventions at Australian agricultural workplaces despite significant levels of non-compliance.

6.3 *International OHS Legislative and Standard Setting Arrangements*

Before describing the regulatory framework pertaining to agriculture in the UK and Australia in detail it is worth making brief reference to international standards developed by the International Labour Organization (ILO) – to which both Australia and the UK are members – and the EU regulatory framework which applies to the UK. Subsection 6.3.1 below notes the principal ILO Conventions relevant to the protection of horticultural workers' health and safety, which are of less practical than symbolic importance but are a form of international regulation. The EU plays an important role in developing policy and legislation in Member States, and OHS is a fundamental issue of social policy. Subsection 6.3.2 describes the European Framework Directive on Safety and Health at Work: a substantial milestone in improving OHS in the EU. Given the influence of the EU framework on the UK, it is logical to discuss the UK next. Subsection 6.3.3 presents the *Health and Safety at Work etc. Act 1974* as the basic text for OHS in the UK. The scope and limit of employers' general duties in regard to persons other than employees is described together with principal provisions regulating the working conditions of precarious workers generally and the vulnerabilities of horticultural workers specifically. Some protections are available to workers in UK horticulture through the Gangmasters Licensing Authority. Whereas the UK has a centralised state structure, in Australia traditionally OHS has been an area of State and Territory responsibility, discussed in subsection 6.3.4. Australian horticulture has not benefitted from initiatives aimed at regulating supply chains involving vulnerable workers in other industries.

6.3.1 *International Labour Standards*

International labour standards are legal instruments drawn up by the ILO's constituents. They set out basic principles and rights at work in the form of legally binding international treaties (Conventions) that may be ratified by Member States, or recommendations that serve as nonbinding guidelines (ILO 2012). The most elaborate infrastructure for OHS is described in C155 Occupational Safety and Health Convention 1981 and the accompanying Recommendation 164. Although Australia is a signatory to C155, ratification did not affect Australian legislation because the principles of C155 are espoused by the Robens reforms, which began prior to this Convention. Several ILO Conventions address the health and safety of

workers in contact with chemicals at work generally and in agriculture specifically. The Convention that most clearly addresses pesticide exposures is C184 Safety and Health in Agriculture Convention 2001. Neither Australia nor the UK are signatories but the Agriculture Convention represents a standard on which national agricultural health and safety policies and programs may be based (ILO 2003a). The Convention addresses frequent deficiencies in national legislation, by which only those employed under contracts of employment are entitled to full OHS protection to the neglect of informal labourers (Vapnek et al. 2007). However it excludes some of the most vulnerable groups, including the self-employed.

Whilst the ILO has sought to develop global standards on working conditions, it has no enforcement powers or sanctions to enhance compliance. The EU represents new types of complex, multilevel decision-making and implementation processes. Since the 1990s the EU influence in relation to OHS increased in scope, depth and volume, leading to a number of related Directives (Hämäläinen 2008). The most significant of these is the Framework Directive 89/391/EEC, which aims to ensure convergence and harmonisation of OHS legislation across EU Member States, discussed next.

6.3.2 EU OHS Framework

As a concept harmonisation has currency across most federal systems and confederations such as the EU. The European Constitution establishes the EU, on which the Member States confer competences to attain shared objectives. The EU is founded on the Treaty on European Union and the Treaty on the Functioning of the European Union (Treaty on European Union Article 1), with the legal basis for the enactment of regulations and directives found in Article 288 of the Treaty on the Functioning of the European Union. Regulations have a direct effect upon Member States, whereas directives require Member States to align their national legislation to the standard directive but allow greater autonomy in the legislative program. The European Framework Directive on Safety and Health at Work (Directive 89/391/EEC) adopted in 1989 was a substantial milestone in improving OHS in the EU. Article 2(1) states the Directive shall apply to all sectors of activity, with explicit inclusion of agriculture.

The Framework Directive guarantees minimum safety and health requirements throughout the EU. Article 5(1) provides that an employer has a duty to ensure the safety and health of workers in all matters relating to work, adopting the wider definition of ‘worker’ to mean “any person employed by an employer” (Article 3(a)). Where an employer enlists competent external services or persons, this shall not discharge the employer of their responsibilities (Article 5(2)). Duties to take proactive risk management approaches are amplified in

regulations. The Directive does more than establish a framework for workers' health and safety protection. The concept of a comprehensive approach to OHS is embedded in Article 6, with requirements that mandate risk management arrangements for employers according to preventive principles that define good practice (Walters 2003).

Directive 91/383/EEC supplements the Framework Directive, aiming to ensure that workers who have a fixed-duration or temporary employment relationship are afforded the same level of protection as other workers. The extent to which measures in the Directive have been implemented is unclear. Although Article 10a provides for a reporting scheme for Member States to report on the practical implementation of the Directive, the European Commission (2011) determined that the quality of information provided by Member States has been insufficient to allow proper monitoring of the Directive. Directive 91/383/EEC was transposed by successive versions of the *Management of Health and Safety at Work Regulations 1999* (Great Britain), and Regulations 2000 (Northern Ireland) and Regulations 1996 (Gibraltar). However, the basic text in this field is the *Health and Safety at Work etc. Act 1974*, discussed next.

6.3.3 UK OHS Legislative Arrangements

Although the Framework Directive adopts a proactive risk management approach, the *Health and Safety at Work etc. Act 1974* and specification-based regulations already provided a regulatory framework for risk management (see James & Walters 1999). Agricultural work is subject to the full range of OHS legislation, and that imposes a general duty of care. Legislative requirements that must be met include: identification of hazards and assessment of risks in the workplace; effective risk control measures; records of OHS processes; employee induction and training; consultation with employees and employee participation; and health surveillance of employees for hazardous substance exposures where relevant.

Although EU legislation does not generally apply to the self-employed,³² section 3 of the *Health and Safety at Work etc. Act 1974* states it shall be the duty of every employer and self-employed person to conduct their undertaking in such a way as to ensure persons not in their employment but who may be affected thereby are not thereby exposed to risks to their health or safety. This is an example of 'gold-plating' in which implementation goes beyond the minimum necessary to comply with the requirements of European legislation. However, James

³² Notable exception is Article 10 of Directive 92/57/EEC on the implementation of minimum safety and health requirements at temporary or mobile construction sites.

et al. (2007) argued section 3 may not provide protection in situations where subcontracted work is undertaken away from an employer's premises. At the very least the type of activities so covered remains uncertain. How far section 3 serves to impose supply chain obligations on organisations in respect of supplier ones is also uncertain (Walters & James 2011). Regulation 3 of the *Management of Health and Safety at Work Regulations 1999* does little to ameliorate the potentially limited application of the Act to externalised activities. Additional obligations on employers in relation to cooperation and coordination when two or more employers share a workplace (Regulation 11), and provision of certain types of information to persons other than their employees (Regulations 12 and 15) highlight further ambiguities in the geographical scope of employers' duties. Practically, many employers are simply ignorant of their obligations (James et al. 2007).

Small workplaces are difficult to reach in terms of OHS regulation and service (Eakin et al. 2000; Walters 2002; Croucher et al. 2013). Safety and Health Awareness Days have been used with apparent success to raise awareness of OHS issues and regulatory initiatives in sectors where there are large numbers of micro-enterprises that are difficult to access through more conventional means, including agriculture, construction and the retail sector (Walters et al. 2011a). The apparent success has bolstered HSE's continued pursuit of OHS promotional strategies, despite criticism that this strategic focus is undertaken at the expense of inspection (James & Walters 2005; Tombs & Whyte 2010). Knowledge of legislative requirements also falls considerably with employer and workplace size, with only a small proportion of small businesses able to identify applicable statutory OHS requirements (James et al. 2004; Wright et al. 2004; Baldock et al. 2006; Underhill & Quinlan 2011b). Walters (2001: 174) explained:

[Small businesses] cannot respond effectively to the management systems approach to the regulation of health and safety; with its emphasis on employer responsibility... they have poor access to help and advice... [and] have difficulty keeping abreast of regulatory obligations, in knowing which regulatory requirements apply, identifying their relevance and what action is needed to achieve compliance.

Although low-level legislative awareness does not necessitate a poor OHS environment (with commitment to good housekeeping and common sense seen as drivers for good practice), significant problems persist in terms of less immediate and less tangible health risks such as those arising from hazardous substance exposures (Vickers et al. 2005).

As in a number of other countries, in the UK there has been growing recognition that supply chains can present a serious challenge to OHS regulatory apparatuses and inspectorates, with evidence of adverse effects on work and OHS in a range of industries. Responses include

adoption of ethical codes and mandatory requirements. Many UK clothing retailers and some manufacturers are heavily involved in the Ethical Trading Initiative's measures on improving working conditions of workers in manufacturing units (Pretious & Love 2006). However, international subcontracting and the role of agents and intermediary suppliers limit the effectiveness of codes-based strategy. This allows the retailer to maintain the high moral ground despite deriving cost advantage by sourcing from noncompliant factories (Hale & Shaw 2001). At the policy level, both government and HSE address the importance of supply chain management in OHS (Walters & James 2011). As a subsector characterised by third-party supplied labour, the fresh produce supply subsector was identified as appropriate for intelligence-led proactive inspection.³³ A summary report of inspection and enforcement action is due the first quarter of 2014/15.

The gangmaster system is a relic of coercive nineteenth century practices associated with the recruitment and control of labour (Strauss 2009). The Morecambe Bay tragedy, in which 23 undocumented Chinese cockle pickers drowned, brought the use of undocumented/illegal labour and working conditions within the gangmaster system to the fore (Anderson & Rogaly 2005). This led to the *Gangmasters (Licensing) Act 2004*, regulated by the Gangmasters Licensing Authority (GLA). The primary objective of the *Gangmasters (Licensing) Act 2004* is to curb the persistent and systemic exploitative activities of gangmasters. Unions, non-governmental organisations, government officials and supermarkets worked together on the Act under the auspices of the Ethical Trading Initiative's Temporary Labour Working Group. Although the term 'gangmaster' traditionally described the self-appointed manager who took charge of a gang of workers (House of Commons 2003), Scott et al. (2007) presented a gangmaster typology which showed the gangmaster epithet masks considerable diversity. The term 'gangmaster' in the Act describes an array of businesses. If an individual or business is supplying labour to the agricultural, horticultural, shellfish gathering or related food processing and packaging industries then they are acting as a gangmaster and require a licence (Wilkinson et al. 2010).³⁴

Licences are issued following demonstration of compliance with wide ranging standards conditions, including OHS. These standards are revised from time-to-time (last in May 2012) and are set out in the current edition of the GLA's Licensing Standards (GLA 2012). When

³³ Workplan 2013/14: Fresh produce Subsector Intervention.

³⁴ The *Gangmasters Licensing (Exclusions) Regulations 2013* exclude from licensing an individual or business who supplies a worker to do forestry work.

assigning responsibility for OHS,

A licence holder must co-operate with the labour user to ensure that:

- responsibility for managing the day to day health and safety of the workers has been agreed and assigned,
- a suitable and sufficient health and safety risk assessment has been completed (and recorded where required) before work commences, and
- any risks identified are properly controlled. (GLA 2012: Licensing Standard 6.1)

A licence holder must also cooperate with the labour user to ensure responsibility for, and provision of any training deemed necessary to carry out the work safely. They must also cooperate with the labour user to ensure provision of adequate and appropriate PPE, welfare facilities, and arrangements for first aid and the recording and reporting of reportable incidents at work (GLA 2012, Licensing Standard 6.3). The Code of Practice for Labour Providers to the Agriculture and Fresh Produce Industry is a voluntary measure that sets out a standard of good practice. This standard involves compliance with existing legislation and generally accepted good practice within the industry.

A major success of the GLA has been raising awareness of the issues and of the Authority itself as an enforcement agency, in turn raising standards in supply chains (Wilkinson et al. 2010). Another endeavour has been generation of maximum publicity from licence revocations, as a warning to other labour suppliers, labour users and retailers, and as a beacon to potential whistleblowers (Wilkinson et al. 2010). However, Brass (2004) suggested coercion remains at the root of gangmaster control. An empirical study of forced labour among low-wage migrants within the UK food industry revealed fear and powerlessness were almost ubiquitous (Scott et al. 2012). The HSE (2010) reported foreign-born workers' knowledge of OHS and related rights and responsibilities was low, and the view that responsibility lies with the individual was widespread. Similarly, many employers reported confusion on allocation of duties and responsibilities when a labour provider under a temporary contract supplied workers. A number of successful cases have been brought for offences related primarily to gangmasters' failure to ensure health, safety and welfare of vulnerable workers (Watterson 2009). In 2012 the Department of Environment, Food and Rural Affairs announced plans to scale back the remit of the GLA, including abolishment of compulsory inspection of businesses upon application of a licence (DEFRA 2012b).

Although sectoral level bargaining is observed in many EU countries, there are only isolated

examples of company agreements in the UK.³⁵ A review of the policy context underpinning the emergence of gangmaster licensing stated:

Whilst the UK has one of the most significant recruitment industries in Europe, it is also one of the least regulated. Moreover, employment/workplaces have generally been subject to low levels of inspection/enforcement in the UK relative to other EU Member States (Geddes et al. 2007: 5).

Small businesses experience especially low frequency of inspection, and the threat of lost business from adverse publicity and regulatory attention is minimal (Wright 1998; Vickers et al. 2005). These conditions create opportunity for unscrupulous operators to thrive across the economy. Chapter Three noted foreign-born workers can be particularly vulnerable. These workers can be excluded from employment rights because of tight access conditions and, because they are vulnerable, they are not in a position to enforce what limited rights are available to them (Ewing 2008).

A number of regulations fall outside the sphere of OHS but are nevertheless relevant to temporary workers. The *Part-Time Workers (Prevention of Less Favourable Treatment) Regulations 2000* essentially extend statutory employment protection to workers engaged in atypical work. McKay (2001) described initial criticism of the draft regulations that sought to limit the right to protection to those classified as ‘employees’. The Regulations were amended to cover all workers however the scope for comparison is narrow. Vosko (2009) claimed such regulations still pivot on the male norm of the standard employment relationship by pursuing a framework for labour protection that extends the employment norm by addressing time-based deviations from it. The requirements for equivalency and comparable worker mean the Regulations will benefit workers in forms of employment closely resembling the standard employment relationship – groups for whom comparators are easily found. Similar provisions are found in Regulation 5 of the *Agency Workers Regulations 2010* (which implements the provisions of Directive 2008/104/EC). Recognition of the unique tripartite relationship between agency, user and worker is a key feature, but practical application is complicated by wide interpretations of ‘employment’ (see Arrowsmith 2006; Waite & Will 2001). Section 4 of the *Health and Safety at Work etc. Act 1974* imposes duties on persons in control of premises to ensure access and egress to the premises, and any plant or substance on the premises, are

³⁵ Notably a recognition agreement between Manpower and the Transport and General Workers’ Union, and collective agreements between GMB and a number of agencies including Montrose, Adecco and Apollo.

safe and without risks to health to persons other than employees. Thus, the labour user has a general duty of care in negligence at common law to agency workers and visitors.

Whereas the UK has a centralised state structure, OHS regulation in Australia has been an area of traditional State and Territory responsibility. This distinction is most evident through inconsistent Australian State- and Territory-based OHS laws. Recent reforms represent a new way of viewing safety governance and reflect the contemporary labour market, discussed next.

6.3.4 Australian OHS Legislative Arrangements

Consistent with the traditional model of OHS regulation and inspection which was founded on addressing physical hazards (and limiting the hours of female workers), the focus during the early twentieth century was on establishment of detailed technical specification standards to prevent occupational injuries, but largely neglecting occupational disease (Walters et al. 2011b). Much of the early industry in Australia was based on establishing agricultural systems and exploiting the natural resources (Henzell 2007). Early colonial OHS regulation concerned working conditions for coal workers. By contrast, agriculture was excluded from the scope of Australian provisions until the mid-1950s, and remained largely so until the mid-1970s³⁶ (Gunningham & Healy 2004b). The predominantly self-employed and family based ownership of farms militated against the extension of industrial legislation to agricultural workplaces (Healy & Gunningham 2003).

By the 1970s, OHS laws had become piecemeal and unwieldy; regulations were passed as hazards arose without regard for consistency or coherence (Lamm 1994). The period from 1974 to 1989 witnessed an overhaul of all Australian State and Territory (hereafter referred to as State) OHS laws based on the Robens philosophy. Legislation remained primarily a State responsibility with each jurisdiction adopting its own variant of the Robens model (Johnstone 2004b). Although the general duty provisions provided a better framework for dealing with complex multi-employer worksites and elaborate subcontracting by ensuring the principal parties were subject to a range of interlocking duties, the precise wording and scope was inconsistent across jurisdictions (Johnstone 1999; Johnstone et al. 2001). The reformed legislation expanded the array of workplaces and hazards that inspectors dealt with, and the general duty provisions included hazards hitherto unregulated, including ergonomic and psychosocial (Walters et al. 2011b). The impact of this is well illustrated by Johnstone et al.'s (2011) examination of Australian inspectorates' activities. Whilst inspections continued to

³⁶ Rural exemptions were not removed in Queensland until 2010.

devote attention to traditional areas like plant and equipment (65.8 percent of total visits), attention was directed to hazardous substances (50 percent), changing work arrangements (49.2 percent), upstream duty-holders (43.3 percent), and manual handling (38.3 percent).

Attempts from the mid-1980s to achieve greater consistency in the regulation of OHS across all Australian jurisdictions led to the development of National Standards and National Codes of Practice in a number of key areas by the National Occupational Health and Safety Commission (NOHSC)³⁷ (Lamm 1994). However, National Standards did not have legal status and were only enforceable in instances where jurisdictions adopted the provisions into their regulations. More recently, the Council of Australian Governments identified OHS as a priority area for national regulatory reform. It was decided use of model legislation comprising a model Act and Regulation supported by model Codes of Practice was the most effective way to achieve harmonisation (Comcare 2009).

The model Work Health and Safety Act (WHS Act) was the most significant reform to OHS laws in Australia since the initial introduction of Robens-style legislation over thirty years ago (Sherriff & Tooma 2010). The change in terminology from OHS to WHS aligned with reconceptualising responsibility for primary duties, and reflected the need for the law to accommodate changes in the way in which work is arranged, allowing for regulation of OHS across all business activities. As of January 2014, the WHS Act and associated model regulations have been implemented in the Commonwealth, New South Wales (NSW), Queensland, Australian Capital Territory, Northern Territory, South Australia and Tasmania.³⁸

In Victoria and Western Australia the definition of an ‘employee’ for the purposes of the employer’s duty to employees includes contractors and their employees. Section 21(3) of the Victorian *Occupational Health and Safety Act 2004* deems an independent contractor engaged by an employer, and any employees of the independent contractor, to be employees of the employer for the purposes of the employer’s general duty to employees. Deeming provisions classify groups of workers with ‘for service’ contractual arrangements as employees (distinct

³⁷ The NOHSC was replaced with the Australian Safety and Compensation Council (ASCC) in 2005. Safe Work Australia was established in 2009, replacing the ASCC.

³⁸ The Victorian Government confirmed in April 2012 that Victoria will not adopt the model legislation. The Government’s position was that the laws failed to deliver on the intent of the Council of Australian Governments’ reform agreed to in 2008; namely, to reduce the cost of regulation and enhance productivity and workforce mobility (Media Release 2012). Western Australia remains committed to the harmonisation process and intends to adopt the model WHS laws but with some amendments to the Act.

from common law tests which can only be applied to individuals on a case-by-case basis) (Waite & Will 2001). Section 23 requires an employer to ensure that persons other than employees are not exposed to risks to their health or safety arising from the conduct of the undertaking of the employer. Similarly, section 21(2) of the Western Australian *Occupational Safety and Health Act 1984* requires an employer or self-employed person to ensure the health or safety of a person is not adversely affected as a result of work that has been or is being undertaken by the employer (or any employee) or the self-employed person. The Western Australian Act further deems temporary agency labour to be employees of the agency and client for the purposes of the employer's general duty in relation to matters over which the agency or client has the capacity to exercise control (section 23F(4)).

There are many aspects to the harmonisation reform which are too extensive to review here, but it is relevant to discuss those with potential to better address the challenges of successive contractual arrangements than previous legislation. In a climate in which the traditional functions of the employer are divided between multiple individuals and businesses, the WHS Act expands the primary duty to a 'person conducting a business or undertaking' (section 19). Subcontractors and their employees have been fully integrated into the legislative model.³⁹ The Act includes principal contractor duties that enunciate a clear set of responsibilities with regard to subcontractors (a longstanding approach in Victoria). The harmonised legislation uses the terms work and worker rather than employment and employee. The nomenclature 'worker' is more general in its application than deeming provisions, and should capture arrangements to supply labour that common law might classify as contracts for services, but which, functionally, are not dissimilar to employment (Stewart 2002). Provisions ensure the primary duty of care will continue to be responsive to changes to the nature of work and work arrangements, including expanded supply chains.

Duties of care are non-delegable, and more than one person may concurrently have the same duty (sections 14 and 16). Incidentally, whilst businesses have often engaged subcontractors under the misconception of diminished or total removal of duties of care (Thompson 2000; Johnstone & Quinlan 2006), in most cases liability was never transferred. Liability for injury and illness would only have been reduced in the rare instance where the subcontractor had been

³⁹ In August 2012, the Queensland Government held a roundtable discussion with industry groups and unions on the operation of the new laws. The roundtable review recommended that Parliament consider removing contractors and subcontractors from the definition of 'worker' in the WHS Act. The *Work Health and Safety and Other Legislation Amendment Bill 2014* does not implement this recommendation.

allocated full site control (Cross et al. 2000). Section 46 of the WHS Act provides that duty holders must consult, cooperate and coordinate activities with all other persons who have a duty in relation to the same matter. This provision attempts to prevent OHS issues arising from fractured or disorganised work processes, and weakened chains of responsibility described in Chapter Two.

As noted earlier, participatory mechanisms at jurisdictional, industry and workplace levels play a pivotal role in OHS regulation (Johnstone et al. 2005). Part 5 of the WHS Act establishes consultation, representation and participation mechanisms. Section 47 requires a person conducting a business or undertaking to consult with their workers who may be directly affected by matters relating to work health or safety.⁴⁰ Although the Act largely ensures all workers have the same entitlements to protection and participation in OHS, there are bound to be difficulties for temporary labour and short-term subcontractors to trigger and benefit from the provisions (Johnstone et al. 2012). Small and non-unionised workplaces and precarious workers are also unlikely to use the participatory provisions, and will be dependent on state enforcement to ensure employer compliance with their duties (Johnstone et al. 2005). Thus temporary horticultural workers are unlikely to benefit from participatory mechanisms.

Considerable evidence underscores the positive relationship between objective indicators of OHS performance and workplaces with joint arrangements or union involvement in worker representation, or both (Shannon et al. 1997; Eaton & Nocerino 2000; James & Walters 2002). The majority of repealed OHS statutes and the Victorian OHS Act confer powers on authorised representatives of unions to enter workplaces.⁴¹ A number of submissions for the national review into model OHS laws from employer organisations and employers opposed inclusion of right of entry for unions. The most frequent concern was that rights of entry could be used inappropriately as means of confusing OHS and industrial issues (Stewart-Crompton et al. 2009). The WHS Act tries to ensure that all kinds of workers have to be consulted about OHS matters and can participate and get the benefit of workplace arrangements, particularly health and safety representatives and committees. The Act confers powers on authorised representatives of unions to enter workplaces, although unions lost the power to prosecute for an OHS offence (previously allowed in NSW under section 106 and the Australian Capital

⁴⁰ Contractors and their employees are expressly included in the Victorian OHS Act (sections 35-36).

⁴¹ In Western Australia right of entry for OHS purposes is provided for under the *Industrial Relations Act 1979* (the WA IR Act). The repealed South Australian *Occupational Health, Safety and Welfare Act 1986* did not include right of entry provisions.

Territory under section 218(2)). The proportion of agriculture, forestry and fishing employees who were trade union members in 2013 was 2 percent (Australian Bureau of Statistics 2013c). The proportion under temporary work arrangements would be considerably less. Thus temporary horticultural workers are unlikely to benefit from powers conferred on authorised representatives.

Regulation and enforcement of labour standards for itinerant or foreign-born workers in Australia is compromised because of the lack of a coherent approach (Lee et al. 2011). In 2001 several State agencies (NSW, South Australia and Victoria) initiated a multi-agency national project called 'Fruitlink' which aimed to develop OHS training for itinerant workers (including numbers of foreign-born) along the harvest trail using mobile facilities. Efforts to get federal government funding were not forthcoming (Guthrie & Quinlan 2005). Fruitlink appears to be an isolated effort.

As in the UK there have been initiatives in Australia aimed at regulating supply chains involving vulnerable workers. While the Australian examples do not pertain to agriculture they do suggest a model that could be applied to it. The textile, clothing and footwear chain embraces several types of activities, occupations and roles whose characteristics (which are a result of a range of market and technological factors) shape the profile of the industry. Akin to the horticultural supply chain, distribution is controlled by a small number of large players who are in a position to exert considerable downward pressure on prices to guarantee their profitability. The outsourcing of low value added and labour-intensive operations accounts for an important part of textile, clothing and footwear activities precipitated by the tension between desire for leaner and faster supply chains and pressure to remain competitive on price (Dunford 2004; Pretious & Love 2006). Statutory rights are available to textile, clothing and footwear outworkers outside direct employment relationships, extending liability for outworker remuneration traditionally associated with the employer to any party up the supply chain (except the retailer and consumer) (Rawling & Howe 2013).⁴² In addition to mandating and integrating minimum labour standards, OHS and workers' compensation entitlements, laws introduced to protect clothing outworkers in Australia focus legal responsibility at the top of the supply chain rather than on intermediaries (Nossar et al. 2004). NSW and South

⁴² *Fair Work Act 2009* (Commonwealth) ss 12 and 789AA-789EA; *Outworker (Improved Protection) Act 2003* (Victoria); *Industrial Relations Act 1996* (NSW) ss 5 and 6(2)(k) and Schedule 1(1)(f); *Fair Work Act 1994* (South Australia) ss 4(1), 5 and 99A-99J; *Industrial Relations Act 1999* (Queensland) ss 5(1)(g) and 400A-400I; and *Industrial Relations Act 1984* (Tasmania) s 3.

Australia each also have a mandatory code of practice enforceable under industrial legislation.⁴³

Research on supply chains in the road transport sector linked intensification of client demands and long hours and low returns in an already competitive industry with unsafe and unhealthy work practices, including excessive hours of work, increased use of kilometre or trip-based payment systems, speeding and drug use (Rodriguez et al. 2006; Saltzman & Belzer 2007; Williamson 2007). Arrays of Australian regulatory requirements impose a chain of responsibility (related to the duty of care principle) with regard to fatigue, overloading, load restraint and speeding (Mayhew & Quinlan 2006), dovetailing requirements under OHS, industrial relations and workers' compensation legislation. The notion of imposing a chain of responsibility has also been picked up in the EU, although the connection between subcontracting/supply chains and safety has not received detailed consideration from the European Transport Safety Council (Quinlan 2012b).

Chapter Two introduced a system of labour subcontracting in horticulture. Chapter Three expanded on the role of labour contractors in facilitating the supply of labour and the role of supermarkets in driving the intensification process. Yet, by and large the vulnerabilities of the horticultural workforce at the bottom of the supply chain have been overlooked. A notable exception was the establishment of the Gangmasters Licensing Authority, which introduced greater formality into UK agriculture, through which improvements in the exploitative conditions of labour may be achieved. Also significant, in theory, are supply chain provisions in EU chemical control legislation affecting downstream users, described in the next section. As noted, Australia does not have a regulated gangmaster system nor does Australian chemical control legislation have equivalent supply chain aspects. Before reporting perceived exposure and potential sources of pesticide exposure, it is necessary to describe the legislative management of agricultural pesticides. The thesis turns to this next.

6.4 Legislative Management of Agricultural Pesticides

This section provides an overview of agricultural pesticide regulation in the UK and Australia. Subsection 6.4.1 notes the complexity of pesticide regulation for mitigating risks to human health (and the environment). The regulation of the risk management of hazardous chemicals

⁴³ *Industrial Relations (Ethical Clothing Trades) Act 2001* (NSW) Part 3 mandates the Ethical Clothing Trades Extended Responsibility Scheme in NSW, and *Fair Work Act 1994* (South Australia) s 99C mandates the Clothing Outworker Code of Practice in South Australia). The Queensland Mandatory Code of Practice for Outworkers in the Clothing Industry was repealed on 9 November 2012.

is based on two sets of assumptions concerning the quality of suppliers' information and the capacity of users to act on information appropriately. Neither set of assumptions is wholly justified. Subsection 6.4.2 introduces the EU legal framework within which chemical risk management in the UK operates, and subsection 6.4.3 describes UK regulatory strategies. Subsection 6.4.4 describes the management of agricultural pesticide use in Australia. A notable absence is a consolidated, uniform system in the latter context.

6.4.1 *The Complexity of the Problem*

Human pesticide exposures have been a focus of attention for decades, and chemicals regulation continues to evolve as clusters of observed human illnesses and disasters reveal new chemical hazards and effects (although often too late to prevent significant numbers of serious illnesses) (Lauridsen & Røpke 2005; Bent 2012). Traditionally, chemicals regulation was based on field experience, epidemiological observations and identification of adverse effects, but a more science-based approach has evolved with the development of human toxicology (Bro-Rasmussen et al. 1996). Both the experience- and science-based approaches have been based on single-substance regulations (Lauridsen & Røpke 2005; Monosson 2005; Pesendorfer 2006). Consequently, legislative control of chemicals has developed of its own accord and is a highly complex area (Winder et al. 2005).

Most commercial pesticide formulations are mixtures of active and "other ingredients" added to increase product efficacy. Adverse health effects of exposure can be a consequence of the active ingredient, other ingredients, or both, but toxicological testing is generally confined to the active ingredient (Alavanja 2009). Indeed, chemical manufacturers are permitted to withhold specific chemical identities for mixtures or substances provided the manufacturer can support a trade secret claim (Bent 2012). Due to restructuring of the organisation of economic activity leading to growth in subcontracting of peripheral activities, hazardous substances are also being used in situations increasingly remote from systematic risk management and regulatory surveillance (Walters 2008). Work-related mobility, both international and intra-national, can also complicate the diagnosis, treatment and recording of occupational illness (Hennebry 2009; Temple Newhook et al. 2011).

In addition to worsening potentially compromised health caused by poor sanitation and crowded conditions (Chapter Four), the potential synergistic effect resulting from an interaction of one component with the pharmacokinetics or pharmacodynamics of a second component is troubling (Abou-Donia et al. 1985; Kortenkamp et al. 2009), and has been demonstrated in the case of agricultural pesticides (Moser et al. 2005; Christiansen et al. 2009).

Workplace exposures seldom involve a single agent. Agricultural workers exposed to pesticides may face household, environmental or dietary exposures to the same or related pesticides, in addition to exposure to fertilisers, nitrates, fuels and engine exhausts, solvents, organic and inorganic dusts, electromagnetic and ultraviolet radiation, and animal pathogens (O'Neill et al. 2007; Brown et al. 2013). Seasonal workers are often exposed to several different types of pesticides throughout any growing season (Coronado et al. 2004), with implications for documenting causes of chronic illnesses (Reeves & Schafer 2003). Exposure to complex mixtures of chemicals that are potentially hazardous is a limitation of epidemiological studies that evaluate the adverse health effects of a single formulation (Schilman et al. 2010; Egeghy et al. 2012). Moreover, direct measurements of exposures are rarely available so researchers must rely on questionnaires to collect exposure information retrospectively, with potential misclassification due to inaccuracies in self-reporting obscuring true exposure-response relations (Zahm et al. 2001; Perry et al. 2006; Hofmann et al. 2010b).

Effective chemical regulation should strike a balance between minimising human health and environmental risks while maintaining the benefits to society of chemical substances (Nordlander et al. 2010). Debate on whether chemical regulation should be based on hazard classification alone, eschewing the assessment of risk, or a combination of both has been circulating since the early 1970s (McCormick 2001; Nordlander et al. 2010; Löfstedt 2011b). The principle criticism of hazard classifications is that decisions can be based on an assumption that a chemical is hazardous without testing whether this is true, leading to inappropriate regulatory consequences downstream (Paustenbach 2002; Nordlander et al. 2010). This argument is problematic not least because chemicals are generally granted a presumption of innocence unless and until proven otherwise (Denison 2007; Bent 2012). Only a small subset of chemicals has undergone significant toxicological evaluation for their potential to cause human or ecological toxicity (Carmichael et al. 2006; van Leeuwen et al. 2009; Judson et al. 2009). The logical impossibility of proving the absence of future damage when the scientific knowledge involved is neither complete nor fixed is often sidestepped (Godard 2012). Moreover, where evidence of human health risks is weak or uncertain, proponents have argued there is no evidence of harm given extended use without apparent ill-effects. This reasoning is flawed: absence of evidence of harm and evidence of the absence of harm are not equivalent statements (Kriebel et al. 2001).

Against this it is argued that risk assessment procedures are value-laden and subjective (Slovic 1999; Wolt & Peterson 2000), and there are limits to what can be measured quantitatively (Viscusi 1998). Who should bear the burden of collating the evidence and undertaking the

analysis, the beneficiaries or those who are potentially at risk (Stirling & Tickner 2001; Denison 2007)? Business interests have also been accused of obstructing regulation and manipulating data or research so as to minimise evidence of harm (Egilman & Bohme 2005; Huff 2007; Bailey 2008). Business-backed research can frustrate safety and environmental measures with the purpose of “manufacturing uncertainty” (Michaels 2006). Labour unions could partly mitigate this problem by coordinating or even funding scientific studies (Lyndon 1989), but amid a climate of declining union membership organised labour will not have the resources necessary to achieve sufficient levels of risk and precaution. A dearth of toxicity information has resulted in a level of worker exposure risk that is systematically too high and a concomitant level of precaution that is systematically too low (Bent 2012).

Environmentalists and consumer protection groups have championed the precautionary principle against industry resistance (Stirling 2007). Despite claims its application results in overregulation of minor risks and regulation of non-existent risks (Bate 2001; Sunstein 2002; Marchant 2003), analysis of 88 cases of alleged overregulation found only four cases fulfilled the definition of a regulatory false positive (Hansen et al. 2007a). By encouraging a search for alternatives whenever a potentially hazardous chemical is identified, the precautionary principle minimises limitations of risk-based regulatory policy (Kriebel & Tickner 2001; Verdonck et al. 2005; Williams et al. 2009). However, typically, only once enough information mounts implicating chemical toxicity will chemical manufacturers and employers scramble to find substitutes, which often present their own unquantified health risks (Bent 2012).

6.4.2 EU Legal Framework within Which Chemical Risk Management Operates

Framework Directive 89/391/EEC contains the basic provisions for managing OHS generally. Individual directives adopted under Article 16 of the Framework Directive are based on the same principles regulating OHS management. The two most directly concerned with protecting workers from hazardous substances are Chemical Agents Directive 98/24/EC and Carcinogen Directive 2004/37/EC. Under these Directives employers are compelled to assess and manage chemical risks by meeting a hierarchical set of obligations, but implementation is scarcely or only partially enforced, especially in small business (Musu 2004). Despite the quantity and detail of existing provisions, recognition of the inefficiency of regulatory instruments led to the promulgation of a monumental regulatory initiative for the Regulation of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (hereafter referred to as REACH) (EC 1907/2006). As a regulation, REACH became directly applicable in all Member States on 1 June 2007 and applies without

prejudice to workplace and environmental legislation, including the Framework Directive 89/391/EEC (REACH Article 2(4)(a)).

REACH consolidates and develops the provisions of directives regulating the management of chemical risks. The Chemical Agents Directive and the Carcinogens Directive remain in force. During the development of REACH, EU legislators expressed the view that substances already adequately controlled under existing sector-specific EU legislation should not face additional regulation (Foth & Hayes 2008). Inconsistent with legislative intentions, the final REACH text does not establish effective exemptions for plant protection products through Article 15(1), with the scope of exemption limited to registration.⁴⁴

The precautionary principle has an important and recognised role in the regulation of chemicals in the EU; it is enshrined in Article 191 of the Treaty on the Functioning of the European Union. Although REACH has been presented as an application of the precautionary principle (Rogers 2003; Fisher 2008; REACH Art 1(3)), the precautionary principle as a theme is not pervasive (see Hansen et al. 2007b). The approach of the scientific committee has been to adopt a precautionary approach in its decision-making only when “strong evidence” is available. Thus, the balance in evaluating data has been weighed in favour of industry interests counter to the objectives of REACH (Denison 2007; Schaible & Buonsante 2012). Transferring the burden of studying environmental and health impacts of chemicals and collating primary data on safety to business presents a conflict of interest. The precautionary principle demands a more diverse source of data than those disseminated by businesses interested to secure their products on the market (Godard 2012).

REACH is often presented as reversing the burden of proof by requiring chemical manufacturers to demonstrate the safety of the chemical through the registration process, rather than requiring public authorities to prove that a chemical is hazardous (Koch & Ashford 2006; Führ & Bizer 2007). Godard (2012) revealed the basic ambiguity in the formula of reversal. The movement launched by the precautionary principle requiring an early account of risks does not shift the burden of proof. It shifts public management of risks away from the concept of scientific proof. In a climate of incomplete, ongoing science the argument of reversal of proof is used to evade activists’ demands for proof of absence of long-term risk, and obtain endless moratoriums against products and technologies. Government evaluation of the information provided by the registrant, or of the risk management measures being utilised

⁴⁴ By contrast, exemption provisions for medicinal products (Article 2(5)(a)) and food and feedingstuffs (Article 2(5)(b)) cover all main REACH obligations without qualification.

is entirely divorced from the registration process (Denison 2007).

Garrigou et al. (2011: 329) praised REACH from a practical standpoint, claiming it was “unreasonable” that employers were responsible for safeguarding workers’ health and safety amid technical and organisational flaws up-stream in the prevention process. A criticism of the former legislative framework was that manufacturers and importers of substances were required to provide information but there was no requirement on downstream users, leading to exposure information scarcity (Commission of the European Communities 2001). Concerns across Europe about improved knowledge of chemical risks and risk management dissemination to all users specifically informed the development of the REACH reform (Walters & Grodzki 2006).

A number of key REACH provisions are based on risk assessment, including the chemical safety report and the evaluation of chemicals by Member States. Risk management is integrated in the assessment process and directly communicated to users as annexes to safety data sheets (SDS) thus facilitating the flow of information and implementation of risk management measures within industry (Christensen et al. 2011). Accordingly, the impact of the REACH reforms was anticipated to be substantial in relation to downstream use because of the focus on improved risk communication within the supply chain (Foth & Hayes 2008; Walters 2008). Walters and James (2009) described REACH as an example of the market regulatory approach to influence working conditions and labour standards within supply chains. Article 37(5) generates obligations on downstream users of chemicals to communicate effectively with the next actor up the supply chain to better assure they receive all necessary information for their safe use (Musu 2006; Marquart et al. 2007; ECHA 2013).

Each downstream user of a substance must ensure their use conditions are covered by the exposure scenarios contained within the extended SDS provided by the supplier (Article 31(7)). If the conditions of use are outside the conditions described, the downstream user must prepare a chemical safety report (in accordance with Annex XII unless certain exemptions under Article 37(4) apply) or in the case of one of the following options. Either the use is made known to the supplier with the aim of having it covered in the registration; or the conditions of use in the exposure scenario are implemented; or an alternative supplier who provides the substance with an exposure scenario that covers the conditions of use is found.

REACH implies a significant restructuring and enlargement in the field of chemicals regulation and thus enforcement. In most Member States enforcement powers are shared among various authorities. The UK enforcement regime has been implemented by the *REACH Enforcement*

Regulations 2008 through which authorities given enforcement responsibility are those with existing remits to protect human health, consumer safety, and the environment.⁴⁵ The enforcement of REACH is carried out in conjunction with other inspection and enforcement matters so as to avoid an increase in site visits (Bergkamp & Herbatschek 2013). A problem that could potentially impede enforcement and compliance is legal uncertainty. What can be required of the downstream user if use is made known to the supplier and the supplier fails to respond or make recommendations? This may produce difficulties for the enforcer to know who has the responsibility (Nordic Council of Ministers 2008). As typically small enterprises, subcontractors have neither economic power to exert influence on suppliers nor profile sufficient to be conspicuous to regulators (Walters 2008).

Although European legislation provides a hierarchy of measures to prevent or avoid hazardous exposures (Framework Directive Article 6), in most cases registrants have proposed PPE as the principal risk management measure to be applied (Schaible & Buonsante 2012). Regulation of the risk management of hazardous substances is based around assumptions concerning the quality of suppliers' information and users' capacity to act on the information appropriately (Walters & James 2009). Generic lists of risk management measures that are over-conservative for many situations are inadequate (Schaafsma et al. 2011), and enforcement may be impaired if descriptions in the exposure scenarios are too general. In such cases it will be difficult to determine if the downstream use is outside the conditions described in the exposure scenarios (Nordic Council of Ministers 2008). Information on uses found in the technical dossier has been extremely generic, and information on exposure scenarios is often missing (in conflict with Article 118). Without a summary or guidance on how the dossier is structured, the extraction of relevant information requires tremendous effort (Schaible & Buonsante 2012). Data required for REACH-compliant SDSs is much more extensive than the historical counterparts, raising concern that SDSs are unlikely to be read thoroughly or interpreted correctly by end users (Sadhra et al. 2002; Nicol et al. 2008; Williams et al. 2009).

