



BUILDING SYSTEMS CAPABILITY TO REDUCE HARM IN THE HORTICULTURE SECTOR

Stage 1: Understand

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FOREWORD

The horticulture sector is diverse and complex – spanning large corporates to small family operations. We know growers face many challenges, and this has been especially evident over the past few years with COVID-19.

The horticulture sector spans more than 20 sector groups, all acting on behalf of their stakeholder growers. Horticulture New Zealand is at the core of the sector, with numerous connections, relationships, and an established position of trust. The sector recognises that harm is increasing, and that new, evidence-based system wide approaches are required to decrease harm.

To ensure the safety of our sector's workers, our project is built around four key objectives – **Understand > Intervene > Support > Lead**. Each objective addresses a specific problem and establishes new approaches to reduce harm.

Publicly accessible accident and injury data is only made available under agriculture, making it hard to understand horticulture-specific harm rates. Our sector currently makes assumptions when it comes to horticulture statistics. As a result, a vital aspect of this project has been to develop a more accurate understanding of horticulture specific data. This report is the first step to developing this better understanding.

There are multiple variables present in near misses, incidents and accidents. At present, little is known about how the different variables combine to increase or decrease the risk of harm. By developing this understanding, interventions can be much more targeted to have the highest impact.

The project emphasises socialisation and sharing of knowledge and resources. By developing a cross-sector community of practice around health and safety, the project will enhance workplace health and safety nationally.



Kate Truffitt
Director – Horticulture New Zealand

ACKNOWLEDGEMENTS

Thank you to all those who took time out of their busy schedules to show us their work. For many, this involved face-to-face meetings during a time when COVID-19 was a significant risk. We are grateful for your time, and your trust in us to share the work you do.

There were challenges during this project phase because of COVID-19 in the community in New Zealand. As such, the site visits were delayed until after the first COVID-19 wave in early 2022. They would not have been possible if not for the tireless work of Emily Lake, who was able to pull together a schedule that covered New Zealand and many crop types at short notice.

Through this work, it has been clear that many in the sector face substantial workloads and have had a tough couple of years. Those we engaged with (via workshops, interviews, site visits and a survey) were open and forthcoming about the challenges they faced.

Finally, we want to acknowledge and thank Horticulture New Zealand, their governance group and all those that provided insight and feedback along the way. We want to especially thank Kate Trufitt for her in-depth and well-thought-out feedback, guidance, and intelligent questions.

SUMMARY

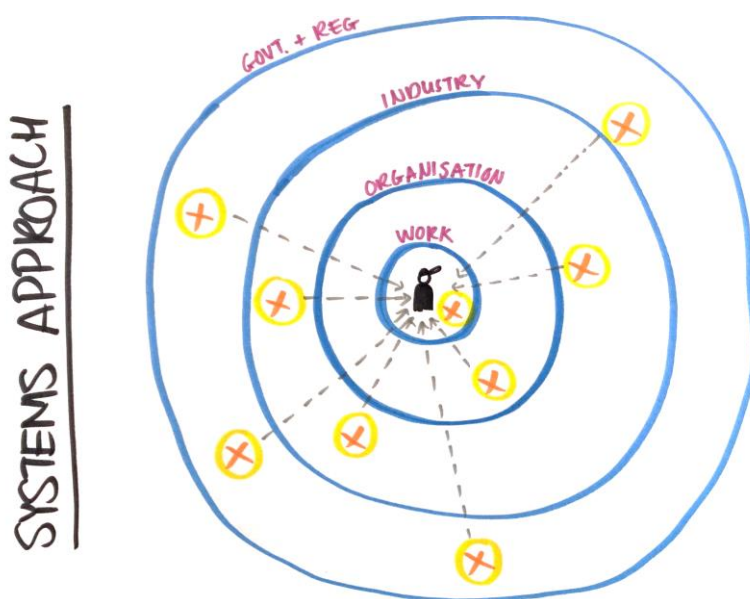
Horticulture feeds our country and is a vital part of the New Zealand economy. Those in the sector have a reputation for taking on hard work and getting it done, often in challenging conditions. Between 2016 and 2020, the number of ACC claims in horticulture remained relatively steady, however, there's was a spike in 2021. This project looks at how work is done in horticulture, the patterns of harm that are emerging, what is already in place to manage harm and support wellbeing, and what further system capabilities could be built within the sector.

The three-year project is led by Horticulture New Zealand and funded by ACC through a Workplace Injury Prevention Grant and Horticulture New Zealand. There are four stages to the project: Understand > Intervene > Support > Lead, and this report outlines Stage one (Understand), led by Mackie Research working closely with Horticulture New Zealand.

Harm from vineyards and grape growing is included in this project. Grape growing and harvest involves many similar tasks to horticulture, and it was considered appropriate to consider these parts of viticulture as well. The manufacture of wine is not included in this project.

Systems approach

This project is guided by a systems approach that acknowledges that harm (or wellbeing) does not occur in isolation, but rather results from a combination of many factors throughout the system. The goal is, therefore, to understand how work is done in horticulture and how system factors contribute to harm, or alternatively are preventing harm from happening. Shared responsibility is a key principle – everyone in the system has a role in keeping workers safe and well. With this knowledge of the horticulture work system performance, capabilities can be developed to maintain safety and wellbeing.



What we did

Stage one of the project (Understand) examined summarised data supplied by ACC and a sample of WorkSafe System for Work-related Injury Forecasting and Targeting (SWIFT), investigation summaries, notifications, and assessment data to identify claim patterns and the nature of harm events.

We then engaged with the sector via a range of online and in-person activities to better understand the sector and understand trends:



13 participants across two key informant online workshops to begin engagement and scope key areas of focus



228 respondents to a survey on the health and wellbeing of those in horticulture and viticulture



17 site visits to gather workers' perspectives and add context to previous data.

All the data was synthesised, analysed and mapped to understand typical causal pathways leading to harm events, particularly focussing on 'upstream' or system influences. System wide harm hotspots were then identified along with suggested areas of focus for next steps. This provided a platform for system capability initiatives in later stages of the project.

What we learned

The horticulture sector in New Zealand is growing. Data from Horticulture New Zealand suggests the sector has grown by 25-29% between 2017 and 2022, and by 5-11% in 2021 alone. While ACC claims data does show a spike in 2021 that was larger than other related industries, there are additional contextual reasons as to why that might be. These included that the sector has been under substantial pressure with the restrictions of the COVID-19 pandemic, including the closed border, significantly reducing available labour, supply chain issues and regulations changing the way work could be done. There have also been several extreme weather events putting pressure on horticulture, causing managers to focus on immediate issues rather than considering a wider range of concerns.

The ACC data showed that lumbar sprains, cuts to hands and fingers, other back or shoulder injuries, and eye injuries were the most common injuries in claims. A deeper inspection of the ACC data told us:

- The spike in claims in 2021 may be related to more minor claims
- While horticulture has a similar proportion of claims requiring time off work as construction and agriculture, staff in horticulture are generally requiring less days off
- While the number of claims in horticulture has spiked in 2021, the size of the sector has also increased, partially but likely not fully, explaining the spike

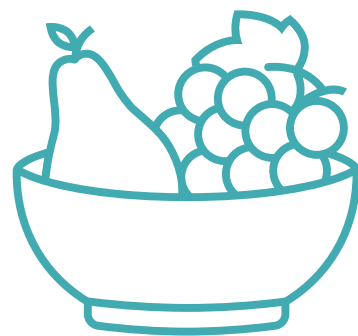
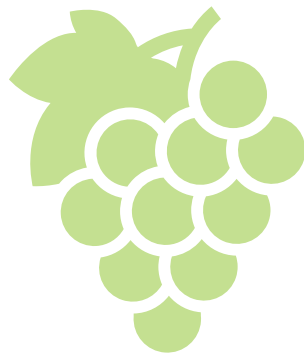
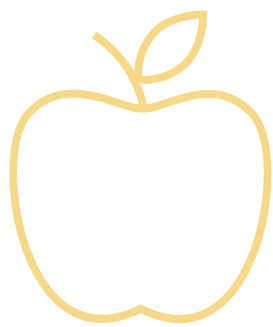
While the sector is diverse, many tasks are similar between different crops, and during the workshops and site visits, we asked how the common injuries happened. Across sites there were similar experiences of lumbar sprains, and other back and shoulder injuries; for example, lifting, carrying heavy crates, and moving ladders. Cuts and eye injuries were more dependent on the crop types. For example, eye injuries were more common in fruit tree pruning- and picking-related tasks.

Those who engaged with the project reported a wide range of influences impacting their work. Commonly reported was the COVID-19 pandemic causing pressure and stress within the sector.

A lack of workers led to staff shortages and increased pressure on existing staff, many staff who did fill the gaps were not well conditioned, and it was common for Recognised Seasonal Employer (RSE) scheme workers to stay on longer than anticipated in New Zealand. Coupled with new challenges such as new regulatory requirements, and restricted access to overseas markets, we learned how these pressures led to increased mental and physical strain and may explain the sharp increase in claims in 2021.

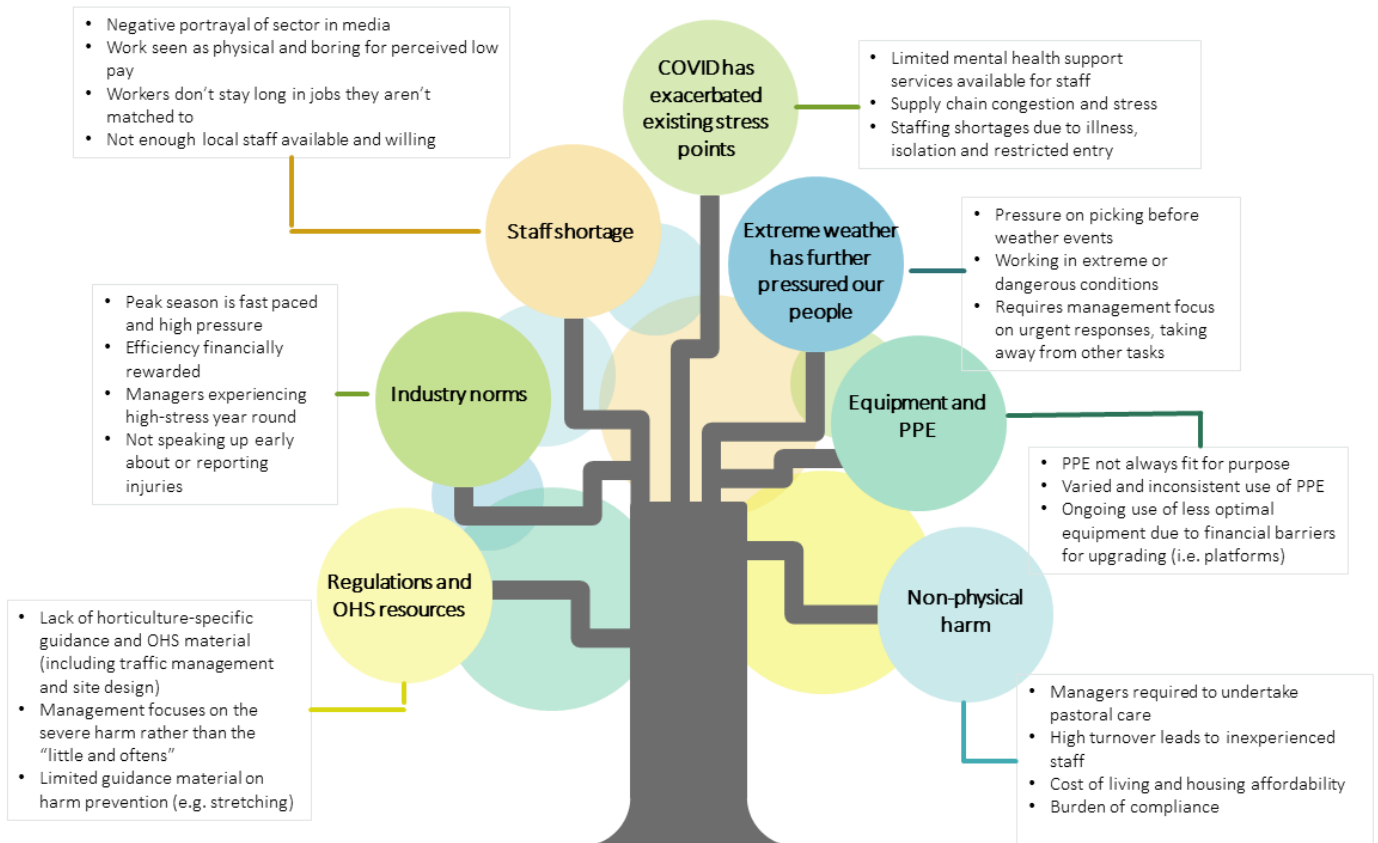
Despite these pressures and others, we found examples of innovative ways to manage harm, such as developing trees that are easier to work with, information packs about alternative duties for doctors when people were injured, technological solutions for strenuous tasks, and flexible work options.

Overall, the survey findings showed a positive attitude towards safety and a sense that generally organisations are engaged in keeping people safe. Many reported working for organisations where safety was a priority, safety procedures made sense, and they felt they could do their jobs safely. Further, when the survey participants were asked how often they had worked in a safe and healthy environment over the previous past 12 months, 92% provided a positive response. The survey also showed that two thirds of respondents reported feeling levels of stress that were uncomfortable for them, and one third responded that they have experienced incentives to work longer or quicker than is safe in the last 12 months.



What we did with the information

The data collected across all sources was used to identify system-focused causal pathways and harm hotspots occurring within horticulture. The tree shows a summary of the consistent harm hotspots identified across crop types and sites visited in this stage of the project.

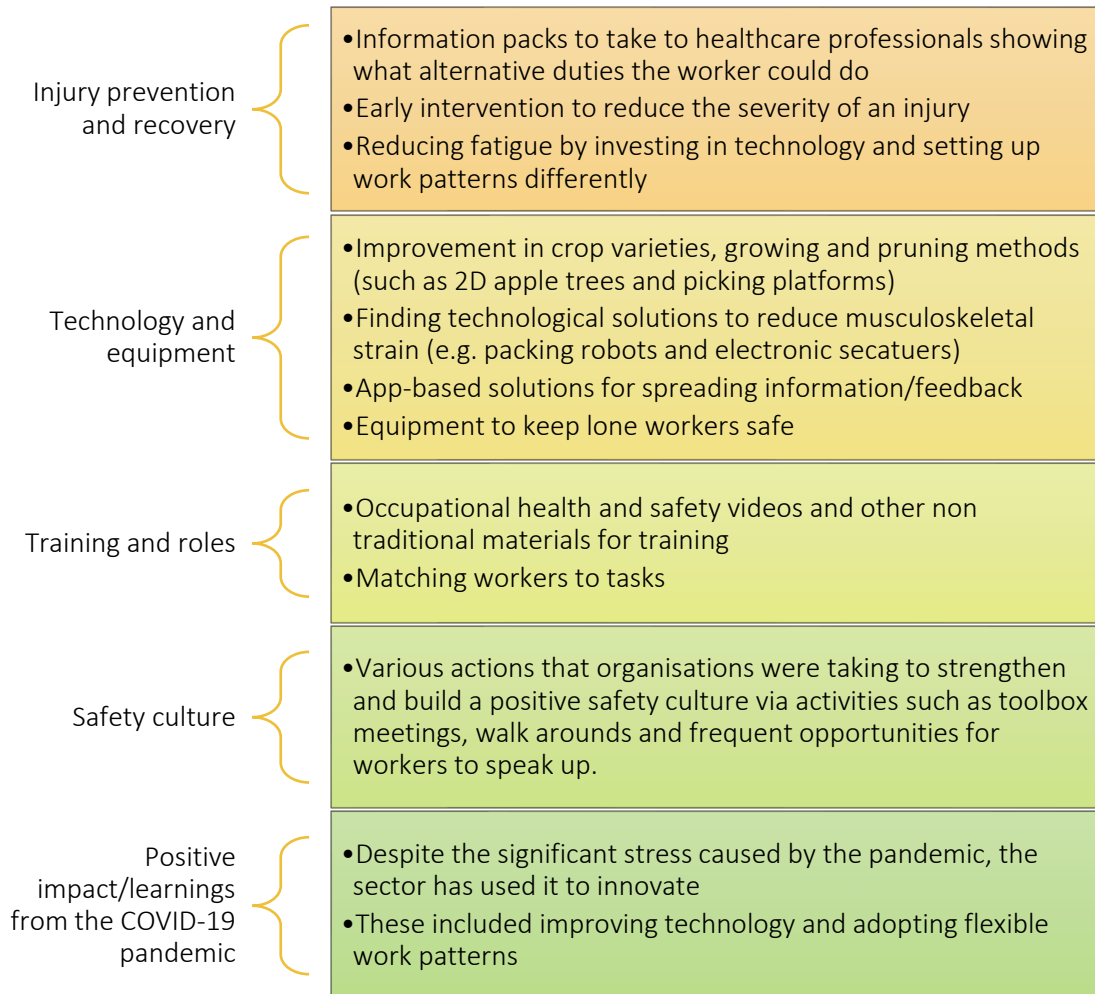


Harm hotspots identified from our system analysis

An overarching theme is that the COVID-19 pandemic, extreme weather and staff shortages have put pressure on the whole sector. There is also considerable variation in crops, approaches to tasks, use of equipment and Personal Protective Equipment (PPE), and approaches to health and safety. Mental harm emerged as a concern, many faced work in difficult conditions, external pressures, and increasing living costs.

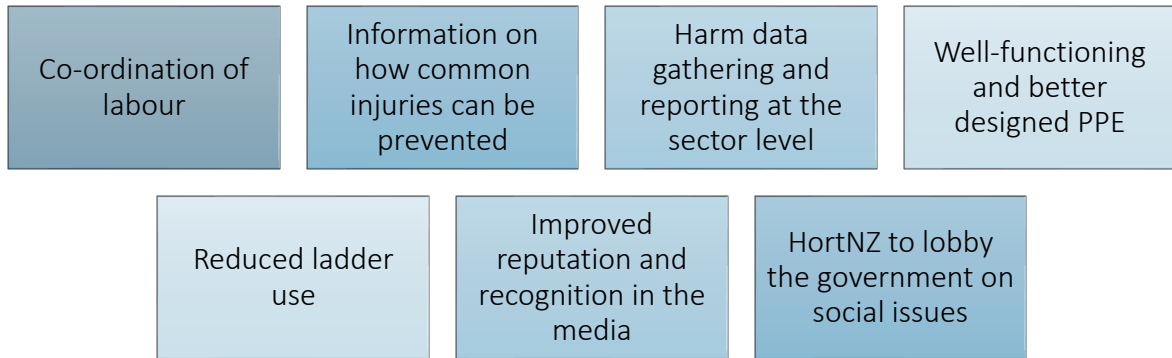
What the sector told us they were already doing to reduce harm

While talking with people in horticulture and viticulture and observing their work, we heard a great deal about effort already underway by businesses to reduce harm. We also saw first-hand many initiatives that are likely to make a tangible improvement to health and safety outcomes. Many of the activities listed below tend to be undertaken by the larger organisations that have available health and safety resources, and yet there is a hunger from smaller growers to understand how they too can be effective with their limited resources.



What the sector told us they want more of

During data collection, we heard suggestions from the sector about what they think still needs to be done. The issues shown below are wide-ranging, and while some of these are within the scope of the sector alone to progress, others will require coordination with government organisations and other agencies to achieve.



Next steps

Overall, we saw a sector that's working hard to maintain the wellbeing of workers and growers, particularly within the context of recent global challenges. But there is also inconsistency across the sector and a need to support smaller organisations. The focus of this HortNZ initiative is on building health, safety, and wellbeing systems capability. Hence, the suggested next steps focus on system-level initiatives that will allow the sector to grow and build on examples of good practice and share that knowledge, while also addressing gaps. Based on the findings of our study, there is an overall theme of a further need for collaboration and connection across the sector.



Suggested system-level next steps designed to reduce harm in horticulture

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1. INTRODUCTION

1.1. The project

This project was designed to build systems capability and establish health and safety leadership in the New Zealand horticulture sector with the aim of reducing harm. The project is led by Horticulture New Zealand (HortNZ) through an ACC Workplace Injury Prevention Grant, with HortNZ providing in-kind and financial support. HortNZ is funded by levies collected on produce, and they advocate for and represent the interests of New Zealand's commercial fruit and vegetable growers. The project includes viticulture where appropriate, as many of the tasks undertaken and injuries seen are similar to that of horticulture. Injuries from vineyards and growing are captured within the data, however those from wineries are not as they are under a different ACC injury code. New Zealand Winegrowers (NZW), the national organisation representing viticulture, has also provided assistance.