The extent and means by which the measures in REACH actually occur makes outcomes with regard to workers' protection difficult to estimate (Musu 2004; Walters & Grodzki 2006; Hammerschmidt & Marx 2014). There is considerable emphasis on extending chemical product stewardship through the supply chain, binding users to engage more actively in ensuring safe

⁴⁵ With respect to registration and information in the supply chain, the HSE of Great Britain and the HSE of Northern Ireland; and with respect to the use of chemicals, the Environment Agency in England and Wales, the Scottish Environment Protection Agency, the Northern Ireland Environment Agency, the Department of Energy and Climate Change, and the local authorities.

use of chemicals. Key factors are the dependencies of one end of the supply chain on the other, and the inherent unevenness of the market power wielded at each end. Moreover, provision of information on chemical safe handling and health risks is insufficient in reducing unsafe behaviours; estimation of risk is affected by context, cultural factors and attributes of the individual (Perry et al. 2000; Mayer et al. 2010). Several researchers also suggested external factors including discomfort and availability of PPE and carelessness contribute to unsafe acts (Yassin et al. 2002; Rao et al. 2004; Barraza et al. 2011). Isin and Yildirim (2007) reported awareness of harmful health effects of pesticide exposures had little or no impact on fruit growers' practices. Growers' overriding concern was crop damage leading to economic loss. Many growers also felt there was no need for protective clothing as they had not encountered anyone using them. Perry and Bloom (1998) reported a similar finding.

The initial hope was that REACH would build on existing workplace provisions, establishing a fully functional and transparent procedure for assessing risk (Verdonck et al. 2005). Pickvance et al. (2005) predicted REACH would plug gaps in existing legislation by reminding employers of their obligations, especially in small businesses. The development of a comprehensive risk assessment of chemicals was overdue. However, amid uneven enforcement and inadequate understanding of conditions contributing to greater user engagement, there is a danger that only a more elaborate system for regulating and controlling chemical use is achieved (Koch & Ashford 2006; Walters & Grodzki 2006).

6.4.3 UK Regulatory Strategies on Pesticide Risk Management

All EU countries operate national regulatory strategies on the management of chemicals at work. Membership in the EU has led to a degree of convergence but there remains significant difference between national approaches. The HSE's Chemicals Regulation Directorate is responsible for the regulation of chemicals as they are regulated by REACH. Regulating the management of the risks of hazardous substances in the UK is the subject of separate and detailed regulations, but this occurs within the framework provided by the *Health and Safety at Work etc. Act 1974*. The *Health and Safety at Work etc. Act 1974* enables the Secretary of State to approve regulations with a purpose of stipulating details of specific legislative standards (section 15). The main requirements controlling the supply, storage and use of hazardous substances in British workplaces are found in the *Control of Substances Hazardous to Health Regulations 2002* (COSHH) (which sits alongside REACH) and Regulation (EC) 1107/2009 concerning the placing of plant protection products on the market (repealing Council Directives 91/414/EEC and 79/117/EEC). Although Regulation (EC) 1107/2009 applies

directly in the UK, *Plant Protection Products Regulations 2011* was implemented to underpin its operation. The statutory Code of Practice for Using Plant Protection Products advises users, suppliers and others on their legal responsibilities and how to meet them.

Regulation (EC) 1107/2009 is prescriptive and sets out processes which offer limited discretion in the rules governing the marketing of pesticides. The Regulation introduces new requirements including the introduction of hazard-based criteria (Article 4), assessment of cumulative and synergistic effects (Article 25), and comparative assessment (Article 50). Additionally, endocrine disrupting properties are classified undesirable and pesticides having these properties will not be allowed on the market (unless in exceptional cases). However, the criteria for determining such properties are undefined. Part 3.6.5 of Annex II states the European Commission shall present criteria for the determination of endocrine disrupting properties by December 2013. The Commission missed the deadline.

The Sustainable Use Directive (2009/128/EC) was published at the same time as Regulation (EC) 1107/2009 establishing a framework for Community action to achieve sustainable use of pesticides. Article 5 outlines training requirements that Member States need to satisfy but does not require employers to provide or ensure that training. Article 7(2) requires that Member States develop systems for identifying and recording information on the health impacts of pesticide exposures amongst regularly exposed groups, including operators, field workers and persons living close to pesticide treated areas. The Advisory Committee on Pesticides is an independent Scientific Advisory Committee providing advice to the Chemicals Regulation Directorate on any matters relating to the control of pests. In late 2009 the Advisory Committee on Pesticides set up a short life Pesticides Adverse Health Effects Surveillance Working Group to review existing arrangements for monitoring the impact of pesticides on human health in the UK and a number of other countries. The report concluded no single monitoring scheme is capable of delivering the best information, and recommended a combination of approaches collated/coordinated through a central body (Ayres & PAHES Working Group 2012). This recommendation may provide a useful input for meeting Article 7(2). The Group's scope was to examine the scientific issues therefore the report recommended an independent cost-benefit analysis on the recommended approach as it is likely to be complex logistically and could have high costs. Ministers have agreed to the further cost-benefit analysis recommended.

The commodity substances and products used to generate ethylene to control fruit ripening continue to be regulated under *Control of Pesticides Regulations 1986*, which fall outside the scope of the EU regime. These Regulations require employers to control risks associated with

pesticides and to demonstrate that usage is strictly monitored and controlled. Pesticide users providing a commercial service or users born after 31 December 1964⁴⁶ must obtain a certificate of competence, or only use the pesticide under the direct and personal supervision of a person who holds such a certificate for the purposes of being trained (Schedule 3).

The COSHH apply to all workplaces using substances labelled dangerous. The Regulations prohibit or restrict use of some substances, and impose general requirements for risk assessment and risk management, record keeping, health surveillance and PPE, and include important provisions for information, instruction and training for any person who carries out work (Regulation 12(4)). The COSHH and REACH both impose responsibilities for risk assessment of chemical substances and the identification of appropriate risk management measures to control exposures. The scope and amount of information required under REACH is based on tonnage produced or imported at the time of registration. Chemical manufacturers have an incentive to submit minimal data in the hope that the majority of their chemicals will slip through the quality control cracks of REACH (Kersey 2009). An implication of the interface between the risk assessments performed under COSHH and REACH is that exposure scenarios under REACH can only practically be used to inform the COSHH assessment which takes into account local workplace conditions.

The COSHH also impose requirements by reference to Table 1 of EH40/2005 Workplace Exposure Limits and the Notices of Approval. Workplace exposure limits are concentrations of hazardous substances in the air, averaged over a specified period of time – 8-hour time-weighted average or 15 minute short-term exposure limit. The Regulations require employers to prevent or control exposure to hazardous substances. Exposure standards only consider absorption via inhalation and are valid only on the condition that significant skin absorption cannot occur. Special measures are required to prevent absorption through the skin (indicated by the notation Sk in EH40/2005). Exposure to substances absent from the list of workplace exposure limits should be controlled to a level to which nearly all workers may be repeatedly exposed day after day without adverse health effects (known as the Threshold Limit Value).⁴⁷

The Code of Practice for Using Plant Protection Products is a source of practical advice on safe storage, transport, handling and use of pesticides. The 'Guidance for Post-application (Re-entry

⁴⁶ The so-called "grandfather rights" for pesticide users are to be rescinded after 26 November 2015.

⁴⁷ EH40/2005 sets biological monitoring guidance values where they are likely to be of practical value, considered particularly useful in circumstances where there is likely to be significant skin absorption. No agricultural pesticide is included in the list of substances.

Worker) Exposure Assessment’ provides an overview of the scenarios in which post-application exposure to workers and the public may occur, and considers how levels of exposure for these scenarios could be assessed (providing worked examples) (Chemicals Regulation Directorate 2008).

The preceding discussion introduced the EU legal framework within which chemical risk management in the UK operates, further noting UK national strategies covering agricultural pesticides. REACH establishes a single, coherent system for marketing chemicals in the EU. There is an overlap between the objectives of this legislation, and those that apply to protect workers from hazardous substance exposures. REACH applies without prejudice to OHS legislation, and supports duties of employers by improving for example the employers’ risk assessment with additional information. Manufacturers and importers are required to describe safe uses of their substances in the supply chain. Whether REACH can deliver its benefits for OHS depends on the efforts of industry and the imputed value of the feedback from downstream users. Chief among the areas needing adjustment are the need to improve the quality of data submitted by industry and better enforcement of the Regulation. The inconsistent Australian State-based laws regulating agricultural pesticide use in Australia are presented for comparison next.

6.4.4 Management of Agricultural Pesticides in Australia

Responsibility for the legislative management of pesticides in Australia is shared between the Commonwealth and the States through the National Registration Scheme for Agricultural and Veterinary Chemicals. Pesticide products sold in Australia must be approved and registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA) (incidentally, veterinary medicines in the UK are subject to COSHH Regulations). The *Agricultural and Veterinary Chemicals Code Act 1994* (Commonwealth) contains as a schedule to it the Agricultural and Veterinary Chemicals Code (Agvet Code). The Agvet Code contains provisions allowing the APVMA to evaluate, approve or register and review active constituents and agricultural chemicals. Mirror State legislation permits uniform interpretation of the Agvet Code under the Commonwealth’s *Acts Interpretation Act 1901*. The Agvet Code establishes a risk-based assessment for agricultural chemicals underpinned by known scientific knowledge. Prior to registration, the APVMA is required to assess the potential impacts of a pesticide on human health, the environment and trade, and the product’s efficacy and registration for use (APVMA 2011).

From its inception, the Agvet Code did not contain a reregistration component, and there was

no requirement on a registrant to defend the ongoing registration of their product. This reflected the regulatory philosophy that prevailed in 1994. Chemical reviews were on an ad hoc basis when interested parties identified potential problems (Agvet Code section 161). Consequently, the APVMA (2010) recounted occasions where product authorisation that met the scientific standards in terms of data and assessment methodologies at the time of registration no longer met contemporary standards. The bureaucracy of the regulatory framework also did little to encourage the substitution of hazardous products for ‘softer’ chemicals and biological controls as they became available (Gunningham & Healy 2004a).

The Australian Government is in the process of implementing reforms for the better regulation of agricultural (and veterinary) chemicals, with a purpose of reducing regulatory complexity and encouraging the development of safer chemicals. The bulk of the reforms are made possible by the *Agricultural and Veterinary Chemicals Legislation Amendment Act 2013*, which amends the *Agricultural and Veterinary Chemicals Code Act 1994*. In the ‘Explanatory Memorandum to the Agricultural and Veterinary Chemicals Legislation Amendment Bill 2012’, the Government stated the proposed amendments would ensure ongoing safety of agricultural and veterinary chemicals by implementing a mandatory re-approval and reregistration regime. Reregistration is a feature of a number of registration schemes in comparable jurisdictions including the EU through REACH. Paragraph 1A(2)(d) of Schedule 1 of the Amendment Act states the Agvet Code will be implemented in a manner that

...recognises that the use of chemical products that pose *unmanageable risks* to the health and safety of human beings, animals and the environment is not appropriate in Australia (Emphasis added).

The reregistration scheme (Schedule 2) should be the mechanism for rapid removal of the backlog of chemicals from the market however “unmanageable risks” is not defined. Thus, the joint submission made by WWW-Australia and the National Toxics Network (2013) to the ‘Inquiry into the Agricultural and Veterinary Chemicals Legislation Amendment Bill 2012’ submitted that in its current form, Schedule 2 is unlikely to achieve this. The APVMA is given much discretion to determine undue risk without a suitable framework under which to determine that risk.

The APVMA regulates pesticides up to and including the point of retail sale after which regulation becomes the responsibility of each State’s control-of-use legislation. Control-of-use legislation differs significantly between States and is administered by different government departments in each jurisdiction. There are currently over 60 Acts and Regulations relating to

pesticide supply and use, taking the Commonwealth and States as a whole.

The regulatory framework assumes users will follow pesticide labels because it is a statutory requirement. Off-label use refers to situations where a registered product is used in a manner not specified on the product label.⁴⁸ A national review of control-of-use legislation conducted by Pricewaterhouse Coopers (1999) described significant misunderstanding by State authorities in terms of off-label use. The wide variation between States, which arise from different off-label use systems (which in turn reflect different approaches to risk management), results in confusion for agricultural chemical users, especially where growing activities cross State borders (Radcliffe 2002; CropLife 2010). Further, some legalised off-label use systems place the onus for risk assessment when using a product off-label on the user (APVMA 2010). To illustrate the complexity of control-of-use legislation in Australia, Table 5 (adapted from Productivity Commission 2008: 220) summarises some main use controls for agricultural chemicals in each State. The main differences concern off-label uses, training and record keeping requirements, and neighbour notification. Victoria has the most liberal off-label use regulation. Practically, this complex and fragmented system has limited regulators' capacity to develop and implement coordinated strategies, and has reduced regulatory compliance for the safe use of pesticides (Gunningham & Healy 2004b). State authorities have developed publications and resources on the safe and responsible use of agricultural chemicals.

Table 5: Major Differences between State Regulations on Pesticide Use

Controls		NSW	Qld	Vic	Tas	SA	WA	NT	ACT
Rates of application	Lower rate or frequency than on label	Yes	Yes ^a	Yes ^b	Yes	Yes	No	Yes	No
	Higher frequency or rate than on label	No	No	No	No	No	No	No	No
Pests	Different pest than on label	No	Yes ^a	Yes ^b	Yes	Yes	No	Yes	No
Crops and situations	Different crop or situation than on label	No	No	Yes ^b	No	No	No	No	No

⁴⁸ For example, use on a crop for which the product is registered (same application rates and timing) to control a pest or disease that is not listed on the label; use on a crop for which the product is registered at a lower rate or frequency of application; and use on a crop and pest combination registered in another State (Productivity Commission 2008).

Controls		NSW	Qld	Vic	Tas	SA	WA	NT	ACT
Application equipment	Different application equipment than on label	No	Yes ^a	Yes ^b	No	NA ^c	No	Yes ^a	No
Record keeping	Records of use must be maintained	Yes	Yes	Yes ^d	Yes ^e	Yes ^f	Yes ^g	No	No
User training and licensing	General user training required	Yes	No	Yes ^d	Yes	Yes ^d	No	No	Yes ^f
	Commercial applicators licensing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Neighbour notification	For general pesticide use	No	Yes ^h	No	Yes ⁱ	No	No	No	Yes ^j
	For vertebrate poisons	Yes ^k	Yes	No	Yes ^l	Yes ^l	Yes	No	Yes ^h

^a Unless the label explicitly prohibits such use. ^b Subject to some conditions and restrictions. ^c Not available. ^d Schedule 7 poisons and restricted chemical products only. ^e Only for commercial and occupational uses. ^f Only for commercial operators. ^g Aerial application only. ^h Only if required by label. ⁱ Only for Schedule 6 and Schedule 7 poisons. ^j Only for Schedule 7 poisons. ^k Only if specified in a control order. ^l Only for 1080.

Under most State OHS legislation special provision is made for the management of hazardous substances used in the workplace (presented in Table 6). Although these regulations are not uniform across all jurisdictions, a number of common obligations exist, including identification of hazardous chemicals, provision of up-to-date safety data sheets (SDS) and risk assessment and control by applying the hierarchy of control measures. Table 6 notes that State OHS legislation requires employers/person conducting a business or undertaking to arrange health surveillance of employers/workers where there is “significant risk” to health or safety from exposure to organophosphate pesticide. Practical difficulties in implementation of this provision include absence of clear guidelines on what constitutes “significant risk” and limited access to rural practitioners with the competency to undertake health surveillance and recognise and treat pesticide-related illnesses (Das et al. 2001; Radcliffe 2002; Hansen & Donohoe 2003). The ability to track and document occupational ill-health across multi-tiered work arrangements is compromised by deficiencies in medical services and surveillance, and absence of incentives to aggressively capture such statistics (Gochfeld & Mohr 2007). Workplace exposure standards for airborne contaminants are available from the Hazardous Substances Information System online database. As with EH40/2005 Workplace Exposure Limits, a limitation of these exposure standards is that absorption through skin may be a

significant source of exposure.

Recognising the need for increased worker protection from pesticide exposures, the US Environmental Protection Agency promulgated a Worker Protection Standard for agricultural pesticides. This standard imposes specific requirements on grower-employers for training, notification of applications, and provision of safety equipment to non-applicator workers. Among other requirements, the Worker Protection Standard states workers must be notified about treated areas so to avoid inadvertent exposures (section 170.120). Also, before a worker enters any area where, within the last 30 days a pesticide has been applied or the re-entry interval for such pesticide has been in effect, the employer must assure that the worker has received pesticide safety training. Workers must also be trained before the sixth day of entry (section 170.130). No equivalent provisions are legislated in Australia or the UK.

Table 6: State WHS Provisions for Pesticide Use

State	Legislation	Administrator	Keynote
New South Wales	WHS Regulation 2011	WorkCover NSW	<p>A person conducting a business or undertaking must manage, in accordance with Part 3.1 – Managing Risks to Health and Safety, risks to health and safety associated with using, handling, generating or storing a hazardous chemical at a workplace (Reg. 34-38). Part 7.1 of the Regulation controls hazardous chemicals including most pesticides. A person conducting a business or undertaking must: ensure that a hazardous chemical used, handled or stored at the workplace is correctly labelled (Reg. 341); obtain the current SDS and ensure that it is readily accessible to workers (Reg. 344); maintain a register of hazardous chemicals used, handled or stored at the workplace (Reg. 346); and provide supervision having regard to the information, training and instruction required (Reg. 379).</p> <p>A chemical is hazardous if it satisfies the criteria for a hazard class in the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (3rd ed.) (Reg. 5).</p> <p>A person conducting a business or undertaking must ensure health monitoring of workers where there is “significant risk to the worker’s health” from exposure to organophosphate pesticides (Reg. 368).</p>
Qld	WHS Regulation 2011	Workplace Health and Safety Queensland	As above (note a hazardous chemical is defined in Schedule 19).
Tasmania	WHS Regulations 2012	Workplace Standards Tasmania	As above.
South Australia	WHS Regulations 2012	SafeWork SA	As above.

State	Legislation	Administrator	Keynote
NT	WHS Regulation 2011	NT WorkSafe	As above.
Victoria	OHS Regulations 2007	WorkSafe Victoria	<p>Employers must provide each employee who may be exposed to a particular risk with sufficient information, instruction and training to perform their work in a manner that is safe and without risks to health (s 2.1.2).</p> <p>Part 4.1.3 outlines the duties of employers and self-employed persons in relation to the identification of hazardous substances in the workplace and the assessment and control of risks.</p> <p>A substance is hazardous if it is listed on the Hazardous Substances Information System, or Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)], or GHS (s 4.1.4).</p> <p>An employer must provide health surveillance for an employee where there is “significant risk to the health of the employee” from exposure to organophosphate pesticides (s 4.1.30).</p>

State	Legislation	Administrator	Keynote
Western Australia	Occupational Safety and Health Regulations 1996	WorkSafe WA	<p>There are specific requirements in relation to pesticide use at the workplace where it has been classified as a hazardous substance. If a hazardous substance is to be used at a workplace then a person who, at the workplace, is an employer, principal contractor or a self-employed person must identify such substances, provide adequate information and training, and assess and control the risks associated with their use (ss 5.11, 5.15, 5.20, 5.21).</p> <p>A substance is hazardous if it is listed on the Hazardous Substances Information System; or NOHSC:1008(2004); or the GHS (Reg. 5.3).</p> <p>If the health of a person is at risk from exposure at a workplace to organophosphate pesticides then the employer, main contractor or self-employed person must ensure provision of health surveillance (Reg. 5.23).</p>
ACT	Dangerous Substances Act 2004	WorkSafe ACT	<p>Provides a statutory framework for regulating the way that dangerous goods and hazardous substances are managed to minimise their risk to health and safety. In particular, a person in control of premises where a hazardous substance is handled must ensure that the safety management system for handling the substance is documented, up-to-date, and complied with (s 31(1)). More than one person may have safety duties for particular aspects of handling (s 21).</p> <p>A substance is hazardous if it is listed on NOHSC:1008(2004) or NOHSC:10005(1999) (s 10(1)).</p>

The National Harvest Trail Working Group (NHTWG 2000) found most farmers tried to meet regulatory obligations and to comply with industry guidelines. Durey and Lower (2004) examined attitudes and beliefs about safety and reluctance to adopt State OHS regulations amongst a sample of farmers in Western Australia. They found the majority of participants believed some OHS regulations were necessary but most felt existing regulations were impractical and were uncertain how to comply. Rather than viewing regulations as supportive, some farmers viewed them as a punitive response to non-compliance. Similar sentiments of overregulation have been expressed in the US where farmers also felt workers disregarded their efforts to follow safety regulations (Arcury et al. 2001). Healy and Gunningham (2003) alluded to confusion around whether reliance on the safety directions provided on a product's label obviated the need to undertake use-specific risk assessments. Compliance with the product label directions (required under the Agvet chemical regulatory system) will not always produce compliance with OHS requirements, primarily because the former is concerned with lower order risk control measures (namely PPE) whilst the latter places emphasis on higher order measures to control the risk closer to source (such as product substitution).⁴⁹ Finally, an APVMA-commissioned review concluded risk management of pesticides in Australia was not world leading, lagged behind other areas of risk management, and major system changes were required to establish a more integrated system of regulation (Allen Consulting Group 2002).

Although all States rely on the SDS as a reference document for risk assessment and risk control, historically there have been few requirements to communicate knowledge of chemical hazards and there are inconsistencies in the classification and labelling of the same chemical between the different States (Winder et al. 2005). Killey et al. (2009) described practical difficulties in determining whether pesticides used in agriculture are hazardous according to Australian OHS legislation. Based on a sample of 300 pesticides used in crop production, they found dependence on the SDS (where available, and this was not universally so) to determine the hazardous nature of a pesticide led to 15-23 percent inaccuracy. Killey and colleagues concluded that there was no simple means by which a worker could identify a pesticide as a hazardous substance. CropLife Australia (2010) commented in its submission in response to the discussion paper 'A National Scheme for Assessment, Registration and Control of Use of Agricultural and Veterinary Chemicals' that the multiplicity of legislation, and the regulatory

⁴⁹ Incidentally, use and exposure patterns of substitute products may actually produce equal or greater risks even if the intrinsic hazards of the constituents are less (for example, a less hazardous but less effective product used in increased volumes may lead to greater risk) (Nordlander et al. 2010).

fragmentation at State level, has caused confusion and unnecessary duplication of the regulatory burden borne by farmers.

The regulatory framework for pesticides in Australia is characterised by complexity. The Commonwealth controls the registration of agricultural chemicals and regulation to retail sale through the APVMA, after which State control-of-use regulations give force to the conditions determined by the APVMA. Agricultural work is also subject to the full range of State-based OHS legislation, which imposes a general duty of care. The federal system gives rise to some similar coordination and implementation issues found in the EU. There is little research on the implementation and enforcement of these requirements, especially with regard to Australia. Reforms for the better regulation of agricultural (and veterinary) chemicals akin to REACH provisions promise removal of the backlog of unmanageable chemicals from the market. However, until chemical policy reforms occur in Australia like those seen in the EU, the Australian chemical market will continue to experience problems associated with lack of market transparency and poor information on hazardous chemicals in supply chains.

6.5 Conclusion

Researchers have remarked on pervasive regulatory failure whereby labour standards are weakened by precarious forms of work, which create fundamental disadvantage for workers so engaged (Bernstein et al. 2006). The very nature of flexible work arrangements can militate against OHS compliance. The ongoing durability of the traditional OHS regulatory model to provide appropriate labour standards for all workers was undermined amid proliferation of complex supply chains. Research points to some changes over the past decade including increased inspection/enforcement practices in the service sector and small business, and greater recognition of hazardous substances and the problems of changes to work organisation including subcontracting and agency work (Johnstone et al. 2011; Walters et al. 2011b). Nonetheless, in a climate marked by limited resources the response of inspectorates is partial and fragmented. This chapter explored the scope and limitations of OHS regulation for successive contractual arrangements, which play a pivotal role in affecting working conditions. The significance of sections 21(3) and 23 of the Victorian OHS Act 2004 and the primary general duty to workers imposed on a person conducting a business or undertaking under the model Work Health and Safety Act are most apparent in relation to multi-tiered or pyramid subcontracting. These provisions provide a hierarchy of overlapping and complimentary responsibilities. Section 3 of the *Health and Safety at Work etc. Act 1974* similarly extends protection to non-employees, although the type of activities so covered and how far the

provisions impose supply chain obligations on organisations in respect of supplier ones is somewhat uncertain (James et al. 2007; Walters & James 2011).

This chapter concerned the regulatory environment and associated regulatory failure. Labour inspection in agriculture is not a priority and labour inspection services are seriously under-resourced. The influence of the Robens Report on OHS regulation, particularly its approach to enforced self-regulation and advocacy of greater employer-employee consultation, was discussed together with the relevance of these approaches to labour markets fundamentally changed since they were formulated decades ago. Temporary (often foreign-born) horticultural workers are unlikely to benefit from participatory and industrial mechanisms that function to minimise OHS risks. Historical exemptions of agriculture from OHS legislation (and labour laws more broadly) reinforced agriculture's unique legal and societal status, and the industry has benefitted from the failure to examine the nature of employer-employee relations. Modern OHS laws cover all industries and all types of work arrangements including supply chains. Yet, by and large the vulnerabilities of the horticultural workforce have been overlooked and further refinements are required in this regard (notable exception is establishment of the Gangmasters Licensing Authority).

Controlling chemical exposures is a major element in ensuring a healthy workplace but implementing control strategies is problematic, especially in small businesses where there is demonstrably poor understanding of responsibilities for chemical risk management (Walters 2008). The chapter described REACH as a major reform of EU chemical regulatory policy. Although its impact was anticipated to be substantial in relation to downstream use because of the focus on improved risk communication within the supply chain, this effect is uncertain. Agricultural chemical regulation in Australia is complex, burdensome for small business and without coherence, consistency or transparency across jurisdictions. A challenge to any regulatory regime is dealing with an array of substances that are also changing over time. Key themes include the complexity of regulation in trying to address this (exacerbated with multiple jurisdictions in the EU and Australia), the insidious nature of the hazard and limited information, the need to adopt a supply chain approach but one that recognises differences in market power, concerns about practicality in the context of powerful interest groups, and fears too strident an approach might undermine competitiveness.

The regulatory framework was already problematic but has been further weakened by the growth of precarious work arrangements. The complex regulation makes it hard for workers to know let alone assert their rights. The next two empirical chapters apply the methods described in Chapter Five. Chapters Seven and Eight broadly address the aspects of expanded

contractual chains that may compromise OHS and undermine regulatory coverage, and note social and institutional factors promoting workforce vulnerability.

CHAPTER SEVEN EVIDENCE ON AUSTRALIAN HORTICULTURE**7.1 *Introduction***

One impetus for conducting this research was widespread concern about the growth in labour subcontracting in horticulture (Bain 2010). Another was concern about the inherent risks from exposure to pesticides (Phipps & Park 2002). While the literature indicates work arrangements can affect hazardous exposures (Chapter Two), the interplay between work organisation in horticulture/agriculture and pesticide exposure has largely been ignored. This thesis sought to shed light on this issue by uncovering workers' own descriptions of work along with interviews with regulators, growers and others involved in horticulture. Chapter Five explained semi-structured interviewing was the best data collection method to investigate the lived impact of work arrangements on working conditions. This is the first of two evidentiary chapters. This chapter presents empirical evidence on Australian horticulture. The chapter commences with a summary of common aspects of employment practices. Sections 7.3 to 7.5 provide more details on employment practices specific to OHS, and address the primary aim of this research which is to describe how work arrangements, particularly subcontracting and temporary employment, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. The evidence in section 7.6 contributes to the second research aim, which is to describe the effectiveness of OHS regulation in horticulture, including knowledge of rights and responsibilities. It points to shortcomings in inspection and enforcement. Section 7.7 notes food safety is a potentially influential concern, and section 7.8 briefly concludes the chapter. Attention will focus on Australia, although some reference is made to the UK to make a particular point or indicate that the Australian experience is in no way unique. The cross-national findings were not sufficiently different to warrant a separate comparison chapter. The thesis then turns to empirical evidence on UK horticulture (Chapter Eight).

7.2 *Industry Overview*

Chapter Five explained data collection occurred in two phases. Phase 1 consisted of interviews with eighteen workers on Australia's harvest trail, together with twenty-three key respondents who employed or provided labour, and industry, union and government representatives. Table 7 summarises participant characteristics with some basic demographic information and introduces participants' unique identifiers.

Table 7: Participants' Characteristics

Code	Category	Employment arrangement	Location/ Nationality	Experience	Gender	Age
AW1	Worker (s417)	Contractor	British	3 weeks	M	18-30
AW2	Worker (s417)	Contractor and direct	British	6 months	M	18-30
AW3	Worker (s417)	Uncertain of employer	British	3 weeks	M	18-30
AW4	Worker (s417)	Uncertain of employer	British	3 weeks	M	18-30
AW5	Worker (s417)	Uncertain of employer	British	3 weeks	M	18-30
AW6	Worker (s417)	Contractor	British	3 weeks	F	18-30
AW7	Worker (s417)	Contractor	German	8 months	M	18-30
AW8	Worker (s417)	Direct	German	5 weeks	M	18-30
AW9	Worker (s417)	Direct	German	3 months	M	18-30
AW10	Worker (s417)	Contractor	German	3 months	M	18-30
AW11	Worker (s417)	Contractor and direct	French	1 week	M	18-30
AW12	Worker (s417)	Contractor and direct	French	3 weeks	M	18-30
AW13	Worker (s417)	Direct	French	1 week	M	18-30
AW14	Worker (s417)	Contractor	French	2 weeks	F	18-30
AW15	Worker (s417)	Contractor and direct	French	2 months	M	18-30
AW16	Worker (s417)	Direct	Italian	1 week	M	18-30
AW17	Worker (s417)	Contractor and direct	Canadian	5 months	F	18-30
AW18	Worker	Contractor and direct	Australian	Years	M	46-60
AG1	Partner-grower		NSW	-	M	31-45
AG2	Owner-grower		NSW	-	M	31-45
AG3	Business Director		NSW	-	F	31-45
AG4	Owner-grower		NSW	-	M	31-45
AG5	Owner-grower		NSW	-	M	>60
AG6	Owner-grower		NSW	-	M	>60
AG7	Business partner		Qld	-	F	>60
AG8	Owner-grower		Qld	-	M	>60

Code	Category	Employment arrangement	Location/ Nationality	Experience	Gender	Age
AG9	Partner-grower		Qld	-	M	31-45
AP1	Labour provider		NSW	-	F	31-45
AP2	Labour provider		Qld	-	F	46-60
AP3	Subcontractor		NSW/ Qld	16 years	M	46-60
AR1	WHSQ Inspector		Qld	-	M	46-60
AR2	WHSQ Inspector		Qld	-	F	31-45
AR3	WHSQ Inspector		Qld	-	M	46-60
AR4	WorkCover Inspector		NSW	-	M	46-60
AR5	WorkSafe Inspector		Victoria	-	M	46-60
AR6	WorkSafe Inspector		Victoria	-	M	46-60
AU1	AWU official		NSW	-	M	46-60
AU2	AWU official		Victoria	-	M	>60
AM1	NSW DPI		NSW	-	M	46-60
AM2	NSW EPA		NSW	-	M	46-60
AM3	Industry rep.		National	-	M	31-45

Interviews indicated the work undertaken was generally unskilled. The most frequently reported work activity for orchard and fieldworkers was picking, followed by thinning, pruning and pesticide spraying. Some businesses had onsite packing. Generally, work was manual, repetitive and physically demanding. Banana plantations were described as hot, humid, wet and muddy. Pineapple picking booms were noisy and moved at a constant rate. Often workers were required at very short notice to complete rush orders; such a system leans heavily on having a workforce which can be summoned at short notice. Working hours were unpredictable. Workers explained the day would end when the orders had been completed and this was rarely known in advance. At busy times working hours were twenty-four hours, seven days a week, and most workers reported not receiving breaks. During these periods working times varied, the longest working time cited by a participant was thirteen hours (AW12). Overtime was routinely worked, sometimes without additional payment and mostly without an overtime premium. Most harvesters were pieceworkers paid per punnet or box of

the product harvested to the required quality. Workers voiced a willingness to work long hours to maximise earnings which financed further travel.

A common method of recruiting workers, predominantly young people from developed source countries, was through word-of-mouth directly to the farm. Workers expressed preference for direct employment, with the majority reporting negative experiences working for labour contractors⁵⁰ (including irregular work and being paid less or not at all). One Workplace Health and Safety Queensland (WHSQ) inspector described “some very bad contractors” who recruit people from the side of the road (AR2). A French backpacker confirmed:

Sometimes we’re just like hanging out here [in the park] and they [contractors] come to us and they ask us if we want to work for them.	AW14 51
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Backpacker hostels and caravan parks provided another link between seasonal labour and employers. Working hostels make it part of their core business to arrange work for their guests, and cooperate with employers to organise transport to farms. However, most workers reported staying in caravan parks and free camping sites, where sanitary conditions and facilities were at times primitive or non-existent, adding to the health risks. This problem is not new but identified with regard to other groups of precarious workers in the past (Quinlan 2013b). Workers staying onsite were generally required to have their own tent or campervan and cooker, with small numbers of self-contained static caravans and limited access to communal toilet and shower facilities. The potential for para-occupational exposures is discussed in subsection 7.5.2.

On account of the seasonal variations in production or demand, employers required large pools of workers willing to accept the characteristically unstable and difficult work; reliable workers but also workers that would not demand higher wages or improved working conditions. Interviews indicated an almost unequivocal view amongst employers that foreign-born workers are crucial to horticulture. An Australian-born harvest labour subcontractor suggested local workers have effectively been restructured out of the industry:

Go back 15 or 16 years ago you [local worker] would be the first one called and then after the first season when you’ve proven yourself to the farmer he’d want you back. But I’ve noticed a decline in that. Now they tend to want these backpackers, and I’m starting to think: <i>why do they want the foreigners? Are they trying to squeeze us out?</i>	AP3
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⁵⁰ See A Note on Terminology.

⁵¹ See Chapter Five, section 5.5 for an explanation of participant notations.

That's the feeling that I get, it may not be the case. And when you start tying other little things along the way you start thinking: *okay, they get somebody that doesn't know and they can manipulate the situation to their advantage.*

Some employers referred to targeted recruitment of the "ideal worker" and acquiescence to, or compliance with tasks and working norms:

I employ Filipinos; they are married to Australian men that live in Orange. There's quite a population of Filipinos here, they have their own network and I'm very, very pleased to employ them. They're very dedicated, very good, very neat in the packing process of fruit so I'm very happy to have them.

AG6

We often find that the Koreans, the Japanese they naturally can move very quickly their hands. Their brain can coordinate their hands. So we really ask for them, for the Koreans and Japanese. You need to be able to think fast and move your hands fast and stand there and do it for hours on end. So they've got a real knack for that that's why we need 'em in.

AG3

The suggestion that foreign-born workers (especially recent arrivals, those with temporary residency status or engaged in temporary work) are seen by employers as more tolerant than domestic labour of undesirable work conditions and hold a superior work ethic in terms of effort without need for continual surveillance is supported in the literature (see Lever-Tracy & Quinlan 1988; Guthrie & Quinlan 2005; Toh & Quinlan 2009; Ruhs & Anderson 2010).

The Working Holiday Maker (WHM) visa permits travellers aged between 18 and 30 years to work for up to one year in Australia. The second Working Holiday visa introduced in 2005 allows subclass 417 visa holders who undertake 88 days specified work in regional Australia to acquire eligibility to apply for a second such visa. Unscrupulous contractors are reportedly using this to their advantage as one French backpacker explained:

I came here [Griffith, NSW] thinking I was going to get my second year visa and they're like "yeah, yeah we'll do it for you, we'll do it for you" and like I started calling them 'cause I was like "yeah I need my visa 'cause I'm leaving soon" blah, blah, blah and they just never called me back.

AW14

Workers' willingness to engage in short-term casual work, and be available without notice to work highly flexible days and hours, were conditions conducive to exploitation, exemplified in the following passages:

In 3 weeks I've done everything from plum picking to pumpkin picking to chilli picking,

AW3

grape picking... I've been sent to a different farm like I'll do 2 days here and days there like I haven't really had a consistent job since I been here I've just been like wherever there's a few day's work I've just been going... the pay is terrible like I've got paid for like literally 4 days' work like 8 hours a day like working my arse off like I've been given \$15 and stuff. Like proper backbreaking work as well. And it's like "well if you don't like it go away and we'll get someone else".	
So that's a bit annoying because sometimes they're like "yeah you're gonna get work tomorrow" and we make like \$10 in one day and we're like "are you serious?"	AW14
I have judged it this way, the farmer don't care about me and my health. He don't care because we are backpacker and he say: "I see this man just one or two week and after I don't see this man".	AW12

The award baseline⁵² appeared irrelevant in practice and it did not seem to matter if workers were proficient in English and educated. Chapter Two suggested precariousness is a multi-dimensional construct encompassing employment instability (type and duration of the contract), low wages, limited rights and social protection, vulnerability to abusive treatment, and powerlessness to exercise legal rights. Interviews indicated labour standards were adversely affected by precarious work conditions. The following responses of a labour provider and two union officials reinforced workers' impressions:

I think they [employers] do see the casual workers that come in just for the harvest as expendable: <i>they're just here for a few months and then we'll piss 'em off.</i>	AP1
...there'd be a number of farmers at the door parked out the front [of the backpackers hostel] at half past five in the morning, and the manager of the site would allocate people to each car, whoever they were going to – "they want 4, they want 3" – and you can see it's almost like second tier employment in America where there's no water or anything down in the vegies.	AU1
They won't argue because the moment they speak up they'll find they're no longer employed because they're all employed casually.	AU2

Feelings of expendability generated insecurity that disempowered workers. Some workers explicitly reported feeling powerless over various conditions of their work (AW3, AW9, AW11,

⁵² Minimum hourly rate payable is \$16.37 plus a casual loading of 25 percent (casual hourly rate \$20.47). Piecework rates must enable the average competent worker to earn at least 15 percent more than the prescribed minimum hourly rate.

AW14). However, WHMs enjoy a great degree of labour market mobility. By contrast, regulators and union officials described fear as ubiquitous amongst guestworkers whose entitlement to remain in the country is tied to a contract of employment with a particular employer (including the Seasonal Worker Program) (AR5, AR4, AU2). This finding is consistent with concerns about the Canadian Seasonal Agricultural Worker Program (Chapter Three).

Growers unanimously reported reliance on seasonal workers (principally backpackers) for picking and packing, and interviews with a range of participants suggested increasing numbers are turning to contractors and other labour providers to meet their labour deficit (AG2, AG3, AW1, AW2, AW6, AW7, AW10, AW11, AR4, AR3). Workers noted the power imbalance between contractors and themselves, exemplified here:

The contractors are a bit dodgy... [but] we can't say anything because it's cash in hand. There is no contract, there's not like there's nothing that assures us that we're gonna get paid. It's like if you want to work, work but ah no contracts nothing... They've got all the power like we can't say anything because we know it's illegal... they know that if there is work they can just [snaps fingers] and we arrive. So they've got lots of power over us and we can't really say anything.	AW14
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Two labour providers confirmed:

[Contractors] just don't care about the people that are working for them. They have very little regard. They treat people really, really badly... contractors are a real worry I think; you're just really breaking down so many conditions that Australians have fought for.	AP2
...they're not employing their workers properly; they're not paying them the legal amount so they feel the workers don't have anyone to complain to so it doesn't matter.	AP1

The Australian experience was in no way unique; a similar concern was voiced by UK union official UU2. Interviews also indicated periphery labour contractors may be exploiting workers from their own ethnic community:

There are just a huge number of really dodgy contractors getting around. They're quite often foreign. They're quite often people that are refugees that have been in the country a while and have got better English than their cohorts and they just decide to run a crew and take advantage of their own countrymen.	AP2
I use the provocative word rape because it's usually their own countrymen that are	AU1

using up the contractors; they use their own countrymen and women as their contacts and do it. It's called race-to-the-bottom, and we're getting near the bottom as to the quality of people and the desperation of people to come and work, and they don't ask questions.

Exploitation within ethnic groups has been regularly identified in research into migrant workers (see for example Mayhew & Quinlan 1999; Grzymała-Kazłowska 2005). The race-to-the bottom hypothesis suggests globalisation may create labour market difficulties for advanced country workers, inevitably leading to a competitive erosion of labour standards everywhere (Singh & Zammit 2004; Woolfson 2007; Davies & Vadlamannati 2013). It can be difficult to establish labour standards in informal sectors. One union official explained:

It comes down to the farmer. The farmer is the weak link in all of this. They know [about contractors' exploitation of workers], their association knows and they make noises but they're not going to say anything against their members or constituents because they hold all the power, and I'm talking about the power to fix it. Having said that, by neglect they are turning that power around and turning it into a force against the individual.

AU1

Similarly, another union official described the main barrier to legislative compliance as the:

...power of the employers – the influence they have over governments is just incredible.

AU2

One employer suggested Australian horticulture needs a relegated temporary foreign-born workforce:

I think Australia needs a second class, we need a second class workplace. Y'know, we need more foreigners allowed like Mexico. Y'know, we need some foreign workers because if it wasn't for the backpackers, then we wouldn't be able to um... it's very hard to compete on the international market with what we pay in wages. But y'know, if foreign workers were allowed over for a cherry season they earn a lot of really good money, for a lesser rate, but they're looked after by the contractor as far as accommodation and that, but they can take this money back home. In what they earn here, y'know, in a week could be three months or six months over in the Philippines or whatever.

AG3

Of course it is improper for work visa statutes and regulations to create a class of comparatively disadvantaged guestworkers. Two-tier wage structures generate a special set of

controversies, violating the basic tenet of equal pay for equal work. A compliant unskilled foreign-born workforce and a higher degree of wage dispersion than would otherwise be the case would enhance employers' options of wage adjustments and dismissal or repatriation as a means of controlling labour costs (Islam & Kirkpatrick 1986).