There are four stages to the project: Understand > Intervene > Support > Lead. Each stage is designed to inform the next; this report outlines Stage one (Understand).

Stage one seeks to understand how horticulture works, and the system surrounding physical and mental harm. This involved a review of existing data, engaging with the sector, mapping the emergence of harm, and identifying existing and potential system-wide initiatives. The outcome is a detailed understanding of harm across the horticulture sector from the sector, providing an evidence base for upcoming project stages. Figure 1.1 details the activities of Stage one.

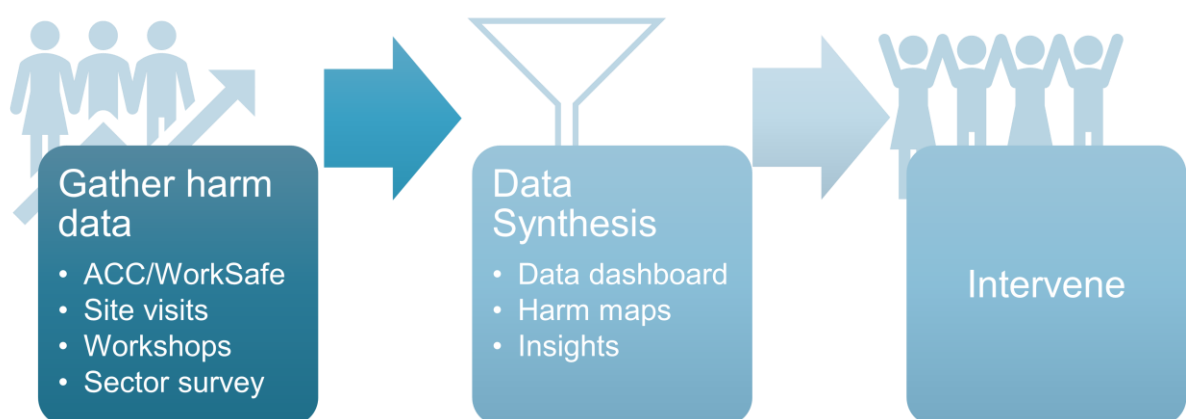


Figure 1.1: Activities of stage one leading into stage two which is called 'Intervene'

1.2. The COVID-19 effect

During data collection it was clear that COVID-19 was front and centre for almost everyone we spoke to. As such, the pandemic features strongly in the findings presented in this report. It caused a variety of pressures and stresses throughout the system.

COVID-19 caused a rapid and substantial shift in the way New Zealand operated. Horticulture, essential to keeping us all fed, continued to operate during restrictions while other sectors did not. Additionally, from March 2020 there has been a large shift in the way many people access medical services. General practitioners rapidly moved towards telemedicine, and often had long wait times for appointments. Other healthcare services were also virtual, such as specialist appointments and physiotherapy. Not enough time has passed to gauge how these changes have impacted harm levels, equity, and long-term health.

Businesses were required to respond quickly and remain agile as new information about the virus and its variants surfaced. The New Zealand Government closed the border as a public health measure, which required many in horticulture to consider alternative sources of labour. Traditionally the horticulture sector has relied on backpackers and RSE workers to fill a shortfall of local workers. Those Recognised Seasonal Employer (RSE) scheme workers already in the country stayed for much longer than expected (some more than two years).

While COVID-19 is predicted to eventually become endemic, global issues which impact horticulture will continue to occur. While reading the report, it is important to remember the circumstances under which this data was collected and particularly the severity of the COVID-19 pandemic at the time.

1.3. Systems approach

A Systems approach underpins the project in line with contemporary health and safety and human factors theory. There is never a single or root cause to harm, but rather harm results from the interaction between many factors throughout the horticulture system. These include wider influences occurring in what's happening in global markets, regulations, and common health and safety practices. With this method, focus is on the interaction between the factors - how one thing causes another. As a result, interventions cannot focus on individual behaviour change alone but instead should focus on optimising and building the capabilities in the system to reduce harm in a more sustainable way. Sharing responsibility for health and safety across the system is an important principle.

In this first project stage, we have used system mapping techniques, to show how all the different factors from throughout the system impact on a normal work situation. The goal of presenting information in this way is to capture the areas of the system that are underperforming and show how higher-level interventions will improve harm downstream.

A Systems approach also provides a road map for data collection. To build the system maps included in this report, data was collected from participants across the system, for example, regulators, growers, workers, marketers etc. Figure 1.2 is a diagram of the Risk Management Framework (Rasmussen 1997) we used, showing the different levels of a system and their

influence on the adjacent levels. This diagram helps to explain that when changes are made to one part of the system, they will inevitably impact other parts of the system. For example, strong and well channelled company health and safety culture will enable effective health and safety practices. Further, the success of any harm intervention will be impacted by the environment in which it sits. For example, if employee assistance programmes are put in place but the stressors in the environment continue, then the likelihood is that any stress-reduction may be short-lived.

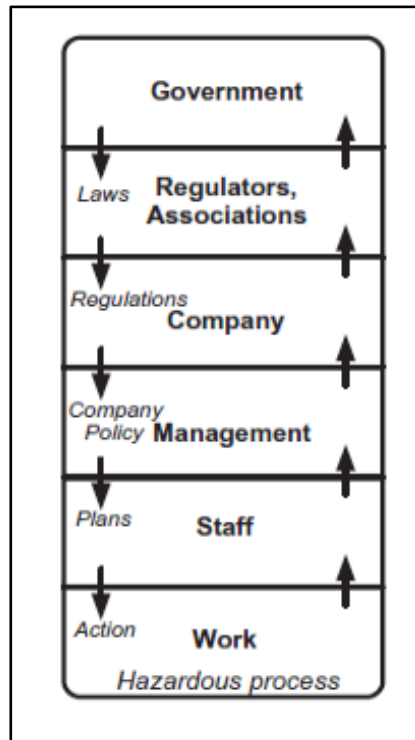


Figure 1.2 Rasmussen's Risk Management Framework showing system levels

2. BACKGROUND

2.1. Introduction

Previous research looking at risks to those working in horticulture has shown a variety of physical and mental harm outcomes. Many outcomes result from the nature of the work and the environment in which the work is carried out.

This section defines harm and then covers what is already known about harm in horticulture. The sources for this section are academic literature, and other secondary data sources, including previous research projects such as Farmstrong's (2021) report on mental health in Horticulture and Viticulture.

Other sources include work investigating how to keep Recognised Seasonal Employer (RSE) workers safe, focusing on pip fruit in the Hawke's Bay.

For this section, a brief literature review was conducted before data gathering from all relevant sources to scope out what is already known, inform questions asked in data collection, and begin identifying gaps. However, conducting a full literature review for this project was out of scope.

While undertaking this project phase, we heard of other parallel injury prevention projects. For example, one specifically looking at work-related sprains and strains in the Hawke's Bay and another looking at Māori Health and Safety. While not all horticulture-specific, these projects are likely to add to the knowledge of harm in New Zealand horticulture.



Figure 2.1: Cherry trees in central Otago

2.2. Defining harm

For the purposes of this project, we have defined harm as:

Any physical or mental injury, or compromise to physical and mental health.

This definition includes physical and mental harm, both of which are briefly defined below in the context of horticulture where possible.

2.3. What we know about harm in horticulture

Often the information on harm in horticulture is from data combined with agriculture. This makes it difficult to identify horticulture-specific injuries. Despite these data limitations, some research has illuminated common injuries in horticulture. Where relevant, research on agriculture has been included. Please note that a comprehensive review of literature was not within the scope of work, but rather consideration of some key documents that help frame our very specific assessment of health and safety in New Zealand horticulture.

2.3.1. Physical harm

Physical harm includes bodily injury, impairment, or disease that occurs when someone interacts with a hazard. The Occupational Health and Safety Administration in the US, (the US equivalent of WorkSafe in New Zealand), have considered the risks to horticultural workers directly. They list the physical risks as cuts, heat and cold stress, lifting and awkward posture, working around motor vehicles, noise, exposure to chemicals, and slips, trips and falls (OSHA 2022).

The academic literature mainly focuses on agriculture. However, many of the findings can be applied to horticulture because the tasks involved expose workers to similar risks. In both agriculture and horticulture, the work includes manual tasks such as lifting, stretching, climbing, as well as working in and around vehicles and farm equipment. Researchers have found that injuries can result from lifting heavy objects, moving and carrying equipment, and working at times in awkward postures (Mishra et al 2020). Others have found that the work can lead to harm from sun, excessive noise exposure, chemical exposure (i.e., dust or fertilisers) and ergonomic injuries (i.e., musculoskeletal disorders) (Kirkhorn, Earle-Richardson & Banks 2010). There is also a concern that exposure to pesticides and other chemicals is causing severe adverse health effects among farmers (Sturm 2022; Lundquist 2001; Tüchsen & Jensen, 2000).

Horticulture, much like agriculture, relies on some large machinery to complete tasks. The result is an increased risk exposure from working in and around machinery and vehicles. On average, six to seven farmers are killed every year in New Zealand when using farm tractors and many have been seriously injured. Risks to drivers include tractor stability, towing a trailer or other heavy implements, rollovers, front-end weight, working under or around tractors and the additional components, and working in and around hydraulics (WorkSafe New Zealand & Horticulture New Zealand 2017).

2.3.2. Mental harm

Mental harm broadly captures harm to an individual's mental health and wellbeing. Farmstrong (2021) recently conducted a survey of the horticultural sector to better understand wellbeing (see Figure 2.2) shows the top seven challenges impacting wellbeing.

Approximately one third of respondents agreed they had too many compliance requirements and their workload negatively impacted their wellbeing. These findings are supported by an earlier study by Ang, Lamm and Tipples (2008) who looked at the psychological wellbeing of New Zealand farmers. They found many of the factors in Figure 2.2, combined with others (including long hours, hazardous working conditions, weather, and access to labour) placed farmers under increasing pressure and stress. Other research has shown farmers are more likely to have work-related injury and illness during their peak seasons. Stress and fatigue were identified as contributors (Morgaine et al 2006).

Research has also shown that temporary and migrant workers experience exposure to stress and fatigue (Ang et al 2008). Research on migrant workers in other fields such as transport and construction have shown that the risk of harm often increases due to communication barriers, payment structures, training access, and other factors (Underhill & Rimmer 2015; Underhill & Quinlan 2011; Johnstone 2016).

It is noted that the RSE scheme in New Zealand was specifically designed to protect workers (discussed in Tipples & Whatman 2010). Previously WorkSafe have engaged with horticultural workers in the Hawke's Bay to better understand harm. Their report detailed common problems faced by RSE workers such feeling a need to work through illness and injury, a high number of musculoskeletal injuries, and mental health pressures from being away from home. Solutions proposed in the WorkSafe report include enabling RSE workers to speak up, improving contractual terms regarding pay, and building up connections with permanent workers. The report provided only outcomes, with no methodology, and thus should be considered a guide rather than evidence (WorkSafe New Zealand 2021).



Figure 2.2: Findings of the main wellbeing challenges from Farmstrong's 2021 survey of Horticulture

2.3.3. Harm in the New Zealand horticulture sector

A major driver for this project was the rise in work-related ACC claims for the horticulture sector. In Figure 2.3 the change in work-related claims for horticulture are shown from 2016 to 2021, alongside overall ACC claims and other similar industries. The data shows that while overall there was a 2% increase in work-related ACC claims, there was a 20% increase in horticulture work-related claims between 2020 and 2021. There was also a large dip in claims in all work-related ACC claims in 2020 compared with 2019, however this trend was not seen in horticulture work related ACC claims. Horticulture work continued though the COVID-19 lockdowns in 2020 and 2021 where many other businesses closed, which could account for some difference. However, this does not fully explain the huge jump seen in 2021. Agriculture faced a similar predicament and saw a 2% jump in claims. Investigating the source of this jump has been an aim for this work.

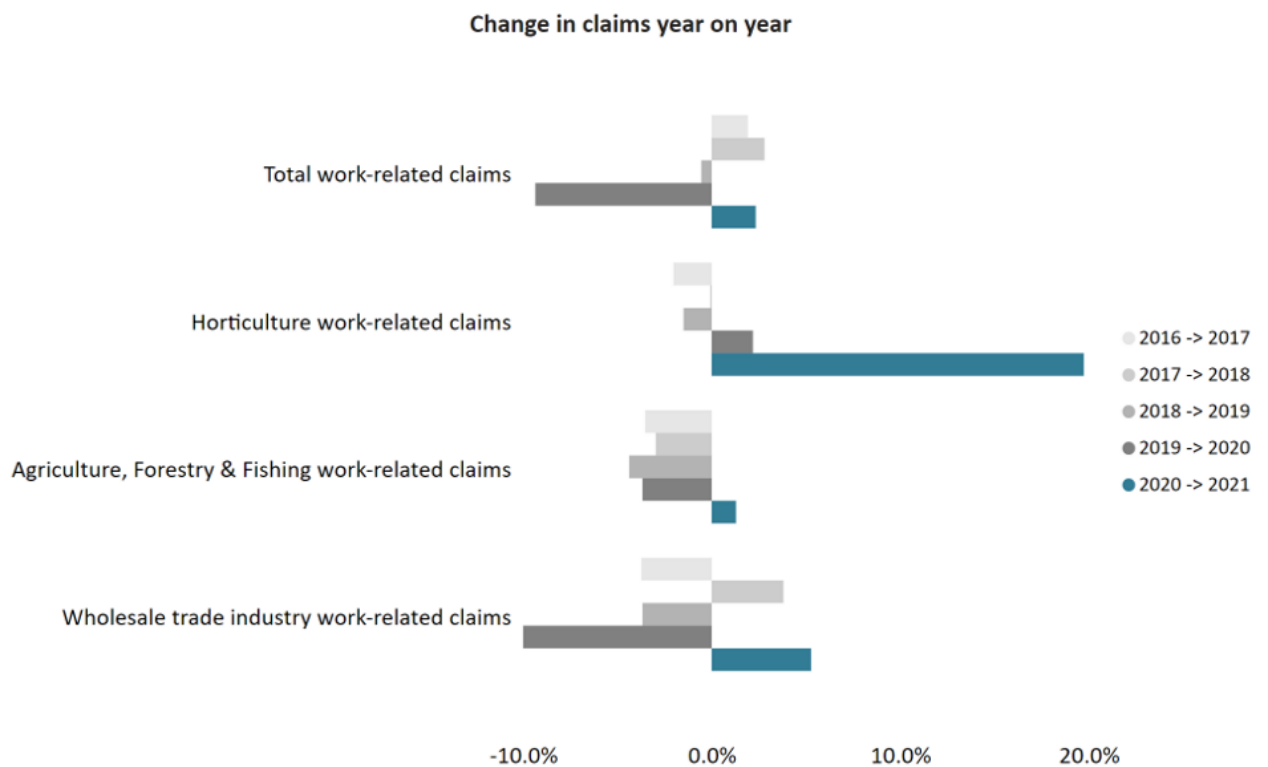


Figure 2.3: Change in ACC claims year on year

Data provided by HortNZ suggests that between 2020 and 2021 the sector grew by between 6% and 11%, and therefore the spike in ACC claims over this period may be partially, but not fully, explained by sector growth. Overall, between 2017 and 2022 data provided by HortNZ suggests the sector has expanded by 25% to 29%. This data is based on financial information about the sector. HortNZ estimate that there are 5500 growers and 40,000 horticultural workers in New Zealand (Horticulture New Zealand 2022). HortNZ is running a parallel project to better collect and track sector data in horticulture. In the future this will provide a more complete picture of the sector. NZ Winegrowers estimate there are 2100 vineyards in New Zealand with 1280 owners. Overall, the sector (across vineyards and wineries) employs approximately 7350

permanent employees (and additional seasonal employees) across New Zealand (NZ Winegrowers 2022, New Zealand Wine (n.d.)).

Figure 2.4 also shows a change in ACC claims, broken down by year and shows how work-related claims in horticulture have increased significantly. Since 2019, there has been an increase in ACC claims, with a steep rise in years 2020 to 2021.

When considering work-related ACC claims for horticulture it is possible to separate them into four industry codes – Growing, Fruit and vegetable wholesaling, Horticultural contracting and labour supply, and Nursery production. Growing includes wine grape growing, however manufacturing of wine is not included in this data. Figure 2.4 **Error! Reference source not found.** shows the changes in claims between 2016 and 2021 per industry code. The spike in claims in 2021 is particularly notable in growing, however there is an increase seen in all industry codes within horticulture in 2021. Note that this data is not adjusted for industry size.

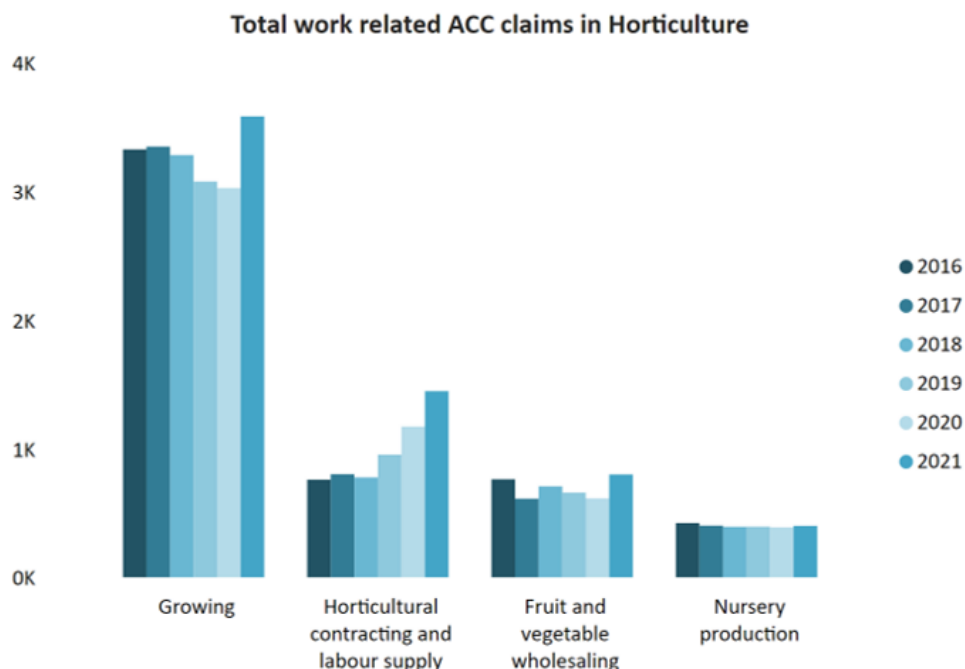


Figure 2.4: Number of work-related ACC claims in Horticulture 2016-2021, separated by industry code

At the start of this project, there was limited data available on the Full Time Equivalents (FTEs) within the sector or how that had changed over time, this was also a thread of investigation during our data gathering. While ACC works to provide the most accurate data possible, it becomes difficult in a situation where a business has multiple activities. Businesses generally have one ACC industry code based on their most common task. It is possible to apply for more than one code, however there are requirements around showing the tasks for each are carried out by different people. This could impact the magnitude of claims with a code; however, we have assumed the trends of which codes are used have stayed static over time.

3. DATA COLLECTION AND ANALYSIS

3.1. Introduction

This section briefly outlines the methods undertaken to meet the aim of Stage one. The following activities were carried out between March and August 2022.

1. Analysis of ACC data
2. Analysis of WorkSafe data
3. Two online Key Informant workshops
4. Survey
5. Site visits and interviews
6. Wider engagement activities

Each activity informed the following step. The ACC and WorkSafe data provided context to the scale of harm, i.e., how many people were being injured. However, it was limited in the contextual information it provided regarding injuries. As such, the survey and site visits allowed researchers to query common injuries with those in the sector and gather context from those on the ground.

3.2. ACC data

Under a research agreement with ACC, summarised claim data was provided for 2016 to 2021. The data provided us with claim patterns and a quantitative view on harm in horticulture however data at the individual claim level was not available. The focus was horticulture, including wine grape growing, work-related accidents, as well as some information to provide context around other similar industries. The researchers worked in an iterative process with a data analyst at ACC to identify and obtain appropriate information. Requested data included payment costs, injury types, injury location (geographic), demographic information, and injury severity. Manufacturing of wine is a separate code and was not included in the data provided.

ACC does not report values less than four claims in any one category, and as such for this analysis, values less than four were treated as zero. This is a privacy measure to reduce the risk of identification. Care was taken to consider the broadness of categories, keeping them large enough to stay above four claims.

Analysis was undertaken in Microsoft Power BI. The data was provided in a summarised form so our analyses were limited to descriptive presentation of the data. The visual interpretation of trends allowed a better understanding of where the 2021 spike in claims may have resulted from and the specific characteristics of these claims.