To summarise, informal modes of recruitment contributed to worker vulnerability, especially violations of labour standards. Ideally, piecework rates are set at such a level as to attract workers and satisfy minimum wage requirements, while remaining competitive in their markets. Given the incentive for speed that piecework creates, it may be expected that employers would not allow workers handling delicate, easily bruised crops to be paid by the piece. However, the award baseline appeared irrelevant in practice (which is consistent with Mayhew and Quinlan's 1999 finding on Australian clothing industry outworkers) and it did not seem to matter if workers were proficient in English and educated. Workers' willingness to engage in short-term casual work, and be available without notice to work flexible days and hours were conditions conducive to exploitation. This finding is consistent with Anderson and Rogaly (2005). Feelings of expendability generated insecurity that disempowered workers. Labour subcontracting has taken on a particular form in horticulture: informal, temporary and often foreign-born. Growing reliance on foreign-born labour appears to disempower both foreign-born and Australian-born workers. Foreign-born workers have limited ability to exercise their rights due to the precarious nature of the work, whereas Australian-born workers face competition from the cheaper and more docile foreign-born workforce.

7.3 Induction and Training

This section provides evidence on compliance with requirements to induct and train workers thereby contributing to understanding whether the nature of employment (including subcontracting) affected work experiences. A number of government OHS inspectors raised concerns about the induction process (AR1, AR2, AR3, AR4, AR5), exemplified here:

Mostly it's verbal; very little documentation for the majority of industry.

AR2

...generally across the board induction's a big issue. There's been a number of projects over the last few years to try to get a generic induction up for the industry... Once someone's done the online induction, not everywhere but a lot of workplaces presume that they've already been inducted so when they come onto the job site they don't have an on-farm or job-specific induction because they've so-called been inducted. But it's only a general industry induction so the specific hazards and risks

AR3

associated with that farm aren't being communicated.	
...the grower will make an arrangement with the labour hire provider that the labour hire provider does the induction training... that level of induction done by the labour hire provider is usually where it falls down; they don't actually make sure that the people understand training or are competent... and then when they get to the farm with that lack of training they're behind already and so they don't understand all the site induction information... they're just assuming that the labour hire providers will provide induction and training instead of making sure that it's done properly.	AR4

Underhill (2008) similarly found induction and training by temporary employment agencies and host employers, when provided, was often poor, and an Australian government committee of enquiry into harvest labour found onsite training for day and pieceworkers often comprised a hurried attempt by supervisors anxious to get work underway and workers anxious to commence earning money (NHTWG 2000) – one downside a purely incentive or piecework payment system. Scholars have argued precariousness is conducive to potentially hazardous forms of work disorganisation in terms of access to information and safety training (Quinlan & Bohle 2004, 2009; Quandt et al. 2006). Despite a number of employers explicitly stating they made no distinction between workers based on employment type (AG1, AG2, AG7), one owner-grower confirmed the misconception identified in previous research that contracting was seen to obviate legal responsibilities (see Thompson 2000; Johnstone & Quinlan 2006):

The guys that I employ and the ones that the contractor has are both totally different I suppose. The guys I employ here, there's a list of things we go through I mean I take them through like the safety procedures for a start, and then I just show them around basically where everything is, any potential risks.	AG4
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Chapter Six explained employers' duties are non-delegable and more than one person may concurrently have the same duty. By engaging a contractor (who may subcontract all or part to another contractor who might do in turn the same i.e. multi-tiered subcontracting) an employer does not transfer their statutory obligations. The role of contractual chains in enabling employers to evade legal responsibilities (see Quinlan 2003; Lobel 2005) is an element of regulatory failure examined in section 7.6.

Government OHS inspectors and union officials raised concerns that the temporary nature of workers' employment negatively affected employer attitudes to induction, training and participatory activities, which in turn had implications for OHS (AR1, AR3, AR4, AU1, AU2):

...the temporary employees don't get a broader knowledge of safety. I think they get limited information and sometimes that is too limited.	AR1
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So you have a casualisation of the workforce, the precarious nature of the employment so they're less willing to raise safety issues, and they're less knowledgeable about the safety issues because they're not receiving any safety-related training because that continuity of employment just isn't there.	AR4
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If there was a direct employment relationship you would find the health and safety concerns of the employees would be addressed.	AU2
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These comments underscore the special vulnerabilities of temporary harvest workers. Broader concerns around employer compliance with their obligation to induct workers were consistent with scholarly concern that procedural requirements can encourage paperwork compliance rather than safer workplaces (Gallagher et al. 2001; Saksvik & Quinlan 2003; Wadick 2010). One WHSQ inspector stated:

I think some places go through the motions of inducting their temporary employees just to sign-off a piece of paper and not really impart the knowledge and skills that the person needs to stay safe.	AR1
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Indeed one Queensland grower admitted:

We do have an induction which maybe we're a bit slack doing sometimes but by Australian law you're meant to do all that. So we hand that out and then we get 'em to sign that; it's just proof.	AG9
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However, not all attitudes were the same:

We just give everybody the induction at the start of the season so that we know that everybody's got it... it's the same when people send people out from town. If they say oh y'know like "they're right to go", I assume nothing... If I give everyone the same induction I can tell you definitively that that person was trained correctly. They sign off to say that they received the training and they understand it and that's the case with everybody who comes onto the place.	AG1
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We do an induction with them and explain the dos and don'ts: their responsibilities for safe working conditions; make it clear that we won't tolerate any harassment – sexual or racial; no drugs or anything like that... they're given a set of rules when they come here and we say "right these are the rules". They've gotta read them and	AG7
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they've gotta sign that they understand. And it has on it that if you do not understand do not sign or if you're not prepared to adhere to these rules don't sign.

These attitudes are in no way unique to Australia. One UK employer similarly stated:

Whether workers are temporary or permanent they are required to go through the same induction procedures.	UG7
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An NSW/Queensland harvest labour subcontractor explained his attitude towards induction:

I have an induction manual and they [workers] keep that... we cover quite a few areas, the generic stuff, and that's what it is. Site-specific is different because you need to go through different routines but it's called a generic induction manual and I don't know why everyone doesn't use it... I don't know whether they read it word for word; quite a few of them do because they come back and ask you about something, or I'll ask them questions throughout the day or a week later just to see. Simple – takes no time whatsoever.	AP3
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These responses confirmed OHS initiatives are predicated on human involvement, and suggest inadequate induction is not always a feature of subcontracting arrangements. During the course of the research some induction and training materials were sighted but further examination of materials and observation of processes and recipients is needed to confirm this conclusion. This is an area for further research.

There was discrepancy between responses regarding induction. All employers reported conducting some level of worker induction yet government-contracted labour providers and union officials shared negative opinions on industry compliance:

All growers are meant to have a very structured set out induction for their workers. I would say 80 percent don't, they will just have a casual "oh and don't do that" and "oh actually no don't do that".	AP1
I think the induction processes on the whole could be vastly improved even on the good farms really.	AP2
Take any horticultural farm in Gippsland in Victoria and I reckon I could go to anywhere around Lindenow or Boisdale and not find an induction sheet or a work safety operational manual anywhere.	AU2
I've had experience working with a number of organisations putting in inductions. Having said that, you can count them on one hand and that's the problem.	AU1

Workers, who almost unanimously reported receiving no induction or training, reinforced the above views. Regardless of employment arrangement (superscripted⁵³), responses to the question “prior to beginning work did you receive an induction, which might include the hazards and risks at work, safe work practices and the location of toilets and hand washing facilities” revealed a similar theme:

No not really like a brief talk but it was literally “don’t kill the trees”. Basically the talk went: “don’t rip the buds off and you’re meant to twist the cherries” and that was it. <small>Contractor</small>	AW1
Yeah the first one I was on they [the farmer] like took me through, gave me a bit of paper with the machine and told you all the controls on the machine, made you sign that you’d been trained and like did their own little licence for you, and they were really good. The second job [with a contractor] didn’t do anything like that. And this one [contractor] is pretty bad. <small>Contractor and direct</small>	AW2
Kinda yeah they show me “you have to do that and that and that and you’re fine”. <small>Contractor</small>	AW7
No nothing. Just a little explain how to pick cherries, nothing else. <small>Contractor and direct</small>	AW11
Some farmers will go on with the safety aspect, some don’t y’know what I mean? <small>Contractor and direct</small>	AW18
A what... oh ah not really, no. <small>Direct</small>	AW13
No. You turn up and he goes “pick them fruit off that tree and put ‘em in that basket” and you just carry on. <small>Uncertain of employer</small>	AW3
Yeah be careful with the ladder because it’s not safe. That’s it, only that. <small>Contractor and direct</small>	AW15
No. About cherry picking he told me I can work whenever I want and I should pick the cherries with the stalk. Yeah that’s it; they didn’t say anything at all. <small>Direct</small>	AW8
No not really it’s just they say “do it and go away!” and then we do our best to finish the job. <small>Direct</small>	AW9

⁵³ ‘Contractor’ indicates employment by a labour subcontractor; ‘Direct’ indicates a direct employment relationship with the grower; ‘Contractor and direct’ indicates reports of employment under both arrangements; and ‘Uncertain’ indicates the worker was uncertain of their employer or the work arrangement.

Ah yeah “pick the grapes and put them in the bucket”. Yeah of course they instructed us to do the work quickly. ^{Contractor}	AW10
Nothing, they just ask “have you ever worked as a picker?” and I just say yes but it wasn’t true and that’s it... They just say “go and picking”. That’s it. ^{Direct}	AW16
No. We were told “pick the red apples”. ^{Contractor}	AW6

Although the most positive reported experience occurred through a direct employment relationship (AW2), it is only possible to conclude that induction and training appeared low across multiple work arrangements. Contrasting their work experience in their home country it was interesting that some workers indicated there should be regulations to protect workers such as training requirements and suitable clothing and PPE. Seemingly drawing the conclusion that current practices were industry standard and compliant with employers’ obligations one worker remarked that the absence of visible enforcement and the ability to work barefoot would never occur in Germany (AW7). Another remarked:

In England it’s ridiculous. For one of my jobs for which I was a deli instructor I had 2 days induction just to work at a deli counter but like here I’m allowed to use heavy machinery at a farm and it’s fine!	AW1
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Despite employer obligations to train, notify and provide PPE being well articulated in State OHS regulations, a WHSQ inspector agreed:

There’s quite a lack of formalised training out there. It is available but often not utilised for general workers.	AR2
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A WorkSafe Victoria inspector explained employers’ noncompliance in these terms:

Firstly, you have to understand what is an induction requirement and what is the standard that you want to meet... Once you’ve established that standard, and you make that the absolute standard, then induction is an absolute key criteria to the first stages of competency to work on that farm. The trouble is that people see induction as being: “that’s where the toilet is, that’s where you hang your hat, that’s where the lunch room is, and now let’s get on with what you have to do”.	AR5
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The experience of most workers interviewed failed to match even the limited induction described above, and subsection 7.5.2 reveals toilet and hand washing facilities were seldom available. Chapter Six questioned the ability of small businesses to respond effectively to the management systems approach to OHS regulation. Some State OHS inspectors indicated business size may affect knowledge of obligations and what action is needed to achieve

compliance (AR2, AR3, AR6), exemplified here:

The bigger players that we're dealing with on a regular basis, whether that's because of our involvement or their own state of knowledge, they seem to have that aspect of it pretty well squared away. Y'know informing their employees what the issues are, what the hazards are, and what potential controls are that they've got in place and how to use them to make sure that the controls are as effective as can be. With some of the smaller operators that knowledge is probably not there.	AR6
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The finding that government OHS inspectors tend to concentrate on larger workplaces, with the result that small businesses can remain almost inspection-free thereby reducing pressures to be aware of and address OHS risks is not unique to horticulture (see Johnstone 1999; Quinlan & Mayhew 2000; MacEachen et al. 2010). Government inspectors also raised broader concerns relating to the itinerant nature of the workforce:

Because they're so transient the induction becomes a problem because you might have two workers from Korea or two German workers turn up on the Monday and then not come back until Thursday, or they might never come back again... You almost have to hold an induction every morning because you have new people.	AR2
Another problem with the itinerant nature of the industry is that you may only have a backpacker or someone there for 2 or 3 hours or just a day, so if you're going through 2 hours of induction before they even get onto the pack floor or the field you've lost 2 hours of their work time so you're not recouping the profit.	AR3

Chapter Three explained WHMs are increasing in number and significance. Whilst it may be common for permanent itinerants to stay in a location for the length of the season, WHMs typically stop in a region just long enough to earn enough money to finance their next adventure (Hanson & Bell 2007). The temporary nature of workers' employment appeared to negatively affect employer attitudes to induction and training, in turn affecting OHS. The critical factor seemed to be workers' temporariness. Induction and training appeared low across multiple work arrangements but further examination of materials and observation of processes and recipients is needed to confirm this conclusion. Government inspectors and union officials suggested induction and training by temporary employment agencies and host employers, when provided, was often poor. Conflicting accounts between employers and workers may reflect the diversity of practices in horticulture. The belief amongst employers that contracting obviates legal responsibilities was perceptible but in no way pervasive. Broader concerns around employer compliance with their obligation to induct workers related

to paperwork compliance. Language barriers, which can magnify the challenge for foreign-born workers to understand basic instructions, OHS measures and their working rights, are discussed as a subsection to induction and training next.

7.3.1 Language

Workforce cultural diversity manifests itself in many ways. Arguably, the most distinctive expression of culture is linguistic (Trajkovski & Loosemore 2006). Researchers have remarked communication barriers in terms of language and literacy make problematic the provision of general workplace safety information or specific pesticide safety information to foreign-born agricultural workers (Arcury et al. 2001, 2010b; Elmore & Arcury 2001; Farquhar et al. 2008). Similar observances were noted in other industries, notably construction where non-English speaking background (NESB) workers fill a high proportion of low-level operative positions (Loosemore & Lee 2002; Trajkovski & Loosemore 2006; Bust et al. 2008). Labour providers considered the language barrier potentially significant:

The main OHS issue would be the language barrier when it comes to their induction.	AP1
Workplace health and safety induction on the farms I feel are sometimes very ineffective because of the language barrier... they're [workers] supposed to read it and then sign that they've read it but you don't really know do you that they've read it? If you've got 2 full pages in English and you've got a Korean that really doesn't speak English very well, are they really gonna understand every word of it? And this is language and terminology that they've probably never come across before, it's not simple language... although the farmer might think he's doing the right thing, a lot of these farmers they haven't travelled a lot themselves, they don't actually know really how to communicate very well with a backpacker from another language.	AP2

The last statement concurs with Helmreich's (1999) observation that people from Anglo countries who only speak English may not understand the problems those from other cultures have in understanding English communications. Asked whether language was ever an issue when communicating with workers employers responded:

No. Well yes and no. Ah you have to speak slowly, you have to speak clearly.	AG2
It hasn't been but if it is well, it hasn't been but we can communicate enough that they can communicate back enough to let us know what they're saying.	AG4
It's really no big issue, and normally if there's one that's not good at speaking they're	AG7

with someone else who can speak good English so they can interpret for them.

It's a challenge but it's offset by the fact that they're motivated... We'll sit down and have a beer with 'em every now and then and it's really a struggle to have a conversation with some of them but very rarely does that impact on work. Safety y'know ours is a fairly safe and simple work environment, and they can pick up the job.

AG9

Bust et al. (2008) claimed the inability to immediately communicate via the spoken word represents a major barrier to successful management of OHS. No employers were multilingual, and they relied on bilingual or more skilled workers to act as translators. Consequently, government OHS inspectors unanimously considered language barriers problematic:

The language barrier's a significant problem. Because there are so many different nationalities it's difficult to ensure understanding of inductions across the board.

AR2

Language is a big variant because trying to get the English across or explain what it all means, well if they haven't got a concept of what it all means then you're behind the eight ball to start off with in communication to try first to tell 'em about the concept and then explain the detail of the concept.

AR3

Some of the workers their understanding of English possibly is not what it should be so we need to be looking at alternative methods of communicating some of those issues to them... I'd say that there are at times cultural and language barriers that aren't really that well understood by employers when trying to communicate to some of their employees.

AR6

Although the inability to understand or speak the English language creates obvious OHS vulnerabilities (Premji et al. 2008a; Sargeant & Tucker 2009), the concentration of low-wage foreign-born labour in service occupations and low end blue-collar and agricultural work, and a greater willingness or susceptibility to pressures to take risks and a lesser likelihood of participating in measures to improve OHS provide a combination of layers of vulnerability with regard to OHS (Lovell et al. 2007; Sargeant & Tucker 2009; Geddes & Scott 2010; Scott 2013b). Consistent with this previous research an NSW union official agreed poor induction is not a language proficiency issue even though language issues may exacerbate the situation. He also restated concerns with regard to misconceptions about delegating statutory duties:

In the small percentage of places where induction is being held well language would be a problem, but it's not language that's a problem it's the lack of will on behalf of

AU1

the employer. With the employer being either the contractor, who may well be Joe with the mobile phone number, or the farmer who thinks that their absolving their legal requirements by the fact that their using Joe with a phone number. So it's a never ending problem.

Interestingly, NESB workers themselves did not perceive language as a particular barrier to communication (AW8, AW9, AW15, AW16). Responses suggested language may not be perceived as problematic because of limited communications, exemplified here:

Not much instruction. They just say "picking fruit this row", that's it.

AW15

I understand more or less everything he says. He's not saying very much.

AW16

Communication between people of differing national cultures can also be impaired by cultural values. Cross-cultural differences in attitudes, perceptions and beliefs regarding safety have been examined elsewhere (Helmreich 1999; Bust et al. 2008), with growing awareness of the importance of better understanding of cross-cultural management (French 2010). Cultural concerns were raised by some participants:

[Farmers] just rattle something off and of course in Asia you don't say you don't understand because that's to lose face; you nod and you say "yes, yes I understand". And they never understood a bloody word of it!

AP2

At times I think industry expects foreign workers to behave and do things the same as a local worker. I don't think different backgrounds are taken into account well enough.

AR1

Koreans are a bit of a problem because they're from a society that accepts particular things and they won't speak out. So if there's a particular health and safety issue Koreans tend not to say anything they just grin and bear it.

AR3

The Australian experience is in no way unique. Similar concerns were voiced by participants on UK horticulture (UP2, UG1, UG3, UR1, UR3, UU1). The role of the regulatory profile for OHS and labour relations in countries of origin in affecting workers' attitudes was also raised:

A lot of the countries don't have a prominent OHS regime. Say from the Baltic states, Arabs, Koreans, the islanders and stuff like that they haven't got workplace health and safety in their environment so they don't know about it so that's a problem.

AR3

[Foreign workers] have come from a place where they earn \$10 a week and here they're making \$80 a day some of them. Yeah they get paid about \$12 an hour,

AU2

whacky-do. But that is an incredible amount of money considering what they've come from so they don't care about occupational health and safety, they've never heard of it.	
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The increase of cultural diversity raises and modifies the overall complexity of OHS management.

Language competency can make the provision of general workplace safety information or specific pesticide safety information to foreign-born workers problematic. Government OHS inspectors and union officials unanimously considered language barriers (and cultural differences) problematic, although poor induction is not a language proficiency issue in itself. There was little evidence employers, none of whom were multilingual, saw English as a requirement or inability to communicate OHS information as a potentially serious risk at work. Inability to understand or speak the English language creates obvious OHS vulnerabilities but it appeared the concentration of low-wage foreign-born workers who were willing to take risks exacerbated vulnerability with regard to OHS.

7.4 Safety Concerns

There was suggestion that use of temporary workers may affect employer attitudes to induction and training. This section reveals workers' perceptions of hazards and their employers' attitudes and behaviours towards their health and safety. For contextual reasons some reference is made to safety because it reinforces observations about the management and regulation of horticultural work more generally. The subsequent section provides an extended discussion of pesticide exposure scenarios.

Asked what they considered the main safety hazards in horticultural work employers identified: insufficient training or skylarking in operation of heavy machinery (AG1, AG2, AG3, AG6, AG8); the natural environment, including exposure to heat (AG2, AG7, AP3), snakes and spiders (AG2); and moving tractors (AG3). Although Australian OHS regulations state employers must take measures to ensure workers' safety at work, a British backpacker recalled working alone in the dark, with inadequate lighting and no plan of action if he was approached or threatened by an intruder:

For night shifts he drops you off, you got four lights on the machine, one at the front, one at each side, one at the back of your basket so you can see behind you. And he'd drop you off for 12 hours at night time and like no one else works night time on that farm, there's two people on machines working all night from like 6pm to 6am. I quite	AW2
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enjoyed the night shifts 'cause you can't see anything I just put my headphones in and I just zone out. But it's pretty fucking dodgy being left on a massive farm all night on your own... The lights were okay though; you could still sorta see what you were doing but then you couldn't see anything else if that makes sense. So the light was here, here, here and here. There could just be like 10 people there waiting to attack you and you wouldn't be able to see them. If I turned the lights off I literally couldn't see anything, like not even my hand in front of me it was proper pitch black.

A German backpacker recalled working in a thunderstorm:

One time we picked in the Hunter Valley grapes and a thunderstorm came and that's dangerous because when the lightening goes down yeah because of the wires and if you're standing on the field and there's metal everywhere. And we picked until the storm was just above us and it was like a wall, we saw it and it came straight towards and then in these few seconds you got totally wet and then the storm was there and then we ran towards our cars. I think nobody [told us to stop working]. It was too stormy to work and that's why we ran.

AW10

Both workers were employed by harvest subcontractors at the time.

When asked to identify the main OHS issues, workers frequently associated OHS risks with an immediate effect, which is consistent with Holmes et al. (1999). One worker mentioned the potential for musculoskeletal injuries, but workers most commonly mentioned the risk of falling from ladders:

Where do I start? The ladders aren't safe, the straps aren't good, like one of the ladders is actually broken – one of the whole steel bits going up... Surely there's some sort of health and safety issue with like carrying 5 lugs⁵⁴ at a time as well.

AW1

A girl fell off a ladder today. There are three ladders that are broken: there's one where the top between the two bars is snapped; there's one where the bottom half of it is snapped off; and there's another one that they still use that the bottom three legs have snapped off but they use it as a little ladder. I was gonna say, I was driving a tractor without a licence and a forklift without a licence; I never driven a forklift before. I drove it all day yesterday.

AW2

⁵⁴ A box used for moving fruit from the orchard to packing or processing. As soon as the fruit is picked it is placed in these boxes typically strapped to the shoulders.

You climb up a ladder: no safety. You lean over to risk your life for one plum.	AW4
If you fall off the ladder or the tree it's very dangerous but we don't have the choice, just picking... the picking it's really dangerous because if you fall off your ladder and something like that and we don't have insurance so we're just in the shit.	AW11
It's not a healthy job because you are a lot of bad movement. You can pick under the tree and so you can't sit on your lug because he says that you broke the lug. And you carry a lug it's quite a heavy weight.	AW12

Owner-growers did not consider use of ladders particularly hazardous; one spoke of limited use through grafting onto dwarf root stock to limit the eventual height of trees (AG4), and others underscored the importance of training and reinforcement of safe behaviours (AG2, AG6). However, contractual arrangements may have affected attitudes as this statement by a worker employed by a harvest subcontractor suggested:

...the ladders are pretty fucked and it's the fact that like he [owner-grower] hasn't pruned the trees or anything and then he expects you to climb up the ladder like that and stretch out to the top to get the fucking cherries. I've fallen off one ladder trying to do that.	AW2
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Notable were struggles with the employer who was often perceived as demanding and uncaring. Workers' negative perceptions appeared more common outside direct employment arrangements. Consistent with this, a grower suggested contractors viewed workers as a "cash cow" (AG2). Workers were asked for their perception of their employer's attitudes and behaviours towards their health and safety:

No one gives a shit like if someone gets hurt it's kinda their problem. <small>Contractor</small>	AW1
...like some bosses if there's like an actual issue which I'm genuinely concerned about I'll speak to them. Whereas some bosses I know if I go up to them and say "this is worrying me" they'd be like "pfft" and they won't care. <small>Contractor and direct</small>	AW2
The contractor or the farmer don't care about you only about his cherries. <small>Contractor and direct</small>	AW11
I think that the farmer takes a lot of pickers and he don't care about health or something so we work without glove, without mask, so he don't care. <small>Contractor and direct</small>	AW12
They [contractors] don't really care about you; they just care about the money. So yeah I guess it's not really very good but we just need to make a little bit of money	AW14

and then leave. ^{Contractor}	
You know the score before you do it. You know, well no one says it but you do, you know deep down that if something happens to you then it's your own fault like you took the risk. ^{Uncertain of employer}	AW3
I think they're not really interested in our health or something like that. They just want that we make the job done and that's it. Some farmers are very nice and give you gloves or something like that but mostly not. ^{Direct}	AW9
In the Hunter valley we had another contractor and all the time he shouted at us: "Pick as fast as you can. Double check your vines". And the supervisors as well. That was okay but it was not a pleasure... I don't really think they care about this [OHS]. Just the job has to be done and that's all. ^{Contractor}	AW10

The perceived nonchalance toward worker safety may reflect small businesses' insufficient resources to develop formal hazard management and risk control systems (Lamm 1997; Walters 1997; Hasle & Limborg 2006), coupled with prevailing safety attitudes and behaviour in agriculture. Two owner-growers considered a safe and healthy workplace a product of "common sense" (AG2, AG8). A labour provider added:

...the problem is that most of the orchardists either are, or have come from "she'll be right" culture: "it'll be right, just be sensible, use you head, you'll be right".	AP1
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On special issues in relation to chemical exposures a WorkSafe Victoria inspector added:

Chemicals and farmers are notorious... they don't really look at the MSDSs, and if they do they're so convoluted and jargon driven that they don't understand them... chemicals have to be treated with more certainty and with more respect because often the attitude is: <i>oh I've used this chemical forever.</i>	AR5
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This is consistent with Tipples et al.'s (2013) study of Filipino workers in New Zealand dairy farming which found casual attitudes to the storage and use of agricultural chemicals in rural areas were conducive to hazardous exposures. Finally, there was some evidence supportive of Frick's (2004) and Hopkins' (2006) findings that contrary to businesses' oft-espoused rhetoric of putting safety first, the experience is often that production takes precedence over safety (AR1, AR3).

To summarise, workers generally associated OHS risks with an immediate effect, notably falling from ladders. It is likely that due to the short-term itinerant nature of the work workers did not consider long-term health but rather immediate safety. It would have been very difficult to

track any exposures if it was thought desirable to do so because backpackers are mainly in the industry for 2 years at most (many for only 88 days). The employer was often perceived as demanding and uncaring, and these negative perceptions were most common outside direct employment arrangements. This also appeared to be an issue in the UK but it is difficult to draw conclusions on UK horticulture because of the number of worker responses.

7.5 Pesticide Exposures

This section addresses the primary research question asked in this thesis: what effect do subcontracting and temporary work arrangements have on workers' knowledge of, and exposure to agricultural pesticides? The research design allows the reporting of perceived exposure and potential sources of pesticide exposure. Increases in intensity of horticultural production and the search for high-yielding crops have had significant impacts on the OHS of horticultural workers (ILO 2003a; Damalas & Eleftherohorinos 2011). The susceptibility of horticultural commodities to pests and diseases requires careful management, and pesticides are often relied upon (Cross & Berrie 2006). As Chapter Four explained pesticide exposures may be direct or indirect. This informs the structure of this section.

7.5.1 Direct Exposures

Chapter Six described the regulatory framework for agricultural chemicals, which assumes users will follow the pesticide label because it is a statutory requirement to do so. There are also legally imposed minimum levels of training and competency for pesticide users however there was concern about the effectiveness of these State provisions:

Requirements are starting to come through that people have to undertake ChemCert® or AusChem or Agsafe, and ACCC legislation tickets for chemical application. But it's still a problem within the fruit and vegie industry that misuse or overuse of pesticides is still a bit of a problem.	AR3
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Healy and Gunningham (2003) noted that industry-based programs provide a high standard of training and information resources but there is an absence of alternative options or supports such as field-based services providing ongoing face-to-face and situation-specific advice on the OHS implications of pesticides. A WorkSafe Victoria inspector similarly claimed:

Our biggest problem here is that people don't understand the difference between being trained and being competent. Often we say: "you're trained and you're licensed and therefore you're competent". Now that is a huge jump, a huge skill jump.	AR5
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One cherry owner-grower agreed:

You bring someone on who's just done their chemical certification from Honest Joe's Chemical Certification Service and comes out to work with you and never actually handled a chemical before, like the potential for them to do some damage, oh that would worry me.	AG1
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An emerging concern was that those undertaking the accredited training were not necessarily the pesticide applicators:

I don't think compliance is very good. An interesting question would be the comparison as to how many employers undergo a chemical certification course and how many employees are put through those courses? And I think you'd probably find it's 20:1; 20 employers to 1 employee because the employer doesn't want to pay for an employee, certainly if they're casual.	AU2
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So I mean there is a level of training there that they have to have, and whether the growers have that and then don't pass that on to the workers and that's where the problems lie. The grower might do the course every couple of years but then they may not be the person who's using the chemicals... and the personal protective equipment will just be stacked getting dust on it or near the chemicals so it's not clean anyway sitting on top of the chemical tin. The understanding I think is there from people who do the courses and the training, but it's not actually implemented at the workplace because they're not necessarily the people who are using the chemicals and the PPE.	AR4
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Similarly, asked what the main OHS issues in horticulture were, a Victorian union official cited:

...the lack of awareness and preparedness by employers, be it the growers or the contractors, to sufficiently train or induct people in chemicals and the use of chemicals.	AU2
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Amongst the owner-growers interviewed the requirement for chemical users to undertake accredited training was well understood. Contrary to research findings discussed in Chapter Two suggesting that contractual arrangements are commonly used to outsource more hazardous tasks, growers overwhelmingly reported themselves or a permanent employee were tasked with applying pesticides (AG1, AG2, AG3, AG4, AG6, AG7). One owner-grower explained:

...we're not that pressed for time that we need to get everybody, well to employ a	AG1
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large group of people to come into the place to spray chemicals.	
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While this finding does not appear to fit with some other studies it is not unique. Underhill and Quinlan (2011b) found one manufacturer did not use agency labour on jobs involving potentially hazardous machinery but on less hazardous tasks. Similarly, a case study of OHS practice in a small New Zealand horticultural business reported the orchardist tried to do most of the hazardous activities in the orchard, including spraying pesticides (Legg et al. 2009). Reasons why growers or their permanent employees may do the spraying – most notably concern to limit residues that might affect the saleability of produce – are discussed below.

However, there were exceptions and some temporary workers spoke of situations in which they were required to directly handle pesticides (AW2, AW7, AW9). In the first example a British backpacker described his work experience in Queensland:

When I was doing the banana bagging we had to drive up, put the bag over the machine and spray the insecticide in it. They even had a TV series about that chemical it was Strike-Out®... I never had any license or any training to do it and they just expect you to do it... Every banana tree you pull up to you go up, snap off the bottom three hands so it grows right, tie a bag around it, spray the insecticide in it, and then tie a string to it so they can tie it up so it stays up and then the bananas get heavy. You have to do that all day. ⁵⁵	AW2
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He reported having performed this work in an open tractor cab without PPE from 7am to 4pm five days a week when working for a grower for one month, and 12 hours per day seven days a week alternating day and night shifts for four months working for a contractor (five continuous months in total). He added:

I only coughed up blood for a little bit!	AW2
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Asked whether he was concerned for his health the worker replied:

Little bit but then I thought it's only 5 months and then I'll be gone and then it'll go away.	AW2
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⁵⁵ To prevent insect damage and fulfil product standards, banana bunches can be covered with a plastic bag treated with chlorpyrifos (a chlorinated organophosphate insecticide and the active constituent in Strike-Out®) (van Wendel de Joode et al. 2012). Incidentally, the APVMA initiated a review of chlorpyrifos in 1997. The interim review report was published in 2000, and a final review report was expected in 2006. In September 2009 a Preliminary Review Findings report was released for public comment. The report has not been finalised.

The worker did not report this symptom. Describing his level of supervision he recalled:

When I was with the farmer you had like a group of eight of us and the farmer would drive around and watch you and to be honest they were pretty fucking good to be honest... The contract one was like alright as well but because it was contract you just worked for this one guy and he had two machines and they just drop you off for 12 hours. He'd come and check on you some days, some days he wouldn't he'd just drop you off and say "I'll be back at this time".	AW2
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In Queensland, the *Agricultural Chemicals Distribution Control Act 1966* (section 39) requires the persons (or the supervisor) operating equipment for the ground distribution of pesticides to have a licence. An unlicensed person may carry out ground distribution under the supervision of the holder of a commercial operator's licence who is present during the whole of the distribution (section 39(2)(a)(ii)). In some circumstances a licence is not required, for example where ground distribution is undertaken on an employer's land to whom the person is bound by a contract of service that is primarily for other work (section 39(3)(a)(iii)). The conditions for exemption were not satisfied.

In the second example a German backpacker recounted applying pesticide for what he assumed was "against bad weed" through a leaking backpack sprayer without PPE when working for a cherry grower in NSW:

...it's mixed with colour so all the clothes and everything is full of this colour. Yeah everything was pink!	AW9
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Asked who prepared the pesticide for application he answered:

We do it from some drum; we put a little bit from this and a little bit from this, what the farmer showed us. So not really strict just what you want.	AW9
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He later added:

...there was some signs and something like that but I'm not that good in English that I understand all the chemical things.	AW9
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In the third example another German recalled applying pesticide without training, explaining that:

Sometimes we had to put chemicals in like let's call it a bucket and put it in a big tank but that's it.	AW7
--	------------

Under the *Pesticides Act 1999* (NSW) persons applying pesticide on product that will be sold

commercially must be trained. The small use exemption (*Pesticides Regulation 2009* Reg. 10(2)(c)) and the occasional use exemption (Regulation 10(2)(d)) do not appear to have been satisfied.

The literature is replete with references to the inadequacy of PPE for horticultural workers, citing time constraints, economic considerations, discomfort in hot climates and poor design (see Sivayoganathan et al. 1995; Recena et al. 2006; Matthews 2008; Issa et al. 2010; Garrigou et al. 2011). A British backpacker described the oppressive Queensland heat and humidity as a barrier to adopting precautionary measures when spraying insecticide:

...I didn't wear a shirt half the time, I didn't wear shoes. But at the same time they told you that you should, and I'd just like get out into the field and take them off... like they said "you should probably wear a mask" and I wore it for one day and just got a sweat rash around my whole face and only one person on the farm even wore a mask, nobody else wore one.	AW2
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Evidently, chemical-resistant coveralls were not provided. Sweating is the principal thermoeffector response in heat stressed humans but the combination of warm temperatures, moisture and increased skin blood flow provides an ideal environment to accelerate the transcutaneous absorption of pesticides (Williams et al. 2004; Gordon 2005; Ngo et al. 2010). In another example a worker spoke of the level of PPE provided:

I got a gas mask so it was fine. And gloves and I was wearing my snowboarding jacket. So like big hood tied up, gas mask and it was fine.	AW7
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Failure to provide PPE to temporary workers has been noted elsewhere (Roelofs et al. 2011; Grzywacz et al. 2012). Young workers are especially vulnerable to failure in this regard, including backpackers (see Guthrie & Quinlan 2005). The safety climate within the rural community, the perceived impact of OHS hazards for the horticultural operation, hard evidence of a problem, and the relevance and practicality of legislative requirements all appeared to influence OHS decision-making:

You never see anybody wearing protective clothing or breathing apparatus when they're mixing or using chemicals.	AU2
There's a huge resistance to the use of PPE. I wouldn't describe it as apathy, it's more a complacency: <i>we've been using these chemicals for 20 years, we've never used this sort of stuff, why do we need to use it?</i> There's a huge lack of provision of SDSs (or MSDSs as they were previously known) therefore they don't look at those, they don't	AR2

look at the PPE that they're required to use when they're using the chemical they just think: *it's alright, it'll be fine*. So that is a problem the resistance to the use of personal protective equipment. Whether they think it's a weakness or whether it's not, they just don't think it's required because we're overreacting.

The older farmers feel that it's not an issue because they've been using them [pesticides] for a number of years and never suffered any known adverse effects but you get a lot of cancers in the fruit and vegie industry so whether you equate that to chemical exposure or some other issue that's up for debate.

AR3

Available evidence suggests a structured strategy for chemical risk assessment in the workplace is especially low in small- and medium-sized businesses (Balsat et al. 2003). The opinion of government OHS inspectors was consistent with this literature:

Speaking from the point of view of the bigger employers, I think they handle the issues with pesticides very well. The smaller guys may not... some of the mum and dad operations are pretty hopeless.

AR1

The small- and medium-sized players it's more of an issue with because they're not so professional in their spray application.

AR3

As was Rao et al.'s (2004) finding, some owner-growers believed currently used chemicals are less toxic than those used in the past and that smaller amounts are used today, although not all attitudes were the same:

I don't think chemicals are nowhere near as toxic as they used to be and, again, y'know tractors have now got cabins on 'em y'know people are taking a bit more care.

AG2

The chemicals that are going out now are so soft that well they're not even doing the job.

AG4

I spoke to a grower, a fairly good grower, probably since the start of the year, who was talking about handling SPRAY.SEED® or paraquat which is not a chemical that I'd muck around with, it's a bad one, and he was talking about putting it into his sprayer, just cracking the lid and just tipping it in, doesn't have gloves and I'm just like "you are nuts man"... you don't know what's what like I just, you don't take the risk, you just make sure you have your gloves, you put an apron on because of spills y'know. I don't muck around with chemical, I don't muck around with chemical. But he's an experienced grower and that's what he's doing.

AG1

Thus, as suggested by Arcury et al. (2001), without substantial reason for behaviour change growers appear to be ignoring information that does not fit their belief system.

In summary, interviews indicated that although industry-based pesticide control-of-use programs provide a high standard of training and information, there is an absence of alternative supports such as field-based services providing ongoing face-to-face training. Another concern was that those undertaking the accredited training were not necessarily the pesticide applicators. Contrary to most other studies (Chapter Two), temporary and contractual work arrangements do not always entail the outsourcing of more hazardous tasks. There are several explanations as to why pesticide spraying is not outsourced: concern to limit residues that might affect the saleability of produce (discussed further in section 7.7); pesticides are expensive; timing of pre-harvest applications do not coincide with surges in labour demand; control-of-use regulation; expense of training temporary workers and fear that failure to do this will be reported; and the perception amongst growers that pesticides are not hazardous. There were exceptions for which the reasoning is an aspect which requires further research, although it may suggest some employers violate regulations. Chapter Four explained pesticide exposures due to hand contact with treated foliage can be extensive for harvesters and cultivators. The discussion now turns to indirect exposures.

7.5.2 Indirect Exposures

Reflecting on the broad nature of the potential externalities associated with the application of pesticides, the Australian Pesticides and Veterinary Medicines Authority (APVMA) (2010) remarked the full nature of the risks posed by off-label use of pesticides may not be immediately visible. In particular, the impact of chronic exposures may take years to present. The APVMA stated this is especially relevant for contexts in which those potentially exposed are unaware they are being unduly exposed due to incomplete information about the risk. The example of residues in food was provided. This thesis argues a similar concern emerges through the fragmentation of tasks. A WorkSafe Victoria inspector explained:

If the spray is being done on another area of the property they [harvest workers] don't realise the risks that they are exposed to. And they don't realise what the consequences are.

AR4

Work disorganisation is an inevitable flow-on effect of the fracturing of tasks into separate contractual units. Contractors and their workers, together with directly engaged casual harvesters, may be unaware of the informal knowledge used by regular workers to avoid hazardous situations (Johnstone et al. 2001). Through the fragmentation of tasks the grower

achieves control over the labour process in-turn enhancing their profit.

Chapter Four suggested that the cognitive model of chemical exposure amongst farmers and workers is that chemicals only pose a risk when wet. That is, residues are not a problem. Although not all attitudes were the same, a number of growers and harvest labour providers stated the pesticide issue was not very important (AG2, AG3, AG6, AG7, AP1, AP3), and believed workers were not exposed as long as they do not mix or apply chemicals and do not enter the fields immediately after application:

I wouldn't say that chemical is, because of what we do, I wouldn't say that it's a hazard because it's all locked up and she's [applicator] trained... We have the MSDSs for all the chemicals. So I wouldn't class the spraying as being a hazard. And it's all done in a cab with clothing on, protective clothing. No I wouldn't put that up as a hazard.	AG3
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Because the pickers that I put in are only here for the harvest period, they're not here so much for the pruning or the spraying, so the chemical side of things isn't really an issue.	AP1
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The MSDS sheets are there if I wanna read them but I find it's not y'know we're picking the fruit that's ready to be eaten. I can't see that or I've never sensed any danger.	AP3
---	------------

An authorised officer for an NSW environmental department suggested growers can downplay or refute the significance of pesticide exposures by residue (AM2). This in turn shaped workers' attitudes, especially where the fragmentation of tasks impaired effective evaluation of risk. Consistent with other qualitative research on pesticide exposures (Quandt et al. 1998, 2006; Arcury et al. 2002), some workers were not concerned by potential exposures:

...my idea is you might get hit by a bus tomorrow who gives a fuck?	AW2
Have I thought that it'd be bad for me? No, it was fine.	AW7
The fruit could have been sprayed 4 or 5 days ago, it could have been sprayed 24 hours ago but in that period of time the chemical isn't gonna hurt you after that amount of time y'know what I mean? Like I've been muckin' around with chemicals for years... I've never seen anyone get hurt from residue y'know what I mean, it just doesn't happen. You'd have to be sittin' there drinkin' bucket loads of it y'know drinkin' it straight out of the back of the bloody boom spray!	AW18
I reckon your metabolism works harder fightin' off the bad so you've got less chance	AW3

of gettin' ill. These people that just stay indoors every day eatin' clean things always get crook.

A WorkCover NSW inspector added:

I don't think that the workers really consider spray drift or residues to be a hazard. I don't think it's really covered in the inductions or in the training unless they are going to use chemicals, and usually that job is down to one person on the property. So the other workers really don't understand the hazards associated with the chemicals and the exposures from residue on fruit and leaves and spray drift.

AR4

This opinion was confirmed by workers asked to explain their understanding of the concept 'chemical residue':

It goes away after a while and I'll be fine. But a serious answer, I actually have no understanding of chemical residue I just sort of thought nothing will be permanent, I'll be fine.

AW2

Nothing, absolutely nothing... Now you've mentioned them chemical things, what's that about? Is that dangerous?

AW3

Don't know anything about it.

AW4

I have no idea. All I know is it burns your skin but yeah I know nothing about it at all.

AW6

Questioning about the re-entry interval returned an equally uncertain response:

Hmm? I'm guessing it's basically like with chemicals you work with them for a couple of weeks and then you should take a break and then go back and take breaks and stuff. I'm guessing that's sorta what you mean by re-entry intervals.

AW2

The erroneous association of pesticide exposure with sensory detection identified in earlier research (Quandt et al. 1998; Elmore & Arcury 2001; Rao et al. 2004) was also evident:

I'm sure that like you could tell the difference 'cause you can see the trees once they've been sprayed the leaves are really not vibrant and the apples... it just looks a lot different.

AW17

I think there are many chemical product on the trees because we smell not very good the tree it smell bad but we don't see the farmer make chemical product so we don't know.

AW15

It was challenging to relate the concept of chemical residue when English was not the participant's first language. Without a base understanding of the fate of pesticide residues the

language barrier was insurmountable. Although one British worker indicated a reasonably good understanding because of previous environmental forensics studies, his concern about pesticide exposures at work did not appear elevated:

...except for maybe eating those cherries and when your mouth goes tingly.

AW1

Other workers noted that whilst their employer had instructed them not to eat the fruit they and others did so despite the risk (AW2, AW3, AW4, AW7, AW12):

Yeah I think, I hope that the tree has no treatment when I pick. I'm sure that when I eat cherries I take a lot of pesticide because the fruit is not washed and so I shine on my t-shirt but it's not enough. Pesticide, fungicide, a lot of treatment bad for my health.

AW12

Bradman et al. (2009) similarly found many workers reported eating strawberries while working in the field. They further found that strawberry consumption amongst harvesters working in fields recently sprayed with malathion was associated with significantly higher urinary malathion dicarboxylic acid metabolite levels. To what extent workers are made aware of potential pesticide exposures was under question. Responding to whether there would be a conversation between the grower and the contractor to the effect that the orchard had been treated with pesticide government OHS inspectors explained:

We'd certainly expect that if there's any potential health effects from exposure to residual chemicals that have been sprayed that that information is passed on to anybody who is potentially exposed... We're not hearing any issues in relation to that from an employee point of view but again whether the employees know that we exist and what our role is that's another issue.

AR6

The contractors know what their obligations are, what their duties are to their workers, and they should have that conversation with the grower before they start... there's an obligation on the grower and there's an obligation on the contractor... I think there's a low level of compliance with that because if the contractor says "I'm not gonna get my crew in, you've just sprayed", then the grower will go to someone else. And they will find somebody else because of the transient workforce.

AR4

One harvest labour subcontractor admitted:

Normally no; doesn't enter into the equation. Gee over the years I've probably only had one person question me about that... I tend to believe that farmers are doing the right thing. As I said I've never had a problem in 16 years so they must be doing the

AP3

right thing.

Harvest labourers often lack access to the requisite knowledge to control hazardous chemical exposures, as one union official explained:

The growers are well aware of what they are putting onto their properties or onto their crops but that's not being translated over to these people I'm sure, it's just unheard of.

AU2

A German backpacker with nine months experience harvesting fruit in Queensland and NSW confirmed:

I knew it when they told me and I had not a clue if they didn't tell me... I think here I eat a lot of cherries which are just sprayed. I think at the mandarins sometimes they were sprayed like 3 or 4 days but I'm not sure maybe it was longer... [here] apparently some were sprayed like 2 days ago but I'm not sure.

AW7

Several other workers reported being unsure of what pesticides, and under what circumstances they were potentially hazardously exposed (AW6, AW8, AW9, AW10, AW14, AW15, AW17). The majority of workers had not applied pesticides through their work; however, many recalled examples of where they knew, or suspected they had been indirectly exposed (AW1, AW6, AW8, AW10, AW12, AW15, AW17):

...when you're working you create the dust from these leaves and stuff and like even in your hair and stuff and you're sneezing. ^{Contractor}

AW17

I assume there is [pesticide] because it makes your skin itchy when you're picking so we've just assumed it's the bug spray stuff. ^{Contractor}

AW6

On the clothes there's chemical. And when we take a part of the tree, you move it and you see pfff [motions a cloud]. Not in fruit picking but we make a thinning with ties, lots of ties for the tree for the apple to grow up. When you separate the apple before the picking, 2 months before the picking we separate apples to permit apple to grow up more. And ah we take tree and see pfff [motions a cloud]. When I shake the tree a lot of product in the air... no mask nothing. ^{Contractor}

AW15

When I was cherry picking there were chemicals on the trees I guess 'cause I had around here [motions to forearm] a rash and it was red. The trees were injected with something. There were some Israeli guys who picked and they told me if you're picking the first time it's normal that you have this kind of problems. ^{Direct}

AW8

[A farmer sprayed] on the block beside the block of vine we worked but it was okay, it smelled a bit strange... I'm sure it's poisonous but I don't feel sick. Contractor	AW10
---	-------------

A labour provider recounted a similar scenario:

Some farmers are still a bit slack about spraying. I have had backpackers come in and say: "look I was working on this row of trees picking and the tractor came along a couple of rows over and I felt really sick". Y'know I have had that happen.	AP2
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The evidence suggests that workers are at greater risk of indirect pesticide exposure when employed by some level of contractor. The temporary employment relationship (in addition to work disorganisation through the fragmentation of tasks) may also affect attitudes:

...because the contractors are maybe not gonna see the workers again after they've left they just get 'em for that particular job and they'll let 'em go after that so there's no continuity there with the precarious nature of the work.	AR4
--	------------

Chapter Four explained workers engaged in tasks such as harvesting, thinning and pruning are frequently exposed to low levels of pesticide residues, and may be disproportionately affected by the absence of available hand washing, showering and worksite laundering facilities, thus prolonging their exposures. Workers reported not being provided with adequate washing or changing facilities to remove residues and put on clean clothes before leaving work, and without access to washing machines workers were frequently compelled to wear pesticide-tainted clothing, often for days on end. Hand washing with soap is an important means of protecting agricultural workers against pesticide exposure, diminishing the risk of workers contaminating or re-contaminating themselves and others with pesticide residues that persist on their skin (Mayer et al. 2010). Yet a union pastoral industry organiser noted:

You won't find a washing facility in a paddock, you won't find a toilet, sometimes you might but very rarely will you find a toilet. And those people are picking and harvesting by hand, and exposed continuously to sometimes harmful chemicals yet there's no provision there for them to wash or toilet facilities and then they go and eat out in the middle of the paddock. What has happened here in Australia is what happens overseas. So they've brought their filthy habits if you like, their draconic industry habits here to Australia and the growers love it because they don't have to provide anything for them.	AU2
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A sentiment confirmed by a number of workers when asked whether there were toilet and hand washing facilities available at work:

I haven't been in the toilets but it doesn't look good... I'm gonna go with no on that one, like there probably is a sink but no one's found it. <small>Contractor</small>	AW1
There was just an outhouse. I gotta say when I went in there, there was a massive shit in there and no toilet paper and I'm pretty sure no sink. So all in all it's pretty good! <small>Contractor</small>	AW2
I think we don't have toilet so no, we can't wash the hands. <small>Contractor and direct</small>	AW11
I don't know, yeah maybe. <small>Direct</small>	AW13
You just piss against the tree... We have lunch in the dirt with our dirty hands and the snakes! <small>Uncertain of employer</small>	AW4
When we pick we don't go to the toilet but ah no. <small>Contractor</small>	AW15
I think on every vineyard there was water available but soap no not really just water. <small>Contractor</small>	AW10
When we just take a break we have like some hand sanitiser and we pour some water and wipe off our hands like that... we brought it with us. Like there is a sink and all that with the washroom but it's typically ages away. <small>Contractor</small>	AW17

Only one worker could recall being explicitly told to wash his hands:

In the Yarra Valley where we worked in the vineyards as well there we had to lift wires that the plants can grow bigger and straight and yeah there was a lot of chemicals on the plants to protect them and then the supervisor advised us to wash our fingers after work but usually we were wearing gloves.	AW10
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He confirmed workers were providing their own gloves. Asked whether these gloves were chemical resistant he replied: "No, Bunnings⁵⁶ gloves". Interestingly those workers that thought about pesticide exposures expressed a sense of powerlessness and resignation to the hazardous nature of the work:

The pesticide yeah we think about that but yeah we don't have the choice. Not a lot of work for immigrant here so we don't have the choice.	AW11
Yeah I think it's dangerous but yeah we have to do it because we need the accommodation and the money so we does it.	AW9

This finding resonates with Salazar et al.'s (2004) suggestion based on their investigation into

⁵⁶ Bunnings is a major household hardware chain in Australia.

Hispanic adolescent farmworkers' perceptions associated with pesticide exposure that the sense of powerlessness stemming from the limited choices of work for foreign-born workers in the US may serve as a major deterrent to self-advocacy in terms of OHS. Reinforcing this argument was the contrasting viewpoint of a similarly precariously employed Australian harvest worker:

<p>You gotta ask, simple as that. And if someone's not prepared to give you a proper answer or an honest answer well you don't do it it's as simple as that... at the end of the day, if the person I'm working for says to me "you gotta get in there and do that" and it's not safe, I'll tell him to get in there and do it and if he don't wanna go in there and do it that means I'm surely not goin' in and doin' it.</p>	<p>AW18</p>
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Workers employed seasonally need temporary housing near their place of work. Although wider issues of social welfare are outside the remit of this study, there are some that may impact on worker health and safety. It is useful to put the Australian observations in a more global context by comparing residential arrangements for these workers in the US. Ziebarth's (2006) Minnesota study found a shortage of housing for seasonal workers resulted in many having to sleep in their cars, which reflected the "extreme housing need" confronting seasonal workers. By contrast, mobile homes were commonplace and sought by the temporary Australian horticultural workforce as a means of reducing accommodation costs and accessing farms frequently in excess of 30 kilometres from the nearest town. The process of travel and the necessity for somewhere to stay are prerequisites of harvest trails. The tent cities and caravan parks that dot the Australian landscape in growing locations attest to the popularity of mobile homes. An NSW owner-grower confirmed "most of them sleep in cars" (AG3). Hanson and Bell (2007) wrote that whilst some growers allow workers to live onsite during the harvest, growers are increasingly restricting numbers or banning the practice entirely because of rising concern about health and safety, and more stringent policing. No worker reported access to employer-provided housing. Of the 18 workers interviewed, 9 were living in campervans including 7 at free campsites or public parks with limited toilet and ablution facilities. A French-born worker explained:

<p>We used to stay at Lake Wyangan camping, the picnic area. But you can only stay there for 3 days I think. So um it's pretty much like around here where we can find a car park and then we're just like sleeping in the vans.</p>	<p>AW14</p>
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A further 6 workers were sleeping in tents (3 at free campsites) but all had shared access to vehicles that were used intermittently as their sleeping quarters. Only 3 workers, without

access to a vehicle, reported staying at a working hostel. In terms of para-occupational exposures, Ward et al. (2006) wrote that carpet dust can be a reservoir for pesticides because they are protected from degradation. This is also true of auto upholstery. Several studies have documented the link between pesticide levels in vehicles used by workers to commute to and from work and elevated pesticide levels in the home (Lu et al. 2000; Curl et al. 2002; Coronado et al. 2004; Fenske et al. 2013). Exposure when the commuter vehicle doubles as the home appears to have been entirely overlooked in the research literature. This should be an area of future research.

To summarise, the majority of workers reported not applying pesticides through their work but many recalled examples of where they knew, or suspected they had been indirectly exposed. There was a suggestion that some employers downplay or refute the significance of pesticide exposures by residue, and this appeared to shape workers' attitudes, especially where the fragmentation of tasks impaired effective evaluation of risk. It appeared that workers may be at greater risk of indirect pesticide exposures when employed by labour subcontractors. Income insecurity and intense competition for work amongst subcontractors contributed to a range of hazardous practices, including accepting unsafe tasks. Although generally workers did not perceive exposure as a cause for concern nor lack of hygiene facilities to be problematic, some workers expressed feelings of powerlessness and resignation to hazardous exposures, and this appeared to be related to limited job opportunities for temporary migrants. Finally, the potential for workers to bring pesticides into their dwellings was intimately linked to workplace factors, specifically the absence of hygienic facilities and risk awareness. Broad concerns about compliance with State and industry-based training and competency programs, acceptance of protective measures and communication of risk point toward shortcomings in inspection and enforcement which are examined in the next section.

7.6 Regulatory Environment

Chapter Six discussed developments in OHS and agricultural pesticide regulation in Australia. It was suggested workers vulnerable to the imposition of precarious conditions of work may be ineffectively regulated. The subsidiary research question asks: how effective is OHS regulation in horticulture? After describing knowledge of rights and responsibilities this section indicates labour inspection is not a priority and what labour inspection services exist are under-resourced and reactive.

In January 2012 the *Work Health and Safety Act 2011* (WHS Act) and Regulation 2011 commenced operation in NSW and Queensland as part of OHS harmonisation (Chapter Six).

State OHS inspectors commented on the impact of the model Act:

Some farmers aren't aware that there's actually been a change in legislation. A lot of farmers still think of the 'contractor' as a definition similar to that of the tax legislation, therefore all responsibility is gone. Some of those that are aware of the new Act are unsure of what the changes mean. In saying that a number of the larger operators are well aware of the changes and are meeting compliance.

AR2

The change in legislation doesn't mean anything. The industry's not 100 percent compliant so the change to the wording in the legislation doesn't change anything at all. Some of them aren't fulfilling their obligations irrespective of which legislation it is.

AR3

Research undertaken by the Australian Workers' Union (2012) similarly reported non-compliance with industrial law is widespread within Australian agriculture. Employers in NSW and Queensland were interviewed between June and November 2012. Employers unanimously reported clarity on their legal responsibilities to their employees and were able to broadly articulate these responsibilities. However, employers were unaware of any recent changes to OHS laws (AG1 was a notable exception). There was also discrepancy within OHS jurisdictions in terms of inspectorates' accessibility and service to employers:

Look if I've got a concern I will ring the local office and they will work with you; they are not the enemy. They are quite happy to work with you if you've got a concern.

AG6

The OHS regulators, their information is freely available, they're happy to pass it on to you. They're incredibly hard to get on to if you actually wanna ring 'em which is intensely frustrating... you just can't get on to anybody and they won't return your call and so that's frustrating but in terms of their delivery of information like you get stacks of stuff in the mail... the information does come out there pretty freely like we're not kept in the dark about it really.

AG1

If I have one complaint about the whole system it is the government knows I'm an employer, the government will turn around and they'll stick their hand out for their wage tax, the government will know everything about us as a business but it's my responsibility to go on and keep checking the websites... We do not get any up-to-dates. Not even a simple letter: please check our website for the current changes.

AG2

It is difficult to reconcile conflicting experiences. Business sizes and locations, and crops grown were comparable. State inspectors spoke of difficulties in allaying fears of inspection and

government encroachment within the rural community (AR2),⁵⁷ and single mindedness which can make it difficult for regulators to exert influence (AR1). Thus, conflicting experiences may reflect some personal attribute of the individual.

Chapter Two discussed the role of regulatory failure in shaping OHS experiences of the precariously employed. Expanded contractual chains can both fragment and obscure responsibility for the implementation of safety procedures and accentuate deficiencies in OHS laws (Thompson 2000; Johnstone & Quinlan 2006; Amon 2010; Eakin et al. 2010). Union officials raised concern about potential avoidance of OHS responsibilities:

See what growers have done and what people don't realise is that they think, and to a large extent they've gotten away with it although they haven't all gotten away with it, but they've contracted out their problems. Simply by engaging foreign workers through these dodgy contractors they've been able to contract out their obligations so they believe.	AU2
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The misconception that by ringing Joe and the mobile number that it is now his responsibility, not mine is rife. I will caveat that by saying that there are some bigger employers that do it right... So that is the misconception of the farmers and I'll even say "misconception" in adverted commas because they know damn well.	AU1
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Investigation of this concern amongst comparable sized businesses returned mixed responses. Responding to where their OHS responsibilities start and end when engaging a contractor two owner-growers explained:

They come to us, they say their rate which is usually the award rate plus a couple of dollars to cover super and all that per person per hour. And so we engage that contractor and they, basically we just pay that cheque once a week and they're responsible after that point. So we drop off pretty early in the piece with a contractor.	AG3
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I get contractors who have their own people who do the picking. But they look after	AG4
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⁵⁷ It is probably more than coincidental that a significant constitutional challenge to OHS legislation originated from an agricultural employer. The employer successfully challenged criminal conviction under sections 15(1) and 16(1) of the OHS Act 1983 (NSW) for failing to ensure the health or safety of the farm manager and contractors working on the farm (*Kirk v Industrial Relations Commission of New South Wales*; *Kirk Group Holdings Pty Ltd v Work Cover Authority of New South Wales (Inspector Childs)* (2010) 239 CLR 531).

them, and they've gotta keep an eye on all facets y'know. I have a meeting with them and say: "this is what I want, this, this, this, this and this, can you do it?"

There were contrasting attitudes:

Say I bring a pruning team in, or I employ a contractor to come in and do some pruning or a contractor comes in and does the picking, technically, while yes they are supposed to be responsible for safe work practices, I sort of feel responsibility as well. So while yes I'm paying them for the workers' compensation and insuring their employees, I gotta make sure that that is actually paid okay so that that's current. Again, when they're out there, while they may be employing the people, this is still my place so I have to make sure it is a safe workplace.

AG2

When we get someone who wants to contract to us they say: "okay look pay me on ABN so you don't have to pay me tax, you can just pay me the whole lot and here's my ABN". And I say: "right okay, can you give me not only your ABN registrar I want to see your workers' compensation" and if we're getting them in to I don't know operate a D10 bulldozer to push trees out or something I want to see their qualification for operating that piece of machinery, and if they can't provide that well then I wouldn't put them on. But if I was putting them on for something simple that necessarily didn't require a qualification but they wanted to be engaged as a contractor but couldn't show me that they had a workers' compensation policy then: "look I can employ you but I won't employ you as a contractor I will employ you as an employee that way I know you're covered under our workers' compensation policy".

AG1

These conflicting attitudes suggest it is necessary to expand understandings of the employment relationship beyond the narrow employer-employee relationship. A related concern is determining who should assume legal responsibilities as the employer when the work is temporary. Workers were asked who they thought was legally responsible for ensuring their health and safety at work:

I didn't think anyone was. I thought if I got damaged I walked off the farm. ^{Contractor}

AW1

Ah the safety manager? Yeah some guy at work who's responsible for that. I've not a clue. ^{Contractor}

AW7

Me. I'm legally the one who has to make the decision whether I wanna do something that might be unsafe; I'm the one who makes that call. ^{Contractor and direct}

AW18

Maybe there is some guys they are all wearing the same t-shirts so maybe those guys.

AW13

I'm really not sure I'm sorry. ^{Direct}	
Us, me self. The thing is I don't mind taking my own health and safety into my hands like if I fall out of a tree as far as I'm concerned it's my fault. I fell out of a tree, the farmer didn't push me out of a tree so why should he have to like so that's the way I see it. ^{Uncertain of employer}	AW3
The contractor? Or the farmer? I don't know... It's really confusing. There's the big boss who comes in everyday but only for like 5 minutes just to check that everything's running smoothly, and then there's the farmers that oversee everything, and then there's the contractor who's there all the time and a checker who keeps an eye on us. I think the checker is like in charge of what we do. We don't really have any contact with the others. ^{Contractor}	AW6
Legally responsible I'm not sure. I think maybe whoever owns the property. I'm not sure. Yeah I don't know. ^{Contractor and direct}	AW17

Two trends emerge: obfuscation of responsibility and individualisation of workplace safety. The suggestion that extended supply chains were complicating and obfuscating legal responsibility is supported in the literature (Quinlan 2003; Johnstone & Quinlan 2006). Workers' uncertainty is also consistent with a South Australian case study of the use of agency workers in the power industry (Gryst 2000; Economic Development Committee 2005). The Australian experience was in no way unique. Interviews with workers in UK horticulture similarly identified uncertainty around responsibility for OHS outside direct employer-employee relationships, especially under cash arrangements (UW2, UW3, UW4, UW7). Individual responsibility was also detected (UW6).

Stable employment has increasingly given way to precarious work involving contractors and subcontractors, self-employed individuals, and on-hire and casual workers thereby facilitating the movement of work beyond the boundaries of established collective bargaining (Castles 2006; Benach et al. 2007; Gunningham 2008; MacKenzie 2010). In horticulture seasonal work was already long established but the use of subcontracting and agency or itinerant workers has grown and there has been also a shift from repeated engagements of local workers to a dependence on more vulnerable groups of foreign workers. The social and political culture in which individual responsibility is embedded and experienced is often neglected, and as an NSW union official concluded:

...unfortunately, and to the shame of all of us, people are out there on their own.	AU1
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Against Almond's (2009) observation on the diminution of notions of personal responsibility in an increasingly litigious and blame-focussed society, evidence of individual responsibility is important. Small business owner-managers are popularly viewed as resistant to complying with regulation and shirking their regulatory responsibilities (Vickers et al. 2005; Baldock et al. 2006; Hasle et al. 2012). Although Kitching (2006) argued such views should be rejected because they derive from negative stereotyping, a number of employers viewed OHS as bureaucratic interference which has overridden common sense and eroded personal responsibility:

What's happened with OHS really is they've taken away people being responsible for their own actions and they've put it on so that people now assume that someone else is responsible.

AG2

Although I am a great supporter of health and safety issues, OHS has gone too far. It appears that OHS reps and organisers have to continually come up with new regulations to justify their jobs.

AG5

There's too much regulation in Australia, there's far too much regulation making the business not competitive with overseas... the industrial relations is a bit constrictive and the other thing would probably be workplace health and safety. We've gotta make sure that things don't go overboard with that... what we're finding is Australia's really worried about this workplace health and safety and wrapping everyone up in cottonwool.

AG9

Barrett et al. (2014) warned the "regulation as burden" narrative is likely to encourage compliance for compliance's sake. Section 7.3 suggested some employers interpret their obligation to induct workers as a procedural requirement producing paperwork compliance. Faced with a worsening ratio of inspectors to premises to be inspected, the challenge for inspectorates is to adopt cost-effective enforcement techniques by targeting high-risk industries and organisations and developing more responsive approaches to enforcement. The itinerant nature of horticultural work makes it difficult to inspect or to have significant impact as the workforce is ever-changing (inspection and enforcement are discussed in the next subsection).

Workers' precariousness made them particularly fearful of reporting mistreatment. A WorkCover NSW inspector described the conditions under which a worker would report:

...usually after they've been terminated or they've left because they're worried about losing their positions because of the precarious nature of the work – they're not

AR4

permanent employees, they might only be there for a month... If there is a unionised workforce on the property then they are more able and more willing to raise the issue through their union – the AWU generally – or straight to WorkCover. But there is reluctance in the industry sectors in general in agriculture because of the smaller workforces on the properties.

An NSW employer identified a similar concern:

I think you also need to have people feel comfortable to report something that they don't see as safe... My permanent employees yeah they don't hold back in saying anything in that way. Ah backpackers come from a different area.

AG2

One WHSQ inspector stated workers' willingness to exercise their rights largely depended on the contractor who can be "unscrupulous" (AR2). Asked whether they would feel comfortable voicing OHS concerns with their employer three male British backpackers responded:

Most of the time when I'm at work I don't really care and quite a lot of the people I work with as well especially on farms they're just like "should I do it like this?", "yeah I mean you might hurt yourself but it'll probably be quicker and it should work but you'll be alright".

AW2

To be honest with you, it just wouldn't even like we wouldn't even think about it.

AW3

As long as I get my money; that's the only reason I'm here to do my 88 days.

AW4

Reflecting on the main risks to his health and safety at work, a male German backpacker stated:

It's not a danger to my health to pick apples. I could fall from a ladder, over-rolled by a tractor so that's all which could happen so I don't think that it's dangerous.

AW8

The literature suggests these attitudes may reflect the hegemonic masculine construct characterised by traditional masculine values such as toughness, resourcefulness and recklessness, which can influence perceptions of health and safety (Liepins 2000; Iaccone 2005; Wadick 2010). However, the gender divide was not absolute, as this statement by a female French backpacker suggested:

We don't really think about it [pesticide exposures]. We just want money and that's all... we don't really mind because we're not doing it like on a daily basis 'cause we're leaving. We just want to make a little bit of money and then we'll leave.

AW14

Youth (a product of the temporary labour migration mechanisms) and the temporary nature of

workers' employment appeared to contribute to cavalier attitudes (although these individual factors are not the primary reason the work is hazardous), as the following responses suggested:

...because of the workforce that you're dealing with. Y'know they can do some really stupid things. You're dealing with young, silly people and they do very silly things.	AP2
They don't worry about the consequences too much because they're not going to be there long enough to see what happens after they go. So they just want to get the money and move on to the next property.	AR4
With a transient workforce often people don't speak up so you don't hear of the issues because they think: <i>I'm here for 10 days, I'm getting a thousand bucks for the 10 days and then I'm getting out of here so what do I care?</i>	AR5

Consistent with past research (see Aronsson 1999; Quinlan & Mayhew 1999; Azaroff & Levenstein 2004), interviews described workers' limited knowledge of their entitlements to workers' compensation. A Queensland/NSW harvest labour subcontractor explained:

Understanding of the workplace health and safety and WorkCover isn't fully understood by foreign workers – knowing that they can claim. If they get injured they just stay at home and they tell their mate to tell Joe that they're not coming in without realising that they could probably put a claim in.	AP3
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Government and worker representatives in the UK expressed the similar view that temporary (particularly foreign-born) workers would poorly understand their rights and entitlements (UR1, UR2, UM1, UU1, UU2). Asked what they would do if they were injured or became ill at work, the individualisation of workplace safety was again evident through workers' responses:

Nothing because I don't have insurance with the farmer or with the contractor so maybe I call the government I don't know but nothing.	AW11
I take an ambulance to the hospital and if it's very bad I go back to France for treatment if it's very expensive.	AW12

Engagement through labour contractors contributed to considerable ignorance and confusion:

I think I call the farmer. It depends if it's a problem. If you fall down and break your arm then I think the farmer can drive and drop off in the hospital I think... [when working for a contractor] I don't know. The contractor but the contractor is not in the farm.	AW15
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That depends who I'm working for. Normally I go to farmer 'cause in Germany it's like that; if you have an accident by work your employer is responsible for the money you have to pay for injury. For example while grape picking if I was to cut my finger I would, okay while grape picking I have this Chinese contractor so I would figure out something by myself, but if I have an Australian farmer I go to him, explain to him, and maybe he can do something.

AW8

Findings of this research contribute to growing awareness that changes to labour markets – notably growth of flexible work arrangements – pose serious challenges for existing OHS regulatory and workers' compensation regimes (Mayhew & Quinlan 2001; Quinlan 2004a; Asfaw 2014), as the following responses by a government OHS inspector and an owner-grower suggest:

...from property to property there's not that continuity of employment so it would be very hard to pinpoint where the exposure was, what caused the actual illness because it will be some time after the exposure.

AR4

I had one lady she came here, she worked for us for probably two weeks and then went off on workers' comp. with tendonitis picking cherries... should I be held responsible for somebody, okay she had tendonitis and it's because she spent the last six months picking oranges. She's probably developed that picking the citrus okay and then she does a couple of weeks with me and it has finally just flared up.

AG2

A WorkSafe Victoria inspector added:

That's always the excuse from the farmer: "how do I know that he got ill on my place? He might have been ill next door and the symptoms have only appeared since he's been on my place so I don't accept liability."... WorkCover is supposed to be a no-fault legislation so regardless of where you get hurt you get covered but some employers just don't accept that.

AR5

Again, the Australian experience was in no way unique. Conversations on UK horticulture substantiated fears of repercussions on employment of filing a claim:

A lot of them are completely blatantly trying it on. Other ones probably do get paid out, the farms' insurance companies probably think well six of one, half a dozen of the other; make a payment and obviously that worker's never going to get invited to come back.

UP2

Relatedly, White et al.'s (2012) examination of rural workers in Victoria revealed presenteeism

was common amongst fruit-pickers who felt they would be penalised by the employer if they went home sick or injured. Another finding was that foreign backpackers would seek compensation for work-related injury or illness through their travel insurance:

I would just stay at my van and hope that it's getting better and can start working again... We have to pay it [doctor's bill] first and then our insurance, travel insurance.	AW9
...our health insurance or something [would pay] but I dunno, backpackers health insurance but I don't know.	AW4

A WorkSafe Victoria inspector confirmed:

We do hear anecdotally that employees are encouraged to claim for any injury on travel insurance rather than going through the sometimes longwinded bureaucratic process of claiming through the workers' comp. process.	AR6
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Additionally, community clinicians may be discouraged from filing workers' compensation claims because of the time required for completion of paperwork and filing. A Queensland grower provided an example of this (AG7). Workers unfamiliar with their rights may not be in a position to protest (McCauley et al. 2006).

In summary, non-compliance with OHS and industrial law appeared widespread. State inspectors spoke of difficulties in allaying fears of inspection and government encroachment within the rural community which can make it difficult for regulators to exert influence. Several employers blamed OHS and associated excessive bureaucracy for overriding common sense and eroding personal responsibility. Hegemonic masculinity failed to adequately explain workers' cavalier attitudes. Overall it was the precarious situation of the workers that appeared to affect their capacity to know and access their rights (including low unionisation discussed next). Workers described obfuscation of responsibility and individualisation of workplace safety and labour subcontracting contributed to considerable ignorance and confusion in this regard. Expanded contractual chains also appeared to both fragment and obscure employers' understanding of OHS responsibilities, and the itinerant nature of horticultural work revealed concerns about workers' compensation regimes.

7.6.1 Inspection and Enforcement

Legal regulation, backed by credible enforcement, is the primary driver for improved OHS performance (Davis 2004; Wright et al. 2004; Walters et al. 2011b). However, there are significant legitimacy implications associated with frivolous cases, including pettiness and heavy-handedness in the interpretation and enforcement of the law (Almond 2009). One NSW

owner-grower asked:

...the thing with legislation is who are you trying to trap... are you trying to make it difficult for those people who are actually endeavouring to make sure they've got a safe workplace?

AG2

He later recounted the following story:

I seen one of those [a chemical spill] that happened in town. So people said: "okay, what do we do?" So they rang WorkCover. WorkCover sorta came out there and decided to come in with their hobnail boots and first thing they got was they got a four hour lecture on, didn't matter what they did (he was an ex-union official) that he could actually close the business down and it didn't matter how good the business was he could always find something. Y'know like, for example, the MSDS sheets. Instead of going into their chemical store and saying: "these are all the chemicals we got, here's your MSDS sheets, here they are", he goes straight to their kitchen. Open up: "oh hang on, where's the MSDS sheet for detergent?" and if you didn't have it, there's your fine. So he made sure that they knew all about it. But then he also made sure that every six weeks he was back there looking at that business. He didn't come in to actually help the business; he came in there to sorta threaten.

AG2

Nonetheless, the low probability of detection and successful enforcement action (a feature of regulatory failure) makes the perception of deterrence less potent (although owner-grower AG1 described the penalties for pesticide use non-compliance as "pretty frickin severe" and explained he "just wouldn't want to run the gauntlet like that"). Generally, monitoring and enforcement of OHS standards was problematic:

...there's just not enough manpower to police all these dodgy contractors. I mean we report stuff and you hope something will happen but the wheels just turn so slowly.

AP2

I think something that has been missing here for many, many years is spot inspections. I don't think they happen... this area everyone forgets for everything. Immigration don't come here. They all just sort of go "oh we'll go a bit closer to home and not worry". So until something bad happens they'll probably keep going that way.

AP1

When it's out in the bush and people are itinerant, they're just coming and going, then that becomes all too hard for the regulators, and they don't want to get outside the 60 km bloody speed limit let me tell you to go and have a look at the real world to

AU2

see what's going on... To get a WorkCover inspector to go out on to a property and conduct audits, random audits, to get a program like that up where you might have a bit of a compliance program, it'd take 2 years to get it in the making, just to get it up. So y'know it's pretty weak, the regulators I'm talking about, they're fairly weak in that area... [and] it's geographic because there's 32,000 farms in Victoria, there's probably (and I'd be guessing) 5000-10,000 horticultural growers, and you've got 15 workplace inspectors... It's just a needle in a haystack situation.

We've got legislation in place to deal with a lot of these things but where's the policeman? WorkCover officials across the road, government employees, are overworked. The bureaucracy: every time they go out and do an inspection it's 2 days in the office with paperwork. I'm not sticking up for them but again I respect them. They mean well, the regulators, but they're political insomuch as sometimes we can't even get them to go out on a property because they've been told to lay low on the employers (they've denied that when I've raised it two times) but I raise that as a frustration for them as much as me.

AU1

The efficacy of a "light touch" approach to regulation (particularly with respect to inspection and enforcement) is contested not least on the grounds that inspectorates' influence is usually restricted to higher profile operators (Croucher et al. 2013), as the following admission by a WorkSafe Victoria inspector suggests:

We do tend to unfortunately focus on the larger players because that's where the incidents are occurring that we're hearing about so we do spend some time in those workplaces. But just the sheer volume of workplaces associated with this industry it is difficult for us to get to every workplace with the resources that we've currently got.

AR5

Incidentally, in September 2013 WHSQ revealed a team of inspectors tasked with checking grower compliance with their OHS obligations had carried out on-the-spot checks on fruit and vegetable farms in the Bundaberg-Childers area. From the 70 farm visits 25 noncompliance issues were identified. The audit found the majority of large workplaces had formal processes to manage OHS. Smaller farms had few formal processes but were managing risks through close supervision and controlled work hours. Medium-sized workplaces received most of the notices issued and were in greatest need of assistance: they did not have a close working relationship with the workers, were more likely to use workers with limited understanding of English, and had problems providing inductions and training (WHSQ 2013).

Chapter Six described the complex State-based control-of-use legislation for agricultural

chemicals in Australia. An agricultural chemical industry representative remarked:

...the rules are inconsistent, often not particularly rigorously enforced, and quite confusing.	AM3
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A national review of control-of-use legislation described significant misunderstanding amongst State authorities (Pricewaterhouse Coopers 1999). The same participant was sympathetic to regulators' enforcement efforts:

Look, States try very hard to regulate use, and it depends upon which jurisdiction you're in and the regulatory regime you're in... there's always a balance between your pre-market intervention and your post-market management and monitoring... It's always going to be hard when you've got a country the size of Australia and probably one or two extension offices in a good couple of hundred square miles.	AM3
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Against a backdrop of reduced enforcement and inspection activity and individual powerlessness it is important to consider the limited role of unions in negotiating and maintaining working conditions. Union officials can enter the workplace if the employer agrees for them to enter or if they have a valid right-of-entry permit to investigate a suspected breach of workplace laws or a worker wishes to speak to them (although access is now more limited than it used to be). The Australian Workers' Union (AWU) is Australia's largest blue-collar trade union representing a wide array of workers beyond those in horticulture/agriculture. Because of the scattered nature of horticulture, employer hostility and resource pressures, union officials reported finding it almost impossible to penetrate the industry:

In this industry, the only protection that workers have got would be the union. They are suffering now because there is no union membership... for whatever reason whether it's access, understanding, awareness, it's an industry whereby it's hard to organise.	AU1
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Unions disproportionately represent permanent workers. One employer remarked:

I don't think you're ever gonna get the pickers to unionise 'cause they're in for four weeks and then they're out again.	AG1
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Some workers similarly questioned the value in paying a membership fee for short-term employment (AW2, AW7). A relationship between lack of awareness of employment rights and temporariness and not being a member of a union was also reported by Casebourne et al. (2006). Some employers suggested unions do not always represent workers' best interests:

Look y'know as far as sorta picking and that goes, a lot of pickers they just wanna do	AG2
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their own thing.

I've asked them before and they say they don't really want to be in any union 'cause like you create more of a headache for them and me.

AG4

However, one union official claimed:

If growers were serious about the health and needs of their employees they would involve the unions. No farming organisation, not one in any State, has an occupational health and safety committee. It is so low on their priority... They don't care about anything if it's going to cost them money.

AU2

Chapter Six noted employer submissions for the national review into model OHS laws opposed the inclusion of right of entry for unions under the WHS Act. The most frequent concern raised was that such rights could be used inappropriately as a means to confuse OHS and industrial issues (Stewart-Crompton et al. 2009). Similarly, an NSW employer remarked:

Unions and OHS, I don't know whether that's necessarily a good thing. I believe that it's a conflict of interest ah mainly that I have sort of seen them go into one particular person's place to have a go at an industrial issue but then used OHS legislation, OHS tickets to go the other way. They should be either one or the other.

AG2

Although himself taking a neutral position, only one employer responding to a question on the role of unions in assuring a safe workplace was able to provide evidence which might support claims that union activity is associated with antagonism toward the employer:

Ugh next question. Okay I'll be diplomatic on this answer. Unions are there to do a job. We had an audit a couple of years ago, someone stepped in and they wanted to audit our books. They were incredibly impolite walking in and also talking to us as if we weren't looking after our employees... [But] at the end of the conversation when the fella came out it was actually quite good I said "look we could really use your help on some of this stuff... So if we have a query with something, typically with the award or how we comply with it, can we give you a call and run through y'know whatever our concern is?" "Absolutely, we're here to help you"... I actually had a query for him later in the year so I give him a call and I woulda rung him literally probably half a dozen times. No call back to this day. It's frustrating and it's disappointing... but you can't tar all with the same brush, because it might just be a bad operator and all that sort of thing.

AG1

This account suggests unions need to devote more resources to horticulture and build a

relationship with employers. Of course the problem is that given the low level of membership and constraints on union finances this would be difficult even if it yielded some increase in membership levels. Early studies of the meat processing industry indicated seasonal workers could be unionised (Jerrard 2000; O’Leary 2008).

To summarise, regulatory coverage in agriculture has always been limited and under-resourced but with the growth of more intensive production regimes there is more need for closer regulatory scrutiny. It was clear from interviews with a range of parties (including inspectors) that the regulatory resources do not enable this in practice. Monitoring compliance appeared particularly challenging with the geographic spread in Australia, compared to the concentration of employers and workers in a small number of highly productive horticultural regions elsewhere. Trade unions play a very limited role in negotiating and maintaining working conditions. As already stated, it was the precarious situation of the workers that appeared to affect their capacity to know and access their rights. This includes low unionisation, itself arguably exacerbated by the new form of work organisation dependent on foreign-born workers with no community attachment. The next section briefly describes food safety and the OHS dimension of horticultural supply chains.

7.7 Supply Chain Pressures

Although established withholding periods (WHPs) were originally considered adequate to protect the health of workers re-entering a sprayed crop to harvest, re-entry intervals (REIs) have served as a primary risk management strategy for re-entry workers for the past 40 years (Knaak et al. 1989). All employers had awareness of regulating the timing of pesticide applications, but spoke almost exclusively of WHPs:

Normally when the harvesting is on you’ve completed your spraying for the year. If there is a spray that has to be put on it would be a fungicide. There would be no picking on that day and there’d be no entry into that block until the withholding period has expired on that block.	AG6
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Your withholding periods absolutely have to be respected. We have to get MRLs done during the year to check the residual level of chemical in fruit that we are sending off... we do put fungicides and stuff out when the fruit’s hanging on the tree so it’s direct contact with the skin so you gotta make sure your withholding periods are respected so that you’re not gonna have a MRL that doesn’t fall within regs or something.	AG1
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Chapter Three noted widespread consumer concerns about food safety and concomitant demand for safety guarantees and transparency is well documented. An authorised officer for a government environmental department suggested evidence of consumer pressure is in the enactment of regulations:

There's the Agvet Code, there's the Poisons Act in New South Wales, there's the Occupational Health and Safety Regulation which is now the Work Health and Safety Regulation, and the Pesticides Act and Regulation. Now the Government has made these regulations because the public wanted to reassure themselves that if the farmer was going to use a poison on his food, on our food, there would be a record of what was done... the public wanted documentation of each application of pesticide on a crop so now we have a record keeping regulation.	AM2
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Mitigation of pesticide residues is a primary objective of many producers to maintain access to supply markets. As already stated, concern to limit residues that might affect the saleability of produce is one reason why pesticide spraying is not generally outsourced. Part of the quality assurance approach adopted by the horticultural production industry is a requirement on producers to apply only approved pesticides on a demonstrated basis of need (Chapman et al. 2009). Evidence that such action has been taken derives from monitoring data and spray application records, and the auditing of those records, and industry-wide residue testing of crop samples. Government representatives and growers confirmed the influence of food safety on the safe use, handling and storage of pesticides (AR1, AR2, AR3, AM1, AG2, AG6). Although food safety sanctions can be very effective if they are implemented correctly, an NSW environmental department officer commented:

Unfortunately they fail because of personal relationships. It's not completely random and it's not unsympathetic. It's often, I'm an agent, and I might say to you: "you've gotta submit a sample next week for the QA thing". So what do you do? You bring in a clean sample.	AM2
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There is of course wider concern that OHS considerations and food safety considerations are not always aligned (Healy & Gunningham 2003; Gunningham & Healy 2004a). Suppliers only experience major consumer pressure to address the latter and low pesticide residue levels in market produce can be achieved without correspondingly low workforce exposures during agricultural production. The same environmental officer suggested that whilst growers may have awareness of OHS regulations, growers under time or economic pressures will take shortcuts. The US EPA (2012) published tables of transfer coefficients that estimate the

amount of treated foliage that a field worker contacts while undertaking particular tasks on various crops. Higher transfer rates were estimated for workers thinning than for workers harvesting. The following comment by a WorkCover NSW inspector provides another explanation for how compliance with food safety regulation can still produce hazardous exposures for workers:

With the chemicals, because there are a lot of sprays that are used and withholding periods for entering into blocks, it's the storage of the chemicals and access to the chemicals that's not really up to standard, and the labelling of the containers. When chemicals are decanted out of labelled drums and put into smaller containers they may not be labelled and people working there wouldn't know what was in the containers so there's that risk there with access to chemicals.	AR4
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Supply chain pressure has not yet resulted in the rejection of highly hazardous pesticides provided, following the WHP, the pesticides do not result in unacceptable residues. Moreover, whilst adoption of quality assurance programs greatly improves the potential for monitoring growers' OHS practice by making compliance more transparent at all points (Gunningham and Healy 2004a), subsection 7.5.1 revealed those undertaking the accredited chemical training are not necessarily the chemical applicators, thereby undermining implementation beyond paperwork compliance.