The data from ACC was also used as a basis for a harm dashboard to help industry track changing trends. The dashboard also contains data from other sources (such as WorkSafe and industry). The dashboard was built in Microsoft Power BI.

3.3. WorkSafe data

The WorkSafe data provided an understanding of the nature of harm events in horticulture in New Zealand. The data provided context to the ACC statistical data and guided upcoming data collection activities such as questions asked while on site visits.

3.3.1. Quantitative data

Quantitative analysis of the WorkSafe data was undertaken in Microsoft Power BI. The researchers categorised structured text variables across all the files provided by WorkSafe. These included geographical locations, level 2 and 4 industry codes and notifications by matter origin. The System for Work-related Injury Forecasting and Targeting (SWIFT) data contains the work-related ACC claims. It contained many of the same variables as provided by ACC, however it included client earner status, level 4 industry codes, and an incident type from automated text recognition of injury descriptions.

3.3.2. Qualitative data

Under a research agreement, WorkSafe provided 10 years of high-level data on work within horticulture. WorkSafe provided redacted investigation summaries, notification, assessment, and SWIFT data to help identify harm trends and insights into the contributing factors to injuries. Investigation summaries gave information about an incident under investigation and information deemed relevant by the investigator. Notifications provided information about serious harm or fatalities received by WorkSafe. WorkSafe assessments are the result of inspectors visiting workplaces around New Zealand and giving a notice of warning or agreement. SWIFT data is the work-related ACC claims data that WorkSafe has received from ACC.

Where there were open text boxes included in the data, a qualitative analysis was carried out. Resource limitations meant that the thousands of rows of data were not all analysed, rather a sample was selected. The data was presented in date order so a selection from across time was chosen to account for changes during the 10-year period. The first and last 120 rows, then another 100 rows from the middle were read and thematically coded. If a theme was mentioned repeatedly then it was included in the findings section.

The equipment, any contributing factors listed, people involved, and the harm outcome were considered for analysis. Where there was frequent mention of any of these, they were recorded as a reoccurring theme. Once no new themes were being added to the list the researcher concluded that the 320 reviewed summaries were adequate for analysis.

3.4. Key Informant workshops

The aim of these two online workshops was to scope out harm topics with those working in the New Zealand horticulture sector. Engaging with the sector from the outset revealed their

pressing issues and ideas, which informed and shaped upcoming activities such as the survey and site visits.

The 13 participants across the two workshops were predominantly in management, administrative, or health and safety roles and worked across growing, operations, packing, exporting and other areas. The participants were chosen to represent regions across the country, from Pukekohe to Otago, and were divided into one fruit and one vegetable group. Participants were recruited via HortNZ using existing communication channels. Attention was given to the variety of crops represented at the workshops. The workshops were carried out in March 2022.

Transcripts from the workshops and the corresponding online whiteboards were analysed by researchers to identify the types of tasks carried out, how the supply chain works, harm patterns, current initiatives, and system-level factors contributing to harm.

3.5. Survey

A survey was developed, together with the project governance group, to investigate health and wellbeing in the sector. The survey was informed by international examples (e.g., The Nordic Musculoskeletal Questionnaire in Kuorinka et al 1987), academic research (e.g., Bailey et al 2015), The Farmstrong survey (Farmstrong 2021) and information gathered during the Key Informant workshops. It was distributed through HortNZ channels and also during site visits using QR codes left at the site.

The purpose of the survey was to gather quantitative data on harm and harm prevention in the sector. The respondents were first asked about their role in horticulture and then screened into a manager/owner question stream or worker stream. Questions were then tailored to their roles and covered their previous 12 months. We were then interested in the types of roles and tasks participants carried out, their experience of physical harm and wellbeing, the wider influences contributing to the harm, and the harm prevention activities they engaged with. We also asked about their demographics to better understand who was answering the survey.

3.6. Site visits

The aim of these site visits was to observe how work is done, gather workers' perspectives and add context to the data already collected. A key human factors concept is to firstly understand the tasks, context, and pressures that workers operate within. Initially the plan was for the site visits to set the context for other activities, but COVID-19 restrictions meant that they needed to be carried out later in the sequence of data collection activities.

Site visit participants were recruited through HortNZ contacts and selected based on availability and ensuring a spread across regions, crops, and organisation size. Between June and August 2022, 17 site visits were carried out across New Zealand. Three visits were dedicated to RSE workers. Researchers were accompanied by a HortNZ representative to each site.

Data was collected in the form of task analysis, observation notes, photos and videos, and informal conversations with workers and management. Focus groups were held during most visits using a semi-structured interview guide with the agenda adjusted to the nature of the participating group. The data was analysed and coded thematically with the goal to uncover the context of harm, how work is carried out, and which incentives were already in place to manage harm.

During the site visits, efforts were made to gain Māori specific perspectives, including a visit with a Māori trust. There were also several other Māori engagement opportunities outside of the site visits. These activities were seen as informing how more substantial Māori engagement should occur later in the project and to draw some early themes, rather than representing an appropriate programme of Māori engagement.

3.7. Wider engagement

Various other activities have been carried out throughout this initial project stage. This has included a meeting with Farmstrong, CHASNZ (Construction Health and Safety NZ), and the group at Massey University running an ACC-funded project on muscular skeletal disorders (MSDs) in Hawke's Bay. Further discussions were held with key people at WorkSafe and ACC. The research team regularly met with and presented intermediate findings to the HortNZ governance group for discussion and feedback.

Pacific engagement specialists were consulted regularly throughout this first project stage and accompanied the researchers to site visits. Researchers also presented on the project at Haumarū Tāngata Symposium and have engaged in informal conversations and presentations with a Māori health and safety specialist. Efforts to date have been useful in informing an approach for Māori engagement, rather than completing an engagement process, and this should be continued. The Māori perspectives gained have been reflected in the research findings where appropriate.

3.8. How the data led to the outcomes

Analysis methods were chosen depending on the data type. Quantitative data (e.g., the numbers provide by ACC) were graphed and described. In quantitative data, care was taken to look for relationships and trends between factors. These were investigated and reported where relevant.

Analysis of the qualitative data (workshops, site visits, descriptions of events from WorkSafe) was undertaken to understand consistent themes. Researchers assigned descriptive codes to summarise sections of conversation or written descriptions. This allowed for the extraction of passages with similar code, and the composition of narratives. The researchers then returned to the quantitative data for supporting evidence.

The methods of data analysis for the qualitative sections, were carefully carried out to ensure the findings remained in the words of the participants and reflected the thoughts, views, and opinions of the those in the sector.

To create the harm maps included in this report (see section 5) we identified commonly mentioned harm outcomes such as overuse injury, back pain, and exhaustion. We then went back to the data to identify factors that were contributing to these harm outcomes. For a factor to be included in the map it needed to be mentioned repeatedly and found in two or more data sets. Initial drafts of the maps were then discussed and refined on multiple occasions with members of Hort NZ.

The data analysis and mapping process led to the harm hotspots found in section 6, the implication for building system capability in section 7, and the suggested next steps in section 8.



Figure 3.1: Worker demonstrating pruning with an electric chainsaw



Figure 3.1: 2-Dimensional apple trees grown on vines allow for easier access

4. RESULTS FROM KNOWLEDGE GATHERING

4.1. Introduction

Presented in this section are the results from all the data collection activities: ACC data analysis, WorkSafe data analysis, Key Informant workshops, survey findings, and site visit data. The site visit data includes two case studies to spotlight in more detail the contextual factors impacting specific parts of the horticulture system.

These findings provide the evidence base for the harm hotspots and harm maps that follow.

4.2. ACC data

The data provided by ACC covers the work-related claims in horticulture between 2016 and 2021. It provided a starting point for understanding who was being harmed, what harm they were experiencing and in which regions they are being harmed. The goal for this analysis was to begin to understand any consistent trends.

The first inspection of the ACC data showed a large spike in claims in 2021. This did not follow the trends of total work-related claims, or other industries which are considered similar (Figure 2.4). The analysis of the ACC data helped to focus the later information gathering phases, continuing to focus on better understanding the spike in claims in 2021.

Consideration has been given to how best to contextualise increasing claims and the relevance of change in size of the sector. In most data sources, horticulture and agriculture data are reported as one group making it difficult to get an accurate number. ACC were able to provide liable earnings information, these are the earnings which qualified to pay the ACC levy for horticulture.



Figure 4.1: 2D cherry trees

While liable earnings information is not a perfect measure of FTE's and sector size, it can be considered a reliable source of trends in incomes paid in the sector. This information showed a 30% increase between 2016 and 2020. During the same time period the overall ACC claim numbers for work related claims in horticulture was relatively steady. There was an increase in minimum wage by 23% (Employment New Zealand 2022) and median wages for New Zealand rose by 10% (Stats NZ 2022) over the same time period. Therefore, some of the increase in liable earnings may result from higher wages, and some is likely to be an increase in sector size, while maintaining approximately a similar number of harm incidents. HortNZ suggests the sector likely grew between 20% and 28% between 2017 and 2021. As such, the ACC data was used to identify changing trends and patterns of injuries within the horticulture sector, rather than quantify absolute harm rates. The spike of 20% more work-related ACC claims in 2021, was likely larger than sector growth. Liable earnings data shows a 9% increase in 2021, compared to 2020, and data from HortNZ suggests the sector growth was between 5% and 11% in 2021. Without specific FTE data it is difficult to conclude how much of the growth in ACC claims is related to increased sector size.

The remainder of the results are organised into 1) the cost of claims, 2) injury descriptions and severity and 3) geographical location of injuries. While much other data was provided by ACC, these metrics were found to be most useful in understanding harm in horticulture.

Key findings from ACC data:

- The spike in claims in 2021 may be related to more minor claims
- While horticulture has a similar proportion of claims requiring time off work as construction and agriculture, staff in horticulture are generally requiring less days off
- While the number of claims in horticulture spiked in 2021, there is also evidence the size of the sector has increased, although not in proportion with the rise in claims.

4.2.1. Cost of claims

Between 2016 and 2021 the cost of horticulture work-related claims rose from \$10 million to \$15 million. Possible reasons for this are discussed later in the report. The initial data provided by ACC showed that while there was a large rise in claims in 2021, claim numbers were relatively static between 2016 -2020. In 2016, the average cost of a claim was \$2,087 which rose to \$2,729 in 2020. It has dropped back slightly to \$2,437 in 2021, however this could be due to many factors including lack of availability of healthcare services due to the on-going pandemic.

Between 2016 and 2020 there was a clear increase in the cost of individual claims. Figure 4.2 shows the changing cost per claim for each industry code. When compared to the number of claims per industry code shown in Figure 2.4 it can be seen that the trends do not correlate. For example, horticultural contracting and labour supply has had a steady increase in claims over the last five years, however, the cost increases have been much more modest. To better understand this trend, the types of payments (i.e. medical, compensation) were

\$15 million

paid out for horticulture work-related ACC claims in 2021

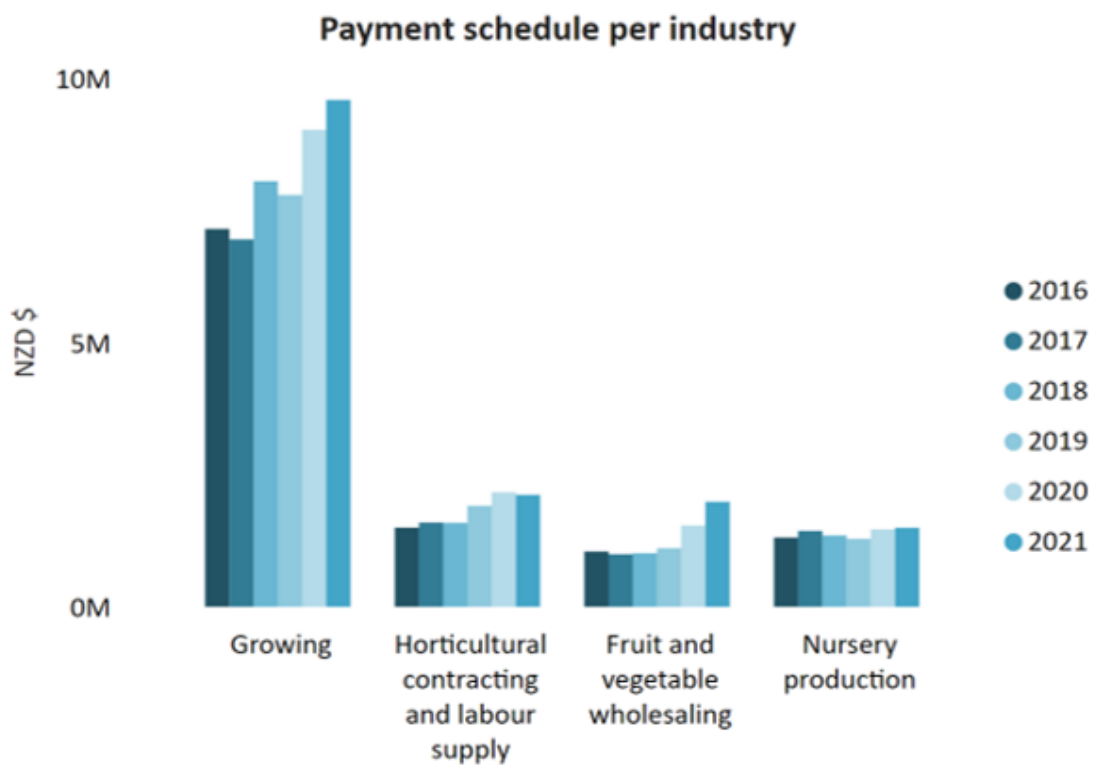


Figure 4.2: Cost of horticulture work-related claims 2016-2021 split into industry codes

14%

of horticulture work-related ACC claims are requiring compensation for time off work

reviewed. The categories used by ACC to categorise its payments (Figure 4.3) show most of the cost comes from weekly compensation payments. Data also provided by ACC shows approximately 14% of ACC claims in horticulture require some weekly compensation, which looks similar to agriculture and construction.

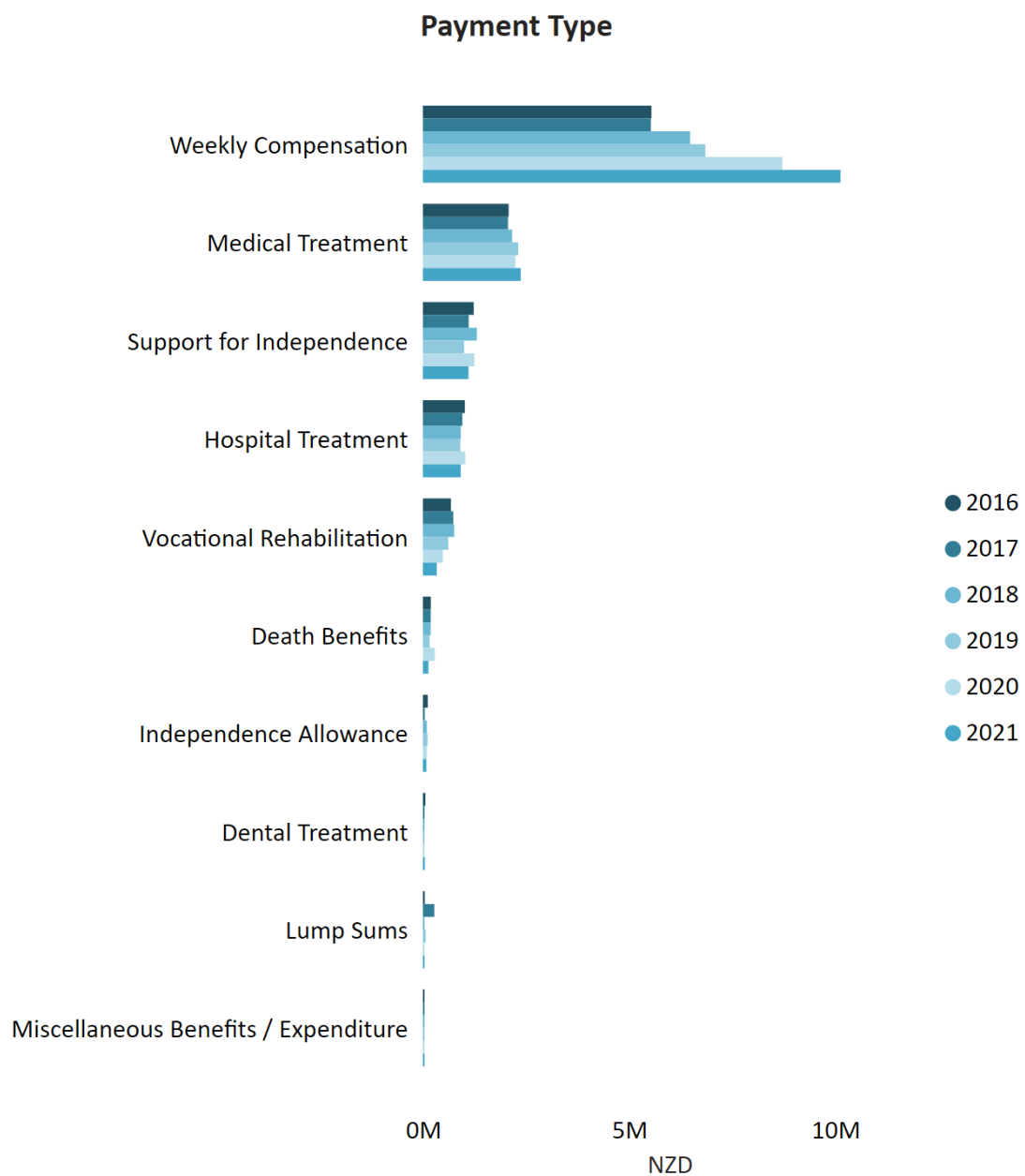


Figure 4.3: Cost of treatment/compensation types for all work-related horticulture claims 2016-2021

When someone is unable to work because of an injury, ACC provides salary support up to 80% of the worker’s salary while they recover. The support is recorded as weekly compensation payments. ACC does not record how many hours support each person receives per week, only if the payment is made, hence there is no differentiation between claims for someone working on reduced hours or those not working. When interpreting this finding, it is important to compare it to the increased liable earnings, median and minimum wage increases. It does not necessarily suggest people have more hours covered by ACC and could be a result of increased salaries.

The cost of compensation payments has been rising since 2017 at a faster rate than other payment categories. In 2021, weekly compensation accounted for two thirds of the cost of all horticulture work-related ACC claims. Between 2016 and 2021 the average number of days on

compensation dropped from 37 to 27 days. Over the same time, agriculture work-related claims increased in number of days on compensation from 49 to 54.

Horticulture has a lower median number of days on salary compensation than agriculture and construction

Of the 14% of claims that required paid time off work (i.e., weekly compensation) the largest portion are for less than 30 days. Figure 4.4 shows the distribution of time where income compensation is required. The data shows very few people require support for more than 180 days (approx. 6 months). The longer support for 2021 claims should be interpreted with caution because if the incident happened near the end of the year, the claimant may not have fully recovered yet and their data on compensation would be ongoing. Note that it takes time for an injury to accrue longer times off work, and

therefore when reading the graph, it is important to assess the time passed. For example, an

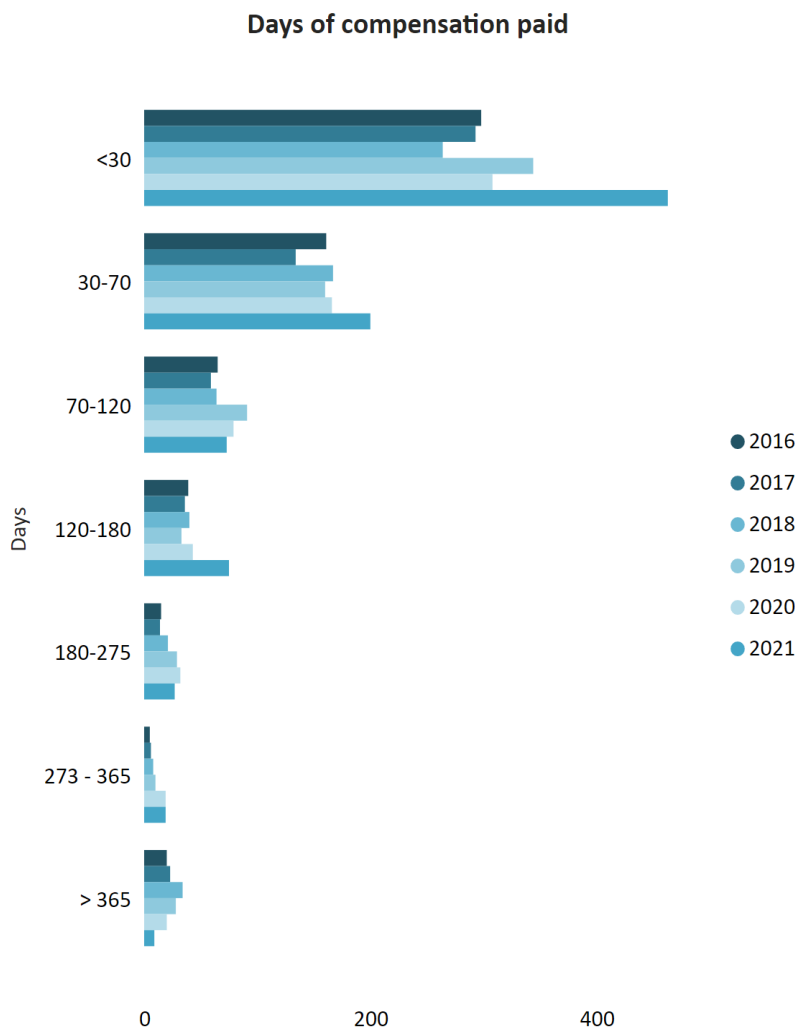


Figure 4.4: Number of days on compensation after work-related incident in Horticulture

injury at the end of 2021, would not yet be 12 months ago, and if that person was still on weekly compensation, they would not yet have reached the 365+ category, but may be heading here. This means in the last year (2021) data could be an under estimation of length of compensation.

The number of claims which have required any amount of weekly compensation has not followed the same trend as the cost of weekly compensation. The number of claims rose slightly between 2017 and 2019 (from 565 claims to 695 claims, 23%) and dropped in 2020 before rising steeply in 2021. This would imply the change in cost of weekly compensation is not solely a result of rising numbers of claims and perhaps length of time on compensation, and rising salaries are playing a part in the overall rising cost.

4.2.2. Injury descriptions and severity

Figure 4.5 shows the severity of claims as per ACC’s classification, described as a percentage of all claims for the year. The claims rose across all three severity categories, relatively evenly, suggesting the 2021 was not an increase in severity but in all harm severity categories. ACC also provided a fourth category for severity – fatal. However, there were less than four for each year, so this data has not been displayed and it is difficult to comment on fatality trends with such (thankfully) small numbers. Figure 4.6 shows the number of claims requiring rehab has been declining steadily since 2017. However, there is a sharp rise of treatment only claims in 2021. This suggests the spike is related to less serious injuries. The two data sources are at

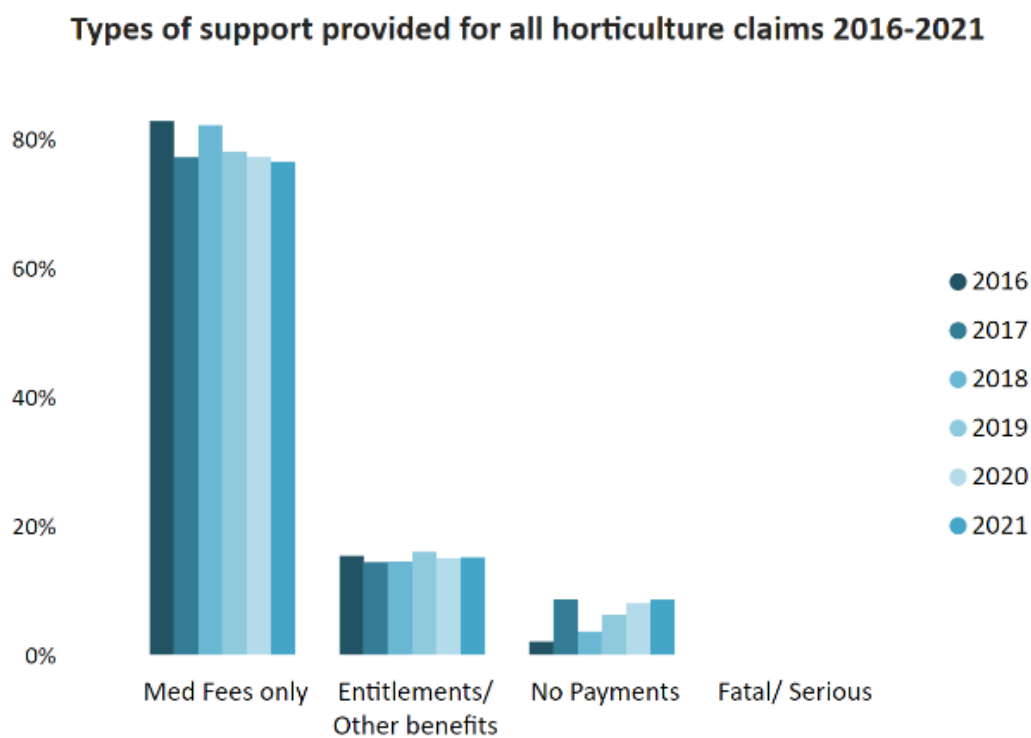


Figure 4.5: The severity of all horticulture work-related claims 2016-2021. Severity classified by care needed

odds, when considering their impact on the severity of claims. This could be due to the way in which each of the categories are recorded and specific definitions of rehab and entitlements. Nevertheless, the results show no increase in proportion of claims requiring entitlements in 2021 (Figure 4.5) and an increase in claims requiring treatment only in 2021 (Figure 4.6).

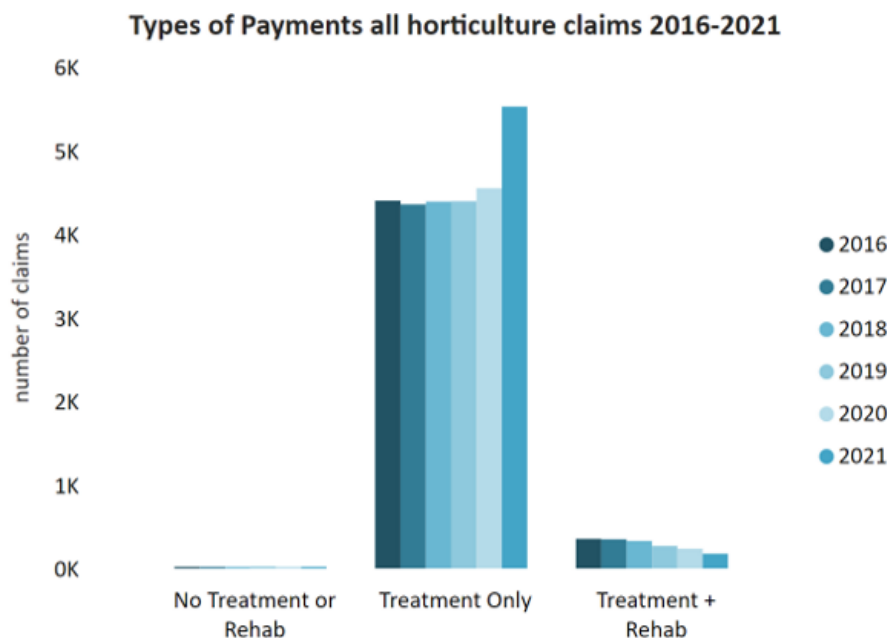


Figure 4.6: Types of care required for each claim for all horticulture work-related claims 2016-2021

ACC provided a classification of injuries over the previous five years which show lumbar sprains have consistently been the largest injury category (Figure 4.7). While the 2021 spike is visible in most categories, other back sprains have had a steady rise over the past five years. This data only shows the injury category, and while ACC provided data on the activity before injury and the external agency it was not detailed enough to understand how these injuries were occurring. This graph was used to inform questions on site about how back sprains, cuts and eye injuries were happening.

4.2.3. Location of injuries

ACC provided the location of all horticulture work-related ACC claims between 2016-2021. It is notable that some regions (Bay of Plenty, Hawke’s Bay, Marlborough, and Gisborne) have a large spike in 2021. This graph was used to help focus the regions for site visits, focusing on regions which saw this spike in 2021.

The trend in regions varied. Bay of Plenty, Gisborne, Marlborough, and Otago showed increasing claims in the years before 2021. Auckland, Waikato, Manawatu-Whanganui, and Hawke’s Bay had decreasing claims in the years before 2021. Other regions have had relatively static claim numbers.

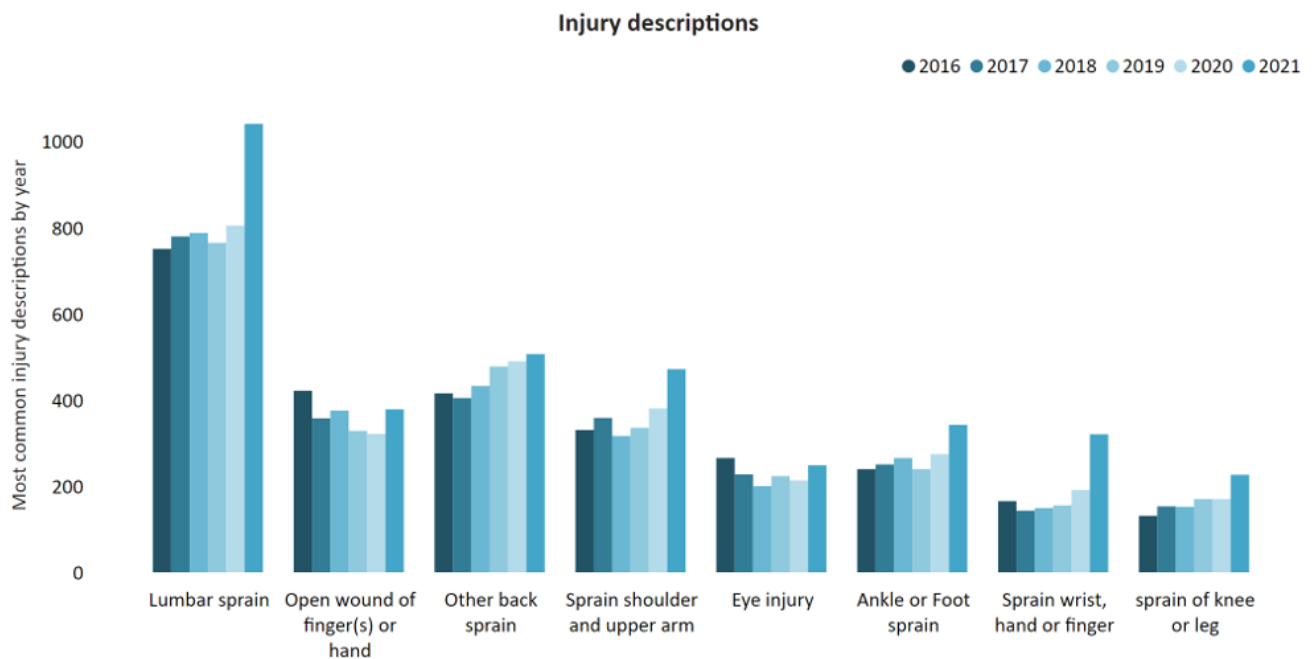


Figure 4.7: Eight most common injury description from work related ACC claims in horticulture

4.3. WorkSafe New Zealand data

4.3.1. Quantitative data

Analysis of the notifications data provided by WorkSafe is shown in Figure 4.7. WorkSafe reported 63 fatalities from work-related activities in 2021, of which horticultural related fatalities account for approximately 6%. It is also of note that in Figure 4.8 there is a spike in notifiable injuries and illnesses in 2018. A review of the description of each notification showed one incident resulted in injury to more than 20 individuals, which are all recorded as separate notifications. No other anomalies were seen in the data. Conversations with WorkSafe suggest that there is a level of under-reporting that happens, and it is difficult to tell if the spike is a genuine rise in incidents or higher compliance in reporting for 2018. It is also interesting to note that the trend of notifications does not correlate with the number of ACC claims. This could be for a variety of reasons. However, it is important to note WorkSafe are not notified about every harm incident, only those that meet the threshold of serious harm.

This raises an important point about the way in which harm data is recorded by government agencies. Both ACC and WorkSafe record incidents at an individualised level, i.e., harm occurred to one person, and the severity of the harm to that individual. While this data makes it difficult to track harm happening to more than one individual (e.g., lots of people in one business being

seriously injured). It can also mean that bigger events, like the more than 20 individuals case described above, cause a spike in data, without there being a spike in harm events.

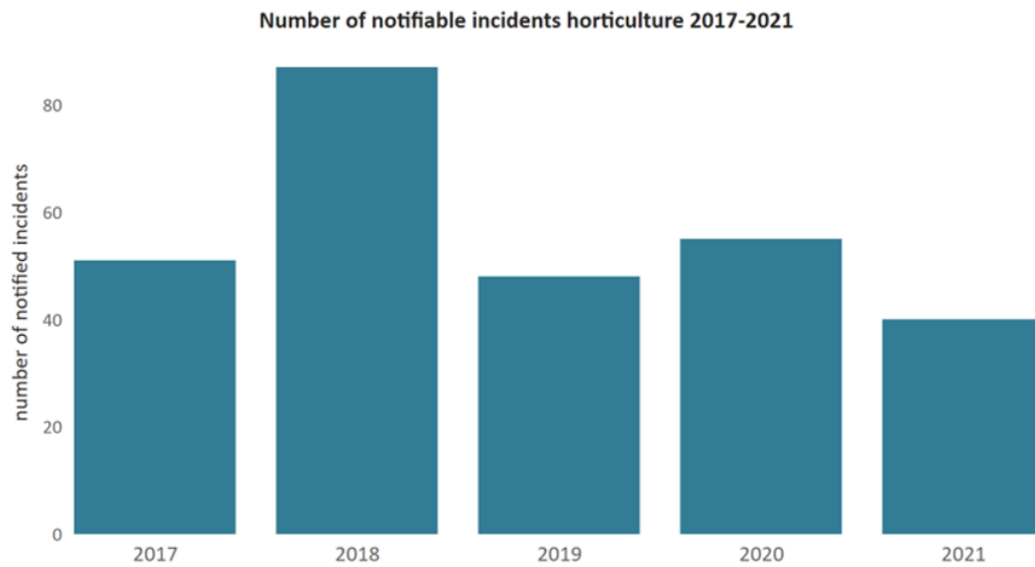


Figure 4.8: number of notifications to WorkSafe from Horticulture 2017-2021

While much of the SWIFT data provided by WorkSafe showed similar trends to the data provided by ACC, the SWIFT data provided information on claimant earner status. Figure 4.9 **Error! Reference source not found.** shows the proportions of work-related ACC claims for horticulture that are from employed and self-employed individuals. The graph shows the proportion who are employed slowly rose from 2014 to 2016 before plateauing. There is however a jump in 2021 of employed claimants, suggesting the spike in ACC claims is attributed to employees rather than self-employed individuals

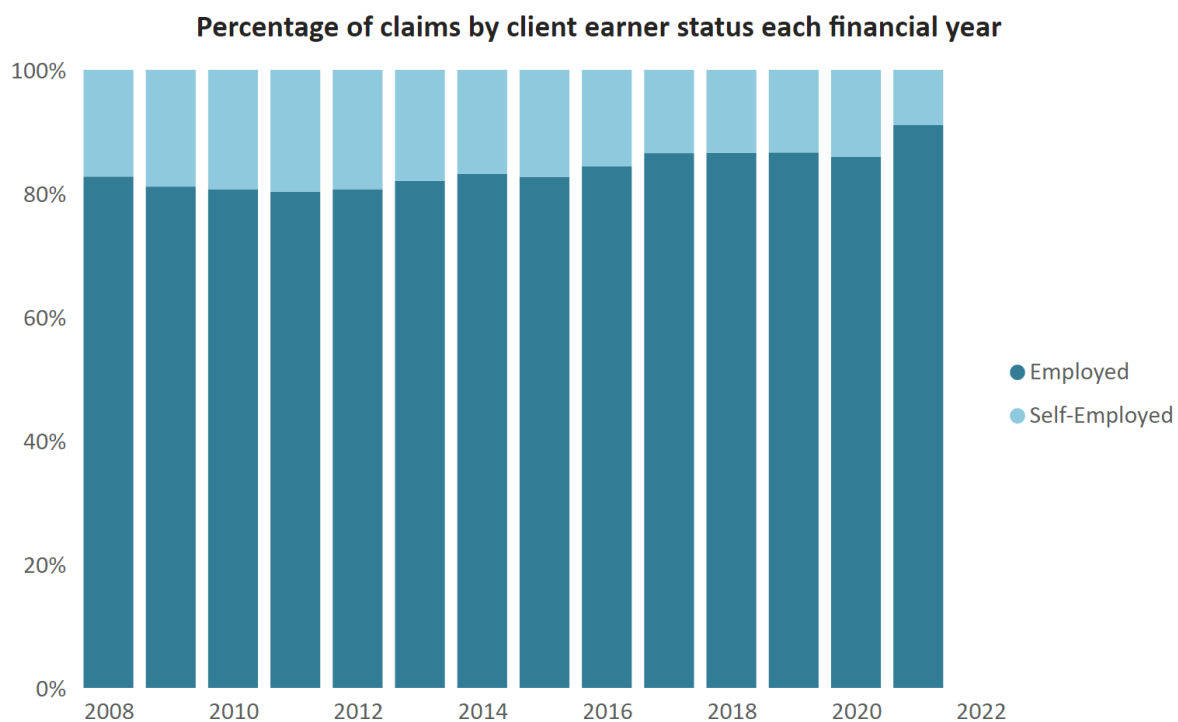


Figure 4.9: Client earner status 2008-2021 from WorkSafe's SWIFT data

4.3.2. Qualitative data

The qualitative WorkSafe data detailed a variety of harm incidents ranging from those serious in nature to the potential for serious injury or a near miss. Below is a thematic summary of the commonly reported types of harm events and harm outcomes from the qualitative data. This data, by design, only includes occasions when WorkSafe are involved, i.e., when something does not go right or a near miss could have resulted in a severe outcome. It is encouraging that near-miss events are included, as it suggests the sector are engaging before a major harm occurs.



EQUIPMENT

Vehicles: Inappropriate entry or exit of a vehicle, vehicle skidded off a surface, tractor ran over or hit someone, tractor hit stationary object, truck/ tractor rolled causing a crushing injury.

Ladder: Ladder collapsed, hit body part on ladder rung, missed bottom step and slipped, knee pain while climbing down, fell from the top, shifting the ladder and caused pain, not having three points of contact, jumped off a ladder.

Working at **heights** without fall protection, workers above safe zone of the ladder.

Personal Protective Equipment: Inadequate or inappropriate personal protective equipment (PPE), particularly when spraying, incorrect footwear, protective equipment such as respirators shared among workers.

Machinery: Power Take-offs (PTOs) not fitted with guards/ unguarded machinery, warning devices, for example on forklifts, not working properly. Standing on sheeting and it pulled out from underneath.



ENVIRONMENT

Uneven ground: Fruit lying around, rabbit holes, tractor tracks. Tripped over items not cleared, tripped while carrying something e.g., ladder or crate.

Bee stings

Chemicals or spray drifting into areas surrounding the spray site, workers, neighbours, and others exposed.

Facilities: Blocked fire escapes, bathrooms far away, workers eating in the same area where chemicals are stored and fertilisers kept.

Boxes and crates stacked high, having to reach high, falling objects causing cuts and bruises.



WORKPLACE RELATIONS

PPE: Workers not given correct PPE or not using it correctly.

Training: No training or inductions provided. Operating machinery without correct licenses.

Documentation: No health and safety manuals, hazard or accident registers, or warning signs.

Reporting: Failure to report serious incident or secure the scene.

Bullying and abuse: Workers told not to come back, employment ended for refusal to carry out dangerous tasks.



HARM OUTCOMES

Lower back: Bending over, lifting equipment and strained back.

Eyes, face, and skin: Dead pollen, dust, branches to the eye. Broken wire caused a wound to the face/eye. Chemical burns on the skin.

Ankles: Rolled ankle from slipping on fruit, wet ground, rabbit holes.

Hands and fingers: Finger jammed in a machine, machinery malfunctioning and worker reaching in to fix it. Not used to working in the orchard resulting in acute pain and swelling. Cut fingers from a knife, pruning scissors, cut by a hedge cutter.

Shoulders: Overstretched shoulder, pain in the arms and shoulders.

Mental: Fatigue/burnt out.

Bone breaks: Fractured ribs, broken leg hit by moving plant e.g. forklift or tractor.

4.4. Key Informant workshops

The Key Informants gave detailed descriptions of the supply chain, work environments, activities and tasks carried out, and the various individual roles within horticulture. In addition, the participants discussed the risks, hazards and concerns they had around harm in horticulture, and explained some of the interventions and solutions they already had in place. The summarised results are presented below.