Through the imperative of market share, supermarkets are consumer-driven whereby retailers are appropriating ever-greater value from producers whilst simultaneously driving down the margins for growers under pressure on quality, volume and price (James et al. 2007; Lloyd & James 2008; Walters & James 2009, 2011). Unintended consequences of tightly pre-programmed schedules and price include negative impacts on working conditions. Interviews with employers and workers indicated increasing labour casualisation and outsourcing and work intensification were prevailing workplace trends:

...we'll just bring in seasonal workers, casual workers, just to do the main jobs like pruning, thinning, picking, packing.	AG2
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During cherries we'd probably have about a hundred people on the books at a time. It's just very intensive... This year because of the [packing] shed I'll probably be running three shifts per day so twenty-four seven. I'll be using a contractor for the third shift, for the midnight shift. So a contractor for that one 'cause you can't, otherwise you're gonna have to find a hundred and fifty staff every day, and there's a big turn-over with cherry staff.	AG3
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With the contactor he had two machines and he had them running all the time so you'd alternate each week. Pretty much 7 days a week 12 hours a day. The first week you'd do day shifts, the second week you'd do night shifts... It was a big farm and he only had two machines. And obviously backpackers are willing to work night shifts if the work's there.

AW2

Longer machine running time chafes against regular fulltime contracts with clearly defined hour limits in a given week. This finding was not unique to Australian horticulture; a rise in the use of contractors and temporary agency workers was positively associated with work intensification by a number of UK growers (UG2, UG3, UG4, UG5). Poor labour practices and consequent transfer of competitive burdens to workers themselves are flow-on effects of economic and reward pressures. Two labour providers assessed the situation this way:

They need that speed, especially the last few years we've had rain throughout the harvest period which has meant they need to strip what's ready now. So they're paying the kids [backpackers] extra to go up higher on the ladders, and to stay out in the rain.

AP1

I think it's such a cut throat business with a lot of these contractors that they're undercutting each other all the time to get the job from the farmer... I heard stories last year of one contractor being paid the same rate the backpackers should be getting paid so you know that he can't be doing the right thing. He's cutting corners, he's not paying WorkCover⁵⁸, he's not paying super, he's not caring about the people that work for him in anyway.

AP2

As previously stated, Australian piecework rates seemed irrelevant in practice. One worker claimed to have earned as little as \$15 for 32 hours of work (AW3), and another claimed to have earned \$10 for one days' work (AW14). A WorkSafe Victoria inspector further noted the piecework payment system provided a perverse incentive to work at high speed and reject precautionary behaviours:

So transient workforces no matter where they are come with the issue around *I'm just gonna do this and get it over and done with. If I complain that's gonna slow down my production rate and I get paid by piece-rate therefore I'll get less therefore I'm not gonna complain about anything.*

AR5

There is a research literature on this (see for example Premji et al. 2008b; Johansson et al.

⁵⁸ The statutory authority which insures most employers in Queensland for workers' compensation.

2010). Campbell and Peeters (2008) assessment of the implications of high work intensity amongst contract cleaners is also noteworthy. They observed high work intensity consolidated short hours and fractured schedules owing to the difficulty of sustaining a high pace of work over long shifts, with their central argument being high work intensity kept hours and therefore income low. By contrast, horticultural work frequently combines high-intensity with long working hours, with obvious implications for OHS.

To summarise, mitigation of pesticide residues that may affect the saleability of produce appeared a primary objective of growers in food supply chains, and partially explains why pesticide spraying is not generally outsourced. The subcontracting process is not just that which is operating immediately at the work level, but it is being driven by the major purchasers, who are pushing for cheaper and more intensive production systems. The role of labour contractors in facilitating the supply of labour to meet production schedules is exemplified in Australian horticulture, as is the role of supermarkets in driving the intensification process. Growth of elaborate supply chains in food production has produced widespread concern about food safety standards which are vigorously enforced relative to OHS.

7.8 Conclusion

This study seeks to describe how work arrangements, particularly subcontracting and temporary employment, are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. The study compares experiences in Australia and the UK; two countries with similar but not identical regulatory regimes. This chapter presented empirical evidence on Australian horticulture. Interviews indicated labour subcontracting has taken on a particular form in horticulture: informal, temporary and often foreign-born. Informal modes of recruitment contributed to worker vulnerability. A seemingly extensive labour surplus, coupled with weak regulatory controls and enforcement, reinforced the substandard working conditions of horticultural labourers, and the award baseline appeared irrelevant in practice. The temporary nature of workers' employment negatively affected employer attitudes to induction and training, and language barriers magnified the challenge for foreign-born workers to understand basic instructions, OHS measures and their working rights. The temporary nature of employment also appeared to affect workers' attitudes toward OHS and their capacity to know and access their rights.

A key finding was that temporary and contractual work arrangements do not always entail the outsourcing of more hazardous tasks. While this finding is contrary to most other studies it is

by no means unique (see Legg et al. 2009; Underhill & Quinlan 2011b). There are several explanations as to why pesticide spraying is not outsourced, including concern to limit residues that might affect the saleability of produce, the timing of pre-harvest applications, control-of-use regulation, the expense of training temporary workers, and the perception that pesticides are not hazardous. Interviews did suggest temporary and contractual work arrangements may increase the risk of indirect pesticide exposures. Employment and income insecurity, and intense competition for work contributed to a range of hazardous practices amongst labour subcontractors, including accepting hazardous tasks. Work arrangements did not appear to affect workers' behaviour; they affected subcontractors' behaviour, with implications for OHS. Additionally, task fragmentation impaired effective communication and in turn evaluation of risk. These outcomes were a result of, or contributed to regulatory failure.

Enforcement of OHS and agricultural pesticide laws through the inspectorates is under-resourced, and changes to labour markets, notably growth of flexible work arrangements and foreign-born temporaries, pose serious challenges for existing workers' compensation regimes. Consequences of tightly pre-programmed schedules and price along the food supply chain include negative impacts on working conditions, which unions play a limited role in negotiating and maintaining.

A seasonal horticultural workforce is long established. Historically local working class families provided recurrent peak harvest labour but the use of subcontracting and agency or itinerant workers, especially foreign workers, has grown. Interviews indicated a more volatile and vulnerable group is now being used in the industry and it did not seem to matter where workers came from. Workers whose first language was English did not appear more conversant or willing to speak out for their rights. Interviews from a range of parties suggested that temporary workers were not very aware of their rights, were not told their rights, and were in a very weak position to make complaints even if they knew their rights. The critical factor here seemed to be that the work was very temporary.

Notwithstanding differences in the regulatory frameworks and temporary labour migration mechanisms, many of the cross-national findings were not distinct. The next chapter turns to the UK where a number of similar themes are identified along with some subtle differences. Further conclusions on Australian and UK horticulture are jointly discussed in Chapter Nine.

CHAPTER EIGHT EVIDENCE ON UK HORTICULTURE

8.1 Introduction

Following on from evidence pertaining to Australia this chapter provides a similar examination on UK horticulture. The purpose of multiple country analysis was to compare OHS experiences and work arrangements in countries with similar but not identical regulatory regimes. Employment conditions in both contexts are regulated by means of common law and statute and both have adopted the Robens model of OHS regulation (Chapter Six). However, there are differences in the extent and functions of OHS law, especially transparency of employer obligations to nonemployees and regulation of pesticide use downstream. This chapter follows the structure of the previous chapter beginning with a summary of common aspects of employment practices. Sections 8.3 to 8.5 provide more details on employment practices specific to OHS and address the primary aim of this research, namely to describe how work arrangements are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. Section 8.6 contributes to the second research aim – describing the effectiveness of OHS regulation in horticulture – where the evidence again points to shortcomings in inspection and enforcement. Section 8.7 describes the influence of food safety, and section 8.8 briefly concludes the chapter. Attention will focus on the UK, although reference is made to Australia to make a particular point or indicate that the UK experience is in no way unique.

8.2 Industry Overview

This section provides an overview of common aspects of employment practices in UK horticulture. Chapter Five explained data collection occurred in two phases. Phase 2 consisted of interviews with seven workers employed in UK horticulture, together with nineteen key respondents who employed or provided labour, and migrant advocate, union and government representatives. Table 8 summarises participant characteristics with some basic demographic information and introduces participants' unique identifiers.

Table 8: Participants' Characteristics

Code	Category	Employment arrangement	Location/ Nationality	Experience	Gender	Age
UW1	Field supervisor	Direct	Bulgarian	15 seasons	M	31-45
UW2	Worker	Contractor and direct	Polish	6 weeks	M	18-30

Code	Category	Employment arrangement	Location/ Nationality	Experience	Gender	Age
UW3	Worker	Direct and uncertain	Polish	1 season	M	31-45
UW4	Worker	Direct	Polish	4 seasons	M	31-45
UW5	Worker	Direct	Spanish	3 seasons	M	31-45
UW6	Worker	Direct	Portuguese	2 months	M	18-30
UW7	Worker	Uncertain of employer	Lithuanian	5 months	F	18-30
UG1	Farm Director		Essex	-	M	46-60
UG2	Fruit Manager		Herefords.	-	F	18-30
UG3	HR Manager		Herefords.	-	F	31-45
UG4	Business partner		Herefords.	-	F	46-60
UG5	Business owner		Kent	-	M	46-60
UG6	HR Manager		Kent	-	F	31-45
UG7	Business Director		Kent	-	F	46-60
UP1	Labour provider		UK-wide	-	M	31-45
UP2	Labour provider		UK-wide	-	F	31-45
UP3	Subcontractor		England	-	M	46-60
UR1	HSE Inspector		UK-wide	-	M	31-45
UR2	HSE Inspector		UK-wide	-	M	46-60
UR3	GLA		UK-wide	-	M	46-60
UU1	Union official		UK-wide	-	F	46-60
UU2	Union official		UK-wide	-	F	46-60
UT1	Trade association		UK-wide	-	M	46-60
UM1	Migrant advocate		UK-wide	-	M	>60
UM2	OHS campaigner		Int'l	-	M	46-60
UM3	Photojournalist		England	-	M	46-60

Chapter One noted there is no reliable data on the size of the seasonal workforce and available estimates are difficult to reconcile. A union official agreed, estimating as many as one million workers in UK agriculture but adding:

...a lot of that will be under the radar y'know trafficked gangs y'know working on the margins.	UU2
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Interviews indicated the largest single group were foreign-born, and recruited under the Seasonal Agricultural Workers Scheme (SAWS). Temporary labour agencies indicated word-of-mouth was significant to their recruitment and horticultural businesses reported use of agencies (sometimes exclusively) for seasonal workers often for their direct employment. When asked why their workforce was almost exclusively foreign-born, employers uniformly stated they were the only people willing to accept and meet the rigours of the work, particularly a fast pace with consistency of output. A number of employers referred to British-born workers as unreliable, and recounted negative experiences (UG1, UG5, UG6, UG4). A migrant rights advocate⁵⁹ and a union official provided alternative explanations:

That's what we've seen over that period of the last 15 years or so, it's suddenly become a high productivity sector and economies have been revived but with a highly exploited migrant labour force assuming all the risks. The ultra-flexibility of the labour force has been the key to everything.	UM1
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You might have a minimum wage. If you bring somebody from another country who's desperate more often than not... they are desperate and if pushed will quite often, often in ignorance, work for a lower wage. So you've got they're cheaper, they're expendable because if you don't know what rights you've got and if I'm a disreputable company owner I'm gonna keep you for just what I want and then I'm gonna release you.	UU1
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Based on observations in the cleaning industry Lado (1995: 36) similarly concluded:

The immigrant labour force, particularly low-skilled, non-English-speaking members, represents a uniquely tractable and self-generating labour pool. Companies that can tap into this pool, either deliberately or accidentally, have no reason to encourage native employment.

The Australian evidence similarly suggested the award baseline was irrelevant in practice and it did not seem to matter if workers were proficient in English and educated. Although violations of labour laws can be pervasive across low-wage industries (Bernhardt et al. 2013), some UK participants provided evidence of compliance. Two SAWS Operators outlined a “three strikes

⁵⁹ As noted in Chapter **Five**, advocacy/community groups with access to horticultural/agricultural workers were not found in Australia (which reinforced isolation) and their activities were considerably limited in UK agriculture.

and you're out" policy in terms of meeting productivity targets and therefore earning the minimum wage without an employer subsidy (AP1, AG1). Workers' primary aim was to earn money. The then forthcoming abolishment of the Agricultural Wages Board (AWB) (Chapter Three) was welcomed by most employers (employer UG6 viewed its abolition with some circumspection) who suggested it had stymied workers' earning potential.

The most frequently reported work activity for fieldworkers was harvesting and picking, followed by thinning, pruning and hand-weeding, and ancillary jobs such as erecting and dismantling polytunnels. A number of businesses had onsite packing and, if necessary, processing facilities – evidence of developments in the vertical structure of the food supply chain. Picking strawberries in polytunnels could be hot and required dexterity, and the packing rooms were noisy and cold. Work required stamina and skill to achieve the productivity and quality targets. Working hours were weather dependent; starting very early in the morning for temperature-sensitive soft fruit. Distinct from Australian accounts, hours were stated in advance, and at the start of each day workers were told how many punnets or boxes they needed to aim for, with regular communication during the day with supervisors.

Interviews indicated workers were housed in self-contained mobile homes and portable cabins, with between two and six people per unit either onsite or a short distance from the workplace. Most employers provided shared cooking, shower and toilet facilities, and several provided communal areas for entertainment, sport and socialising as well as wireless internet access, weekly grocery shopping transport, and on-demand excursions to other places of interest. A Health and Safety Executive (HSE) inspector described a spectrum whereby living conditions can be "fantastic" to "diabolical" (UR2). A migrant rights advocate conceded conditions were "as good as can be expected" (UM1). Workers were satisfied but described conditions as overcrowded (the potential for overcrowding to increase home pesticide residues is discussed in section 8.5). A number of employers identified onsite accommodation as a potentially hazardous scenario, especially in terms of fire and evacuation (UP2, UG2, UG6), and one spoke of the newly introduced role of a Campsite Warden (UG2). Aggressive behaviour under the influence of alcohol was raised as a concern (UG4), and another employer recognised the potential for communicable diseases to "spread like wildfire" where large numbers of people live in very close quarters (UG1).

One employer explained:

...as time moved on the crops have expanded and you need the reliability of a workforce so the best thing we can do is have them onsite.	UG2
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Chapter Five noted the impact of employer-provided accommodation in UK horticulture on participant recruitment whereby access to residential camps was controlled by employers and supervisors which affected both their vulnerability and researcher access to them compared to Australia. Workers residing in employer-provided accommodation were geographically, culturally and linguistically separate from surrounding communities, and dependent on their employers for both income and housing. A photojournalist remarked:

A lot of these employers they actually have got accommodation and so they kind of keep their labour y'know they control the accommodation as well which of course is a way of controlling the workforce.

UM3

This observation parallels the findings of historical and recent research, including descriptions of poor living conditions under which merchant seamen and dockworkers lived for much of the nineteenth century (Quinlan 2013b, 2013c) and migrant domestic workers in the UK (Barrett & Sargeant 2011). Schenker (2008) drew similar parallels between the horrific living and working conditions of immigrants in the Chicago stockyards over 100 years ago and the conditions of immigrant workers today. Robinson (2011) claimed the housing of migrant labour in the Kuwait construction industry in accommodation either onsite or in the isolation of outlying regions prevented the workforce from interacting socially with Kuwaiti society thus giving rise to underreporting of injuries, exacerbated by poor communication and language difficulties. Sepúlveda Carmona et al. (2014) reported similarly on migrant farmworkers in labour camps across the US, adding employers frequently forced migrant farmworkers to live in deplorable and overcrowded housing conditions under threat of premature repatriation for complaining or seeking legal or medical assistance. The infrequent inspections by government officials preclude enforcement of the few sanctions levied against deficient and unsafe housing, although the SAWS Operators partially countered this.

Limited bargaining power and pressure to earn a liveable wage paved the way for unscrupulous employers to exploit the situation. Participants discussed exploitative practices in UK horticulture, including unlawful wage deductions (UR2, UG6, UW3) and anonymous immigration tip-offs to avoid paying wages (UU1). A migrant advocacy NGO representative noted:

There's not a lot of evidence of an exclusive business model which is about "how do we ruthlessly exploit migrant workers and sustain our profitability on the basis of that?" It is more of a sort of y'know hunting for weaknesses y'know operating in the mainstream hunting for weaknesses in the workforce that you've got access to

UM1

recruiting, looking for every opportunity that's possible to reduce costs like pushing wages down to minimum levels.	
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Individuals meeting generic, expendable labour demands face a constant struggle to escape falling down to a stigmatised underworld of downgraded labour (Castells 2010; Boocock et al. 2011). Substandard labour standards are easier to impose on a workforce racially or culturally outside the host society. However, participant UM1's argument also supported Robinson et al.'s (2011) finding that wage and pesticide safety violations were not simply due to employers targeting/exploiting specific groups, although the argument that some employers may exploit workers from their own ethnic community is supported in the literature (see Allamby et al. 2011; Boff 2013), and interviews underscored this dimension of worker vulnerability (UM3, UU2).

The evidence highlighted the temporary and foreign-born dimensions of labour subcontracting in UK horticulture. The temporary workforce appeared almost exclusively foreign-born (the largest single group recruited under the SAWS). Employers described British-born workers as unreliable but other participants suggested labour migration mechanisms have created an expendable and self-generating labour pool. Employer-provided onsite housing in the isolation of outlying regions prevented the workforce interacting with surrounding communities, and dependence on the employer for both income and housing may be affecting vulnerability.

8.3 Induction and Training

This section provides evidence on UK employers' compliance with requirements to induct and train workers thereby contributing to understanding whether the nature of employment (including subcontracting) affected work experiences. Operators under the SAWS conducted pre-placement risk assessments at host workplaces and provided information packs which set out workers' placement terms and conditions. All employers reported conducting workplace inductions and most clearly articulated the content, exemplified here:

Basically we can have up to 1000 seasonal workers onsite so it's very important that they're inducted properly because health and safety and induction is really critical... the Horticultural Development Board have put together some specialist DVDs for manual handling and safety on farms which are all in different nationalities.	UG3
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In some cases there was discrepancy between the emphases in induction, such as food safety:

...they have health and hygiene questionnaire, medical questionnaire, all the terms and conditions of employment, we show them a DVD which shows them the picking	UG4
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techniques and all the hygiene requirements and all that type of thing.

On the statutory requirement that employers induct and train workers an HSE inspector stated:

Some are doing it very well. Some are not doing it at all... [because] some don't understand it, some choose to ignore it, and some couldn't care less.

UR2

A union official added:

...if you've got an employer who doesn't care about health and safety, he doesn't care about health and safety. He's: *I'll take my chance in getting caught; chances are I won't*. I don't think he will think: *I'll get away with it because I don't employ them direct*.

UU1

The suggestion that some employers violate regulations was noted in the previous chapter.

The Australian evidence revealed OHS inspectors were concerned that the itinerant nature of the workforce affected compliance with requirements to induct workers. Similarly, the HSE inspector just cited above remarked:

...what you will have is the labour being provided might change on a day-to-day basis so the labour user will have a contract with the labour provider and say: "I want 20 people for the next 5 days to pick a field of onions". There's no guarantee that the labour provider will ensure that those 20 people are gonna be the same from day 1 to day 5.

UR2

As with the Australian findings, participating workers were unable to recall the content of any induction they may have received. One worker acknowledged that OHS was important but reported having neither knowledge nor training to recognise potential hazards (UW3). Conversations with employers and labour providers revealed awareness of the requirement to document worker induction and training (UP1, UP2, UG3), and a number spoke of training as ongoing, although training appeared primarily to focus on techniques to aid productivity (UG2, UG6, UP2). Some workers were unable to recall the content of any training they may have received (UW2, UW5), and others confirmed the productivity focus (UW3, UW4):

On the beginning we watch a movie about this. Of course we have supervisors they help us, show how to pick enough fast but not too fast to don't bruise, bruising apples. And every day you are better and better you have bigger experience.

UW4

Although some participants described multimodal training strategies (UP2, UG3), hand

harvesting is a relatively simple task and there was a prevailing belief that training was not paramount (UP2, UG5, UW2, UW6). However, not all attitudes were the same:

Now you're training people and saying: "listen, this might sound stupid, don't put a fork through your foot". But you've gotta tell people and however simple it might sound to us actually you reduce the risk dramatically by training people properly and getting people to sign off on it.	UP1
...it's all about making sure that you bend properly because it's a bending job and we find that actually making sure that people bend is very, very critical. It's important that supervisors pick up in the field if people aren't bending properly. It also highlights awareness of things like tractors – if a tractor is coming along where should you be standing? Stupid things like that, thinking about where you are.	UG3

Similar to the Australian findings, there was discrepancy between worker and employer responses with regard to induction (which again may reflect the diversity of practices in horticulture); all employers articulated the content of induction yet workers were unable to recall the content of any induction they may have received. Also similar to the Australian findings was the suggestion that the itinerant nature of the workforce may affect compliance with requirements to induct and train workers. The previous chapter suggested language barriers can magnify challenges faced by foreign-born temporaries in understanding basic instructions, OHS measures and their working rights. Language is discussed as a subsection to induction and training next.

8.3.1 *Language*

Previous research cited language barriers as a contributing factor to health and safety inequalities (Trajkovski & Loosemore 2006; Premji et al. 2008a; Alsamadani et al. 2013). Relatedly, one SAWS Operator remarked:

There are some specific risk assessments that are important to us, for example the risks associated with employing people who don't speak English. It's a big thing because obviously a lot of our people are migrants, a lot don't speak English. So what are the risks around that?	UP1
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A union official added:

I believe if somebody's making that decision [to use foreign-born workers], along with it they should make the decision to make sure that either they, the potential workers,	UU1
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have the ability to understand, read, hear and respond in the English language. Or, if they don't, they should make sure that they have a translator, that they print documentation in the appropriate language.

Interviews revealed strong evidence of written translation. On a day-to-day basis participants reported reliance on supervisors or experienced workers to communicate with particular groups (UG1, UG2, UG3, UG4, UG5, UG6, UG7, UP1, UP2), exemplified here:

We have all key documentation translated into Romanian, Bulgarian and Polish. This covers a major part of the workforce and the induction video is translated into all European languages... We do not often have communication issues and try to ensure that all gangs have a representative that can speak the appropriate language, be it Polish, Romanian or Bulgarian so that someone can be translated if required.

UG7

...the core language is English. So to progress beyond picking or packing you are going to have to be able to speak English. So the supervisors can speak English. They can be supervisors from their own nationality. We try to make sure we've got a variety of people around so if the supervisor doesn't speak the nationality of some of the workforce... what you do is you make sure you've got members in the team who speak very good English and also speak the language so they can be the intermediary between the two.

UG3

A Spanish-born worker confirmed acting as a translator for English speaking supervisors (UW5). The translator's job is demanding and without proper training messages can be distorted and even lost (Trajkovski & Loosemore 2006). Government OHS inspectors viewed language proficiency, together with culture, as problematic during induction and training, believing communication barriers may compromise OHS (UR1, UR2). The selective opening of the UK labour market to workers from Bulgaria and Romania satisfied seasonal, low-skilled agricultural labour needs. However, a discourse presenting the work as "youth mobility" and "intercultural exchange" starkly contrasted the realities of the SAWS.⁶⁰ A migrant advocacy NGO representative explained:

Well ironically it was actually once a good scheme... But that very much changed after 2007 after the Romanian and Bulgarian accession into the European Union and at

UM1

⁶⁰ The National Farmers' Union of England and Wales set out a proposal for a replacement SAWS which returns to the origins of the scheme as a youth work experience program – see National Farmers Union (2012).

that point the SAWS was transformed into an employment scheme solely for workers of those nationalities... So now you've got people who weren't simply looking for three months of work they were actually looking for a regular wage but they were confined to a low-paid system... and the fact that improving their English is very often a big thing that they want to do but they're locked up with 1000 other people who are all speaking Bulgarian or Romanian and they never have the opportunity to do that. So you start getting a sense of much more frictions and discontent.

Similarly, Ivancheva (2007) described deep frustration about false promises of cultural exchange and learning and resulting segregation on national basis, together with wage and living condition exploitations. Additionally, cleavages based on ethnicity and national origin can diminish worker solidarity and shift the power balance in favour of employers (Binford 2002; Butovsky & Smith 2007; Thomas 2010).

The selective opening of the UK labour market appeared to engender a targeted approach to written translation of employment terms and conditions and general safety information. Similar to the Australian findings there was little evidence employers saw inability to communicate OHS information as a potentially serious risk at work, although in contrast to Australian horticulture most employers had multi-lingual supervisors. Interpretation was not seen as problematic; employers trusted and, in the case of workers translating for workers, assumed that instructions were being translated correctly (Australian OHS inspector AR2 explained many Australian growers adopted a similar strategy). There was suggestion of potential discontentment arising from the false promise of intercultural exchange and cleavages between workers based on national origin which may limit the ability of workers to advocate for improved OHS.

8.4 Safety Concerns

Although the focus of the research is on pesticide exposures, for contextual reasons this section briefly examines safety and welfare concerns because, as noted in the chapter on Australia, it reinforces observations about the management and regulation of horticultural work more generally. Employers' and labour providers' attitudes toward the credible risk to workers' safety varied, but the following principal safety concerns were identified: manual handling (UG2, UG6, UP2); slips and trips (UG1, UG3); moving vehicles (UG5, UG6); falls from height (UG2); entanglement from moving parts (ancillary work) (UG2); passengers riding in cargo trays (UG6); and the natural environment, particularly bees and allergenic matter (UG1). Most employers outlined preventative measures such as training, safe work procedures,

limiting tree growth height, machinery guarding and enforcement of appropriate footwear, and one provided a cautionary tale of worker dismissal for a safety violation (UG6). Workers were unable to recall receiving OHS information, and were unable to identify potential risks. Employers spoke at length on levels of supervision and the critical role that supervisors play in keeping workers safe. Workers confirmed supervision.

Chapter Two described work disorganisation as an explanatory factor for OHS outcomes. An HSE inspector underscored the importance of communication between the labour provider and user on risk assessment (UR2). Although researchers have suggested subcontractors are frequently unaware of their responsibilities, believing it is not their responsibility to interpret regulatory compliance (Loosemore et al. 2003; Loosemore & Andonakis 2007), one labour subcontractor detailed his businesses' job-specific step-by-step approach to the identification, assessment and control of OHS risks, including provision of PPE. Asked how well he is positioned to ensure that labour users are meeting their obligations and not placing workers at risk he responded:

We don't give them a chance to make a mistake. Whatever job they tell us that they are gonna do, we have our own health and safety that we go through with 'em.	UP3
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However, he intimated that not all attitudes would be the same, especially amongst smaller Operators:

Y'know if you're a one man band with 30 people and working with 'em, the last thing you want to worry about is if they've got enough water. In their view if they haven't got enough sense to take it then they shouldn't be employin' 'em. It's the truth, that's how they think.	UP3
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An HSE inspector concurred, identifying a direct link between business size and compliance with requirements to induct workers and undertake risk assessments (UR1). However another HSE inspector did not consider size an influential factor (UR2) and a union official presented a reverse interpretation of the influence of business size (UU2). The literature suggests knowledge of legislative requirements falls considerably with employer and workplace size, and small businesses are unlikely to have at their disposal resources to implement measures (James et al. 2004; Baldock et al. 2006; Underhill & Quinlan 2011b). The evidence was not conclusive.

Notable from Chapter Seven was workers' experiences with employers who were often perceived as demanding and uncaring. In contrast, UK employers displayed maternalistic/paternalistic attitudes towards employees, exemplified in these statements by a

Portuguese-born worker and two employers:

In terms of farms, I feel this is y'know a top farm to work at to be honest. I think so because there's lots of shit farms out there you know and shit employers and shit people going into those shit farms and it's a lot of shit. And here it's very good... This is a very good place. The supervisor, the manager, they're all very nice people, they treat us well, they communicate with us. It's really nice to be here to be honest.	UW6
...they nearly all live onsite. And you become not only a health and safety person, you also become a, you have to have an interest in the pastoral care of these people. Because some of them, although some of them are very street-wise now y'know they've driven from Romania in a car, they're fairly independent, you are also their slight guardian while they're here.	UG5
[Seasonal workers] do go back to a child mentality a lot of them. They sort of expect you to take them everywhere. We take them shopping and we take them to work and all they have to do is turn up at the right time.	UG3

It is probably more than coincidental that the mission of the Gangmasters Licensing Authority (GLA) is to safeguard the welfare and interests of workers, and an objective of the HSE is to secure the welfare of people at work. Employers' obligation under the SAWS to provide accommodation reinforced their guardian role but also made workers dependent on employers for both income and housing. Limited English proficiency may have resulted in social isolation and a high level of employer dependence, exacerbated as workers were corralled into minibuses for weekly food shopping trips. An empirical study in Ontario, Canada found community members rarely formed any type of relationship with migrant workers, and engaged in the processes of stereotyping and racialisation (Reid 2004). One union official, a photojournalist and an OHS campaigner raised concerns about social isolation and discrimination, including implications for outcomes of pesticide exposures:

You still don't have your back-up system – you don't have your family, you don't have your friends, you don't have the contact points, you don't have an understanding of where to go when you need assistance in certain aspects of your life and quite often if you're a different colour then you can be shunned by your co-workers. Let's not pretend that racism doesn't exist. And so you're in a vulnerable position even if you are knowledgeable about exactly what was expected of you.	UU1
I mean there's a lot of dialogue about people coming here for the benefits system which everybody talks about, the newspapers talk about it as though it's a fucking	UM3

luxury and actually it's one of the worst benefits systems in the whole of Europe... they come here to work. And they work but it's work that's very difficult for anybody who's y'know resident in the UK already it's very difficult for them to do any of this work because it's temporary... I mean it's all lies and bullshit but the point I'm trying to make is people are inevitably a bit sensitive or can be a bit sensitive about it because they know that they're being abused.

There's a whole social problem that comes with taking people from their homes and planting them in the middle of somebody else's community to work. Over here I'd say there'd be two factors, there'd be isolation for the workers that are moved which will affect your mental health and I'm sure your vulnerability to chemicals, and also the hostility of local people... I can't think of any reason why stress which would compromise your immune system to some degree would not affect you when you are chemically exposed.

UM2

A review of evidence from animal and human studies on the effects of pesticides on the immune system concluded the intrinsic balance of the immune system shows vulnerability to any chemical, including pesticides, and that human exposures may be compounded by stress (Blakley et al. 1999). Studies linking horticultural workers' psychosocial conditions to their pesticide exposures at work suggest workers exposed to pesticides may be at increased risk of depression (Parrón et al. 1996; Bazylewicz-Walczak et al. 1999; London et al. 2005; Jaga & Dharmani 2007). Literature on the mental health of itinerant and seasonal agricultural workers was presented in Chapter Two.

To summarise, there was evidence of employers providing for workers' pastoral care needs but OHS provisions were less evident. Workers were unable to identify potential risks to their safety, which further highlighted limits in training. If workers are less able to recognise hazards and more fearful that raising OHS concerns will negatively affect ongoing employment, then work refusals would be rare. Findings on the relationship between acceptance of OHS responsibilities and business size or work arrangements were inconclusive. The chapter now turns to pesticide exposures.

8.5 Pesticide Exposures

Unlike the Australian fieldwork, interviews undertaken in the UK did not provide evidence of temporary workers directly handling pesticides, which may reflect the low worker participation in interviews in the UK. Thus this section presents accounts of indirect exposures, including

hand hygiene practices and para-occupational exposures. A fact reiterated by the growers' interest group British Summer Fruits (2012) in championing polytunnels is that polytunnels achieve a 50 percent reduction in pesticide use. However, Evans (2013) described this as axiomatic rather than scientifically demonstrated, and noted protestors against polytunnels argue polytunnel cultivation represents an overt increase in pesticide use. Crop covers can also slow degradation of some pesticides compared with exposure to full sun, wind and rain (Edwards 1975; Allan et al. 2009), and greenhouse workers have higher pesticide exposure compared with outdoor horticultural workers (Petrelli & Talamanca 2001). Studying the distribution of a pesticide and its fate after application in a greenhouse, Katsoulas et al. (2012) stated workers are exposed to high residue levels on the crop and the ground and walls of the greenhouse. They concluded PPE should be used during application and for many days following application. Interviews indicated temporary workers performed overtime erecting and dismantling polytunnels without supervision and without PPE (UG5). Several participants praised neo-productivist agricultural technologies deployed to meet the quality and quantity demands of the supermarket-driven supply chain and suggested modern-day pesticides are not very toxic, which is consistent with the Australian findings:

I think a lot of the technological advances with growing a lot of these crops, for example nettings on swedes and polytunnels on strawberries, things like that reduce quite dramatically the amount of chemicals that you use.	UP1
...the pesticide usage and everything else is very controlled, especially under tunnels growing cherries we hardly apply much stuff at all y'know because there's very few chemicals we can actually apply anyway... the stuff we're spraying on sometimes only has a harvest interval of a day so you could eat the fruit then and there almost y'know it's not overly toxic.	UG2
And y'know the sort of chemicals we're talking about are stuff that I would spray on the strawberries. ⁶¹ We're not crop dusting or anything like that.	UG5

Employers spoke of the requirement for anyone using a professional pesticide to have a recognised certificate of competence; alternatively the applicator may, for the purposes of training, work under the direct supervision of someone who has such a certificate of competence. Nevertheless, one HSE inspector reported he would not be totally confident that those applying pesticides were certified to do so (UR2). This is similar to the Australian

⁶¹ Incidentally, strawberry production is consistently rated as one of the most pesticide residue contaminated foods (Environmental Working Group 2013).

findings. Another HSE inspector explained the inspectorate's primary concern regarding pesticides is that the pesticide is authorised for use and that the authorised conditions of use are understood. Beyond that, it is assumed that applicators are compliant (UR1). There is a serious flaw with such assumptions as the following OHS campaigner identified:

What the HSE is interested in is whether or not they're [pesticides] being controlled. Well control is something which when it works perfectly that's perfect state situation y'know anything less than it working perfectly is toxic exposures and you can't have a system that works on the assumption of perfection in health and safety because that's not real life.	UM2
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Incidentally, labour providers also appeared to be making assumptions about pesticide use:

We would have knowledge, we would have knowledge but we wouldn't really get involved in the management of it. We would check through our checks of the health and safety and the risk assessments that it is being managed by the farm... We wouldn't check that on an individual farm basis we would check it on an overarching health and safety management perspective... we would assume that it would be managed.	UP1
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Labour providers and users were asked if they could foresee situations in which workers might be exposed to pesticides, directly or indirectly. One employer spoke of optimal weather conditions and restricting access to areas adjacent to the area where pesticide application is in progress (UG4) however generally they did not recognise indirect exposures:

No, in all the years I've been farming, 30-something years I've never had an issue like that.	UG5
We utilise cabbed tractors so workers are not exposed to chemicals.	UG7
Well I suppose if they were to go into the field whilst the sprayer is spraying but they don't go wandering off. They live onsite and they meet here and they all go to work so they're not just wandering around.	UG2
...they're in an environment where there is chemicals used on a daily basis with irrigation as well as spraying for pests and things like that but there isn't really many instances where they would come into contact with it unless they were part of the team and were qualified to spray in which case they'd get the training and wear the appropriate clothing to do that. So no, not unless they were being somewhere where they shouldn't be.	UP2

Would they be exposed to chemicals? Well yeah they would be; the people driving the sprayers would be.	UP1
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No. What would happen, for example, if we're in Field B or a particular field unless I don't know unless they were spraying right next door to the field and the wind blew it across to 'em which is highly unlikely 'cause the farmer's not gonna spray in the wind 'cause he's gonna waste his chemical... I don't see how they would get sprays on 'em or near 'em or by 'em if I'm honest.	UP3
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The following opinions of a union official and an HSE inspector contradicted these understandings:

...they'll be coming into contact with whatever the crop's been sprayed with in quite unpredictable ways really because the way the crop will be sprayed. Some heads of cauliflowers will have more of the substance on them than others just because of y'know the effect of the wind. So yes, they will be [exposed].	UU2
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Obviously there could be residual chemicals in the crops, residual chemicals in the soil. In a glasshouse if there was fumigation that would be an area where they could be exposed to chemicals.	UR2
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Although expressing an expectation that there would be a conversation between potentially affected parties about pesticide applications, the HSE inspector just cited above was not optimistic that this would be occurring in all instances. Another HSE inspector acknowledged the disconnection between pesticide application and harvesting could create hazardous situations (UR1). No worker could recall a conversation whereby they were advised of pesticide applications or provided with information on how to prevent or reduce exposures, exemplified here:

No. Never said anything about the chemicals in terms of health and safety which is what you're focussed on never. Never heard anything about the chemicals. They're not perfect. They don't kill me but I'm sure it's not nice but anyway it is what it is.	UW6
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The potential for significant indirect exposures was underscored by an OHS campaigner who further remarked that susceptibility may be compounded by environmental factors (discussed in Chapter Four):

...going onto the farms and handling the food is a good way to get it [exposure]. And if you needed an illustration of that y'know tea pickers and tobacco pickers get diseases purely from handling the crop. Y'know so it's clear that there's sufficient contact with	UM2
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the crop to cause quite serious problems... and then you put on top of that the problems of overexposure to sun, dehydration, exposure to pesticides and you have this sort of like a toxic cocktail. The potential to potentiate is a lot higher than for more controlled jobs where all you've got is one easily defined exposure and relatively controlled exposure.

Due to the non-specific nature of many of the health effects of pesticide exposure it can be difficult for workers to effectively discriminate between chemical exposure and other common conditions such as heat stress and reactions to plants. One worker explained that his girlfriend's hands were dry and itchy during strawberry picking but they were unsure whether it was a chemical reaction or allergy (UW2). The symptoms were not reported and eventually subsided. Lack of knowledge on the possible reasons for certain symptoms is purportedly endemic to the agricultural worker population (Busby et al. 2009). Cunningham-Parmeter (2004) provided examples in which growers, whether out of malice or ignorance, misled labour contractors and workers suffering ill-effects of pesticide exposure. Participants recounted problems with diagnosis:

We have had misunderstandings about chemicals. With lettuce and with daffodils there's the sap from the plants that can react with some people's skin... We've had y'know complaints come in: "oh they've sprayed the crop and I've got this rash". But every time I've heard that it's come out to be this. And then you get allergies and things like that.

UP1

If they're getting a sudden rash and they don't understand it's a by-product of being around a certain chemical, they're not going to know to report it or how to report it.

UU1

Workers unanimously reported they had not been asked to apply pesticides. However, a number believed they had been exposed to pesticide residue (UW2, UW3, UW6) and spray drift (UW2, UW3, UW5). One worker recalled seeing blue spray marker dye during apple thinning (UW3). The residue was not always dry. This same worker recounted a tractor spraying pesticide in an adjacent row. Because of the odour he asked a supervisor whether the pesticide was dangerous. The supervisor reportedly laughed saying that nowadays the chemical was not even dangerous to the insects. The worker made no further enquiry. There were other recounts:

Sometimes you know the air when they are spraying the air sometimes comes across. Normally I have no problem but you can smell it.

UW5

We are I know we are [exposed]. We get the hands white and this particular feeling like it's dry. Our bodies get this chemical feeling as well and we both feel it she [motions to girlfriend] was the first one to recognise it and after a few days after I recognised it as well. Because they spray all the time and it's there. I know it for real it's there and I know it's not good but y'know it has to be like that. So yeah I'm pretty aware of that but I just have to keep going.

UW6

The above passage suggests a fatalistic resignation to the existence of risk, consistent with Holmes et al. (1999). Researchers have concluded that receiving information about pesticide safety reduces perceived risk and increases perceived control (Austin et al. 2001; Arcury et al. 2002; Strong et al. 2009). Resignation to the existence of risk can have important implications for adoption of preventative behaviours. All workers reported not wearing gloves. Although this was generally a personal preference, a request for gloves was denied due to concern about potentially damaging the fruit (UW2). Labour providers and users reinforced this attitude:

No, we'd prefer that they didn't but it's their choice. There are people who pick strawberries who wear latex gloves but we'd prefer that they didn't because they're more dextrous if they do it with their fingers.

UG1

They don't have to wear gloves. Some people choose to wear gloves, other people find gloves very restricting in terms of being able to feel the fruit and so softly holding the fruit and therefore damaging the fruit if they can't feel it through their gloves.

UP2

We don't like them to. Some wear the very thin gloves but the thicker the glove, the harder it is to feel and you can bruise the apples if you squeeze too hard so we don't like them to wear gloves. Some wear the very thin ones and they're okay but they do that themselves 'cause the thing is if you give a pair to one you gotta give a pair to all of them and then they're all wearing gloves. So we prefer them not to wear gloves so we don't give them gloves.

UG6

Similarly, Duke (2011) found workers were discouraged from wearing gloves because they would impede the delicate handling of tobacco leaves, resulting in exposure to industrial chemicals and green tobacco sickness. On the management of pesticide exposures HSE inspectors referenced the *Control of Substances Hazardous to Health Regulations 2002* and EH40/2005 Workplace Exposure Limits. However, Chapter Six noted exposure standards only consider absorption via inhalation despite certain pesticides readily penetrating intact skin. Hand-harvesters and cultivators absorb pesticide through the skin (particularly hands and

forearms) due to foliar contact. Factors affecting the level of exposure include type of activity, use of PPE and personal work habits and hygiene (Dosemeci et al. 2002). Responding to a question on the main OHS issues for horticultural work a labour subcontractor stated:

...the biggest issue that I see is gonna be a problem in the future is toilets and hand washing facilities. I mean that's all well and good yes they can go back to the farm but the type of people we use they're out here to earn money and save as much as possible. So here's the option: you're out in the field 1-2 miles from the farm, you can go to the loo, not bother to wash your hands 'cause you've got gloves on to pull weeds out and then sit in your car and have break and then go back to work, or you can drive from the field to the farm use the canteen, wash your hands, go to the toilet etcetera, and then drive back to the field. Well if you do that 3 or 4 times a day, that becomes quite expensive so they aint gonna do that.

UP3

This impression was restated by a union official:

...traditionally, people have y'know had to make their own y'know improvise things like going in the bushes and so on and so forth. If you think of the size of some of the fields where people are working, it's a long, long, long way back to get to a toilet block that's where the accommodation is or some other central point where there might be should anything have been provided like a portaloo that would be a long way away. I think people are in a position for all the reasons I've just talked about, about pressures of time and piecework, they just either don't go or improvise... The industry will probably say it's part of the checks that they run y'know but there's a difference between providing this stuff and people actually being able to realistically have access to it if it's a 15 minute walk to the toilet block. You're just not gonna do that because you're gonna lose half an hour of time when you should be and need to be working.

UU2

Pay and reward systems are a major factor in risk taking, especially when temporary workers are used as a 'buffer stock' to absorb cyclical variations in employment (Amuedo-Dorantes 2002). Mayer et al. (2010) similarly stated even if fieldworkers have access to hygiene facilities, the perceived pressure of production demands may prevent them from taking the time necessary to properly undertake preventative practices. Studies of the health care sector have also suggested cascading effects in which outsourcing and downsizing lead to behavioural changes amongst health care staff including hygiene failures (Pittet 2001; Miller 2004).

Interviews indicated it is often the labour user's responsibility to provide toilet and hand

washing facilities in the field. One HSE inspector outlined expectations regarding the provision of toilets:

Right in the field what we would be expecting is for them to be provided with portaloos. There's no minimum distance but around about 500 metres. So if you were field working picking cabbages or brassicas in the field all day then you would want toilets nearby. However, if you were just doing some weeding and you had a vehicle then that would be acceptable. But if they're working in the field all day then we would expect toilets to be provided.	UR2
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In turn, workers were asked whether there were toilet and hand washing facilities available at work. Facilities were reportedly not always available (UW2, UWP3 UW4, UW6, UW7) or accessible (UW2, UW3, UW5), and were at times inadequate and unhygienic (UW2, UW7). Where facilities were available they were not utilised:

We have portable toilets in main harvest but now we don't have nothing. Sometime we are near we can come back here [accommodation]. There is water and this gel in toilet but I never used it.	UW4
Just for girls I think. In harvest there is portable toilets for girls... I never been in one of those toilets, I never been inside. I don't like it... No. Sometimes we are picking near here [accommodation] so we come back here for meals but when we are far away no.	UW5
Yeah I use the bushes and the trees and I go there, and I use the leaves sometimes. I don't care. The call of nature is the call of nature I don't repress myself y'know I just go and that's the end of it. But they will have some portable toilets I guess when 60 or more people will come. Nature is like that y'know you just need to become part of it... Well I use the grass and all that. It's clean you know. I'm not going to eat the apples anyway and they will be washed after! No but I use grass to clean if I do that kind of stuff but most of the time it's just taking a piss so not a big deal.	UW6

Workers generally did not consider lack of hygiene facilities to be problematic. This suggests they were unaware that tasks such as harvesting, thinning and pruning were exposing them to low levels of pesticide residues, and that they were disproportionately affected by the absence of available hand washing facilities which was prolonging exposure.⁶² Moore (2002) argued

⁶² Incidentally, although waterless soap products (hand sanitisers) reduce bacterial levels, they are not acceptable alternatives to water, soap and towels for reducing hand residues.

that portable toilets provide the clearest example of inadequate toilet facilities. A clean toilet equipped with toilet paper, potable water, soap and single-use towels is adequate for both men and women but a dirty portable toilet (noted by UW2 and UW7) that may adequately suit men's needs may place women at risk of infections. One Polish-born worker expressed the opinion, based on his girlfriend's experiences, that lack of facilities is problematic for women (UW2). Lack of basic sanitation is an acute problem for all people, but presents unique problems for women (Fisher 2006), including inability to maintain adequate menstrual hygiene at work (Rajaraman et al. 2013). Union officials articulated this problem by recounting scenarios from other industries:

...this was a meat production workplace and you've got women who were working not allowed to take breaks, not to visit the toilet. You've got women who were menstruating and were getting in a very difficult situation because they weren't allowed to use the facilities. You've got horrendous circumstances that people were working to.	UU1
An improvised wee in the hedge is one thing but female workers have got periods y'know we're back to the times of the women working in factories in Victorian times y'know using rags from the floor to kind of improvise and ending up with all sorts of cancers, ovarian cancers because it was contaminated with machine oil and things like that.	UU2

Contrasting workers' experiences, employers confirmed, sometimes emphatically, provision of toilet and hand washing facilities:

It's not woods here. They have full hand washing facilities and toilets – very high hygiene. We're audited by the major multiples you wouldn't expect people to go behind the hedge or something. Of course we have to have very high standards we couldn't possibly do less. They have to have full hand washing of course.	UG4
They come back here at the moment 'cause it's only a group of 12. When we get the main harvest we will take a toilet out to the field with them and that just travels around with them.	UG6
...in the field obviously you've got to have hand washing facilities and toilets available to people as well because they could be out all day. So we have polytunnels up, small ones with benches inside. We have a designated smoking area – I'd rather they didn't but some of them do, a lot of the Eastern Europeans smoke. And then they also have a toilet and a hand washing station at the same place. And bins obviously for their	UG3

rubbish.

Employers appeared to regard toilet and hand washing facilities as welfare facilities necessary for the wellbeing of workers, as well as a food safety management requirement. The knowledge that fieldworkers may have substantial contact with pesticide residues did not appear well understood so was not being communicated to potentially affected workers. These findings are consistent with the Australian findings. In addition to time and economic considerations, lack of awareness of potentially hazardous exposures may explain why workers are not availing themselves of available hygiene facilities.

To summarise, there was discrepancy between worker and employer responses with regard to hygiene facilities, which may reflect the diversity of practices in horticulture. Employers stated they provided toilet and hand washing facilities but workers reported hygiene facilities were not always available or accessible, and were at times inadequate and unhygienic. It appeared temporary work arrangements were conducive to potentially hazardous forms of work disorganisation through disconnect between pesticide application and hand-harvesting which increased risk of indirect exposures. It seemed fieldworkers were discouraged from wearing gloves which may impede the delicate handling of fruit, and most temporary workers recalled examples of where they knew, or suspected they had been indirectly exposed to pesticides. Although one expressed a fatalistic resignation to the existence of risk, workers generally did not perceive exposure as a cause for concern nor lack of hygiene facilities to be problematic. These findings, which further highlight limits in training, are supported in the literature (see Simcox et al. 1999; Ward et al. 2001; Gentry et al. 2007; Calvert et al. 2008). Consistent with the Australian findings, interviews suggested employers can downplay or refute the significance of exposure by residue. Control-of-use regulations did not seem to be monitored or enforced which is evidence of regulatory failure. The residential pesticide exposure of horticultural workers may be greater than that experienced by others. Workers are likely to increase their exposure through the para-occupational pathway; they unintentionally bring pesticides into their dwellings from work (Arcury & Quandt 2009). The relative importance of para-occupational pesticide exposure risk factors is briefly considered below.

In rural areas, where housing is in short supply, providing adequate and affordable housing for harvest workers creates ongoing challenges. Although wider issues of social welfare are outside the remit of this study, there are some that may impact on worker health and safety. In addition to the standard pathways of diet, drinking water and residential pesticide use, the presence of pesticide metabolites in urine of rural residents indicate two major exposure pathways: a para-occupational take-home pathway whereby workers bring pesticides into

their dwellings on their person or on their clothing, and an environmental pathway whereby pesticides applied to nearby fields drift into the residential environment (Fenske et al. 2000; Ward et al. 2006; Arcury et al. 2007). Workers reported not being provided with adequate washing or changing facilities to remove residues and put on clean clothes before leaving work, and because there can be too few washing machines to accommodate the large temporary workforce workers were frequently compelled to wear pesticide-tainted clothing, often for days on end. No worker could recall a conversation whereby they were provided with information on how to prevent or reduce pesticide exposures.

Pesticide detection has been associated with housing adjacent to pesticide-treated fields (McCauley et al. 2001; Fenske et al. 2002; Quandt et al. 2004). Interviews indicated workers were frequently housed onsite or a short distance from the workplace, either in employer-provided subsidised accommodation or in campsites adjacent to horticultural fields (section 8.2). The cost of rental housing together with workers' low income (minimum hourly pay is £6.52) problematised housing affordability. A labour subcontractor reported a common response was for workers, particularly family members, to share housing:

...they will rent a house for £500 a month and then they'll have 10 of their family move in. Y'know you can't stop 'em or do anything about it but y'know they're here for money they don't care y'know they'll share bedrooms with their brothers and sisters.	UP3
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Pesticide residues have been significantly associated with the number of individuals in the home whose work included high exposure pesticide activities (McCauley et al. 2001, 2003), and the number of individuals in the household has been negatively associated with adherence to recommended changing, storing and showering behaviours (Rao et al. 2006). Studies have documented potential increased exposures from not changing immediately after work, waiting for extended periods before showering after work, and failing to separate work and household laundry (Curwin et al. 2002; Goldman et al. 2004), but direct evidence in support of this association is limited (McCauley et al. 2003). Whalley et al. (2009) found safety and sanitation conditions declined during the season due to influx of workers. One Polish-born worker housed in employer-provided accommodation described a similar situation:

Hmm it's just like you see. Not bad but when everyone's here it is much difficult than now. You have to wait for everything, pan and everything, to shower.	UW4
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The infrequent inspections by government officials preclude enforcement of the few sanctions levied against deficient and unsafe housing, although SAWS Operators appeared to fulfil a

quasi-regulatory role in this regard. Three temporary workers in Kent described living conditions at a purpose-built caravan and campsite as overcrowded, with ablution facilities insufficiently meeting demand (UW2, UW3, UW7). One worker recounted his living conditions working for a labour subcontractor in Herefordshire. He and his girlfriend initially slept in their car before moving into a share house with other Polish workers working for the same employer. Living conditions were described as cramped and unclean (UW2). This problem has been identified with regard to other groups of precarious workers in the past (Quinlan 2013b). Overarching concerns about inspectorates' capacity to enforce employers' obligations are examined in the next section.

8.6 Regulatory Environment

The subsidiary research question of this thesis asks: how effective is OHS regulation in horticulture? This section discusses knowledge of rights and responsibilities and such related themes as sources of information, modes of recruitment and management before turning to government inspection and enforcement. Employers' responses to the effectiveness of OHS regulation were generally positive, although there were concerns about pettiness and heavy-handedness in interpretation of the law:

By and large, effective. Sometimes way, way, way over the top. I don't know what Australia's like but y'know we're heading down a road of just unbelievable pettiness in terms of what you can and what you can't do in the name of health and safety and I think some of it is absolutely pathetic. And it's costing everybody in this country millions upon millions of pounds to put signs up... I've got all my protocols on the wall and everything like that but there's so much of it now that we're spending more time ensuring that we're complying with all the paperwork and almost at times possibly paying lip-service to the actual practicalities of it.	UG5
We have to have risk assessments and health and safety meetings and that is a good thing on the whole. Yes I think the balance is probably about right. There are some small details which you feel are rather pedantic and unnecessary.	UG4
I think some of it is overdone. I think particularly this risk assessment paperwork. It's more important to actually make sure that you're doing it. Health and safety isn't about having a piece of paper in a folder and you can wave it at your auditor. It's about actually making sure that what you do, how you actually run your farm and how you actually do something is much more important... I think it's about making	UG3

sure health and safety is real not just ticking a box.

Concerns that enforcement strategies promote minimum compliance are supported in the literature (Gallagher et al. 2001; Saksvik & Quinlan 2003; Wadick 2010), and are consistent with the Australian findings. A Gangmasters Licensing Authority (GLA) representative added:

So what we're making sure is say if something is written down on a bit of paper that can be pretty much meaningless unless it happens in practice so I mean that's the key thing for us.

UR3

Employers stated they were clear on their OHS responsibilities. The importance of, and mechanisms for reporting OHS issues was underscored by a number of labour providers, employers and supervisors who frequently described a chain of command reporting structure (UP2, UG3, UG4, UG5, UW1). Some workplaces had health and safety representatives and a health and safety committee (UG3, UG4), and one employer and a field supervisor described an "open door" policy to reporting issues and concerns (UG5, UW1). Overall, a proactive approach to the management of OHS risks was described, as one employer explained:

We hope to avoid health and safety accidents, we don't want any so we're looking out, we want to see problems so that we can avoid having them.

UG4

Only one worker had experience reporting an OHS concern. Although there were no negative repercussions, his supervisor deemed his concern laughable. Accordingly, he reported being unlikely to raise further concerns unless the issue was very serious (UW3). Labour providers and one union official further suggested temporary workers were unlikely to raise OHS concerns:

We have to remember where a lot of these people are coming from. They're coming from former communist countries where there is a huge amount of mistrust of authority... so they feel frightened sometimes with no legitimate concern of speaking to their employer... some people don't like speaking to their manager because they think: *oh he's gonna get upset with me*. And that's not because the manager will; it's a cultural thing.

UP1

I've gotta say I'm not necessarily sure that most of them think along the lines of health and safety when they're working i.e. if they were going down a row and for instance there's a rabbit hole whereas obviously the most sensible thing is to tell someone that it's there so that the next person doesn't stick their foot in it and break their ankle, the likelihood of someone thinking like that is practically nil to be honest.

UP2

I think it's remote really that possibility that people are gonna complain. Unless there's something that's affecting a large group of people where they might feel more empowered to raise it but even then, depending on the person who is literally standing over you what they're like. And some of them are very brutal y'know they need hardly any provocation to start y'know meting out physical pressure and physical assault and so on.

UU2

It was relevant to investigate sources of OHS information for employers. A representative of the GLA referenced a best practice guide for labour users⁶³, which begins with ensuring the labour provider is licensed (UR3). A trade association representative stated:

There's general advice available on the Health and Safety Executive website. You've got some guidance that's available on the Ethical Growers website. But other than that, for fieldwork there isn't really a lot out there.

UT1

Acknowledging this gap and conceding that general safety and welfare conditions can be poor, one HSE inspector spoke of intentions to develop guidance material for agricultural fieldwork (UR2). A Bulgarian-born field supervisor spoke of having access to resources and capabilities as part of a vertically integrated business (UW1). Interviews indicated SAWS Operators fulfilled an important role in provision of information for employers on compliance with legislative requirements:

There are no set guidelines per se. There's obviously regulations laid down by the Health and Safety Executive. There's various different regulations with regard to different aspects such as the requirement for gas testing or electrical testing or PPE or various other things but those all come from different regulations... Part of our job when we go around auditing farms, and this is the same certainly for all the SAWS Operators, is kind of making sure that the key elements out of those are there.

UP2

Well the thing is a lot of farms have Concordia⁶⁴, and Concordia are excellent because a lot of farms, including us, are not up-to-date with all the laws y'know and how things should be done but Concordia are there and they are excellent at keeping us up-to-date with changes.

UG6

Nevertheless, subcontracting and temporary work arrangements can obfuscate legal

⁶³ Supermarkets and Suppliers' Protocol with the Gangmasters Licensing Authority – Best Practice Guide, March 2011. Appendix 1: Good Practice Guide for Labour Users and Suppliers.

⁶⁴ One of the Home Office appointed Operators of the SAWS.

responsibilities and accentuate legislative deficiencies, paving the way for unscrupulous employers to exploit the situation. Business and worker representatives were asked if they were aware of situations in which employers had seized opportunities to capitalise on ambiguities in legislative language:

Well if something's legal is it a loophole... There have been certain interpretations of rules regarding travel and subsistence arrangements that have been, let's put it this way, where there's been less than clarity whether they are legal or not. Some businesses have adopted those, some haven't.

UT1

I think two things go on: 1. an avoidance of legislation through loopholes, and 2. *there aren't enough people to come and catch me at it....* One of the biggest things that I came across, they say that every time you set a goal somebody somewhere will find a way of cheating. So we have minimum wage. Who doesn't have to be paid the minimum wage? Well if you're self-employed. So what we'll do, we'll create this fallacy where you have to provide your own tools, where if you want to take holiday you've got to provide somebody else to fill in so that the job continues to get done. You have to hire off us the vehicle that you use. Ergo you're self-employed and you're not entitled to all the things that trade unions have struggled really hard to achieve.

UU1

Interviews indicated use of labour providers (sometimes exclusively) for recruitment of seasonal workers was common. Findlay and McCollum (2013) developed a typology of foreign-born labour channels to UK agriculture. Drawing from their fivefold classification, labour recruitment, employment and management are considered here. The most common labour channel encountered was the situation where labour was sourced and supplied by a labour provider to an employer, who then employed them directly on a temporary or fixed-term basis. The providers were large agencies that frequently, but not exclusively, supplied Bulgarian and Romanian workers through the SAWS, using overseas agents to source workers. Labour providers and users were unanimous in their understanding of who the employer was: the labour user. However, one labour provider articulated an overarching duty of care to the workers placed, adding

We visit every single person we supply, every single farm we supply we visit before we supply them, we check all of the processes they've got in place, a lot don't have them so we work with them by using our examples to help them get them in place before we'll supply and then when we supply... we visit them a minimum of once a year and we complete an audit.

UP1

As already stated, SAWS Operators fulfilled a quasi-regulatory role in terms of minimum labour standards, including OHS. It is interesting to contrast the proactive approach above with the following response of an Australian labour provider who described a reactive approach to workplace inspection (and an approach that did not comply with OHS legislation, also noted by Underhill & Quinlan 2011a):

It's actually in my contract that I ensure all the workers are placed in a place of safe work... But the only time I'll go there when it comes to an OHS issue is if I get a complaint, then I will go and I will y'know do an inspection to my ability and if it comes to it I will ask for their work safe policy.	AP1
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Under the SAWS, employers were able to loan workers for a short period of time to other businesses contracted to the same SAWS Operator but all moves had to be authorised by the Operator (UKBA 2013). One labour user reported engaging in this practice (UG2).

The gangmaster-employer collaborative system involved labour providers sourcing and supplying workers to businesses on a temporary or fixed-term basis, with the labour provider paying workers' wages. Labour is managed by the labour user on a day-to-day basis, and engaged in response to frequent and significant fluctuations in produce demand. A labour provider explained the employer-employee relationship under this arrangement in the following terms:

They would be our employees but once they're on their site they are covered by their health and safety... basically for insurance purposes obviously we have to have employer's liability and public liability but they will never claim on it 'cause the people in our contracts it says once they're on your site they're under your control and supervision therefore they're under your health and safety and your direction so therefore they're under your insurance.	UP3
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This provider reported conducting pre-placement risk assessments of host workplaces and emailing workers their placement terms and conditions, including hazards and risk control measures. However he admitted:

The only time it goes wrong is if he's [the farmer] forgotten to tell us he's lent 'em to his neighbour for 2 days, which they do do.	UP3
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One workplace principally recruited workers directly and without external influence, recruiting workers on a fixed-term or seasonal basis (UG6). There were three examples of where workers were sourced, paid and managed by a labour provider as a means of getting extra workers during planting and harvesting (UG5, UG7, UG3). Under this regime the labour provider was

responsible for managing workers on a day-to-day basis and was thus present onsite. In one example this relationship involved a great deal of cooperation between labour provider and user:

If you're going to put those people to work with your people in a job, they come here for a short period of time to sort something out for you but they're still doing the same job as the other people so they need to be treated the same way. Apparently they did like that. It's the first time we've ever used agency staff and their comment was how nice it was that they felt part of everything.

UG3

However, one temporary worker recalled a very different experience when working for a labour subcontractor who was always shouting that they were too slow, and often kept them separate from people working at the farms directly (UW2). One labour provider discussed a model whereby labour subcontracting could improve labour standards:

We'd need to do the same checks on the agency that we'd do on the farm y'know make sure they're employed properly etcetera... For example where a farm maybe has a history of not employing people very well and struggles to manage people and keep them happy, we might get another agency involved. We'll supply half the people for the farm to employ directly, the agency will supply half the people but will oversee and manage our people.

UP1

Regulators have long been concerned with expanded contractual chains, most often verbalising an apprehension of the way businesses may be able to absolve themselves of their regulatory responsibilities (Haines & Gurney 2003). One HSE inspector explained:

I think some people think that by engaging a labour provider you can absolve yourself of some of your responsibilities which you can't. And I think some people think: *well it has nothing to do with us, we've engaged a labour provider, they'll make sure everything's alright*. And that is not the case which is why communication between the labour user and the labour provider is key so everybody understands what their roles and what their responsibilities are and who's gonna do what.

UR2

Contrary to these concerns, some labour users did not make a distinction between fractions of their workforce:

Even if using agency staff, it is up to us, as the site owner, to ensure that the health and safety is acceptably managed.

UG7

...they [agency workforce] weren't our employees but we still had a duty of care. You

UG3

have a duty of care to the public and you also have a duty of care to everybody.	
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In summary, employers generally regarded OHS regulation as effective but were concerned about pettiness and heavy-handedness in interpretations, which is consistent with the Australian findings. Overall, a proactive approach to the management of OHS risks was described. Employers discussed OHS reporting mechanisms but there were doubts temporary or foreign-born workers would raise OHS concerns. The most common labour channel reported was temporary labour agencies which sourced (often using overseas agents) and supplied labour to horticultural businesses, which employed workers directly on a fixed-term basis. Participants also provided examples of direct recruitment and gangmaster-employer collaborative systems and subcontracting. Despite concerns that contractual and temporary work arrangements may obscure the employment relationship and extend of legal responsibilities, both labour providers and users appeared clear on who was the legal employer. However, in terms of treatment of subcontracted workers, workers and employers provided conflicting accounts which may reflect the diversity of practices in horticulture.

8.6.1 Inspection and Enforcement

Chapter Six noted reduced HSE enforcement and inspection activity in agriculture is frequently cited. An OHS campaigner raised concern about the implications:

I think regulation doesn't exist as far as farmwork is concerned because if there's not a regulator there's not a regulation. Regulation is effective if regulations are enforced and we don't have any proactive inspections of farm workplaces in the UK... If the laws aren't enforced, the exposures are invisible and we know we're getting high exposures but we're not gonna find them... in truth you're lurching from disaster to disaster, nothing happens here unless we get a Morecambe Bay where 23 die.	UM2
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One government OHS inspector described employers' obligation to provide adequate toilet facilities as "one of the few areas" of proactive inspection in horticulture (UR2). Describing the inspectorate's approach to the regulation of horticulture as "light touch", another OHS inspector explained past priorities for inspection and enforcement in horticulture and the wider land-based industries failed to reduce injury and death rates (UR1). This can be counterposed against recent findings that regular and proactive workplace inspections reduce work-related injuries (Levine et al. 2012). A union official explained that contrary to the image of intrusiveness and omnipresence, budgeting cuts have limited OHS regulators' capabilities and effectiveness:

It used to be that you had spot-check visits and then it became more “we’ve had a complaint can we check it out”. Now not only has it been reduced but it’s been reorganised... I always draw this analogy: if I get in the car and I don’t put my seatbelt on, the chances of me driving for an hour without getting stopped and prosecuted are incredibly slim. If I employ somebody and I haven’t done a health and safety inspection, I haven’t done risk assessments and I haven’t done everything I’m supposed to do to keep them in a safe working environment, the chances of me going a year without getting prosecuted for that I think are a lot higher than me having an hour in the car without my seatbelt.

UU1

This analogy was remarkably similar to the following reference to the alcohol limit by an Australian union official:

...people really don’t drive in excess of 0.05 anymore, and it’s not because they’re scared of injuring someone, it’s because they’re scared of the fine. That’s what they’re worried about. And if you don’t have to worry about that then you will drive over 0.05, and that is the same for these farmers. They know that the chance of a WorkSafe inspector walking on to their property is less than 2000:1. The only time you might get a WorkSafe inspector on a farm now of any sort is in the event of an incident, they’ll go out and investigate. But then again that’s probably the last you’ll ever hear from them.

AU2

One HSE inspector spoke of inspection and enforcement initiatives targeting mobile and stationary agricultural machinery and work near overhead power lines, adding that because of the latent effects of pesticide exposures, pesticide exposure is not a focus of the HSE (UR1). An OHS campaigner described potential implications of this omission:

If you don’t count the bodies then the bodies don’t count. Nobody’s going to do anything to change the system if it’s an invisible workforce being invisibly exposed... also there are problems in that the workforce is isolated from the community and the medical care that they get... if you’re in a reasonably geographically diverse workforce you don’t get that opportunity to find out that everyone’s got asthma or everyone’s got the same skin itch. So it doesn’t come out informally and it doesn’t come out formally.

UM2

These arguments are supported in the literature. Isolation and language barriers can compromise workers’ compensation systems (Pransky et al. 2002; Burgel et al. 2004), and demonstrating a link between the suffered affectation and responsible employer is difficult

within an itinerant workforce. The number of confirmed pesticide poisonings is potentially low due to low levels of diagnosis (Reeves & Schafer 2003; Garrigou et al. 2011), claims that do arise relate almost exclusively to acute exposure (Gunningham & Healy 2004b), and low-dose exposures may not be apparent in the absence of immediate ill-effects (Kamrin 2007; Birnbaum 2012; Vandenberg et al. 2012). There are also historical connections between precarious work and health. One feature of casual dock work of the nineteenth and early twentieth centuries was that workers left the industry before long-term health impacts became apparent (Quinlan 2013b). Chapter Six described the EU legal framework within which chemical risk management operates and stated the impact of the REACH reforms was anticipated to be substantial in relation to downstream use because of the focus on improved risk communication within the supply chain. This thesis found no evidence of an impact of the reforms in horticulture.

A theme throughout this thesis has been that special measures are required to address unique vulnerabilities of certain workers, and the horticultural workforce has been largely overlooked. Chapter Six presented the Gangmasters Licensing Authority (GLA) as a notable exception. Gangmasters who supply temporary labour to the fresh produce supply chain are regulated by the GLA which issues licences to gangmasters and keeps under review persons acting as gangmasters. Since its inception, 210 licences have been revoked for breaches (as of 20/06/2014). Although gangmasters are supposed to be licensed and regulated, one HSE inspector acknowledged “roguish behaviour” of third party contractors (UR1). Earlier research cited growth in horticultural labour subcontractors as a principal concern (Bain 2010). Asked whether he would ever contact another labour provider to meet the full complement of workers required, one labour provider responded:

No 'cause they lie, cheat, promise you the earth and do the complete opposite. The people haven't been interviewed, they've been charged to get jobs and that's an endless problem. You're just better off not doin' it.	UP3
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Another labour provider added:

...in this sector there has been y'know there are shadowy corners that you don't want to get anywhere near.	UP1
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The complex nature and range of practices in horticulture, poor resourcing and the limits of the GLA's reach present challenges:

Obviously we've got finite resources... so it's being intelligence led, and working in a	UR3
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way that makes best use of what we've got available.

... [the GLA] can only operate in the agriculture and shellfish sectors which meant that as soon as they felt any heat on them, first of all they had very limited investigative powers in any event, but then whenever people did encounter difficulties they'd simply say: "well we're not going to be providing labour in those sectors anymore, we'll simply be moving to an unregulated sector".

UM1

The second comment by a migrant rights advocate raises concern about the phenomenon of 'phoenix' companies. These are rogue operators who, having been caught exploiting workers and have had their licences revoked, ostensibly cease to exist but in fact remain in the labour-provider business either operating under a different name or behind the scenes, or switching to industries not regulated by the GLA (Wilkinson et al. 2010: 16). Amid proposed reduced GLA remit (DEFRA 2013b) – the Government as part of its Red Tape Challenge has reduced the ability of the GLA to make physical inspections of businesses applying for a licence to supply labour, instead introducing a "light touch" approach to licence applications⁶⁵ – there is a strong argument that if the principle of licensing labour providers is justified then it should apply across all employment sectors (Diacon et al. 2008; Wilkinson et al. 2010; Boff 2013). But the GLA would need additional resources for the larger remit.

Against a backdrop of reduced enforcement and inspection activity and individual powerlessness it is important to consider the potential for collective action and trade union organisation. Brickenstein (2012) revealed the majority of Pacific seasonal workers in Australia and New Zealand are not unionised because they do not want to pay member fees. Similarly, labour providers in the UK explained:

I don't think the people will actually join 'cause that's a cost.

UP3

...it's not something that seems to have been taken up predominantly probably because you've gotta pay to be part of a trade union and these people don't want to pay for anything. So to them it means nothing: *I'm only here for 6 months, why am I*

UP2

⁶⁵ Participant UR3 described the Authority's new 'discretionary' approach to application inspections in this way: "At the moment we inspect all applications that we receive. We're actually moving to a slightly different approach from the 1st of October where in certain circumstances we've got the discretion not to conduct inspection if we consider it to be particularly low risk... there may be certain circumstances where we think a physical visit to see the business isn't needed, and it might be that a decision could be to refuse the application based on the information that we have... Or it might be that we're satisfied that the applicant is sufficiently low risk that a physical visit wouldn't have any benefit".

gonna pay someone to have a little membership card?

Some workers similarly questioned the value in paying a membership fee for short-term employment (UW2, UW3, UW7). Although two participants (UU1, UG2) suggested cultural barriers surrounding foreign-born communities' understanding of the union movement in the UK can present a challenge in overcoming suspicion to build a relationship of trust, two foreign-born temporary workers voiced support for union presence:

There's always advantage in that because if you can't sort things out with your employers then you can go somewhere else to see someone else. So it's nice and yeah I am for that... It's someone you can talk about things with and maybe they can help if the employers are really shit. In those places you really because the employers will be shit and you will not be able to communicate with them so you need to talk with someone else and that will force the employers to behave appropriately.

UW6

It's a good idea maybe. Maybe because we can have a lot of problems. Now is only 12 people so it is easy to ask to go to [name omitted] or a manager or one of the supervisors or [name omitted] and tell what we need, what is wrong, what we want to change so now it's easy. When it's more people maybe there is more use for this trade union.

UW4

Just one worker outwardly questioned the legitimacy of unions (UW5). One employer queried the workability of unions for business, but also exposed misunderstanding on the subsection of labour law which governs the collective aspects of employment relationships:

Even big farm businesses are not set up to deal with unions. British Airways can't deal with unions and they're one of the biggest employers. I personally don't think trade unions are necessarily a good thing in general. So we would not want to see the trade unions but we couldn't ultimately stop it because you are not allowed to. If the right percentage of people come forward and say we want to be part of a trade union you either adopt it or you don't but if they keep coming forward after three years you've got to accept it.

UG3

This employer (who employed 800 seasonal workers) appeared to be confusing a worker's right to join a union with union recognition. In 2000 the statutory trade union provisions of the *Employment Relations Act 1999* were brought into effect – through these unions can seek recognition from employers for collective bargaining purposes. The statutory procedure may only be used in respect of employers with at least 21 employees (Schedule 1 7(1)). In making an application to the Central Arbitration Committee the union must show that it has at least 10

percent membership within the proposed bargaining unit and that the majority of these workers are likely to favour recognition (Schedule 1 14(5)). The then General Secretary of the TUC, John Monks, stated:

The main effect of this new law is to encourage more voluntary [recognition] deals. Only a small minority of employers are now hostile to unions in principle. Most recognise that unions want partnership, not endless conflict (BBC News 2000).

Asked their opinion on advantages and disadvantages of trade union involvement, attitudes amongst labour providers and employers ranged from receptive to hostile:

I gotta be honest, certainly for the clients that I supply with manual harvest labour, trade unions is not something that's that present. I'm actually not that familiar with, if they wanted to sign up who would manual harvest labourers sign up with. There's nothing stopping workers from joining trade unions.

UP2

We don't really have that here so it's a really difficult one to answer. I don't really know anything about that side of things. But we don't really I mean it's gonna be harder this year because our wages are governed by the Agricultural Wages Board but the government are abolishing that this year so that will be gone in October. So I think the unions may be more useful in the future because I think people are gonna have to do individual waging and bargaining.

UG6

There's a good question. Um no [laughter]. I don't want to sound too political. Trade unions have been involved on farms with lots of seasonal workers before. Have they delivered any benefits to the workers?

UP1

Well the unions don't always work in favour of the employees. In actual fact in this country we've just about disbanded something called the Agricultural Wages Board which was a union-managed quango, a government body which sets the wages for people working in agriculture/horticulture. But they made it so complicated and it was so out-of-date and unwieldy that the Order itself actually worked against the people.

UG4

Agriculture in the UK doesn't have trade unions and I'd like it to stay that way. Without the Agricultural Wages Board there will be room for trade unions to try and get involved.

UG3

As indicated above, employers anticipated the effect of the abolition of the Agricultural Wages Board (AWB) to be potentially significant. Despite misgivings about union involvement,

employers were unable to recall direct dealings with them, although one (UG3) alluded to a relationship between union membership and a loyal workforce whereby workers have interests which are aligned with those of their employer. Incidentally, Snape and Chan's (2000) examination of employee company commitment and union membership revealed the latter appeared to be a response to union commitment rather than disloyalty to the company or even dissatisfaction with the job. Interestingly, some labour providers conceded, somewhat reluctantly, that they saw their role as not dissimilar to that of a union; they provided support and advice for workers, and helped negotiate working conditions and living standards (UP1, UP3).

The subsidiary research question of this thesis asks: how effective is OHS regulation in horticulture? This subsection restated the Australian finding that enforcement of OHS through inspectorate is under-resourced. Interviews indicated a presumption against proactive inspection, which was viewed as a resource intensive and relatively inefficient form of regulatory intervention for the geographically dispersed horticultural industry in both contexts. Consequently, pesticide usage and health consequences are out-of-sight, out-of-mind, especially consequences for itinerant and temporary workers. Interviews also indicated a somewhat hostile environment for unions, with negligible influence in both UK and Australian horticulture. The greater the fragmentation of the labour market, the weaker the bargaining power of the individuals and the more vulnerable they are to abuses. The next section briefly describes supply chain pressures, including the public health issue of food safety.

8.7 *Supply Chain Pressures*

Chapter Three noted that the growth of elaborate supply chains in food production has led to widespread concerns about food safety and related consumer demand for high quality food, safety guarantees and transparency. Growers are motivated to avoid recall campaigns, adverse publicity, loss of sales and food scares, all of which result in reduced profits and export demands (Tauxe et al. 1997; Lynch et al. 2009). Preventative, proactive food safety practices from raw material production and handling through to consumption is a safeguard for the health and safety of consumers (Luedtke et al. 2003). One employer described a supermarket that requested pre-employment health questionnaire for seasonal workers (UG6), and responses to whether workers were provided with, or were required to wear protective clothing revealed a food safety orientation:

They have their hair back, they can't wear jewellery, they can't wear excessive	UP2
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perfumes and things like that but they don't have to wear gloves.

If they're in the packhouse some of them will have aprons, they all wear hair nets, they can have gloves and there are gloves available.

UG3

Well just sensible clothing. For example, your hair wouldn't be permitted you'd have to have your hair tied up properly. And they're not allowed to wear rings and bracelets. So we have very high strict standards. If your hair was like that we'd expect it to be tied up maybe put it into a tight ponytail because of course hair is a risk when you're dealing with food.

UG4

Retail firms can use their corporate market power to impose standards above those required by regulation, such as measures which guarantee food free from contaminants and chemical residue. However minimised crop residue is no assurance of reduced workforce exposure, which did not appear to be at the fore of producers' consciousness:

...farms wouldn't let people drive sprayers without those [certification and licensing] because the consequences of health are very serious but the consequences of crop damage are extremely serious as well and food safety and things like that.

UP1

Things like the blueberries you do need to spray them but you need to be aware of when you're going to harvest because the spray can't be on the berries when you're harvesting because you've got to eat them.

UG3

To protect human health national programs have been established to monitor levels of pesticide residues in foods and to prevent the marketing of food containing residues that exceed specific tolerances set by regulations (Chavarri et al. 2004). Growers compete in a global marketplace and are subject to tracking, monitoring, food safety and other inspection/compliance programs. Interviews indicated growers were used to, and expected regular inspection by multiple government and nongovernment agencies, exemplified here:

Every single field has a full history and a very detailed record of when spray is used, exactly when, how much was applied and the conditions it was applied in. It's all managed on a computerised system. We have to do that that's the minimum... If you're interviewing anybody who's an operator who supplies the major multiples, there's no chance at all of not doing those things properly because we're audited all the time.

UG4

The UK experience is in no way unique, as the following statement by an authorised officer for an Australian State environmental department demonstrates:

With Coles and Woolworths, Government is told that if the grower has a poor sample they can be told: “we’re not getting produce off you for a fortnight”. And when you’ve got a very tightly woven supply chain, with a grower who is getting marginal profits for produce and is depending on a product, for it to be taken off line for a fortnight can be financially quite devastating.

AM2

One union official made an interesting comment on potential negative ramifications of a disenchanted workforce:

...at some point the supermarket buyers might come in and inspect and they might check health and safety practices or y’know to see that the food chain is being protected all the way along. Y’know because they’re worried about their strawberries more than they’re worried about their workers’ welfare but there is a welfare element in there because y’know you don’t want contamination or you don’t want disenchanted people working on your stuff.

UU2

There is evidence of workplace deviance (voluntary behaviours of workers that violate significant business policies or rules and threaten the wellbeing of the business or its members) including sabotage in the wider literature (Ambrose et al. 2002; Henle 2005). Monitoring and enforcement may also be undermined by expanded supply chains:

Where you will find bad practice if you were looking for that or you wanted to find out more you should go to small farms where they’re just probably doing things like potatoes or one or two other crops where they don’t supply directly they just supply to other bigger producers and there they’re not audited... it’s all about traceability and they pick up the responsibility you see.

UG4

Chapter Four noted occupational pesticide exposures are primarily minimised by PPE and controlling the time between application and re-entry into the sprayed area by workers – the re-entry interval (REI). The withholding period (WHP) or harvest interval is related to food safety and is the minimum time that must elapse between the last application of a pesticide and harvest (Hetherington et al. 2010). Employers described the role of the WHP in ensuring the maximum residue limit (MRL) is not exceeded:

In terms of harvest intervals we record it all and then I use something called GateKeeper... A lot of it’s paper chasing ‘cause ultimately I decide what we spray and I decide when we pick it so I know that I can’t go into that field for 3 days. Re-entry, do you mean when people are working in an orchard? Y’know in some respects it’s the

UG5

same thing. Y'know if we can't go back in there for three days then we don't pick it for three days.

...we can't do anything until after that harvest interval. So we know that there is no danger. There was a guy a few years ago who came out in a rash and things and he was saying "it's your chemicals, it's you chemicals" and we were saying "it can't be because we've gone past the harvest interval, there's no danger to you". I think he just had an allergy to something in the trees y'know. He was fine after a while; I think it was just getting used to the change. But as long as you don't go past your harvest interval date then you know that everyone's safe.

UG6

However, the REI and the WHP are not equivalent statements. Salvatore et al. (2008) studied the relationship between behaviours promoted by the US Worker Protection Standard and pesticide exposures in strawberry fieldworkers. Participants had significantly higher levels (approximately 61 to 395 times higher) of exposure as compared with a national reference sample. Fieldworkers were sampled at the expiration of the WHP (72 hours after application), which is 60 hours later than the expiration of the REI for fieldworkers. Thus, it is likely that fieldworkers' exposure would be higher at the time that they legally re-enter fields for non-harvesting work. Employers are not mandated to provide PPE to workers who enter treated areas once the REI has expired (Strong et al. 2008), and section 8.5 provided evidence of employers expressly discouraging harvesters from wearing gloves. An OHS campaigner discussed MRLs in these terms:

...that's residue related and that's also after the fact, that's after the food has been processed and washed and everything else y'know that's not food that the workers are dealing with. And the whole thing about residues is there's an assumption that the residues will be low when they get to the consumer because consumers are protected by standards several orders of magnitude more strict than those protecting workers. So it means nothing that they're testing for residues, there's no relation to occupational exposures at all, compounded by the fact that you don't have a chance to wash or go to the toilet or if you get to the toilet at all you're probably contaminated and you're not properly hydrated and all those other factors that compound it.