Participants reported that reducing the risk of severe injuries took a great deal of time and focus as they were life altering and potentially life ending. As a result, there was sometimes less focus on the little and often injuries.

4.4.1. Risks, hazards and concerns

The participants discussed how the nature of many tasks can expose workers to risk of harm. For example, pickers and pruners are often using sharp blades and knives, workers may be up high on ladders, frequent manual handling of heavy items, and exposure to chemicals.

Workers are at risk around vehicles, particularly forklifts, tractors, and harvesters. Forklifts versus pedestrians were of concern to the participants, as were people being around harvesters as they were likely to result in severe and even fatal outcomes. In less acute outcomes, workers were reportedly receiving injuries from jumping in and out of tractors or other vehicles incorrectly.



Figure 4.10: A typical ladder used for picking shown next to a 3D apple tree in winter.

Certain circumstances in a worker's immediate environment were thought to increase the potential for risk such as lone work, uneven or untidy surfaces, working at pace, poor ergonomics, overfilled bags, fatigue and inexperience/language barriers as examples. However, the Key Informants revealed a range of contributing factors from across the wider system as well.

The participants explained the importance of safety culture within organisations, in other words, how embedded safety was in all activities and tasks. They noted the challenges for smaller organisations who may not have access to occupational health and safety (OHS) resources. They explained there were limited harm-reduction resources online or from the sector/key government agencies that related

specifically to horticulture work in New Zealand. Some of the participants reported pay structures, speed incentives, bonuses, and time pressures were potentially contributing to harm within their organisations. When this finding was discussed with others in the sector, they reported differences in the intention of the productivity incentives compared with the implementation. For example, some managers reported these measures were designed to incentivise productivity, particularly during peak work conditions, while still maintaining safe work conditions (such as taking breaks and working reasonable hours). Other data collected during the site visits from workers suggested they worked through breaks when incentives were available.

As many Key Informants were managers, they were able to speak to the immense pressure they faced during recent years. COVID-19 and extreme weather events made the last few seasons tough, coupled with an increasing burden of compliance, supply chain pressures, and a staff shortage. Staff shortages meant dealing with worker inexperience, troubles getting the right workers, and not being able to match people's skills to the job. These factors were also reportedly leading to harm outcomes.

Harm outcomes they were seeing included fatigue both mental and physical, lower leg and ankle injuries in orchards, shoulders and backs in packhouses, among others. They saw trends in slips, trips, sprains and strains sometime becoming bigger issues than might be expected and, as quoted by one participant it's the "little and oftens" not the severe incidents that actually require most attention, however it is the potential for severe incidents that get the attention.

4.4.2. Harm interventions and solutions already in place

In response to a lack of online information, the participants showed willingness to share knowledge and information with each other because they agreed many were facing similar problems. However, it seemed that this does not routinely happen through structured or formal channels.

One problem they noted was the response of medical/healthcare practitioners who, when a worker presented with a strain/sprain injury, tended to immediately sign them off work. Some suggested that it is actually better for the worker to switch to alternate duties. One participant described how their organisation had designed an information pack that could be presented at any healthcare appointment which outlined the nature of the worker's tasks and alternative tasks where appropriate. There was interest among the group to share this idea with the wider sector.

Similarly, other workplaces had set up early intervention plans and pain checklists where workers went straight to physios when even a small injury presented. They agreed that a lack of injury reporting from workers was a challenge still to overcome. Frequent safety conversations were thought to encourage reporting, and equally empower workers to do things in a safe way. Positive health and safety conversations were important also, they reported.

Practical steps were taken where feasible such as managing the grounds to remove excess fruit that could be slipped on, fruit grown on 2D wires to reduce certain risks, and reducing the use

of ladders. Matching the worker to the job and commissioning the right technology were other suggested ways of reducing the risk of harm.

4.5. Survey data

The survey was in the field from the 15th of June until the 1st of August 2022. It was distributed via sector newsletters, other professional networks, and researchers leaving QR codes at sites visited. Viticulture was included in the survey, with NZ Winegrowers distributing it amongst their members. HortNZ facilitated most of the distribution for this survey. There were 228 responses to the survey collected over the six-week period. As the survey was distributed through a range of channels the response rate cannot be determined.

Survey demographics, injury descriptions, safety in the workplace, wellbeing and wider influences are presented in this section.

There were some stand out results from the survey. Most respondents (52%) reported not having a physical injury in the previous 12 months. The most common injuries were muscle strains and sprains, which was supported by the ACC data.

Overall, the survey findings showed a positive attitude towards safety and a sense that generally organisations are engaged in keeping people safe. Many reported working for organisations where safety was a priority, safety procedures made sense, and they felt they could do their jobs safely.

Respondents were also asked about their work-related experiences and how that might contribute to wellbeing outcomes. As with previous findings (e.g., Farmstrong 2021), the majority of participants suggested they experienced physical or mental tiredness during work, and experienced uncomfortable levels of stress.

Wider influences impacting on respondents' work were also reported. Many respondents, and in particular managers, were negatively impacted by COVID-19, recent weather events, compliance requirements, supply chain costs and delays, and unexpected occurrences. Despite this, many look forward to work, are positively impacted by their community at work, and report feeling valued and appreciated.

4.5.1. Demographics

The full demographic breakdown of survey responses is shown in Figure 4.11. Approximately 20% of responses were in vegetable production, and 16% indicated they worked within viticulture, leaving 64% in fruit production. Most respondents were from the North Island, and there was a tendency towards respondents being older.

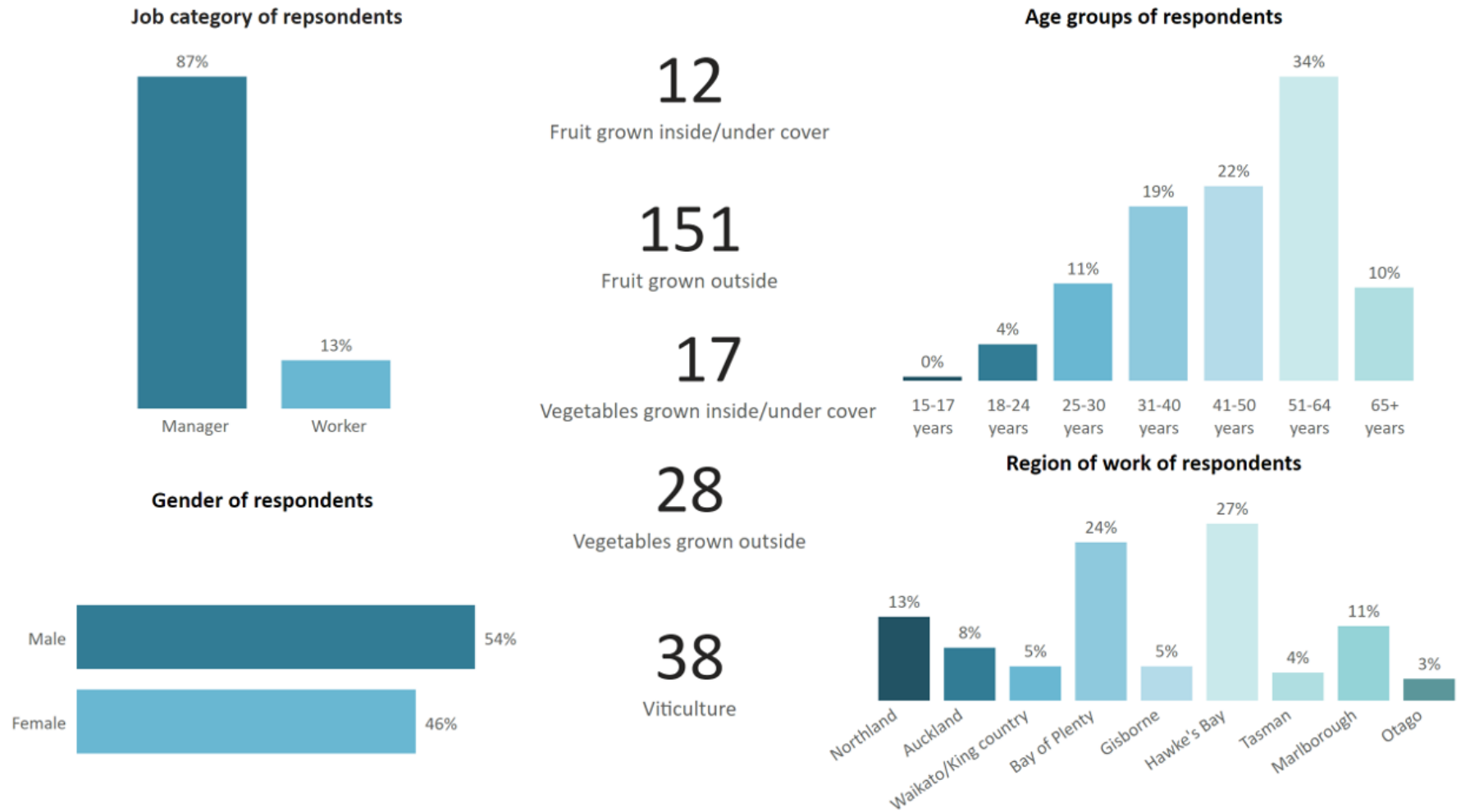


Figure 4.11: Demographic information of survey respondents

Respondents chose from a series of options that best described their current job role and the survey pathways/questions were matched accordingly. The individual was considered a ‘worker’ if they selected *other permanent worker, causal/contract worker* or *other* as their role. All other roles were categorised as *manager* for the survey logic. Figure 4.12 details the job description of the respondents. The largest proportion of respondents were owners, closely followed by managers. While this was expected, it creates a bias which should be considered when interpreting the survey results. Although this may suggest worker voices are under-represented in the survey data, the wider dataset including site visits provided a stronger representation of worker voice. For all questions, patterns in response were checked between workers and managers to assess any differences that arose. Where appropriate any differences have been noted, however they were few.

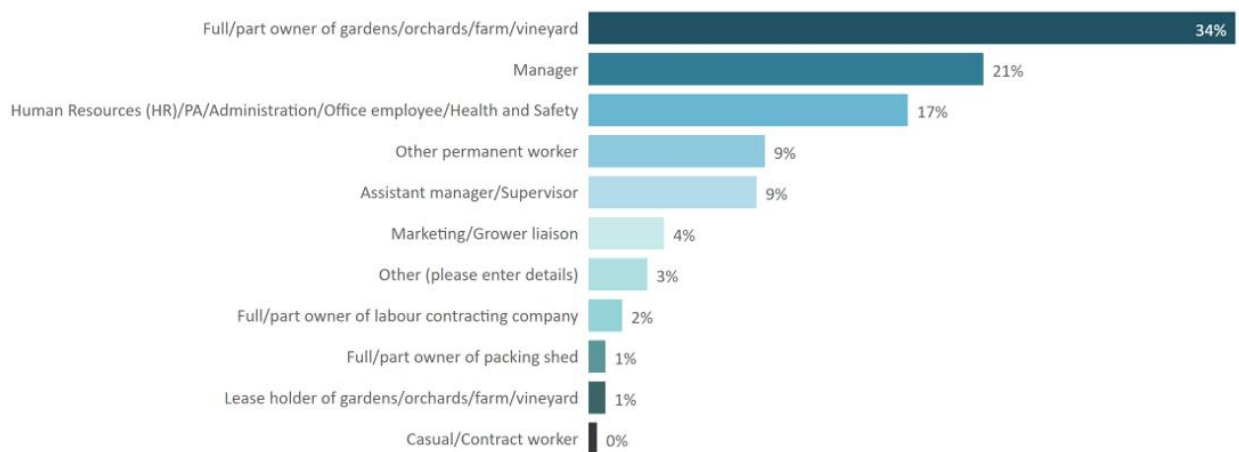


Figure 4.12: Job descriptions of survey respondents

4.5.2. Injury descriptions

All respondents were asked about any injuries they had suffered at work in horticulture or viticulture in the previous 12 months (Figure 4.13). 48% of respondents reported that they had been physically injured in the previous 12 months, and the most common injury was strained or sprained muscles for those who had. Very few respondents (18%) reported requiring time off for their injuries.

When considering only workers, 59% reported having experienced a workplace injury in the past 12 months. Strained and sprained muscles and tripping over an object were the most reported injuries. This was closely followed by bruising, broken bones/dislocations and rolled ankles. While the sample size of workers was small, it does show that the injury types suffered by workers differ to those suffered by owners and managers, though this might be expected.

Many in the sector have reported an increase in needing managers to assist with manual tasks due to the labour shortage over the past couple of years. The change in tasks may have exposed managers to different hazards and increased their risk of physical harm.

Percentage of respondents with each injuries in the last 12 months

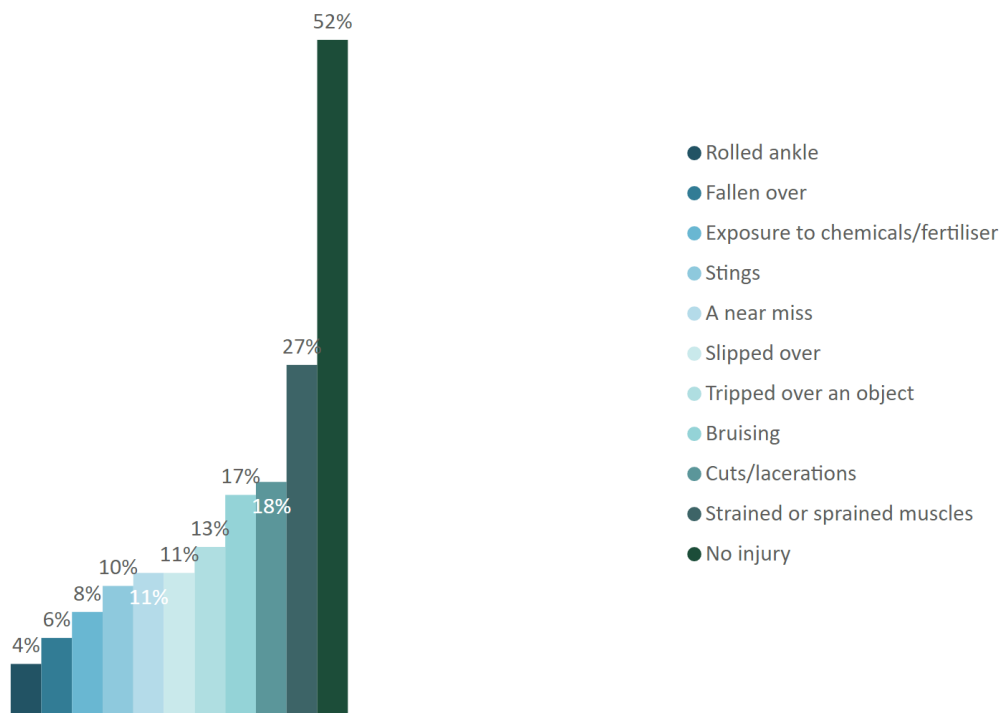


Figure 4.13: Injuries reported in the previous 12 months by survey respondents

4.5.3. Safety in the workplace

The survey also asked which approaches organisations within horticulture and viticulture were already using to keep workers safe. Figure 4.14 showed that most safety measures (e.g., taught safe ways to do things, regular breaks etc.) are used within their workplaces. Encouragingly, 87% of respondents reported that they are provided with personal protective equipment (PPE). It should also be recognised not all tasks require PPE.

A low number of respondents indicated they did stretches before starting work. When the worker only sample was analysed, the number remained low. This indicates that the practice is not widespread in the sector.

How does your workplace keep you safe at work

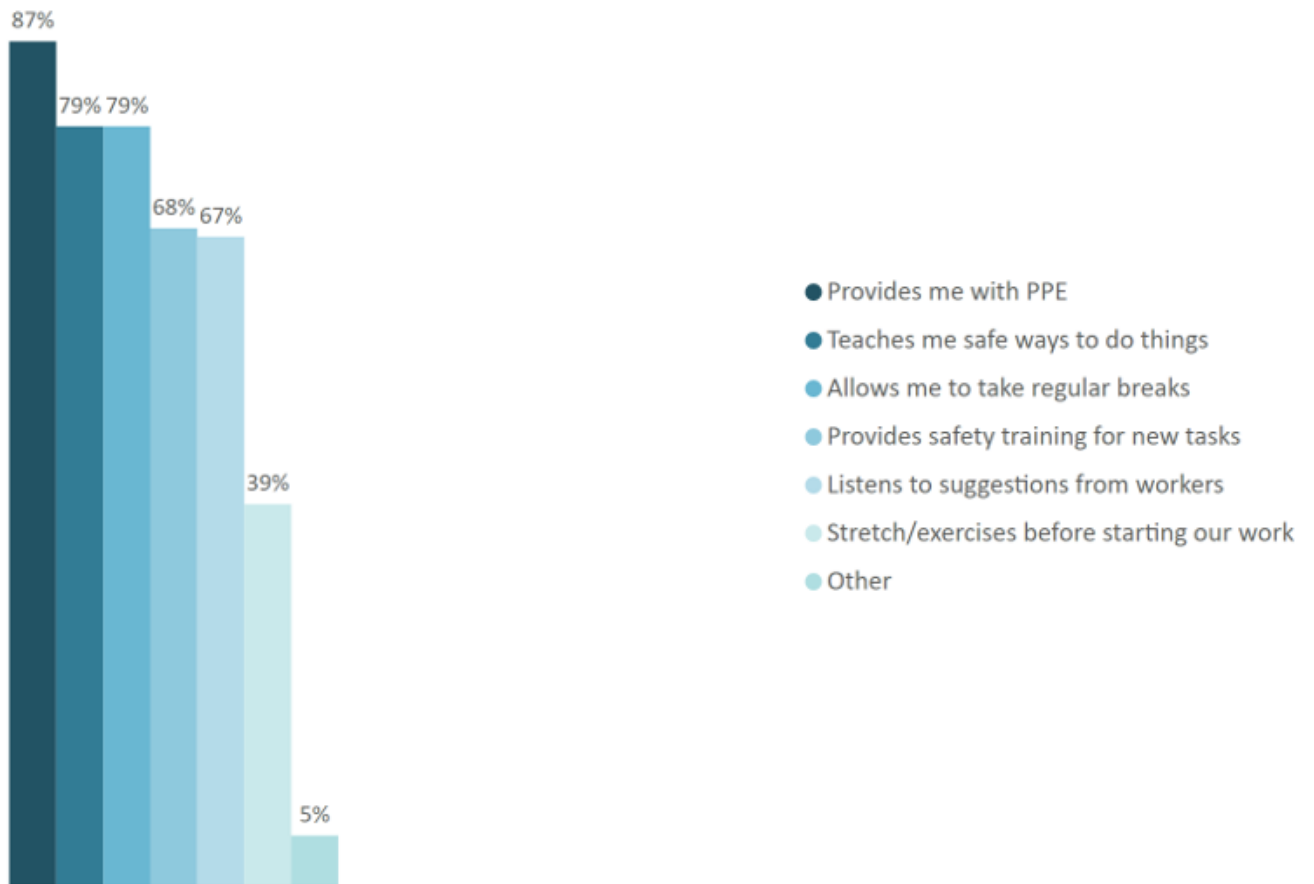


Figure 4.14: Respondents were asked which of the listed activities their workplace does to keep them safe

84%

of respondents agreed that safety was a priority for the organisation they worked for

Respondents were asked how often certain safety procedures occurred in their workplace. Figure 4.15 shows the responses to three of the questions. All show a high level of agreement, representative of the questions about techniques for reducing harm. When the relatively small number of worker responses were interrogated separately, the trend was similar, indicating broad agreement with the overall sentiment.