UM2

Subcontracting is intimately linked to the concept of supply chains. According to Quinlan and Mayhew (2001: 9), a frequent complaint of subcontractors is that they do not operate within a "level playing field". Such is the nature of competition that businesses often bid on contracts

at a loss, hopeful of recovering costs by reorganising work and subcontracting to cheaper providers, as articulated by several participants including a number of labour providers:

People who don't pay the right wages, don't treat people properly can significantly undercut those who do...That happens in the agency market y'know people who don't pay the right holiday pay can charge a lower hourly rate than what the guys who do and then straight away they're cheaper. Some can be massively cheaper and it's clear they're not paying the right wages.	UP1
...a lot of companies will go in and say "yes we can do piecework, this is our percentage, this is our charge rate". But they should be making up that persons wages but I can bet my house that they don't. 'Cause they can't afford to can they? People who are doin' piecework, I would imagine if you spoke to the people who worked last week on piecework doing particular jobs they would not be getting paid the right money... That is quite rife in the industry.	UP3
The problem is that we do need a bottom line type of thing and that's all threatened by the rogues who come in and who undercut me by saying: "I can do it for 50p an hour cheaper". And everybody knows that they can only do that by y'know pushing the regulations to breaking point and breaking them.	UM1
Even people who try to do good things end up being undercut. So even if you try and pay good wages, if you wanna stay in business you're gonna be undercut.	UM3

One labour subcontractor just cited above expanded upon the economics of the problem:

The GLA and ALP [Association of Labour Providers] and so on and so on will tell you that a 30 percent margin is a breakeven point with all your costs and how it all works. So to get profit and management charges out of that you need to be 34 upwards. Most of these agencies doing piecework are on 32, 31, 33 maybe or less. So if somebody earns the right amount of money on piecework, their own money, perfect 'cause you will make 1 or 2 percent. So out of all the people that's doing a good job you're making 1 or 2 percent that's great. But out of all the people who do piecework I know from facts and figures if you had to have a person to work in a job, you had 10 people turn up that all wanted to do it and believe they could do it, you'd be lucky if you had 1 that meets the target. So for every 10 people you put on the field, 9 are gonna fail. So out of your 32 percent margin, is there enough to cover 9 people not making it? I'm not gonna tell you how or why but I know that that don't stack up.	UP3
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Inexperienced subcontractors are at serious risk of falling below minimum safety net

provisions provided to employed workers (Johnstone et al. 2012). One union official added the piecework payment system militates against OHS, including providing a perverse incentive to work at high speed and reject precautionary behaviours (UU2). Participants referenced international price pressures, particularly difficulty producing efficiently and competitively when different values are placed on equivalent labour (UP3, UU1). Others suggested supermarkets have created a situation in which the existence of direct-hire workers in industry is uneconomic:

Needing that continuity and having I suppose more pressures of margins and getting it to supermarkets and everything else it's just completely dictated how we and who we employ in horticulture hasn't it.	UG2
...profits were only available providing you ran a tip-top operation and used all sorts of modern management techniques y'know a labour force that was just in-time... And that meant a much more mobile workforce, one that was basically stuck in agriculture and fieldwork.	UM1

This problem is exacerbated by retail competition and increased concentration of grocery retail operators. Chapter Three argued supermarkets have driven the work intensification process. One labour subcontractor articulated the economically induced tendency of small operators to cut corners:

...the farmer's now in a real dilemma. He's got his strawberries, he's got an agency that will do it but they're gonna charge him the hourly rate which is gonna cost him more for his strawberries or he's got John Smith who lives in a caravan who he doesn't know who's gonna bring all these illegal foreigners or whoever he can get his hands on to pick your strawberries at 10p a punnet. Well let me make a decision. I could lose my house, my job, my farm and everything else by using this agency to do it properly or I can cut corners for 6 weeks of the year, get the strawberries picked, sell 'em all to Tesco, happy days... If I was that farmer and I had to make a choice: bend the rules because this guy said yes he's legal, yes he has a licence and yes he's gonna make their money up for their days' pay. For me, that's good enough 'cause I'm gonna keep my house, keep my job, keep my strawberries, keep my wife happy for another year. I'm gonna accept his word that he's gonna do a good job and do it legally 'cause that's the risk I'm willing to take for 6 weeks for my livelihood.	UP3
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Variations in the bargaining power of businesses in the food supply chain arising from differences in market share, contractual terms between buyers and suppliers, and regulation,

have created imbalances in the burden of the price increase borne at each stage (Barrientos 2011; Quinlan 2011b; MAC 2013). Interviews indicated supermarkets are particularly successful in transferring risks and costs down their supply chains:

...if there's a frost one morning and the quality of the lettuces goes down then it's built into the contract that the farmer pays the cost of that rather than the purchaser. And then the farmer safeguards it by transposing a portion of that risk down to whoever he's in a position to extract it from.	UM1
Price pressure is an enormous thing in farming because supermarkets cut prices to the bone so farmers get very little margins because you've got a monopoly of the buyers y'know so they can just force prices down.	UM2
...we had to pay time and a half at least so more than £9 an hour for any hours over 39 hours. And a lot of growers and farmers won't do that because they can't recover the cost because the farm gate price is so low.	UG4
...the main British supermarkets have a complete stranglehold over food and agriculture and what they say goes. But their price pressures are the things that are really providing the framework now for much of what goes on in the industry... the supermarkets they're in competition with each other y'know price competition with each other, it's quite explicit, and the way they are saving costs is by not paying the growers, they're not even keeping pace with inflation. And so the growers who are all acting as individuals, they don't gang together and say "sod this", they push the pressure downwards, down the supply chain to the contractors and ultimately to workers' pay.	UU2

Work intensification and lowering or bypassing existing labour standards are the two main options for cutting labour costs (Brosnan & Wilkinson 1989; Campbell & Peeters 2008). Despite contractual arrangements playing a pivotal role in affecting working conditions, the following comment by a union official suggests labour remains overlooked at the bottom of the supply chain:

...when we've brought up issues about breaches of pay with the end recipient of the produce i.e. the supermarket, they do wash their hands of a certain amount of responsibility because they'll say y'know "we're at one end and the individual worker is at the other end of the chain and there are so many different contractors and sub, sub, subcontractors it's impossible to keep an eye on what's going on".	UU2
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To summarise, relative to OHS, food safety standards are vigorously enforced through a

proactive program of inspection. Interviews also indicated food safety can detract attention and awareness away from OHS. Major retailers' influence on food safety highlights how retailers can control supply chains when they choose to. This indicates that they could play a more positive role in OHS rather than simply pushing down prices, which has the opposite effect. The precariousness arising from work organisation seemed to be a fundamental problem, especially in such a highly competitive industry dominated by large buyers advocating an integrated system of production, distribution and retailing.

8.8 Conclusion

This exploratory study seeks to describe how subcontracting and temporary work arrangements are associated with factors related to pesticide exposure and to worker perceptions of pesticide exposure. The chapter presented empirical evidence on UK horticulture and this was generally consistent with Australian accounts. Interviews indicated growers generally relied on temporary labour agencies (sometimes exclusively) to recruit foreign-born workers often for their employment. This finding contrasted with Australian accounts of predominantly informal modes of recruitment. The selective opening of the UK labour market engendered a targeted approach to written translation of employment terms and conditions but there was little evidence employers saw inability to communicate OHS information as a potentially serious risk at work although most UK employers had multi-lingual supervisors. Some UK participants suggested potential worker discontentment where reality contrasted promises of cultural exchange and learning. Moreover, cleavages based on national origin may limit worker solidarity and thus workers' ability to advocate for improved OHS. The temporary nature of workers' employment appeared to negatively affect employer attitudes to induction and training and workers' capacity to know and access their rights and willingness to avail themselves of OHS reporting mechanisms. Onsite housing in the isolation of outlying regions prevented the workforce from interacting with surrounding communities, which may also give rise to underreporting of injuries and illnesses. Conflicting accounts of working conditions under subcontracting arrangements may reflect the diversity of practices in UK horticulture. Employers generally regarded OHS regulation as effective but were concerned about pettiness and heavy-handedness in interpretations, and a somewhat hostile environment for unions and negligible union penetration was detected. Enforcement of OHS through the inspectorate was under-resourced thus pesticide usage and health consequences (especially for itinerant and temporary workers) were out-of-sight, out-of-mind. Relative to OHS, food safety standards are vigorously enforced through a proactive program of inspection.

Workers believed they were commonly indirectly exposed to pesticides but employers appeared to downplay or refute the significance of exposure by residue.

The cross-national findings were not sufficiently different to warrant a separate comparison chapter, but conclusions on Australian and UK horticulture are jointly discussed in Chapter Nine. This similarity, despite these being very different groups of workers, highlights that it is the vulnerability of the work more than the vulnerability of the workers that is critical. Chapter Nine also provides the conclusion to this study. It highlights key findings and links observations to existing research discussed in the literature review.

CHAPTER NINE CONCLUSION

9.1 *Introduction*

This thesis seeks to describe how work arrangements, particularly subcontracting, temporary employment and reliance on foreign workers, are associated with factors related to pesticide exposure and to worker perceptions of exposure. The link between the organisation of work and OHS in horticulture has attracted scant scholarly attention, although evidence elsewhere suggests several interrelated processes underlying the nature of the employment relationship would contribute to pesticide exposures (Chapter Two). This study assists in filling this gap through examination of two countries with similar regulatory regimes: Australia and the United Kingdom (UK). The research design allows the reporting of perceived exposure and potential sources of pesticide exposure. The dependence on a mobile and principally foreign workforce, though not unique to horticulture, adds an interesting dimension. Studies have examined the role of foreign-born workers in horticulture (Frances et al. 2005; Rogaly et al. 2008; Anderson et al. 2012), but few considered the implications for OHS (for exceptions see McKay et al. 2006; Tipples et al. 2013).

This chapter returns to the primary and subsidiary research questions:

1. What effect do subcontracting and temporary work arrangements have on workers' knowledge of, and exposure to agricultural pesticides?
2. How effective is OHS regulation in horticulture?

Before presenting a synthesis of the main findings as answers to the research questions, it is important to provide a detailed comparison of the two countries based on the discussions in the evidentiary chapters. As previously stated, despite differences in the regulatory frameworks and temporary labour migration mechanisms, the cross-national findings were very similar.

9.2 *Comparison of Similarities and Differences across Countries*

Data are drawn from semi-structured interviews with a range of parties and involved country comparisons which showed that factors which might be seen as unique, such as the vulnerability of Eastern Europeans into Europe (see Woolfson 2007; Woolfson & Likic-Brboric 2008), are not that unique but may be more typical of all short-term (particularly temporary) workers, especially in highly competitive industries. Indeed, the use of foreign workers can itself be seen as a conscious form of work organisation. Being an exploratory study, the findings are of necessity somewhat tentative, but the evidence suggests subcontracting and

temporary work arrangements are associated with factors related to pesticide exposure and to worker perceptions of exposure (methodological limitations will be discussed in more detail below). Although Australia and the UK are only two countries, there are very similar food production systems operating in practice, which suggests that the observations apply not only to Australia and the UK but probably more widely. Indeed some key findings were similar to Arcury et al.'s (2001) study on pesticide safety and sanitation in US agriculture, but there needs to be more research done in this area.

This section follows the structure of the evidentiary chapters, beginning with a summary of common aspects of employment practices. The evidence highlighted the temporary and foreign-born dimensions of labour subcontracting in horticulture. In Australia informal modes of recruitment contributed to worker vulnerability, especially violations of labour standards. Growing reliance on foreign-born labour appeared to disempower both foreign-born and Australian-born workers; foreign-born workers have limited ability to exercise their rights due to the precarious nature of the work, whereas Australian-born workers face competition from the cheaper and more docile foreign-born workforce. The UK horticultural temporary workforce similarly appeared almost exclusively foreign-born. By contrast, the most common labour channel reported was temporary labour agencies which sourced (often using overseas agents) and supplied labour to horticultural businesses, which employed workers directly on a fixed-term basis; labour migration mechanisms have created an expendable and self-generating labour pool. UK employer-provided onsite housing in the isolation of outlying regions prevented the workforce interacting with surrounding communities, and dependence on the employer for both income and housing may be affecting vulnerability. Despite these being very different groups of workers, the results are similar which highlights that it is the vulnerability of the work more than the vulnerability of the workers that is critical.

The findings suggested the temporary nature of workers' employment and the itinerant nature of the workforce negatively affected employer attitudes to induction and training, which in turn had implications for OHS. Induction and training appeared poor across multiple work arrangements but further examination of materials and observation of processes and recipients is needed to confirm this conclusion. Australian government inspectors and union officials added induction and training by temporary employment agencies and host employers, when provided, was often poor. Although discrepancy between worker and employer responses with regard to induction and training may reflect the diversity of practices in Australian and UK horticulture, the critical factor seemed to be workers' temporariness. The belief amongst employers that contracting obviates legal responsibilities was perceptible but

not pervasive. Broader concerns around employer compliance with their obligation to induct workers related to paperwork compliance.

Language issues exacerbated gaps in induction, and this can create obvious OHS vulnerabilities, but there was little evidence employers saw inability to communicate OHS information as a potentially serious risk at work. Similarly, Quinlan's (1982) investigation of patterns of employment and post-war immigration in Australia found little evidence to suggest management took much interest in migrants upon engagement. The selective opening of the UK labour market did engender a targeted approach to written translation of employment terms and conditions and general safety information, and most UK employers had multi-lingual supervisors. However, there was suggestion of potential discontentment arising from the false promise of intercultural exchange (which is consistent with Ivancheva 2007) and cleavages between workers based on national origin which may limit the ability of workers to advocate for improved OHS. Across both contexts the most common strategy used to overcome language problems on a day-to-day basis was use of cultural gatekeepers with no formal support or training. This is consistent with Loosemore and Lee's (2002) research examining the Australian and Singaporean construction industries, which are similar in the relatively low level of English competency that characterise their workforces. Evidence on whether deficient induction, training and supervisory practices, and hazardous exposures were higher in small business compared with large business was weak, although evidence elsewhere suggests a relationship between business size and ergonomic, physical and chemical hazards (Sorensen et al. 2007). Workers tended to accept poorer working conditions perhaps because of their vulnerable position in the labour market.

Workers in Australia frequently associated OHS risks with an immediate effect, most commonly the risk of falling from ladders, which is consistent with Holmes et al. (1999). It seemed that due to the short-term itinerant nature of the work workers did not consider long-term health but rather immediate safety (and it would have been very difficult to track any exposures if they were considered – discussed further in section 9.3). Workers in the UK were unable to identify potential risks to their safety, which further highlighted limits in training. If workers are less able to recognise hazards and more fearful that raising OHS concerns will negatively affect ongoing employment, then work refusals would be rare. Australian employers were often perceived as demanding and uncaring, and these negative perceptions were most common outside direct employment arrangements. This also appeared to be an issue in the UK but it is difficult to draw conclusions on UK horticulture because of the number of worker responses. There was evidence of UK direct-hire employers providing for workers'

pastoral care needs.

Australian interviews indicated that although industry-based pesticide control-of-use programs provide a high standard of training and information, there is an absence of alternative supports such as field-based services providing ongoing face-to-face training. Another concern was that those undertaking the accredited training were not necessarily the pesticide applicators, thereby undermining implementation beyond paperwork compliance. Contrary to research findings discussed in Chapter Two suggesting that temporary and contractual arrangements are commonly used to outsource more hazardous tasks, growers overwhelmingly reported themselves or a permanent employee were tasked with applying pesticides. This finding is discussed further in section 9.3. However, there were exceptions and some temporary workers in Australia spoke of situations in which they were required to directly handle pesticides. The reasoning is an aspect which requires further research, although it may suggest some employers violate regulations. Unlike the Australian fieldwork, interviews undertaken in the UK did not provide evidence of temporary workers directly handling pesticides, which may reflect the low worker participation in interviews in the UK. Control-of-use regulations in both Australia and the UK did not seem to be monitored or enforced which is evidence of regulatory failure, discussed further below.

The Australian and UK findings on indirect pesticide exposures were remarkably similar. Across both contexts there was discrepancy between worker and employer responses with regard to hygiene facilities, which may reflect the diversity of practices in horticulture. Employers stated they provided toilet and hand washing facilities but workers reported hygiene facilities were not always available or accessible, and were at times inadequate and unhygienic. While sanitation appeared to have been a general problem, it presents a particular concern for women because it inhibits their ability to maintain adequate menstrual hygiene at work. Generally, employers and labour providers discounted the risk of indirect pesticide exposures which may explain why hygiene facilities were not always supplied or maintained. Incidentally, most pesticide use instructional material understates residue exposures. Despite recounting direct and indirect exposures, a popular cognitive model of pesticide exposure was that residues workers cannot personally detect do not pose a risk to their health, which further highlights limits in training. This finding is consistent with earlier research (Quandt et al. 1998, 2006; Arcury et al. 2002; Rao et al. 2004). Workers appeared unaware that tasks such as harvesting and thinning exposed them to low levels of pesticide residues, and that they may be disproportionately affected by the absence of available hand washing facilities which would be prolonging their exposures. A small number expressed feelings of powerlessness and

resignation to hazardous exposures, and this appeared to be related to limited job opportunities for temporary migrants, especially in Australia. The literature suggests the piecework payment system provides a perverse incentive for workers to maximise their income in the short-term by rejecting precautionary behaviours (Perry & Bloom 1998; Quinlan & Mayhew 2001; Earle-Richardson et al. 2003; Mayer et al. 2010). Although sanitary facilities when they were available were not always utilised, payment systems did not consistently affect workers' reported behaviours, which would suggest workers' behaviours are not always economically induced.

The full nature of the risks of pesticide exposure were not immediately visible, and because of the non-specific nature of acute effects it was difficult for workers to discriminate between pesticide exposure and other common conditions (including reactions to plants), especially when they were uncertain of whether they were being exposed. Government OHS inspectors and union officials did not believe temporary fieldworkers would be advised of potential pesticide exposures not least because of perverse financial incentives of labour subcontracting, as one experienced Australian harvest subcontractor confirmed (also noted in other industries, see Mayhew & Quinlan 1997, 1999). Moreover, employers appeared to downplay or refute the significance of pesticide exposures by residue, which in turn shaped workers' attitudes, especially where the fragmentation of tasks impaired effective evaluation of risk. Although overall a proactive approach to the management of OHS was described, if the employer does not believe that pesticides are very hazardous and if the employer does not believe that people can be indirectly exposed then management of pesticide exposure risks is always going to fall short in terms of safety oversight. Rarely did workers recall any conversation whereby they were advised of pesticide applications or provided with information on how to prevent or reduce exposures. Although gloves reduce exposure to dislodgeable foliar residue, employers are not mandated to provide PPE to workers who enter treated areas once the re-entry interval has expired. UK interviews revealed fieldworkers can be discouraged from wearing gloves which may impede the delicate handling of fruit, and this is consistent with Duke's (2011) finding on tobacco workers.

The nature of employment appeared to affect workers' knowledge of, and exposure to agricultural pesticides. Australian interviews indicated workers were at greater risk of indirect exposure when employed by labour subcontractors, with limited control over when and whether they were exposed. This also appeared to be an issue in the UK but it is difficult to draw conclusions on UK horticulture because of the number of worker responses. The majority of workers interviewed in Australia and the UK had not applied pesticides through their work

but many recalled situations where they knew, or suspected they had been exposed (nine reported a contractual arrangement; four had a direct employment relationship; and two reported exposure under both work arrangements). The disconnection between pesticide application and harvest created hazardous situations, but intense competition for work also contributed to a range of hazardous practices amongst labour subcontractors, including accepting hazardous tasks.

Unlike many safety issues, exposure to hazardous substances is not confined to the workplace. Although wider issues of social welfare are outside the remit of this study, there are some that may impact on worker health and the evidence described para-occupational take-home pesticide exposure pathways, which underscored the more insidious health risks associated with pesticide exposure. The findings illustrated the historical connections between precarious work and health; workers employed seasonally need temporary housing near their place of work and the capacity of such arrangements to adversely affect worker and community health was well documented by the early twentieth century (Schenker 2008; Quinlan 2009, 2013b, 2013c). UK interviews indicated workers were frequently housed onsite or a short distance from the workplace, either in employer-provided subsidised accommodation or in campsites adjacent to horticultural fields. Infrequent government inspections seemed to preclude enforcement of the few sanctions levied against deficient and unsafe housing, although the Seasonal Agricultural Workers Scheme (SAWS) Operators partially countered this. Temporary workers in Australian horticulture appeared to prefer mobile homes, which reduced accommodation costs to site rent only and facilitated access to geographically dispersed farms. Commuter vehicles are an important component of the take-home pesticide exposure pathway. Exposure when the commuter vehicle is also the home appears to have been overlooked in the research literature. This should be an area of future research.

The structure of subcontracting and temporary work was not conducive to achieving good OHS standards. The mechanisms by which these arrangements can affect hazard exposures seemed to be inexperience and lack of training at the workplace, hazardous working conditions created by intense competition and perverse financial incentives of labour subcontractors to accept unsafe task and the effects of tightly pre-programmed schedules in food supply chains, job insecurity, and constrained agency (i.e. subcontracting and temporary work arrangements were not conducive to worker input, either through unions or through mechanisms in OHS legislation). The structure of subcontracting and temporary work also provided the basis for obfuscating responsibility and denying rights.

Generally, workers had limited knowledge of OHS responsibilities and of their entitlements to

workers' compensation, and described obfuscation of responsibility and individualisation of responsibility for workplace safety. Labour subcontracting contributed to considerable ignorance and confusion in this regard. Complication and obfuscation of regulatory rights and responsibilities is typical of subcontracting arrangements (Gryst 2000; Quinlan 2003). Although government OHS inspectors and union officials verbalised an apprehension of the way businesses may attempt to absolve themselves of their regulatory responsibilities through expanded contractual chains, evidence provided by labour providers and users indicated evasive attitudes are not pervasive in Australian and UK horticulture. However, the itinerant nature of horticultural work revealed concerns about workers' compensation regimes in Australia. Workers and employers in UK horticulture also provided conflicting accounts of treatment of subcontracted workers which may reflect the diversity of practices.

Employers generally regarded OHS regulation as effective, although several Australian employers blamed OHS and associated excessive bureaucracy for overriding common sense and eroding personal responsibility. Despite employers' concerns around pettiness and heavy-handedness in interpretations of the law, overall the evidence debunked the myth of over-burdensome OHS regulation, pointing to rather low levels of regulatory enforcement and common if not widespread evasion of regulatory standards. However, the study found evidence of approved SAWS Operators being involved in monitoring and enforcing labour and living standards through contractual mechanisms. Australian State inspectors spoke of difficulties in allaying fears of inspection and government encroachment within the rural community which can make it difficult for regulators to exert influence.

Regulatory coverage in agriculture has always been limited and under-resourced but with the growth of more intensive production regimes there is more need for closer regulatory scrutiny. It was clear from interviews with a range of parties (including inspectors) that the regulatory resources do not enable this in practice. A common sentiment was that the inspectorates are under-resourced and inspections are rare. Monitoring compliance appeared particularly challenging with the geographic spread in Australia, compared to the concentration of employers and workers in a small number of highly productive horticultural regions in the UK. Yet, UK interviews still indicated a presumption against proactive inspection, which was viewed as a resource intensive and relatively inefficient form of regulatory intervention for agriculture. Broad concerns about compliance with government and industry-based training and competency programs, acceptance of protective measures and communication of risk were indicative of under-resourced inspectorates. In both contexts, trade unions play a very limited role in negotiating and maintaining working conditions. Overall, it was the precarious

situation of the workers that appeared to affect their capacity to know and access their rights. This includes low unionisation, itself arguably exacerbated by the new form of work organisation dependent on foreign-born workers with no community attachment.

Interviews highlighted the influence of public health and food safety. Food safety standards are vigorously enforced relative to OHS through a proactive program of inspection. Responding growers were economically viable and expected to remain part of the national or global food chain and thus they realised they could not abuse pesticide regulations for short-term gains or out of neglect. However, food safety appeared to detract attention and awareness away from OHS. Minimising crop residues and meeting environmental safeguards provided no assurance of reduced workforce pesticide exposure. The latter did not appear to be at the fore of employers' consciousness. The findings confirmed the importance of supply chains. Supermarkets' influence on food safety demonstrated how retailers can control supply chains when they choose to, which suggests they could play a more positive role in OHS rather than driving down the margins for growers, which has the reverse effect. Labour was an overlooked element at the bottom of the supply chain despite contractual arrangements playing a pivotal role in affecting working conditions; there was no finding of supermarkets accepting responsibility for remedying bad practices amongst suppliers from whom they source produce. The role of labour contractors in facilitating the supply of labour to meet production schedules was exemplified in the Australian and UK findings, as was the role of supermarkets in driving the intensification process. Although Australia and the UK are only two countries, there are very similar food production systems operating in practice, which suggests that the observations apply not only to Australia and the UK but probably more widely.

The dependence on principally foreign-born labour, though not unique to horticulture, added an interesting dimension. Foreign workers encountered the same problems as local workers, including insecure work and dubious OHS conditions, but their temporary foreign worker status often meant they were exposed to other risks. Similar to Ruhs and Anderson's (2010) finding, some employers voiced a racialised view of foreign workers, arguing people of a specific nationality or ethnicity exhibit mental attitudes or physical characteristics that make them "ideal" workers. Some labour subcontractors were also seen to be exploiting workers from their own ethnic community, which is consistent with Allamby et al.'s (2011) study of forced labour in Northern Ireland. Nevertheless, there is a significant question about the extent to which the vulnerability that comes from being foreign-born can be differentiated from vulnerability arising from the work situation, discussed further below. It appeared unlikely that labour standards violations and pesticide safety violations were simply due to

employers targeting or exploiting specific groups of people. Violation of regulations and hazardous exposures were common. The conclusion that failure of protection in one area invariably has a compounding effect on other areas has been remarked elsewhere (see Quinlan & Sheldon 2011; Robinson et al. 2011). The primary source of vulnerability appeared to be the nature of the work arrangement itself but workers' temporary residence status meant regulatory consequences were seen as low to nil. This is an exemplar case of precarious workers who are viewed as dispensable.

9.3 *Work Arrangements and Pesticide Exposures*

The thesis was not a test of any particular model of work organisation and health, but there were elements that were relevant to a number of the models introduced in Chapter Two. The workers appeared to have very little task discretion relative to the demands that were put on them (i.e. Demand–Control–Support model), and the Effort-Reward Imbalance model would also seem to have applicability because of the demanding but unstable nature of employment, which rarely provided temporary workers promotional prospects. Participants also suggested the stress and uncertainty associated with temporary work and limited access to support from formal organisations (such as unions), co-workers and family would have been frequent sources of poor health (i.e. Employment Strain model). Mainly the risk factors identified in the Economic and Reward Pressure, Disorganisation and Regulatory Failure (PDR) model seemed to have applicability to this study (discussed below). It would be useful to apply all four of these models as they are essentially models of how work organisation affects health.

Regarding subcontracting, the issues raised were not just impressions of workers and unions; many of the following observations were endorsed by other participants including growers and even subcontractors themselves. The nature of employment appeared to affect workers' knowledge of, and perceived exposure to agricultural pesticides. In particular, workers perceived greater risk of indirect exposure when employed by labour subcontractors. This study looked beyond the medical paradigms explaining adverse health outcomes in horticulture to consider the broader social, economic, and cultural contexts in which OHS issues are embedded. The findings support the explanatory value of Quinlan and Bohle's (2004, 2009) PDR model. Employment and income insecurity, and intense competition for work, contributed to a range of hazardous practices amongst labour subcontractors, including accepting hazardous tasks. There appeared to be competition amongst subcontractors, which resulted in a race-to-the-bottom with cost-cutting. These problems could exist even without subcontractors, but the problems were exacerbated to the extent that it could be worked out,

being consistent with the interviews. The evidence suggested temporary fieldworkers are not informed of potential pesticide exposures, not least because of perverse financial incentives of labour subcontracting (also noted in other industries, see Mayhew & Quinlan 1997, 1999). Labour subcontracting exacerbated poor labour practices and was conducive to potentially hazardous forms of work disorganisation through the disconnection between pesticide application and hand-harvesting, which increased the risk of indirect exposures. The itinerant nature of seasonal work also contributed to hazardous forms of disorganisation arising from constant changes to co-workers and experience from job to job, and networks of employment relations obstructed the quality of information flow on pesticide use and preventative behaviours thereby increasing vulnerability to exposure, and created more elaborate networks of responsibilities. This overlaps with regulatory failure in the sense that there was a tendency to minimise or shift the legal responsibility for training and induction, and networks of employment relations also complicated the task of the regulator in terms of trying to oversee this. Without the protections afforded by union representation workers were vulnerable to adverse conditions of employment. There was again an ethnic dimension in that some of the subcontractors were reportedly exploiting people in their own ethnic group.

Despite a body of research documenting work organisation and its implications for OHS amongst foreign-born agricultural workers (Ahonen et al. 2007; Grzywacz et al. 2007, 2013, 2014; Swanberg et al. 2012; Svensson et al. 2013), the present findings raise significant questions about the extent to which the vulnerability that comes from being foreign-born can be disassociated from vulnerability arising from the work situation. There is considerable overlap because vulnerable groups of workers (especially foreign temporaries) tend to be concentrated in jobs characterised by seasonality of production and competitive global production chains. One way to conceptualise this is through Sargeant and Tucker's (2009) theory on multiple layers of vulnerability and their interaction with regulation, which the findings seem to support. However, this still leaves the question about which is the more important layer. The evidence tends to suggest that it is the nature of the work that is critical; it did not seem to matter where workers came from although in the UK employers could potentially optimise the fact that these people are desperate for work and with prior experience of poor OHS standards typically found in Eastern Europe. It may be expected that backpackers on the Australian harvest trail, often proficient in English and educated, would have been more conversant and willing to speak out for their rights than workers from recently acceded EU Member States, but these workers can also be desperate for work and are diverse. Many are from developed source countries with high OHS standards and expectations

of returning to their home countries to earn relatively high incomes but others originate from Asia where there are weak OHS standards even if the country is fairly wealthy (Frost 2003; Chen & Chan 2004). Workers in Australia also viewed the work as short-term, which the evidence suggested shaped their attitudes to OHS. Aspects of the work structure, including the requirement to perform specific work in a regional area for a minimum of 88 days to acquire eligibility to apply for a second Working Holiday visa without monitoring or regulation of working conditions or payment, made these workers particularly vulnerable.

Interviews from a range of parties (i.e. not just interviews with workers) suggested that temporary workers were not very aware of their rights, were not told their rights, and were in a very weak position to make complaints even if they knew their rights. The critical factor here seemed to be that the work was very transitory. Although there was little variability in the work itself, it was always a new workplace and because it was a new workplace these workers did not appear to consider long term health but rather immediate safety issues. Moreover, because the work was itinerant it would have been very difficult to track any exposures if it were considered desirable to do so. Australian horticulture temporaries are mainly in the industry for 2 years at most (many for only 88 days) and do not return on a regular basis. Strong evidence of subtle long-term cumulative effects of pesticide exposure (outlined in Chapter Four) suggests need for improved periodic medical surveillance for horticultural workers, yet there is no surveillance system for acute pesticide illness reporting and no surveillance system for tracking chronic illness related to pesticide exposure. The restructuring of the organisation of economic activity, including growth in subcontracting of peripheral activities, means pesticides are being used in situations increasingly remote from systematic risk management and medical or regulatory surveillance. Workers are unable or unwilling to report their symptoms and no one is recording the symptoms of an itinerant workforce, exposed to different chemicals under different conditions, for which many of the effects of pesticide exposure will only manifest themselves when the people are no longer agricultural workers, and probably not even living in agricultural communities. The findings also underscored the importance of simultaneous multiple job holding and the heterogeneity of pesticides, which present further epidemiological difficulties. Industry and regulatory agencies would realise this thus in effect is not regulation but capitulation and abrogation of duty to safeguard workers' health. It appears that consumer concern about the effects of pesticides on their health has not yet generated comparable public interest in the pesticide-related health risks to horticultural workers who remain out-of-sight, out-of-mind.

It was apparent that industrial assumptions about chemical exposures are inappropriate when

evaluating risks to agricultural workers because their exposures are wide and varied, and change seasonally depending on what pesticides are being applied and what tasks are being performed. Additionally, there was not a 'standard' working day or working year. Assumptions about biological monitoring were also undermined by the short-term itinerant employment; workers who are occupationally and geographically mobile are poor candidates for longitudinal studies, and prospective monitoring is complicated when workers are resident in communities for short periods of time (Villarejo & Baron 1999; Quandt et al. 2002).

A key finding was that temporary and contractual work arrangements do not always entail the outsourcing of more hazardous tasks. While this finding is contrary to most other studies it is by no means unique (see Legg et al. 2009; Underhill & Quinlan 2011b). This finding must also be treated with caution; whilst the person directly handling pesticide formulations had the greatest exposure potential, they also had the highest degree of protection from engineering controls and PPE. A review of the literature also revealed patterns of exposure and the effectiveness of protective measures among applicators have been examined (Arbuckle et al. 2002; Hoppin et al. 2002; Hines et al. 2011). More detailed research is required to test and compare exposure levels amongst harvest workers and applicators, considering the duration of exposure during pesticide application is considerably shorter than for re-entry activities and less frequent. Outsourcing hazardous activities has to be balanced against other considerations, and there are several explanations as to why pesticide spraying is not outsourced, most notably concern to limit residues that might affect the saleability of produce. Other explanations include the high cost of pesticides, the timing of pre-harvest applications which do not coincide with surges in labour demand, control-of-use regulation, the expense of training temporary workers and fear that failure to do this will be reported, and the perception amongst growers that pesticides are not hazardous. There were exceptions which suggest some employers violate regulations.

Placing the findings into a broader context, horticultural seasonal work is longstanding but historically local working class families provided the peak harvest labour and would have had knowledge about the work environment because of the recurrent seasonal pattern of the work, even though at that time hazardous substances were not recognised as a major issue. A more volatile and vulnerable group is now being used; unlike Schweder's (2008) study of the processing of primary agriculture products and Temple et al.'s (2011) study of employment-related mobility, there is no realistic expectation that the employment will be recurrent. Increasing reliance on foreign workers including foreign temporary workers is part of explicit work organisation and supply chains nowadays affecting a wide array of countries and

industries (Castles 2006; Ruhs & Martin 2008). The findings tend to suggest that it is not just the vulnerability of the foreign-worker, although the outsider status of foreign workers exacerbated the vulnerability already structured into the organisation of work i.e. the very temporary nature of the employment and the role played by subcontractors/agencies providing labour (including multi-tiered subcontracting). The precariousness arising from work organisation seemed to be the most fundamental problem, especially in such a highly competitive industry with many small operators (both growers and labour providers) and a few very large and influential buyers. Thus, while the use of foreign workers may be viewed as a layering of vulnerability (Sargeant & Tucker 2009), in another sense it is itself now an integral part of work organisation in horticulture and this seems to be a global phenomenon, not something just found in the EU, Australia, the US and Canada (see Amnesty International's 2014 report on exploitation and forced labour of temporary migrant agricultural workers in South Korea).

Irregular labour demand and casual labour supply have yielded work arrangements that violate workplace democracy in a context in which the labour contract is almost indispensable. Labour subcontractors appeared to play a pivotal role in meeting surges in labour demand and providing a buffer for growers caught in a double envelopment between rising quality standards and falling prices. Production pressures contributed to longer working hours, with potentially increased risk, and labour subcontractors reportedly supplied workers at costs so low that minimum wage laws were violated. Foreign-born workers were more amenable to these conditions. The critical role of multi-tiered subcontracting in cutting labour costs, evading labour standards and placing pressure on workers has been identified in other industries, especially highly competitive industries like construction and road transport (Quinlan et al. 2006; Kaine & Rawling 2010). In road transport (especially long haul trucking) foreign-born workers have not been a critical feature of the workforce in some countries including Australia (where workers are typically drawn from rural areas where alternative employment is scarce) although this may change.

The subcontracting process is not just that operating immediately at the work level; it is being driven by the major purchasers (i.e. supermarkets) who are pushing for cheaper and more intensive production systems. Although labour subcontracting appeared to be a contributory factor to increased hazardous exposures, contractual aspects of subcontracting, particularly the power imbalance along the food supply chain, present opportunities for improvements in OHS practices in business. Food safety standards are vigorously enforced relative to OHS through a proactive program of inspection, but the former appeared to detract attention and

awareness away from OHS. Supermarkets' influence on food safety highlights how retailers can control supply chains when they choose to, which suggests they could play a more positive role in OHS rather than simply pushing down prices, which has the opposite effect. However, as this study found at present quality and food safety concerns are not having a positive effect on OHS practices, indeed in some cases the opposite. The logical point to ensure compliance is to begin dealing with the parties that have the resources to make improvements such as the major purchasers of horticultural produce who are driving the process.

In addition to the impact of work practices it is also important to recognise the overall effect of power imbalances in the supply chain on work contracts and who is hired. The findings of this thesis support the conclusion that supermarkets have created a situation in which the existence of direct-hire workers in industry is uneconomic, as noted in previous research (Wright & Lund 2003; Brass 2004). The nature of short-term contracts, increased competition and a seemingly extensive labour surplus appeared to drive subcontractors to cut back on workers' pay and standards of work, and workers' precariousness made them fearful of reporting mistreatment in a climate of limited union influence. The erosion of labour standards, including evasion of legal requirements regarding wages and hours, identified in the thesis has implications for OHS (Quinlan & Johnstone 2009).

9.4 *Effectiveness of Regulation*

The apparently widespread problems of unsafe practices and non-compliance with regulatory requirements just identified are more readily understood in a context where there are significant shortcomings in the enforcement of OHS standards. A common sentiment was that the inspectorate is under-resourced and inspections are rare so that the probability of regulatory breaches being detected, let alone prosecuted, is very low. The evidence suggested a presumption against proactive inspection, which was viewed as a resource intensive and relatively inefficient form of regulatory intervention for the geographically dispersed horticultural industry in both contexts. Consequently, pesticide usage and health consequences are out-of-sight, out-of-mind, especially consequences for itinerant and temporary workers. Reactive inspection removes pesticide exposures from regulatory scrutiny, complicating the tasks of identifying, monitoring and addressing the insidious health risks associated with exposure, and the frequent migration of labour and exposures to complex mixtures of chemicals does not invite epidemiological surveillance. Regulatory coverage in agriculture has always been limited and under-resourced. This study highlighted the role of geography in regulatory failure regarding minimum labour standards' enforcement. Although

regulatory scrutiny in UK horticulture seemed inadequate, SAWS Operators fulfilled a quasi-regulatory role and were instrumental to this endeavour. The findings suggested higher regulatory compliance may coincide with greater inspection and enforcement of regulations. Arrangements under the SAWS ceased at the end of 2013. The impact on health, safety and welfare of the closure of the SAWS should be an area of future research.

The literature describes the role of regulatory failure in shaping the OHS experiences of the precariously employed, and OHS regulators have long been concerned with expanded contractual chains (Haines & Gurney 2003). Although OHS regulators and union officials verbalised an apprehension of the way businesses may attempt to absolve themselves of their regulatory responsibilities, evasive attitudes were perceptible but not pervasive. However, workers' accounts suggested obfuscation of responsibility and individualisation of workplace safety. Complication and obfuscation of rights and responsibilities is typical of subcontracting arrangements (Gryst 2000; Quinlan 2003), but evidence of individual responsibility amongst workers is contrary to findings on the diminution of notions of personal responsibility in an increasingly litigious and blame-focussed society (Almond 2009). Temporary workers appeared to have limited knowledge of grievance procedures and entitlements to workers' compensation. Subcontracting and temporary work arrangements seemed to contribute to considerable ignorance and confusion in this regard. Knowledge of the regulatory system and the regulatory profile for OHS and labour relations in countries of origin also appeared to impede workers' ability to understand and exercise their rights at work. This finding is consistent with McKay et al. (2006).

Of course regulatory coverage in horticulture/agriculture has always been limited and under-resourced but with the growth of agribusiness in particular and the more intensive production regimes that have been brought in, and with the view now that OHS in agriculture is important, there is more need for closer regulatory scrutiny. It was clear from this study that the regulatory resources do not enable this in practice. A key challenge for regulators is how to expand their regulatory reach when working with constrained budgets. Only the EU regulations had supply chain provisions for hazardous chemicals, but as far as could be determined they were not being very effectively enforced. There is a broader issue here in terms of evaluating the impact of the EU chemical regulation REACH which probably varies significantly across industries. This needs further research.

9.5 *Limitations of the Study*

As a pilot study based on qualitative methods the findings must remain tentative and further

research is required, hopefully using an array of different research methods. Every attempt was made to preserve the intellectual rigor of the study but there were a number of limitations that were difficult to overcome due to the nature of this particular field of research, and which present areas for expansion and refinement in future research. One of the greatest limitations was participant recruitment. There was potential for bias amongst employers as those who expressed interest in the study may have been more highly motivated to seek industry-wide OHS improvements. On the other hand, participants represented a wide variety of sources, including temporary workers (from a variety of cultures) and government and union officials. These factors would be likely to counterbalance each other to some extent. Although the limited involvement of low profile providers of peripheral labour was another limitation of recruitment, participating workers represented a range of backgrounds and employment situations thereby providing insight into such working conditions. Efforts were taken to ensure the cross-section of participants reflected the wider population but the research is not statistically representative and any generalisations drawn largely reflect the participants' experiences. Nevertheless, interesting issues and commonalities emerged from the data, and these may be applicable to a larger section of the horticultural worker population as well. The fact that all the participants were drawn from eastern Australia and England was another potential limitation. One balancing factor was that regulator, union and advocacy activities, and some labour providers and work experience covered the expanse of the UK. Although Australian harvest trails often cross state borders, and it is common for workers to travel substantial distances, participating workers displayed a strong east coastal orientation. Targeting different localities would have increased the breadth, richness and transferability of the findings. The researcher also only spoke English. Ability to communicate in participants' first language may have generated richer material. These may be areas for future research development.

A multidisciplinary approach applying a range of research methodologies, including directly measuring and comparing pesticide exposures, would have further contributed to developments in the OHS field. However, locating a control from within an industry dominated by temporary types of work, the potential for simultaneous multiple job holding and the itinerant nature of horticultural work created methodological issues. A longitudinal cohort study would have allowed analysis of causal pathways for illness, but workers in short-term employment, in combination with geographical mobility, are not viable candidates and prospective monitoring is complicated when workers are resident in communities for short periods of time. In the case of Australian horticulture, temporary workers are mainly in the

industry for 2 years at most (many for only 88 days). Participants worked on several crops with concomitant exposure to different types of pesticides, and the findings indicated different practices on different farms in the same jurisdiction. It is quite possible that the exposures could have been worse in some places although responses indicated that these variations should not be exaggerated. The survey questionnaire was another well-established tool undermined by the mobile, short-term and increasingly undocumented horticultural population, together with the absence of centralised databases of temporary workers that might be used to locate participants. The difficulties just described are not only true of horticultural work; they are due to an increasingly volatile workforce which is now characteristic of many industries.

9.6 *Implications of This Research*

This thesis has an applied dimension. Chapter One suggested a foreseeable outcome may be identification of successful strategies for other regulatory agencies to learn from. This section asks: what recommendations would facilitate more sustainable OHS improvements?

First, introducing practices to reduce the number of work-related injuries and illnesses is a continual challenge. Australian OHS regulatory agencies have responded to the additional pressures of the construction industry by mandating safety awareness training and competency assessment for all workers before they begin work on a construction site, issuing a general construction induction card.⁶⁶ Chapter Six noted in 2001 several Australian State agencies initiated a multi-agency national project called 'Fruitlink', which aimed to develop OHS training for itinerant workers along the harvest trail using mobile facilities. Efforts to secure Federal Government funding were not forthcoming, and Fruitlink appears to be an isolated effort (Quinlan 2004b; Guthrie & Quinlan 2005). Centrally funded mandatory face-to-face learning and certification prior to commencement of agricultural work would be a useful approach to addressing some of the OHS concerns of seasonal workers. Of course, general induction programs can provide an illusion of complete compliance, and a challenge for employers and workers intent on subverting the system and achieving certification without learning. Robinson et al.'s (2013) review of Registered Training Organisations may prove useful in this regard. Workers need to be able to refuse work when site- and task-specific induction and training are not provided, but this requires employment security. Without regulation it is

⁶⁶ Most UK employers have followed the lead of the UK Contractors Group in demanding Construction Skills Certification Scheme certification of operatives but as a non-legally enforceable scheme there are legitimacy concerns (see Balch & Scott 2011).

difficult to see how training schemes can be extended to a meaningful level of coverage.

Second, the requirement under Australia's Working Holiday visa program to perform specific work in an eligible regional area for a minimum of 88 days to acquire eligibility to apply for a second such visa, all the while providing no monitoring or regulation of working conditions or payment, leaves participants particularly vulnerable (Canada's Live-in Caregiver Program has been similarly criticised, see Granda & Kerr 1998; Fudge 2011). Interviews indicated these workers were underpaid and faced a substantial imbalance of power that left them at the mercy of their employers for risk of not completing the program requirements. Beyond the economic benefits of backpacker tourists to host nations (Hampton 1998; Cooper et al. 2004a), researchers have only recently critically examined the diverse social and cultural implications of an established backpacker market on the destinations they inhabit (Peel & Steen 2007; Wilson & Richards 2008; Jarvis & Peel 2013). The second Working Holiday visa needs to be critically evaluated in terms of consequences, whether these are intended or not.⁶⁷

Third, regulatory scrutiny of UK horticulture seemed inadequate but SAWS Operators appeared to fulfil a quasi-regulatory role. The use of Operators to administer the scheme conferred credibility by ensuring appropriate accommodation, pay and working conditions were maintained, and offering a cost-effective means by which businesses could access labour from a legitimate source. With the removal of numerical limits, UK horticulture may experience a high influx of Bulgarians and Romanians. Any attempts to exploit desperation by increasing competition and potential race- or circumstance-based division thereby downgrading terms and conditions of employment and reinforcing the downgrading of particular jobs should be subject to careful monitoring.

Fourth, a risk-based regulatory approach shifts inspectorates away from random inspections and toward targeted intervention, focussing on industries creating the most OHS risks. This thesis highlighted incongruence between rationale and practice: agriculture is one of the most hazardous industries, yet proactive inspection is not considered an effective use of resources. Evidence of under-enforcement debunked the myth of over-burdensome OHS regulation. A key challenge for regulators is how to expand their regulatory reach when working with

⁶⁷ The Seasonal Worker Program is a substantial step towards a labour migration scheme based on workers' rights (Ball 2010; Brickenstein 2012). Unfortunately the web of regulatory control and government oversight to ensure minimum standards has made the employment of Pacific workers unattractive in an industry that has historically been subject to limited regulation, with reliance upon a highly casual and itinerant workforce (Hay & Howes 2012).

constrained budgets. Labour inspection services appeared crippled by lack of financial resources, limiting regulators' capabilities and effectiveness. Agriculture needs effective regulation, with properly resourced agencies with the technical expertise to better safeguard worker health and provide industry with an equitable base for healthy, safe and economically sustainable activity. This can be achieved by supporting the key principles of precaution linked to strategies such as toxics use reduction. Workers' rights to a safe working environment are best protected by elimination of the most potentially toxic pesticides where data indicates problems or where there are data gaps and their replacement with safer, less toxic pest management tools.

Finally, discussions on the UK fresh produce supply chain revealed wider concerns about the limited remit of the Gangmasters Licensing Authority (GLA). If the principle of licensing labour providers is justified then compulsory inspection of businesses upon application of a licence should apply to all applicants and across all employment sectors, but the GLA needs additional resources for the larger remit. The Memorandum of Understanding between the GLA and Health and Safety Executive (HSE) establishes the areas of agreement on information exchange and support for operational activity. A similarly consolidated means of regulating labour providers in Australia is a great notion but tasking and coordination for compliance and enforcement action would be complicated, perhaps untenably, by disparate Australian State- and Territory-based OHS inspectorates. Incidentally, worker mobility across jurisdictional boundaries may potentially affect pesticide exposures because of the different off-label use systems (which reflect different approaches to risk management) and training requirements (presented in Chapter Six).

9.7 Further Research Implications

Protecting workers who are both temporary and itinerant from hazardous chemical exposures can be especially difficult because of the multiplicity of issues and instances of poor practice that are likely to escape detection. Directions for future research building upon the themes already explored in this study include the following.

First, quantifying what true magnitude, mechanism, and pathways underlie the relation between worker health inequality and work arrangements, and how this varies according to the country's labour regulations. Community-based participatory research would bridge the gap between traditional epidemiology and practice through community engagement and social action to increase health equity. The Agricultural Health Study is one of the hallmark efforts currently underway in the US. Second, intervention effectiveness in preventing the take-home

pesticide exposure pathways should be a central outcome of future evaluations. Commuter vehicles are an important component. Further research on the concentration of pesticides to which workers are exposed in their homes (including commuter vehicles) and the potential health effects is needed. Third, the issue of regulatory failure is ongoing and additional inter-country comparative studies may offer insight into outcomes of different regulatory approaches for OHS, pesticide control-of-use and labour standards. Finally, increased pressure for short-term performance rather than long-term sustainability diminishes the attraction of investing in the on-going health or job satisfaction of workers, yet failing to pay attention to workers' wellbeing can negatively affect the sustainability of organisational performance (Hailey et al. 2005; Seifert & Messing 2006). Therefore addressing contradictions in management practice is a critical area of human resource management, OHS and industrial relations research.

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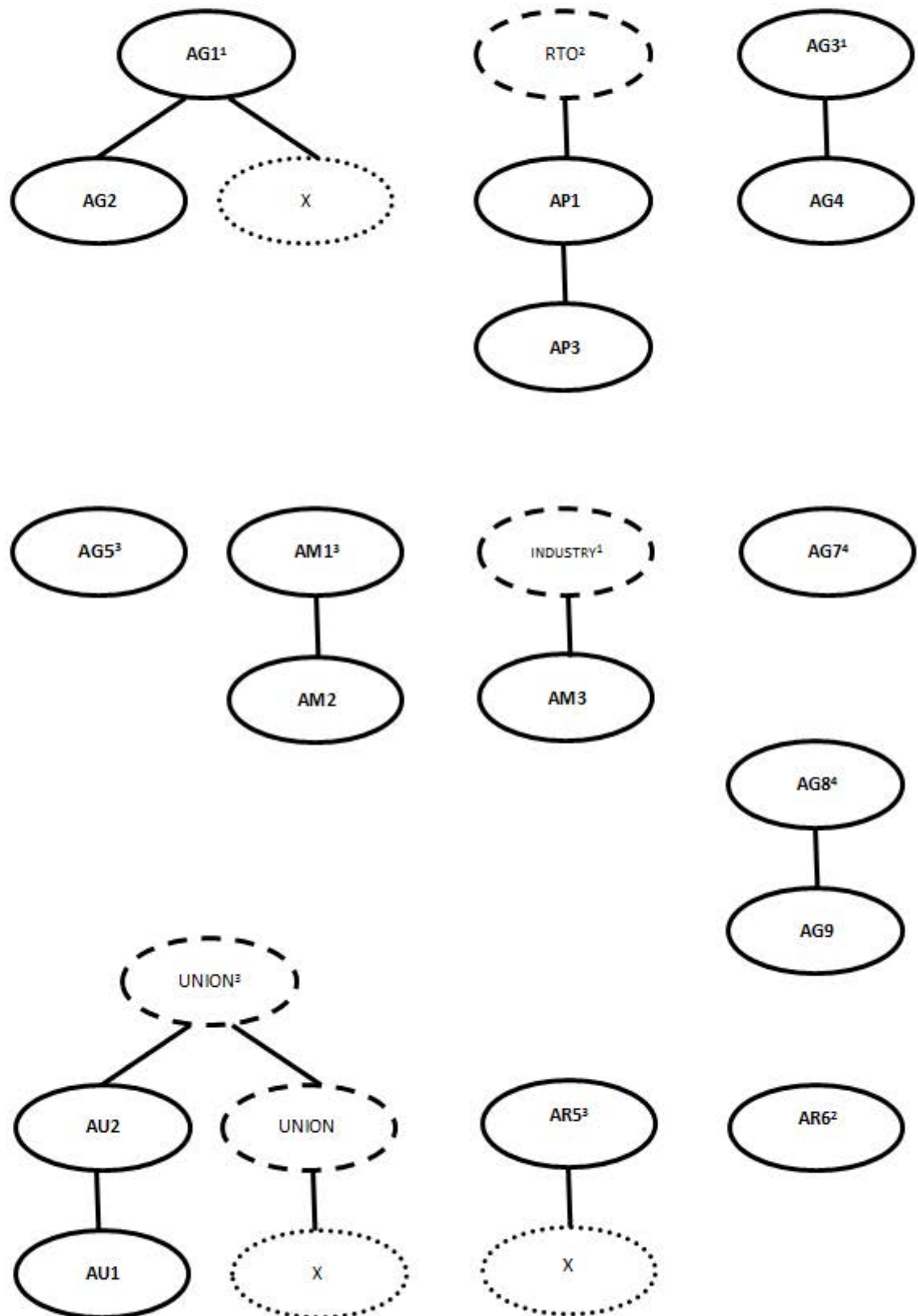
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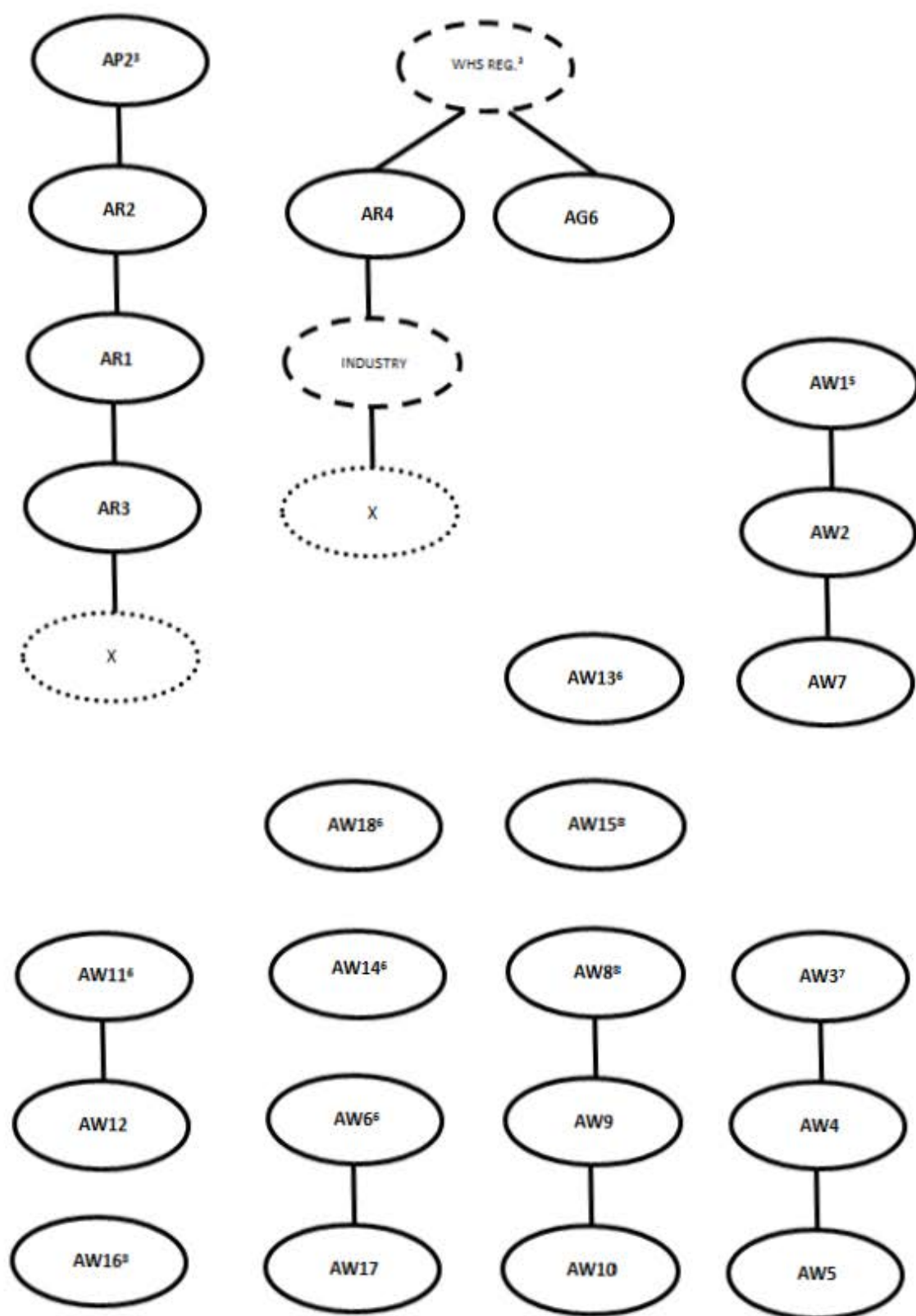
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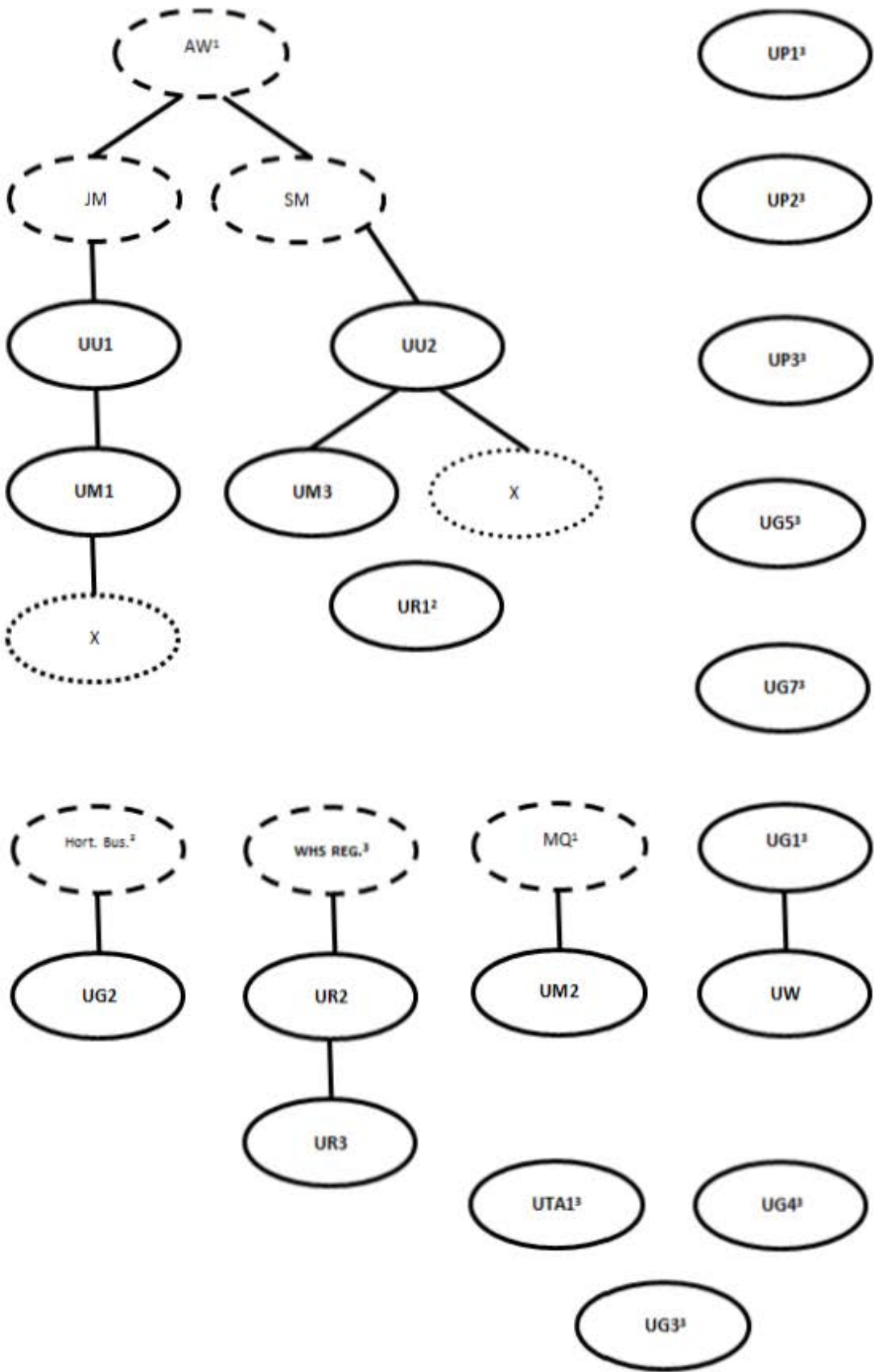
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APPENDICES

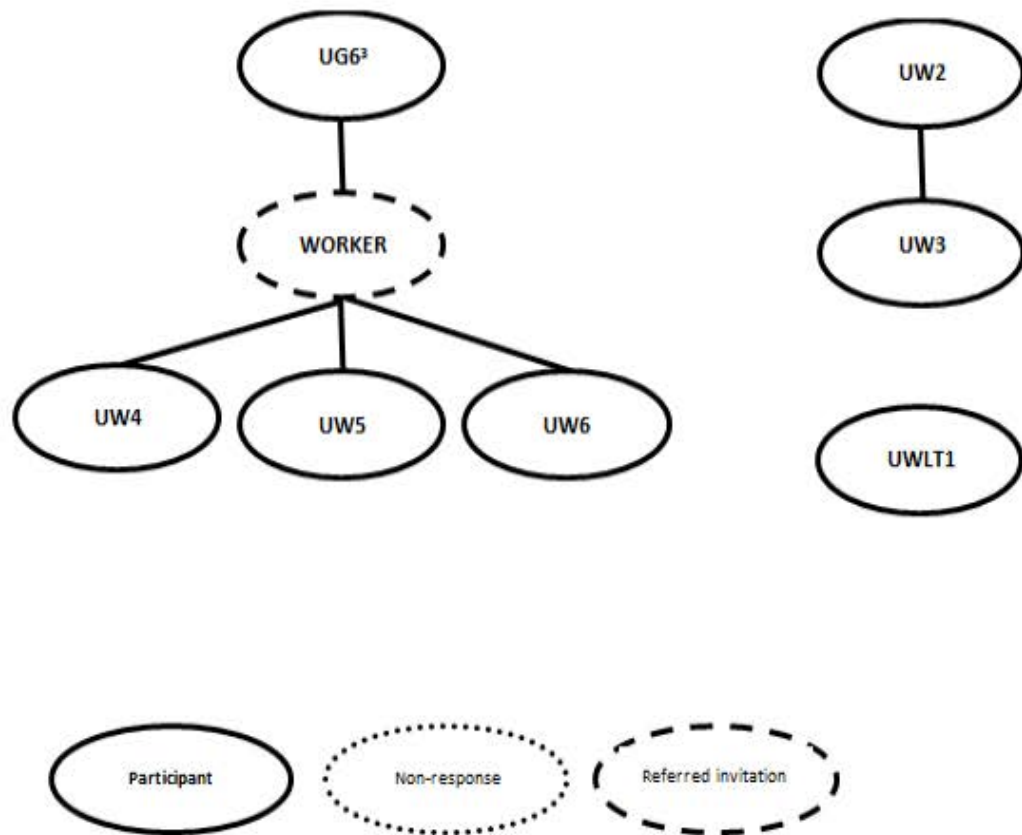
Appendix 1 Snowball Sampling Recruitment







APPENDIX



¹ Introduction by industry contact, ² Unscheduled office visit, ³ Cold email, ⁴ Approached at grower's market, ⁵ Work acquaintance, ⁶ Approached at camping ground, ⁷ Approached at hostel, ⁸ Approached at caravan park.

Appendix 2 Participant Information Statement and Consent Form

Approval Number: 126018

THE UNIVERSITY OF NEW SOUTH WALES

Work arrangements and OHS in Australian and UK horticulture**Participant selection and purpose of study**

You are invited to participate in this study examining work arrangements and their effects on health and safety in horticulture/agriculture. I hope to learn how health and safety is managed in the industry, especially as the structure of the workforce becomes more complex. You were selected as a possible participant in this study because of your involvement (or influence) in horticulture/agriculture. Please note that you must be at least 18 years of age to participate.

Description of study and risks

If you decide to participate, we will undertake the interview which will last approximately 45 minutes. With your permission, the interview will be audio recorded. If you do not wish to be audio recorded, please let me know and hand-written notes only will be taken. At any point throughout the interview you can request to discontinue the audio recording, including the request that I erase preceding recording.

It is not the intention of this research to discover illegal activity, and you will not be asked to respond to questions pertaining to your/your employees' conditions of entry into the host country, declaration of earnings, provision of fictitious identities, and so forth. However, please be advised that inadvertent discovery of illegal activity may have legal implications, including the possibility of legal orders that compel disclosure of information.

There are a number of foreseeable outcomes and benefits of this study to the wider community. Firstly, strategies that have achieved high levels of success in communicating and improving health and safety at work may be identified as examples for other work health and safety agencies to learn from. Secondly, improvements in protection for all workers so that they have more leverage to demand higher health and safety standards at work without fear of retribution. Finally, the potential for hazardous exposures to impact on the general quality of life must be more broadly communicated, and where this leads to a deterioration of wellbeing, this should be more widely perceived as unacceptable. These foreseeable outcomes notwithstanding, I cannot and do not guarantee or promise that you will receive any benefits from your participation in this study.

Confidentiality and disclosure of information

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, except as required by law. If you give me your permission by signing this document, I plan to publish the results in such a way that you cannot be identified, for example, in the form of de-identified statistical information in a hard cover thesis that I am undertaking to complete a doctorate degree through the University of New South Wales, Australia, or in any other publications.

Complaints

Complaints about my activities may be directed to:

Ethics Secretariat

Phone: +61 2 9385 4234

The University of New South Wales

Fax: +61 2 9385 6648

Sydney 2052 AUSTRALIA

Email: ethics.sec@unsw.edu.au

Complaints about my activities in the United Kingdom may be directed to Professor Andrew Watterson, University of Stirling, Scotland on: +44 (0) 1786 466283, or at: a.e.watterson@stir.ac.uk.

Any complaint you make will be investigated promptly and you will be informed of the outcome.

Feedback to participants

You will receive a copy of the interview transcript via an email attachment or the postal system (reply paid) before analysis is complete. Upon receipt, I would encourage you to verify the transcript's accuracy. A summary of the major research findings and recommendations will be made available to you via an email attachment or the postal system upon completion of my doctoral degree.

Your consent

Your decision whether or not to participate will not prejudice your future relations with the University of New South Wales. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice.

If you have any questions, please feel free to ask me. If you have any additional questions later, please feel free to contact me on: +61 4 2377 1664, or at: a.bamford@student.unsw.edu.au, I will be happy to answer them. You can also contact my supervisor, Professor Michael Quinlan, on: +61 2 9385 7149, or at: m.quinlan@unsw.edu.au

You will be given a copy of this form to keep.

Yours sincerely

ANNABELLE BAMFORD

THE UNIVERSITY OF NEW SOUTH WALES

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM (continued)**Work arrangements and OHS in Australian and UK horticulture**

You are making a decision whether or not to participate. Your signature indicates that, having read the information provided above, you have decided to participate.

I confirm that I am at least 18 years of age

Yes ☐

No ☐

I also give my consent to be audio recorded during the interview

Yes ☐

No ☐

.....
Signature of Research Participant

.....
Signature of Witness

.....
Please PRINT name

.....
Please PRINT name

.....
Date

.....
Nature of Witness

Researcher:

Annabelle Bamford

School of Management

Australian School of Business

The University of New South Wales

Sydney 2052 AUSTRALIA

Supervisor:

Professor Michael Quinlan

School of Management

Australian School of Business

The University of New South Wales

Sydney 2052 AUSTRALIA

THE UNIVERSITY OF NEW SOUTH WALES

REVOCATION OF CONSENT

Work arrangements and OHS in Australian and UK horticulture

I hereby wish to **WITHDRAW** my consent to participate in the research proposal described above and understand that such withdrawal **WILL NOT** jeopardise any treatment or my relationship with the University of New South Wales.

.....
Signature Date

.....
Please PRINT name

The section for Revocation of Consent should be forwarded to:

Annabelle Bamford

Phone: +61 4 2377 1664

School of Management

Email: a.bamford@student.unsw.edu.au

Australian School of Business

The University of New South Wales

Sydney 2052 AUSTRALIA

Appendix 3 Interview Guides

Interview Introduction

Thank you for participating in this research project. The interview will comprise a series of open-ended questions relating to health and safety issues in the horticulture/agriculture. I will also ask you to reflect on the ways in which different employment arrangements might affect workers' work health and safety experiences.

Before we begin, I would like to remind you that your participation in this study is voluntary, and that all information collected in this interview will be completely confidential. If there is any question you would rather not answer, we can skip over it and move to the next question.

Feel free to ask me any questions about the interview at any time. If you would like to take a break at any time, please tell me.

Do you have any questions before we begin?

Horticultural Businesses

1. Can you describe for me your involvement in horticulture/agriculture?

Probe 1: where or who do you supply your produce to?

2. What is the employment basis of your workforce?

Probe 1: from where do you source your temporary workforce?

Probe 2: is there a particular reason why you use foreign nationals?

3. Are there ever situations in which you are not the direct employer of workers onsite?

4. Prior to commencing work, what sort of instruction are workers given?

Probe 1: does everyone receive the same instruction?

Probe 2: can you outline some of the content?

Probe 3: how long does this process generally take?

5. In your experience, does language present any particular challenges to the dissemination of information?

6. Can you give me a rough breakdown of tasks?

Probe 1: what level of supervision is provided?

Probe 2: who provides this supervision?

Probe 3: do communication issues arise in the field and how are they resolved?

7. What facilities (hygiene and other) are provided for workers?

Probe 1: are workers able to stay onsite?

8. What do you consider to be the main health and safety issues affecting your workers?

Probe 1: are workers required to wear any specific clothing?

9. In your opinion, how well do you think pesticide use is managed across the industry?
Probe 1: who does the spraying on this farm?
Probe 2: can you tell me anything about bad practices in the industry?
10. Can you foresee any situations in which workers might be exposed to agricultural pesticides at work?
Probe 1: how do you manage this?
Probe 2: is there anyone that you inform of your pesticide application?
11. What effect might the presence of temporary workers onsite have on health and safety generally?
12. Briefly explain your understanding of your legal responsibilities to your workers.
13. Can you describe any situations in which the onus of ensuring workers' health and safety is placed on another party?
Probe 1: in such cases, how well are you positioned to ensure that they are meeting their obligations and not placing themselves or your workers at risk?
14. In your opinion, are the regulations for work health and safety effective?
Probe 1: are there any potential barriers to compliance?
Probe 2: are there any restrictions on who may handle and use agricultural pesticides?
15. Are there any other important issues that we have not spoken about?
16. Is there anyone else you think I should speak with?

Workers

1. How long have you been working in horticulture/agriculture?
Probe 1: did you have any previous experience in this, or related work?
Probe 2: how did you get this job?
2. Are you employed directly by a grower or indirectly by a contractor, agency, or some other party?
Probe 1: what was the arrangement in past employment?
Probe 2: in your experience, are there any differences between being employed directly and indirectly?
Probe 3: how long do you expect this job to last?
3. Can you describe your accommodation conditions?
4. Prior to beginning work did you receive an induction, so this might include the hazards and risks at work, safe work practices, the location of toilets and hand washing facilities, and so forth?
Probe 1: were you able to understand the information?
Probe 2: was this a formal or informal process?
5. Can you briefly describe the work you do?

6. Have you received any specific training?
Probe 1: can you outline the process and some of the content?
Probe 2: in your opinion, was the training appropriate and enough?
7. Are hand washing and toilet facilities available at work?
Probe 1: are you able to break during the day and where would you do so?
8. How long does a standard day last?
Probe 1: how much control do you have over hours worked? Who controls this?
Probe 2: how achievable are the productivity targets you're given to meet minimum wage?
9. How safe do you feel your workplace is? What risks are there?
Probe 1: can you describe the level of supervision at work? Who provides this?
Probe 2: are you, or have you ever been required to wear any specific clothing?
Probe 3: do you ever wear gloves when you are at work? Why/why not?
10. Do you, or have you ever been asked to use agricultural chemicals such as pesticides at work?
Probe 1a: can you describe that use (what and how; PPE; hours per day/ week; breaks)? OR
Probe 1b: who does the spraying?
Probe 2: other than applying chemicals directly, can you think of any examples of when you might be exposed to agricultural chemicals at work?
11. Has your employer or supervisor ever had a conversation with you about any chemical spraying that had been, or would be done?
Probe 1: are you ever told not to enter a field/orchard until after a particular date or time following chemical use?
12. What is your perception of employer safety attitudes and behaviours?
13. To the best of your knowledge, who is legally responsible for ensuring your health and safety at work?
14. To who would you, or have you gone to with a work health and safety concern?
Probe 1: how approachable are/were they?
15. What would you do if you were injured or became ill at work?
16. Can you think of any advantages or disadvantages of trade union involvement?
17. Are there any other important issues that we haven't spoken about?
18. Is there anyone else you think I should speak with?

Labour Providers

1. What is your involvement in horticulture/agriculture?
2. What sort of tasks are the workers you place engaged to undertake?

3. What is your recruitment process?
4. Are the workers you place considered your employees?
Probe 1: at what point does your involvement cease?
Probe 2: what level of supervision is provided and who provides this?
Probe 3: whose workers' compensation policy are they covered under?
5. Prior to commencing work, what sort of instruction are workers given?
Probe 1: who provides the instruction?
Probe 2: can you outline some of the content?
Probe 3: how long does this process generally take?
6. In your experience, does language present any particular challenges to the dissemination of information?
7. Are hand washing and toilet facilities available onsite to you and/or your team?
8. What do you consider to be the main health and safety issues?
Probe 1: how confident are you that workers understand the hazards and risks?
Probe 2: are you and/or your workers required to wear any specific clothing? Who provides this?
Probe 3: do communication issues arise in the field and how are they resolved?
17. Are there any special issues that arise in relation to chemical exposures?
Probe 1: are you, or anyone you employ ever required to use pesticides?
Probe 2a: can you describe that use (what and how; PPE; hours per day/ week; breaks)? OR
Probe 2b: who does the spraying?
9. Can you foresee any situations in which workers might be indirectly exposed to pesticides at work?
Probe 1: how well are workers likely to understand or be aware of pesticide residues on plants?
10. Has a labour user ever had a conversation with you about their pesticide spraying regime?
Probe 1: are you ever made aware of any past, present or future applications?
11. Briefly explain your understanding of your legal responsibilities to the workers you place.
Probe 1: are there any regulations or guidelines that address temporary workers?
12. How well are you positioned to ensure that labour users are meeting their legal obligations and not placing workers at risk?
13. Are there ever situations in which you have supplied labour to another labour provider?
14. Conversely, would you ever contact another labour provider or smaller subcontractor to supplement your pool of workers during periods of high demand?
15. In your opinion, would workers voice health and safety concerns at work? Why not?
Probe 1: are any groups more likely to accept inferior health and safety standards?

16. Can you think of any advantages or disadvantages for workers of trade union involvement?
17. Are there any other important issues that we have not spoken about?
18. Is there anyone else you think I should speak with?

Government OHS Inspectors

1. What is your involvement in horticulture/agriculture?
2. Regarding the industry's workforce, have there been any changes to the use of contracted labour and the use of migrant workers?

Probe 1: what have been some of the flow-on effects of changed work arrangements?
3. What do you consider to be the main health and safety issues in horticulture/agriculture?

Probe 1: are you ever contacted by workers concerned about health and safety issues?
4. How well do you think employers are meeting their obligations in terms of carrying out inductions and training?

Probe 1: can you suggest reasons why employers might be failing to meet these obligations?

Probe 2: does language present any particular challenges to the dissemination of information?
5. Can you foresee any situations in which workers might be exposed to agricultural pesticides at work?

Probe 1: how well are workers likely to understand or be aware of pesticide residues on plants?

Probe 2: generally, would toilet and hand washing facilities be available to workers? Who is responsible for provision?
6. Would there be a conversation between potentially affected parties about the pesticide spraying regime onsite? Are growers likely to advise contractors and workers?

Probe 1: in your opinion, would a contractor or indeed a worker ever ask about such matters?
7. What effect might the presence of temporary workers onsite have on health and safety generally?

Probe 1: can you foresee any problems that might arise through the division of tasks?
8. From a regulatory perspective, are there challenges to enforcement of good OHS practices in horticulture/agriculture?

Probe 1: are there any regulations, codes of practice or guidelines to assist employers in meeting their OHS obligations?
9. In terms of OHS legislative responsibilities, is the misconception that by engaging a contractor/subcontractor or some other labour provider one absolves their legal requirements still pervasive?
10. How well do workers understand their rights at work, especially migrant workers?
11. In your opinion, how well are the risks associated with using, handling and storing pesticides managed in the industry?

Probe 1: how would you rate compliance with PPE requirements?

Probe 2: how prevalent do you think the use of pesticides by non-accredited workers is?

12. There are permissible exposure limits for noise, are there comparable exposure limits for agricultural chemicals?
13. Can you think of any advantages or disadvantages for workers of trade union involvement?
14. Are there any other important issues that we have not spoken about?
15. Is there anyone else you think I should speak with?

GLA

1. How do you determine whether an inspection is required upon receipt of an application?
2. What does an inspection entail?
3. Looking at Licensing Standard 6 on health and safety, there are obligations on the labour provider to cooperate with the labour user on the assignment of responsibility, risk assessment, training, safe systems of work, and so forth. How do you assess this (or how would a labour provider demonstrate compliance)?
4. Not all the Licensing Standards will apply to all businesses. Are there situations (particularly in horticulture) in which Licensing Standard 6 does not apply?
5. What are the mechanisms leading to discovery of exploitative working conditions?
6. Generally, who is likely to report concerns about the welfare of workers or a labour provider operating without a license?
7. Are there particular barriers to workers voicing concern?
8. Use of gangmasters and exploitative working conditions are not only issues of concern for migrant workers. Have there been cases in which British workers were being exploited?
9. What factors make migrant workers more vulnerable to abuse of rights at work?
10. The maximum penalty for operating without a license is ten years in prison and a fine. To date, what have been the punishments?
11. In instances where a breach leads to the revocation of a license, are there further penalties?
12. In terms of engaging labour through a gangmaster, what are, or what should the responsibilities of labour users be?
13. From a regulatory perspective, what are the principal challenges to monitoring and enforcing compliance amongst gangmasters in horticulture?

Trade Unions

1. What is your involvement in horticulture/agriculture?

Probe 1: about what proportion of workers in the industry are unionised?

Probe 2: what effect do you think low union membership is having on health and safety?

2. Regarding the industry's workforce, have there been any changes to the use of contracted labour and the use of migrant workers?

Probe 1: what have been some of the flow-on effects of changed work arrangements?

3. What do you consider to be the main health and safety issues in horticulture/agriculture?

Probe 1: are you ever contacted by workers concerned about health and safety issues?

4. How well do you think employers are meeting their obligations in terms of carrying out inductions and training?

Probe 1: can you suggest reasons why employers might be failing to meet these obligations?

Probe 2: does language present any particular challenges to the dissemination of information?

5. Can you foresee any situations in which workers might be exposed to agricultural pesticides at work?

Probe 1: how well are workers likely to understand or be aware of pesticide residues on plants?

Probe 2: generally, would toilet and hand washing facilities be available to workers? Who is responsible for provision?

6. Would there be a conversation between potentially affected parties about the pesticide spraying regime onsite? Are growers likely to advise contractors and workers?

Probe 1: in your opinion, would a contractor or indeed a worker ever ask about such matters?

7. What effect might the presence of temporary workers onsite have on health and safety generally?

Probe 1: can you foresee any problems that might arise through the division of tasks?

8. In terms of OHS legislative responsibilities, is the misconception that by engaging a contractor/subcontractor or some other labour provider one absolves their legal requirements still pervasive?

9. How well do workers understand their rights at work, especially migrant workers?

10. In your opinion, how effective are current practices for the regulation of health and safety at work?

Probe 1: can you suggest ways in which OHS might be more effectively dealt with?

11. In your opinion, how well are the risks associated with using, handling and storing pesticides managed in the industry?

Probe 1: how would you rate compliance with PPE requirements?

Probe 2: how prevalent do you think the use of pesticides by non-accredited workers is?

12. Are there any other important issues that we have not spoken about?

13. Is there anyone else you think I should speak with?

Trade Association

1. Can you explain what you do and your involvement in horticulture/agriculture?

2. What was the impetus behind the establishment of this association?
3. Do you impose guidelines or outline expectations of your members?
4. Nowadays, how likely are growers to use a labour provider rather than directly hiring workers themselves?
5. How prevalent are rogue operators?
6. How effective has the introduction of gangmaster licensing been at stamping out illegal activity and regulating labour providers?
7. Are there any legal loopholes being exploited?
8. Are there any other important issues that we have not spoken about?
9. Is there anyone else you think I should speak with?

Miscellaneous – Government and Industry Representatives

1. What is your involvement in horticulture/agriculture?
2. What do you consider to be the main health and safety issues in the industry?
3. Are there any special issues that arise in relation to pesticide exposures?
 Probe 1: other than applying pesticides directly, can you foresee any situations in which workers might be exposed to pesticides at work?
 Probe 2: how well are workers likely to understand or be aware of chemical residues on plants?
 Probe 3: in your opinion, how well are potential hazardous exposures likely to be communicated to potentially affected parties?
4. What effect might the presence of temporary workers onsite have on health and safety generally?
 Probe 1: can you foresee any problems that might arise through the division of tasks?
5. Are there any regulations, codes of practice or guidelines in relation to agricultural pesticides?
6. In your opinion, how effective is regulation of use, handling and storage of agricultural pesticides?
 Probe 1: generally, do growers know what they are required to do or is there genuine confusion?
 Probe 2: how would you rate compliance with PPE requirements?
 Probe 3: how prevalent do you think the use of pesticides by non-accredited workers is?
 Probe 4: has REACH had any discernible effect on chemical use and health outcomes down the supply chain?
 Probe 5: can you suggest ways in which regulation might be improved?
7. What effect has food safety (quality assurance and so forth) had on the way chemicals are used?
8. Are there any other important issues that we have not spoken about?
9. Is there anyone else you think I should speak with?

Miscellaneous – Migrant Advocate

APPENDIX

1. Can you begin by describing the work you do?
2. Through what channels are migrant workers accessed?
3. In your opinion, how prevalent are abuses of migrants' rights?
Probe 1: how well are their working conditions regulated?
4. What factors make migrants more vulnerable to abuse of rights at work?
5. How well do migrants understand their rights at work?
6. Would workers ever raise concerns about their working and associated living conditions?
Probe 1: are there particular barriers to voicing concern?
7. How successful is the SAWS in terms of meeting minimum working and living conditions?
8. What effect might the presence of temporary workers onsite have on health and safety generally?
Probe 1: can you foresee any problems that might arise through the division of tasks?
9. Are there any other important issues that we have not spoken about?
10. Is there anyone else you think I should speak with?

Appendix 4 Data Analysis Codes