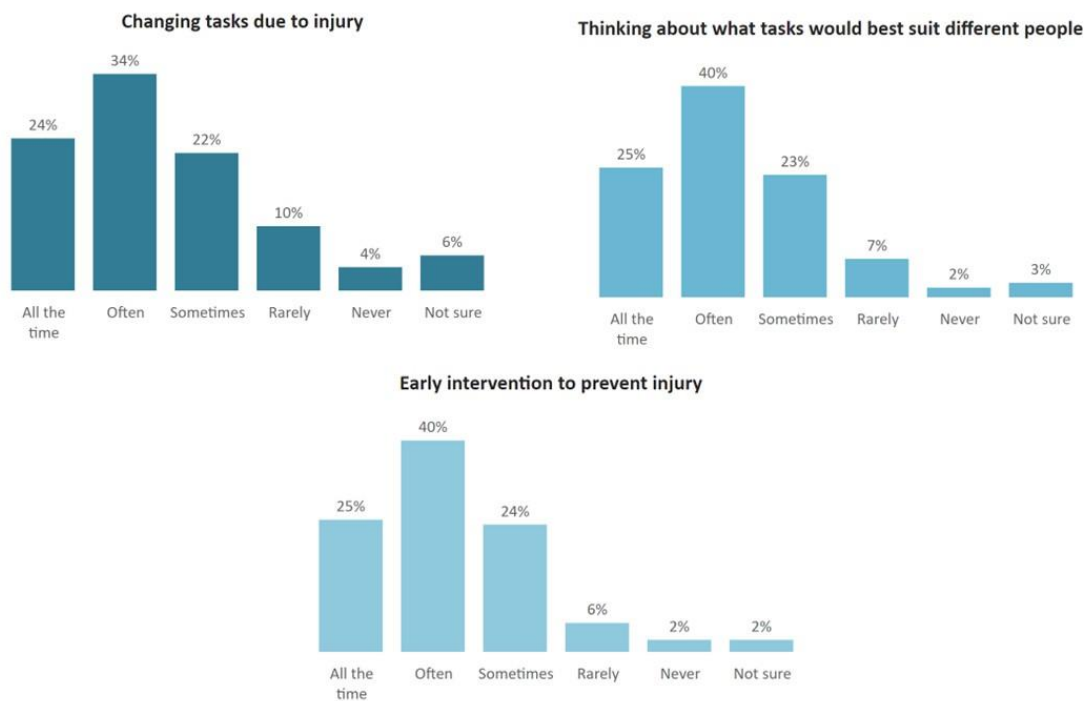


Figure 4.15: Respondents were asked how often each safety procedure occurs at their workplace

4.5.4. Mental Wellbeing

Respondents were asked a series of questions on their experiences related to mental wellbeing in horticulture and viticulture in the previous 12 months. Overall, the responses were generally positive. However, Figure 4.16 shows that 67% of respondents reported uncomfortable levels of stress at least sometimes.

When asked how often respondents had worked in a safe and healthy environment over the previous past 12 months, 92% provided a positive response.

Respondents were also asked how often in the last 12 months they had experienced incentives to work quicker or longer than is safe. This response (shown in Figure 4.17) shows that most respondents chose 'never'. Given the high proportion of responses from management and administrative roles, the response is

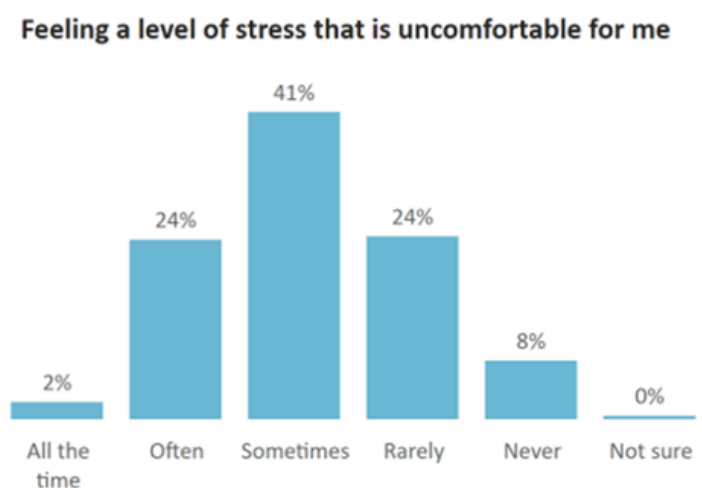


Figure 4.16: Responses to the question how often in the last 12 months have you experienced feeling a level of stress that is uncomfortable for me during your work in horticulture

Incentives to work quicker or longer than is safe

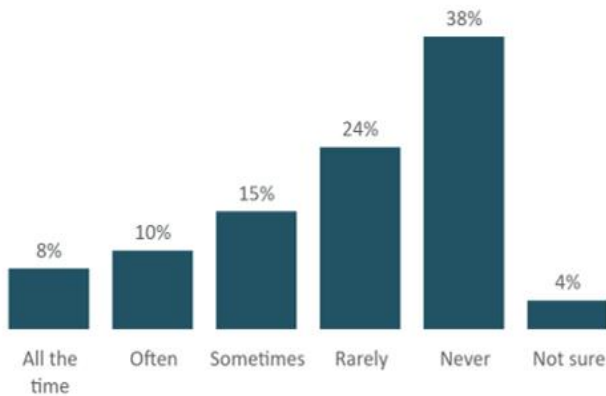


Figure 4.17: Responses to the question how often in the last 12 months have you experienced incentives to work quicker or longer than is safe during your work in horticulture and viticulture

expected as most would not be on incentive-based pay. However, 33% of respondents gave an affirmative (all the time, often or sometimes) response to this question. About one third of these respondents were owners/leaseholders with HR/PA/administration/H&S, with managers (including assistants and supervisors) making up most of the remainder. This suggests there are times when working longer or quicker than is safe is occurring (i.e., during seasonal peaks) and this result is explored further later.

Respondents were asked which options contributed to their wellbeing (shown in Figure 4.18). 86% reported good relationships with people at work and home was a contributing factor, and 75% said quality sleep. The question is like one asked by Farmstrong in their survey (Farmstrong 2021) of the horticulture and viticulture sectors. Farmstrong asked which three of a more extensive list contributed to wellbeing. In their survey quality sleep (33%), having sufficient good employees/contract workers (31%) and exercise (31%) were the top three responses. They asked about relationships at home and work separately with 16% and 29% agreeing respectively. Some of the differences in results could come from the differences in the way the

Factors contributing to wellbeing

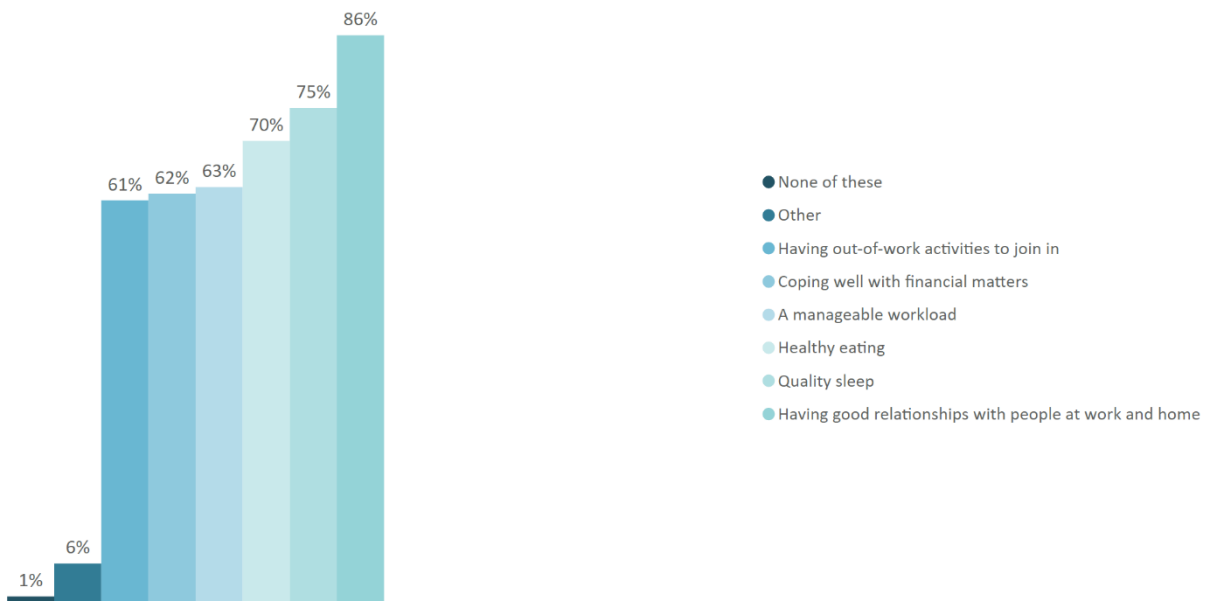


Figure 4.18: Respondents were asked which of the responses contributed to their wellbeing

questions were asked. This survey allowed respondents to choose as many responses as were relevant, compared with the top three in the Farmstrong survey. The responses received in this survey reflect the inter-relationship between home and work life, and how each can impact the other.

The following themes reflected a generally positive wellbeing environment response:

- Community in the workplace
- Enjoyment from working with crops
- Feeling valued and appreciated
- Feeling a level of stress that is uncomfortable for me
- Positive engagement with my manager/supervisor/teammates
- Feeling alert, fresh and ready to work.
- However, Physical/mental tiredness was a negative reported contributor to wellbeing.

4.5.5. Wider influences

Respondents were asked a series of questions about wider influences and the impact of these factors on the previous 12 months of work. The ‘managers’ category was asked about 14 specific influences of which 11 showed a high level of negative sentiment. Of the wider influences posed to managers the following had a high negative sentiment:

- Staffing levels
- Compliance requirements
- Crop prices
- Crop pests and infestations
- Weather
- COVID-19 related staffing
- COVID-19 rules and regulations
- Supply chain costs
- Supply chain delays
- Inadequate rest or down time
- Unexpected occurrences

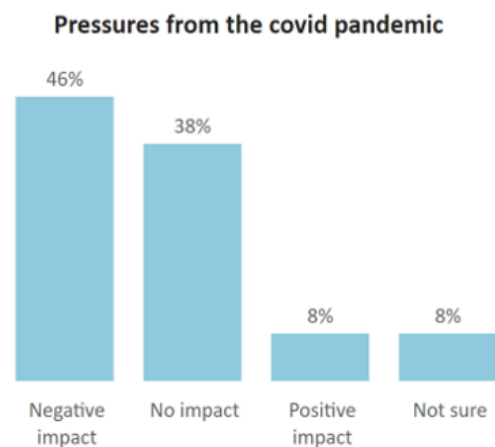


Figure 4.19 shows the negative impact COVID-19 rules and regulations had on respondents during the previous 12 months. The distribution (skewed to toward negative impact) is similar for all results that had high negative sentiment.

Figure 4.19: level of impact COVID-19 rules and regulations have had on managers in the previous 12 months

The result for Access to OHS resources, shown in Figure 4.20, is particularly interesting. It suggests that respondents have limited access to resources as that would have elicited a positive response. A sense of community in the workplace was the one wider influence that showed a positive impact on wellbeing (Figure 4.21).

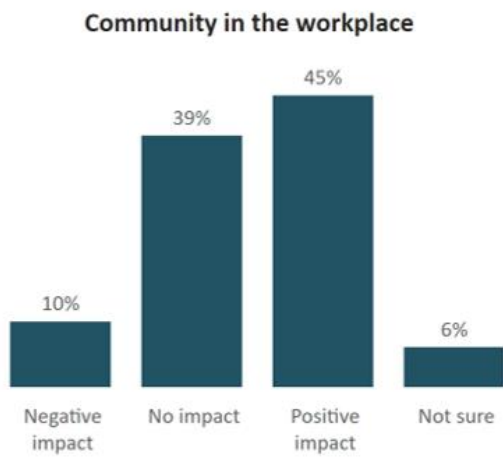


Figure 4.22: level of impact a sense of community in the workplace has had on managers health and wellbeing over the previous 12 months

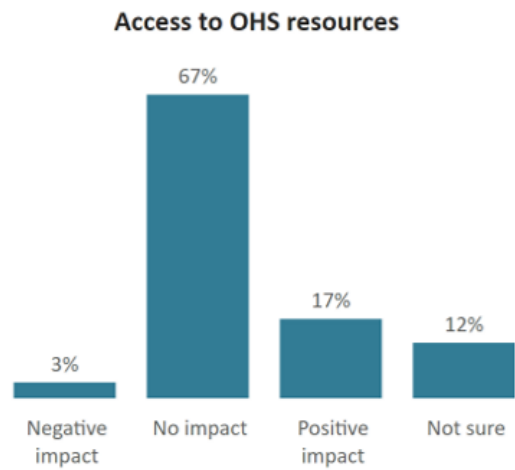


Figure 4.21: level of impact access to occupational health and safety resources has had on managers previous 12 months



Figure 4.20: Combine harvester with maize front. Harvesters are capable of the serious harm many worry about

4.6. Site visit data

During the site visits, it became clear that sites across multiple regions were experiencing similar issues leading to harm. The key themes are detailed below and are not shown in any particular order.



There is an **enormous range** in the produce grown, business size, tasks, environmental conditions, and health and safety maturity across sites. This means understanding each crop is important while also looking for commonalities across product types.



Equipment and PPE. There appears to be varied and inconsistent use of equipment throughout the sector. Incidents while using ladders were common and a cause for concern. Platforms and hydro ladders were increasingly being used and crops grown in different ways to reduce ladder use. However, some chose to use ladders. Eyeglasses are rarely compulsory, and sometimes there are issues with using them (e.g., fogging up). Gloves are difficult to use with wet hands.



Working in and around machinery is of concern, particularly harvesters, tractors, and forklifts. Safe zones are not always in place/used. Not having safe zones can result in pedestrians around forklifts and tractors around people up ladders. Trucks and forklifts can also be operating in the same space.



Technology is making work easier and possible for a wider demographic of workers. It does however, bring new risks if machine guarding is not in place e.g., fingers/hands stuck in machines. Machines may replace jobs, reducing the pressure during staff shortages. Technology may come at a high cost but can reduce worker harm in some areas if the potential risks are managed. Improved technology was thought to positively impact productivity gains and also attract more skilled and high-tech people. Lower-level technology can make work safer and easier e.g., electric pruners.



Injuries. Manual handling and musculoskeletal disorders (MSD) are prominent issues. Packhouse work can result in sore backs and shoulders. Pruning can result in repetitive movement, placing pressure on hands and arms. Rolled ankles can result from uneven surfaces, jumping off ladders, or rabbit holes. Eye injuries can result from dust, wind, pruning (not looking in front but at the branch to be cut) and not wearing appropriate PPE. Cuts may occur from not wearing gloves while snipping, more serious

cuts (such as loss of fingers) are more common with loppers rather than secateurs. More severe injuries, although less frequent still happen, often while working in and around machinery.

Most spoken to during site visits have a good understanding of the more common worker injuries. They felt that ACC resources (or someone) that linked the specific injury to a solution i.e., what could be done when injury occurs and how to work with injury prevention would be helpful. In response to MSD injuries, some organisations had worked with physiotherapists and occupational therapists or developed their own responses. However, it was not always easy to schedule stretches into a busy working day.



Managers reported that workers were appearing to often push through while injured, and sometimes **not reporting injuries** or waiting until the injury was too severe to continue working. Despite efforts from the organisations, workers didn't always come forward in time. This appeared to be common among workers who relied on return work the following season or had a fear of letting their team down, as examples. To mitigate these issues, some organisations have early intervention plans in place. These early intervention plans may result in more ACC claims being recorded and reduce under reporting.

People doing things they shouldn't be doing reportedly caused incidents, injury and near misses, as did complacency. **Inexperience** was a contributing factor; it sometimes led to panicked responses, an inability to call someone out when they were doing something unsafe, or poor supervision. An example given was workers reaching around guarding on a packing line while it was in operation to clear blockages, as they didn't want to stop the whole line to clear it. On the other hand, experienced staff reportedly reduced the stress and pressure on managers. Return workers were thought to be more familiar with the systems and culture so were possibly more comfortable speaking up when something wasn't right.



RSE workers are vital to the sector as there are not enough local people available or willing to do the work. Returning RSEs are particularly valuable and some have been returning for up to 15 years. There are now some highly sophisticated RSE systems and villages, and there was evidence of significant integration into local communities (e.g. through community groups and sports teams). Money and pay structures were cited as sometimes influencing work behaviour such as working through lunch or accepting the more physical jobs to earn bonuses. Injuries are not always reported so that work can continue.





At one site visit focussing on RSE workers, management staff outlined that RSE workers are essential as recruitment of the **local workforce** has proved to be unsuccessful. It was suggested that horticulture working conditions were not always seen as attractive (presumably compared with other local options) and/or the areas where the orchards are may not be desirable places to live. It appears that there isn't always social support for local workers to take up the work, i.e., transportation to work, childcare, consistency in earnings from the work. Some organisations have initiatives in place to support solo parents, and flexible working shifts/hours though this varies between regions.



It is worth **matching the individual to the job**. However, this was reportedly challenging during worker shortages. During the COVID-19 pandemic, some people had to do jobs that they were not used to doing or trained to do. We heard that when a worker is not well matched to a job task, it is unlikely they will remain in the job.



The **huge increase in staff numbers** between peak- and off-season presents challenges in the transfer of information, inductions, consistency in training and supervision. Having contractors working on site also made OHS inductions, training, and communication challenging. Some organisations insisted that all contractors attend the OHS meetings (that were initially set up for core staff only).



Staff were, at times, required to read inductions. This was despite **language and literacy barriers** for some workers. Some organisations have started making videos as a result. However, this requires a lot of investment and regular updating of the resources.



Figure 4.23: Apples not picked in the last season due to staff shortage



Positive safety culture was reported as an important factor in keeping workers healthy and safe at work. Positive safety culture was found to be fostered through constant (sometimes repetitive) communication, toolbox meetings, worker reps, making changes promptly, being seen to make the work easier where possible, listening to the workers' concerns, creating a sense of family, caring for the workers, empowering them to speak up or monitor their peers, and not punishing them for coming forward. Information/ feedback throughout the organisation was thought to be important (both bottom up and top down).

Toolbox meetings were used frequently and OHS was often top of the list to discuss. Organisations had various methods for designing content for these meetings, such as through apps, forms, and staff representatives. They were seen as a good way to encourage workers to speak up, raise issues, but also for management to maintain awareness of concerns on the ground.



Constant improvements in **crop varieties and growing methods** seemed to be impacting the work e.g., some varieties were more resilient to weather changes, some easier to pick. Another example are 2-D apple and cherry trees which were adopted to improve productivity but also greatly improve safety by reducing the need for working at height, lessening risk of eye injuries, providing clearer rows.



A need for more collaboration. Across the sites, community was fostered in various ways. Some found it within their organisation, others found this connection over the fence with neighbours. Information, equipment, and experience was shared. It was important for transfer of information but also perhaps for improved wellbeing. More collaboration throughout the sector was generally seen as a positive thing and was wanted. This included labour sharing and collaborative resource creation particularly with safety material.



The **COVID-19 pandemic** impacted organisations in various ways. Some managed to make it through peak season before lockdowns or outbreaks. Some did not and many were exhausted. Restrictions required reorganisation and new ways of working, including recruiting new staff who were often inexperienced or unfamiliar with the work. Businesses were required to think creatively/differently about worker incentives and conditions.



There are some **large players in the market/supply chain** who dictate standards and others who have control over IP and selling rights. Also,

local larger companies often set the bar for health and safety, and wellbeing systems but they also have the resources to do so. Small and medium sized businesses do not always have the resources.



The uncertainty and extreme nature of the **weather** caused a lot of concern for organisations. Managers indicated they often worried about the impact of weather on the crop and all the flow on effects from this. It made working conditions very difficult at times.



Māori culture and values were discussed with stakeholders throughout the site visits in interviews and during public engagement. In our initial engagement we heard how Māori values guided an approach to horticulture. This included protection of the land to ensure sustainability and health for generations to come, a focus on the people including caring for the staff you have and designing new developments with people at the centre, and a concern for what is left behind.



Figure 4.24: Workers picking vegetables in the rain, in a wet field

Case studies from the site visits

Given the systems approach that underpins this project, it was determined that context needed to be provided around two issues, both of which stood out during the site visits. The first expands on external factors, the increasing need for pastoral care of workers and the pressure that results on managers. Secondly, the RSE workers have specific conditions under which they work and so this has been discussed below.

Worker Care

While on site, we saw the impact of external or societal factors on horticulture workers. In many regions there is a lack of housing, increasing living costs, insufficient mental health services, and a lack of social support to help people stay in work. Consequently, some workers were reportedly showing up distracted, exhausted, distressed, and unwell. Keeping workers healthy and safe at work while they face these pressures was taking a toll on managers who themselves were dealing with these issues.

Worker welfare was front of mind for many managers. They knew that the stress from external factors was intensified by work in extreme weather, hard physical work, and long hours. Managers, owners, and operators wanted to find ways to help. Some were building houses to accommodate workers, others brought in external mental health experts, and some took food to workers when they were sick. Adjustments to work schedules, offering childcare solutions, and finding technological solutions to physical tasks were also discussed.

Many we spoke to understand the link between the pressure and worker recruitment and retention. Implementing solutions made workplaces more attractive and kept workers there longer once hired. Further, the next generation of horticulture workers reportedly have expectations of improved working conditions, flexible options and increasing advancements in technology.

Relying on managers and individual organisations to fill the gaps of an ill-functioning system is unsustainable. Changes are needed at all system levels to strengthen the resilience of the system and ensure the necessary social structures are in place to support those working in horticulture.

Recognised Seasonal Employer Workers

RSE workers arrive from predominately the Pacific Islands and their visa allows for work with specified employers in horticulture, who are responsible for their care. While the workers we had access to reported fair treatment, and had reportedly good wages, the researchers are aware that there is a potential bias due to who let us talk to their workers.

The request to visit generally went via owners or those within the networks of HortNZ staff, which could mean those we spoke to are likely sector leaders. On two of our three visits we had a representative from WorkSafe with us who took the time to explain their Puataunofu programme, in the workers' first language.

The workers said they were able to ask for things they needed, had good accommodation, and said they were comfortable with the wages they received. We visited two purpose-built RSE accommodation blocks, which had large, heated living spaces with facilities such as SKY television and pool tables. The kitchens were large and clean, and there was space for outdoor activities (shown in Figure 4.25 and Figure 4.26). Workers reported sleeping two people to a bedroom and having access to vans for personal use as well as work.

Workers were reportedly encouraged to participate in activities in their free time, including taking trips and participating in local sport leagues. We saw examples of respectful and friendly relationships between managers and RSE workers. Overall, the facilities we saw looked comfortable and spacious.

Recent secondary data sources from the media suggest variability in RSE workers' experience. It is important to note that this report is not an exhaustive review of the RSE scheme and worker treatment, and as such, does not capture a wide enough variety of stories to make generalised judgements on the RSE scheme in New Zealand. Participants in this research said they know that some mistreatment of RSE workers does occur, but it is only a few employers.

It was also stated many times that horticulture in New Zealand could not work without RSEs. They are important and essential source of labour and were highly valued by many.

There are conditions about RSE work which could expose them to additional vulnerability. These include one group member translating for the rest of an RSE work crew, a motivation to earn as much money as possible while in New Zealand, a strong motivation to return the following season, and living away from home. These factors occur not only among RSE workers and therefore, could be considered when strengthening the resilience of the whole horticulture system.



Figure 4.25: RSE accommodation facilities block at Dunstan Hills



Figure 4.26: Hortus RSE accommodation in Blenheim

5. HARM MAPS

5.1. Introduction

This section presents the findings using a socio-technical approach. This approach is based on the premise that there is no single or root cause when harm occurs, but that many factors interconnect to result in harm. Recognition is given to the interaction between these factors because these interactions do not happen in isolation (Tappin, Bentley & Vitalis, 2008). Therefore, intervention cannot focus on individuals or individual-level behaviour change alone. Reducing harm and optimising the system requires focus and change across all levels.

AcciMaps (Rasmussen 1997) are a way of showing how harm can result when many factors across the system interconnect. The maps, as used in this project, show a multi-linear process emphasising the influence different factors can have on a normal work situation. The goal of these maps is not to identify or assign blame but to capture where person/organisation and structural components of the system are underperforming, helping to identify where to make improvements and avoid harm occurring downstream.

There are four maps below. The first is a Stakeholder map, the second is a general map showing a thematic summary of the systemic factors. Two AcciMaps follow to show a series of commonly reported scenarios to help identify which systemic-factors are interacting to cause harm. Each AcciMap is accompanied by an evidence-based but hypothetical narrative to aid in reading the map.

To read an AcciMap, identify the blue box(es) at the bottom which relates to the incident outcome. The map is a vertical chart, with each box showing factors and influences from different levels in the system. Each level up is theoretically further away from the worker and incident than the level before. The arrows join factors when relationships exist.

It may appear after reading the AcciMaps that COVID-19 is the cause of many issues throughout the system. The data was collected during 2022, a time when COVID-19 and the related outcomes were front and centre of people's minds. This is reflected in these maps. Although it has caused significant disruption, many of the issues existed prior to the pandemic and were exacerbated during this period. This is not the first global disruption and is not likely to be the last. Learnings from this pandemic will strengthen the resilience of the system in anticipation of future events that may have similar level of impact.

5.2. Stakeholder Map

The aim of a systems approach is to steer focus away from individuals and instead show the nature of work, who is involved, the structural arrangements that influence behaviour, and how tasks are carried out. A stakeholder map, Figure 5.1, represents those who make up the system and at which level in the system they sit. This map sets the scene for the upcoming AcciMaps as it shows the location of the stakeholders (person/role/organisation components) and the level of their influence and decision-making impact.¹

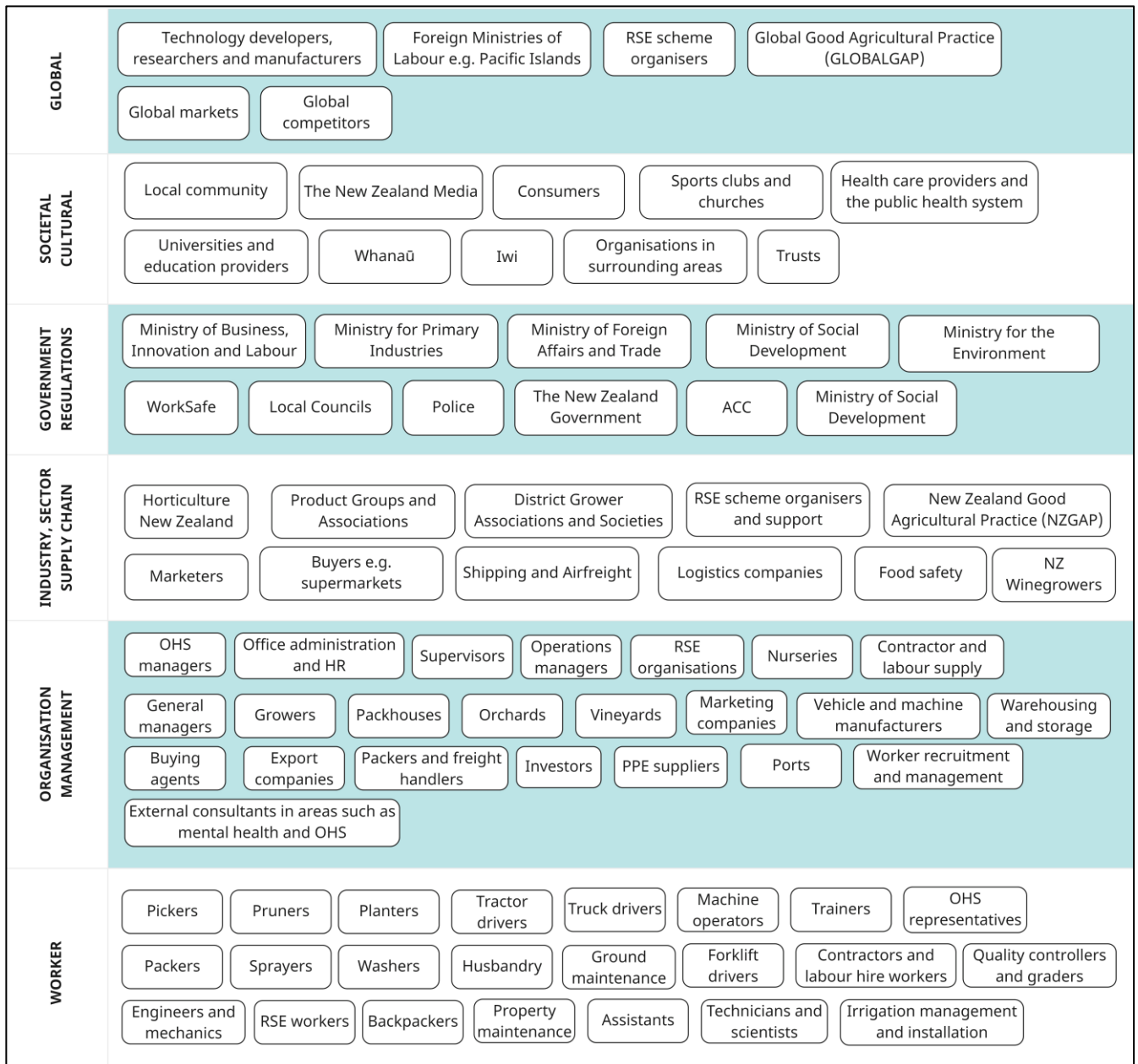


Figure 5.1 Actor map showing actors in the horticulture system

¹ This map contains the stakeholders within horticulture. There are many other non-person contextual factors that occur within the horticulture system, including COVID-19, and these have been integrated into the subsequent AcciMaps.

5.3. General map of themes from across the system

Figure 5.2 is a map showing a thematic summary of the causal factors that were identified in the data collected from Stage one. All of the data explained earlier was coded and the themes that emerged were then placed at the various system levels as shown on the map below. The purpose of this map is to identify the conditions that have been suggested as contributing to harm outcomes in horticulture.

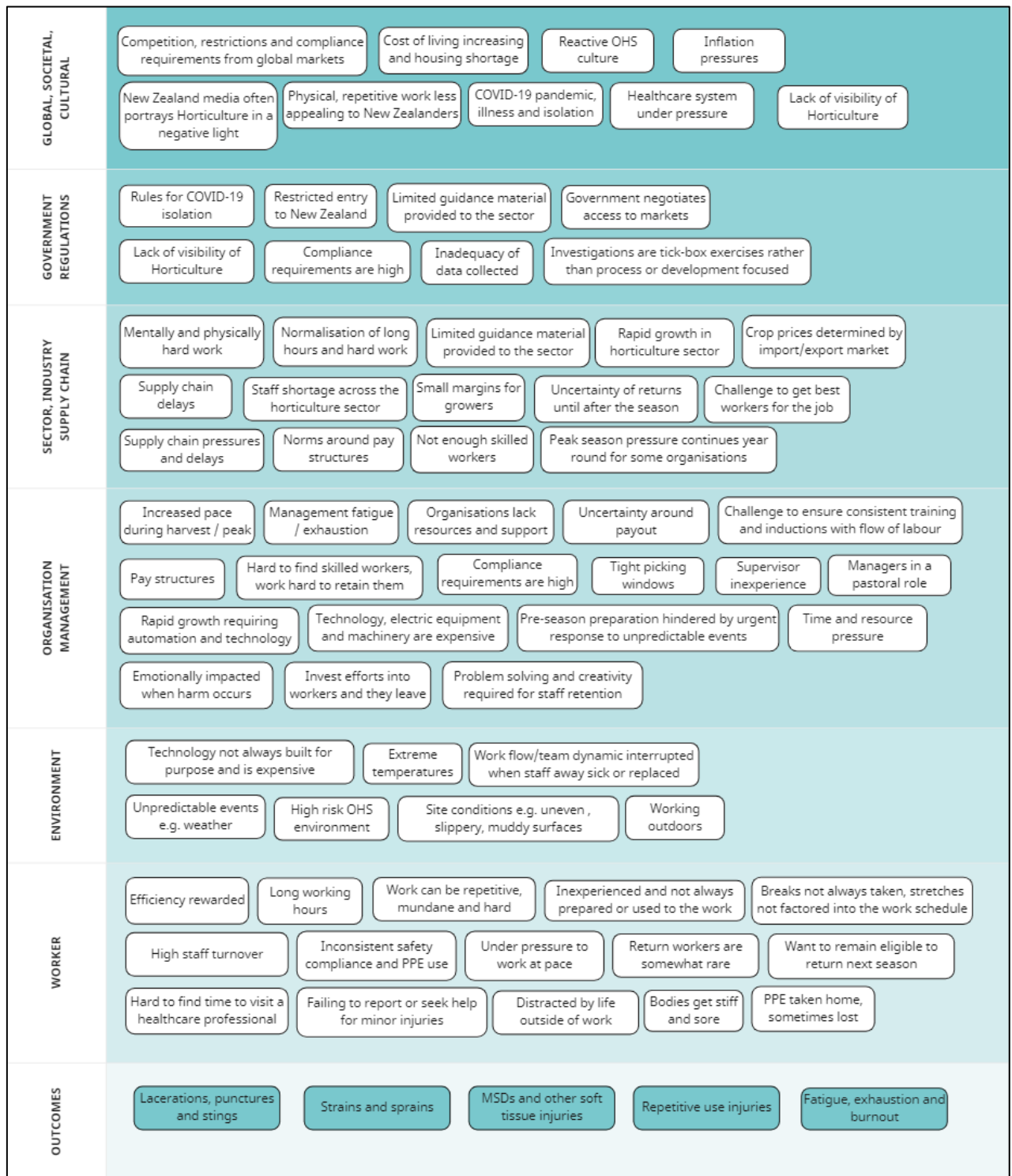


Figure 5.2 General map showing causal factors from the horticulture system

5.4. AcciMaps

Figure 5.3 and 5.4 are two AcciMaps with accompanying narratives outlining evidence-based but hypothetical scenarios. The maps show how potential factors at different levels can impact work throughout the system and ultimately lead to physical and/or mental harm. There are five other AcciMaps shown in the separate map pack, presenting a range of other common harm outcomes from the data.



Figure 5.4: Electric secateurs for pruning fruit trees. They require less force to create the cut



Figure 5.4: workers grading potatoes in a packhouse. They change sides after each break

5.4.1. Occupational overuse injury

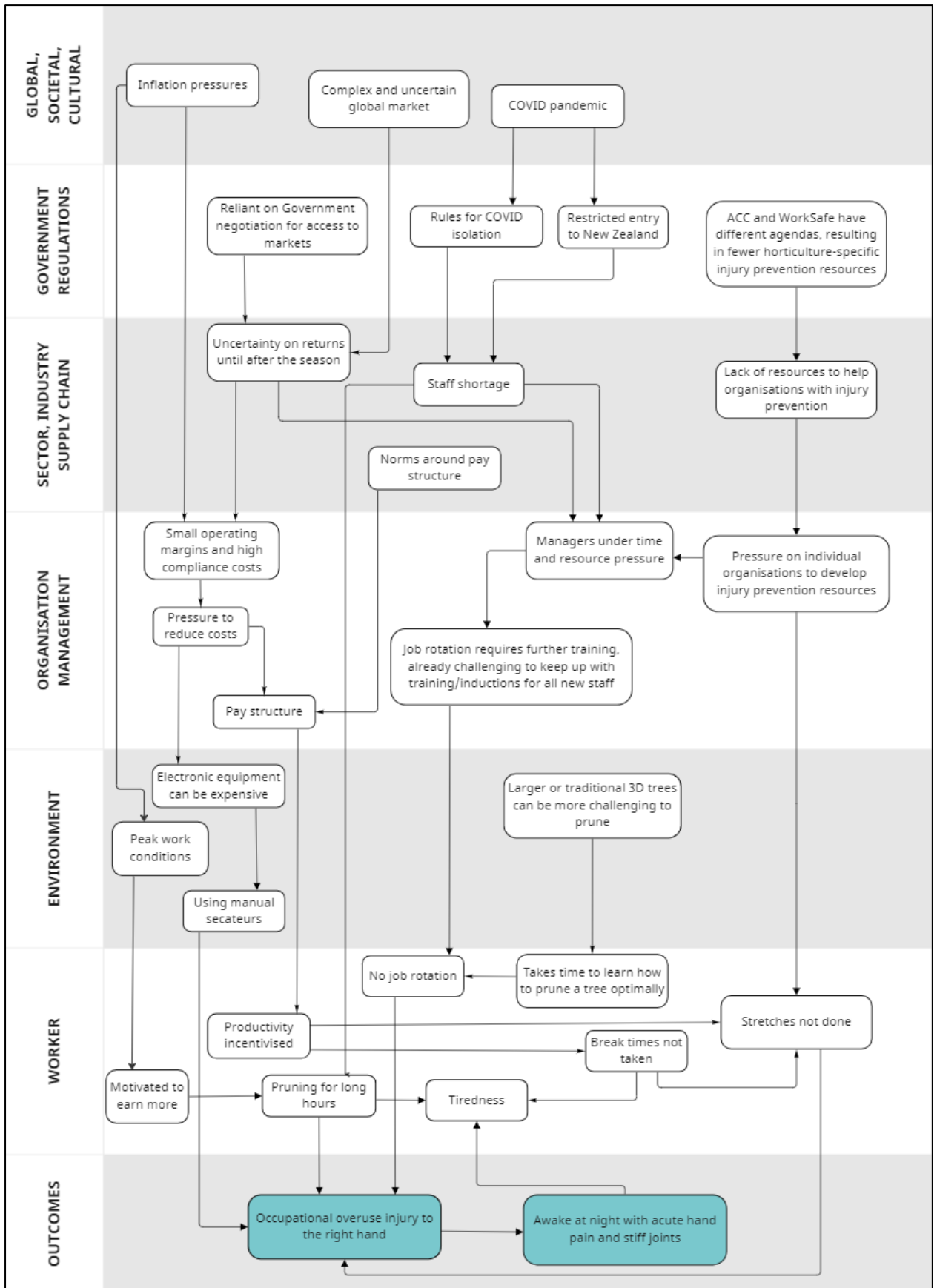


Figure 5.5 AcciMap showing causal factors leading to occupational overuse injury to the hands

Occupational overuse injury: Narrative

A worker on an orchard has presented with acute hand pain and stiff joints. The acute pain is the result of a repetitive strain injury. Long hours of pruning with manual secateurs have contributed to this injury.

The worker was unable to rotate to another job after first experiencing the hand pain as most, if not all, other jobs on site require the use of a worker's hands. Job rotation also requires extra training and potentially time off-site. The time away and price of the training adds cost to already tight margins.

The worker had been pruning traditional 3D trees (or larger trees). They must be pruned correctly to ensure optimisation of the yield and it takes time to build this skill. The larger trees are often picked using platforms which require a qualified operator. Losing key people to injury, such as supervisors or qualified people, can add pressure to the whole work system. People often work in teams, who know how to work together and where there is a heightened sense of comradery. Individuals may not want to let the team down by rotating out or taking time off for injury. This may be one reason why injuries are underreported, and job rotation is low.

The worker did not stretch (including their hands) during their shift, despite supervisors suggesting they do so. A contributing factor in this was the desire to maximise earnings and as they are paid per tree, they did not consider taking a break. Guidelines were not available from government or sector sources on good practice around stretching and injury prevention which put onus on the organisation to develop their own practices. This was challenging given the time and resource pressure management were under.

In this case, pay is based on productivity within the sector and is likely influenced by operating on small margins. Inflation pressures have led to increased running costs for organisations and increased living costs for everyone. The pressure is on both the organisation to keep costs down, and the worker who may work longer hours during the peak pruning period to maximise their income.

The staff shortage within the sector adds stress and pressure to managers, owners, and operators as well as workers who may have their workloads or team dynamics altered. A lack of access to the international labour pool and the local workforce impacted by COVID-19 isolation rules have led to a staff shortage. Workers are required to remain at home if any symptoms appear, and at times whole families working in the orchard are unavailable for work. Although COVID-19 has had a huge impact on the sector over the past few years, it has highlighted weaknesses in areas of the system that have not previously been considered.

There remains a backlog from the COVID-19 pandemic and it's placing pressure on the supply chain. There are delays in receiving and sending goods and in getting the right machinery needed for the job. The global market is complex and uncertain, and the culmination is resulting in continued pressure on all in the sector.



5.4.2. Manager fatigue and exhaustion

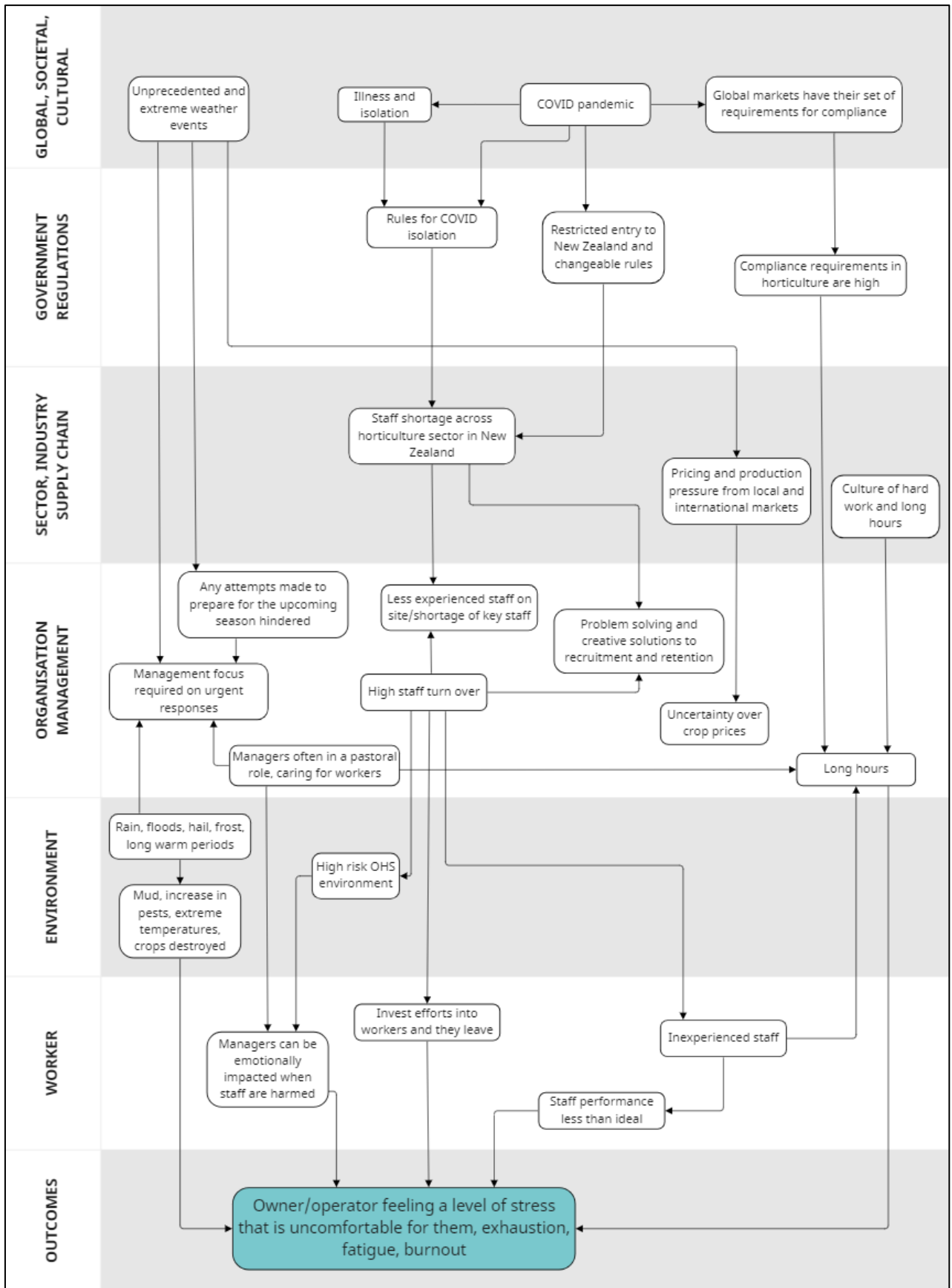


Figure 5.6 AcciMap showing the causal factors leading to manager fatigue and exhaustion

Fatigue and exhaustion: Narrative

During the previous two seasons, managers have been required to handle many unprecedented events. The COVID-19 pandemic coupled with extreme weather events such as flooding made any attempts to plan ahead near impossible and many were operating on survival mode.

Poor weather has led to lost crops and impacted the percentage of produce at export quality, flooding the local market and influencing the price received. Pressure is placed on the growers from the supermarkets who react when prices are too high. The reality is many growers had to walk away from crops due to poor weather or unavailable staff.

Management focus was required on immediate and urgent responses and at times required them to step into pastoral roles, caring for their workforce. Many managers were emotionally impacted when staff were harmed, ill, or struggling which contributed to their mental load. A loss of key staff also meant the flow of work was disrupted as there weren't always replacements to step in.

Similarly, efforts were going to training and inducting new staff only to have them leave or fall ill. Staff inexperience and turnover meant they had extra work to do. Additionally, they were having to be creative and find alternative labour sources during a time when the borders were closed. We heard how difficult it was to think creatively and strategically when under pressure and feeling so tired. People are feeling the burden of the pandemic, worrying about the health of their staff, families, friends, and the future of their business.

Some told us about the culture of long hours and hard work in the sector. The long hours were a result of the urgent responses, problem solving, staff shortages and not having enough skilled people to do the jobs. However, many also explained that this is the nature of this work, and it always has been. There is reportedly a culture of just wanting to get things done.

The compliance cost and burden on growers was reportedly contributing to the stress and pressure they felt. Sometimes the crossover of requirements made compliance difficult. Further, sustainability requirements are increasing, for example in Europe where there is a demand for home-compostable labels. Meeting this requirement means trying to understand the individual countries' requirements, developing new labels and new machinery to apply them. This costs, and requires time and investment.

This map illustrates the system-wide pressure on managers, owners and operators leading to situations of stress and compromised mental health.



6. HARM HOTSPOTS

6.1. Introduction

This section brings together the harm hotspots which emerged during the mapping process. We have called the place where factors interact on the maps, a harm hotspot. They are expanded on below to show which factors throughout the system are leading to harm. By identifying these points, we are better able to see where interventions may be most effective and efficient and prevent harm occurring in the first place. Contemporary Human Factors research tells us that addressing higher level hotspots or intervening at the higher system levels may result in a wider impact than focusing on individual behaviour change alone.

Perhaps most importantly, these harm hotspots should be considered when any future interventions are designed. When changes are made to one part of the system, they will inevitably impact other parts of the system too, and the success of any intervention will depend on the environment in which it sits.



Figure 6.1: Forklift unloading truck. Interactions between vehicles and workers was a common cause of concern for many

6.2. Harm hotspots

Figure 6.2 shows the harm hotspots identified in the data collected from this project stage. Overall, they fit within seven key themes. While these themes are not exclusive the groupings address different ways in which harm is occurring. Further detail of each theme has been included below the figure.

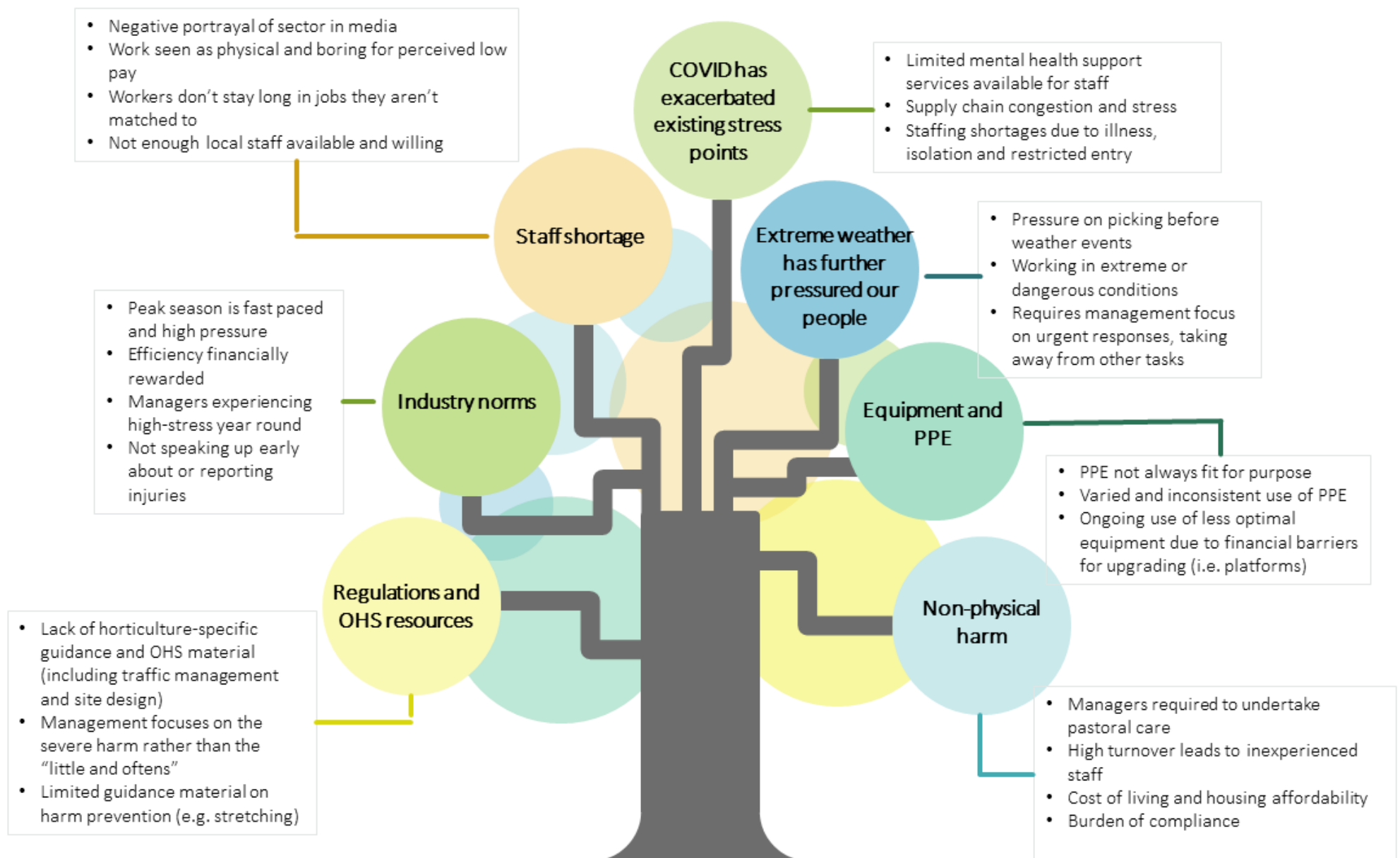


Figure 6.2: Harm hotspots

Staff shortage: The sector is reporting significant staff shortages which are contributing to physical and mental harm in various ways. The sector reported that often when they do find staff, they do not stay long. The media's negative portrayal of the sector and the physically hard nature of the work was reportedly contributing to a shortage of local workers.

The constant flow and changing of staff (including temporary, migrant, backpackers, contract/labour hire workers) means workers may be inexperienced, ill-prepared for the physical nature of the work, and not always confident to speak up. Inexperience and training requirements can contribute to mental harm among managers and can lead to negative safety outcomes for workers. Further, if workers are not matched to the task, they may leave early. For example, a worker needs to be tall enough and have the strength to stack boxes.

Regulations and OHS resources: A common frustration was the lack of horticulture-specific guidance material available on health and safety including injury prevention and standard operating procedures. Larger organisations with the resources were developing their own materials, including site designs, traffic management, procedures, and training programs. The lack of guidance material can lead to a variation of OHS standards across the sector and inconsistent OHS protection for workers.

We heard from managers that a lot of time was dedicated to preventing severe harm (e.g., risk of entanglement in equipment). The "little and oftens" (e.g., sprains and strains) prevention often took a backseat despite these injuries being most common. These injuries were not always reported and if not treated early were found to lead to more serious outcomes.

Sector norms: Horticulture as a sector has a culture of hard work. Peak season has always been fast paced and high pressure. However, in recent years managers have reportedly experienced this pace and pressure all year round. The data highlighted a lack of downtime and little reprieve from the stress.

Throughout the sector, financial incentives for efficiency were rewarded. These include incentive-based pay for picking, through to owners receiving higher pay-off for their crop. Incentives at the worker level were often designed to ensure a good wage while maintaining breaks and a reasonable pace. However, it was reported that when on incentive-based pay, workers worked through breaks, overfilled buckets/crates and took steps to be as efficient as possible, at times at the expense of health and safety. Different organisations also reported a large variety in the structure and estimated earning potential of different incentive-based earning schemes. Some did a simple per weight-based measure, others paid minimum wage plus a quality/quantity incentive. These were reported to hit a variety of targeted average hourly rates, and one site reported that their workers could be earning \$14 an hour over minimum wage when the picking was good.

It was also observed that there is a culture of horticultural work hurts; everyone has sore muscles and does not speak up early about niggles (e.g., a consistently sore back) and do not always report injuries. Underreporting of injuries was commonly mentioned.

COVID-19 has exacerbated existing stress points in the system: One of the clearest findings we heard was that those in horticulture have had a tough couple of years. When looking at the wider influences impacting their work, many reported limited staff availability (due to illness, isolation rules, and restricted entry to the country), supply chain issues and a lack of available support services. While these issues existed before the COVID-19 pandemic they are exacerbated during this time. The impact has resulted in hard decisions such as which crops to pick and which to leave.

The accumulative pressures from staff shortages, closed borders, and supply chain pressures meant that, at times, work needed to be done with fewer people, at pace, or during long days. This was leading to fatigue, mental health pressure, and other types of physical harm such as strains and sprains. Worker's may also have come to work distracted due to family concerns.

Extreme weather has further pressured our people: In the previous 12 months the number of significant weather events has been high. These events have had a significant impact on the sector. Those we spoke to described high pressure situations to try and get crops picked before weather events arrived, working in extreme and sometime dangerous conditions, and a large clean-up afterwards. These situations took focus away from other tasks. Some also discussed the damage to the roading network from storms which meant their produce could not get to market.

Again, this led to working at pace, for long hours, and in sometimes unsafe conditions. Working at pace can mean that harm occurs from misjudgement, inattention, and fatigue among other contributing factors. The uncertainty of the damage cost can also lead to stress among growers, owners, managers and/or operators.

Equipment and PPE: While technology exists that can reduce harm within horticulture, the cost of upgrading was a barrier for many. For example, electric secateurs are useful for reducing hand injuries. However, a set is several thousand dollars and requires regular maintenance. Many sites with ladders for picking also discussed the desire to move to picking platforms, however the cost made it unfeasible for them. It was also clear in speaking to people that PPE usage is varied and inconsistent both within, and across organisations. Others described situations where PPE was not fit for purpose. Improper use of PPE can expose workers to risk of harm, as can PPE that does not work as it is supposed to.

Mental harm: It was common for managers to undertake pastoral care of staff. Many managers also noted the burden of compliance (e.g., market access, food safety, human resources and health and safety). The mental load for managers from the high turnover of staff resulted in inexperienced staff, who needed more supervision and training. Participants from all levels discussed the high cost of living and housing affordability weighing on them. The mental overload experienced by many meant that concentration and turning up fit for work was sometimes compromised.

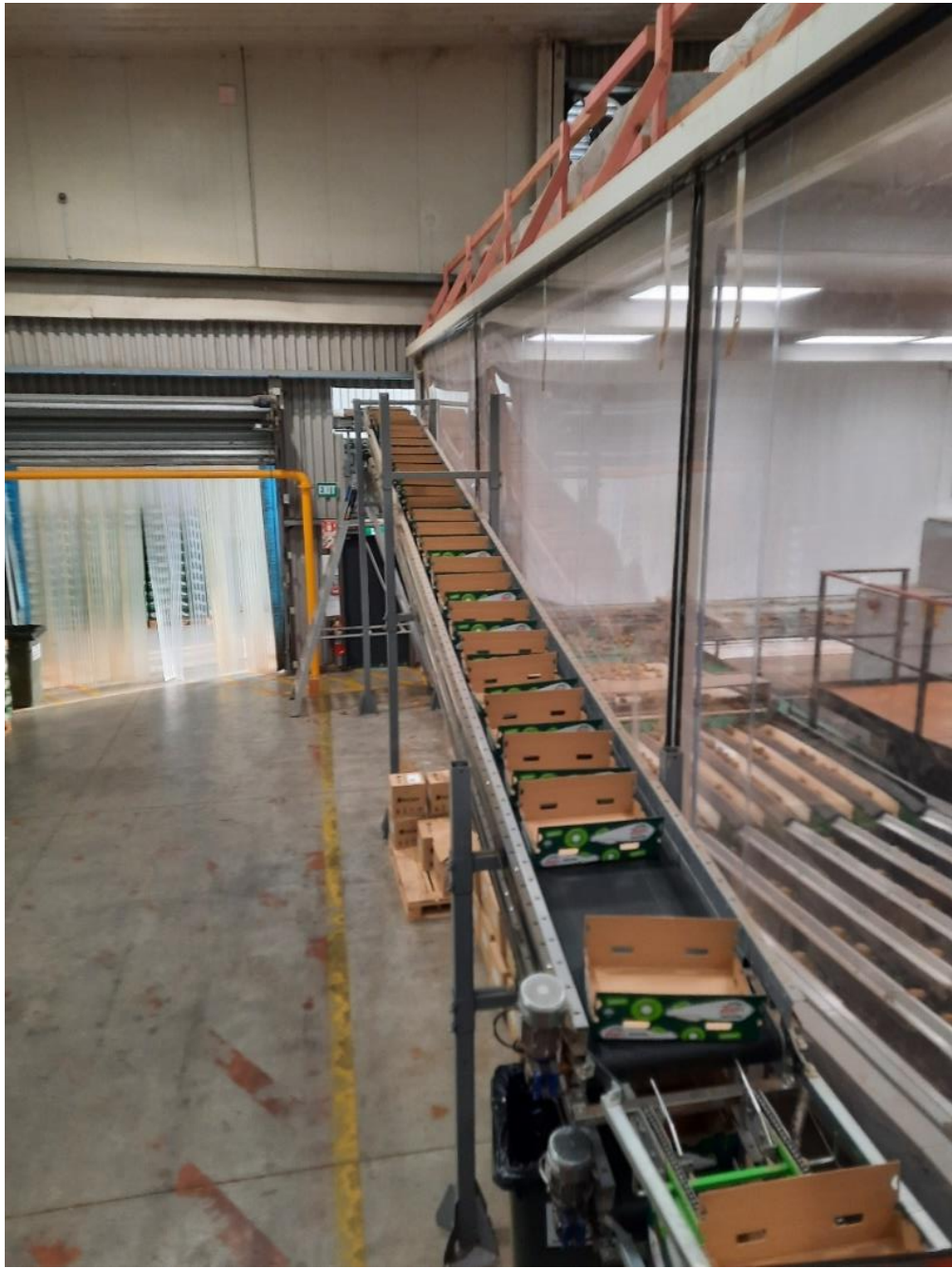


Figure 6.3: Boxes entering a packhouse via an automated line

7. BUILDING SYSTEM CAPABILITY

7.1. Introduction

While previous sections provide a detailed overview of the harm occurring and the higher-level systems factors involved, the ultimate goal of the Understand stage is to build horticulture system capability. This section draws on the findings and discusses areas for building and strengthening the horticulture health and safety system.

7.2. Implications for building system capability

This may be an important time for the New Zealand horticulture sector and an opportunity to build on current efforts to reduce harm without having to respond to crises like some other sectors. Overall, the horticulture sector has worked hard to reduce the risk of large harm events, however, there is still room for improvement. The COVID-19 pandemic has given a hint of what can suddenly happen and how external forces can cause upset in the system. The key is to reflect and learn, taking the next steps towards sector health and safety maturity.

Throughout the findings we saw wide variation in health and safety practices and distributed or fragmented operations. To build the system's capability it will be important to gather examples of the good work demonstrated and make health and safety more collective, while considering where the gaps in the system are.

7.2.1. Data and knowledge sharing

There are current gaps in knowledge of harm in the New Zealand horticulture sector. More accurate and nuanced data would ensure a more complete picture and the ability to build system capabilities. The following observations have been made about data and knowledge sharing:

- While the **data provided by ACC** has been useful in understanding harm in horticulture, more nuanced information would contribute to more impactful interventions. For example, days on compensations is recorded as a binary variable, whether a client requires some or all their hours covered by ACC. If it were possible to record what percentage of their time ACC was compensating, it would help describe the return-to-work pathways being utilised.
- The **data collected should be horticulture specific**, and not aggregated with agriculture. While these sectors have some similar work activities, clear data on horticulture injuries and illnesses would again allow for more nuanced responses. The interchangeable use of agriculture and horticulture in various data sets suggest that the sectors are perhaps not clearly defined or understood. Those in the sector see horticulture as generally more labour intensive than agriculture with a greater need for a large increase in staffing over harvest.

- This project was designed to gather data from the sector and begin to put the capabilities in place for **repeated data collection**. It will be important, for example, for the sector to collect annual survey data with the inclusion of contextual and upstream factors, to track system performance. Continued site visits would be a way to gather worker insights in a more qualitative way and gauge the effectiveness of harm-reducing interventions.
- Efforts to **understand the size of the sector** are reportedly happening. Knowing the number of growers in New Zealand, for example, will help us understand the scale of the population in focus.
- The sector is already **addressing harm in innovative ways**. Collecting this information and feeding it back to the growers is one way of strengthening the collective capability of the system. Participants shared a desire for more collaboration. Many wanted more harm reported at the sector level and data that helped benchmark them against comparable organisations.
- **Collaboration and knowledge sharing** may help bring consistency of health and safety practices across the sector, particularly for small to medium enterprises who may not individually have the resources. This will ultimately impact and strengthen the wider horticulture system.

7.2.2. Sector norms

Building a sustainable system will require a review of current sector norms. This is a difficult task. There may be resistance to such questioning because work patterns are established across generations and are, perhaps, required to get the work done. With the rapid growth in the sector, it is an opportunity to be proactive and put the systems in place that make the work more sustainable and attractive.

A positive sector norm is the practise of ‘looking over the fence’. This natural behaviour should be expanded and formalised, possibly through an information sharing platform or system.

7.2.3. Workforce development and maintenance

Staff shortages across the sector were linked to harm outcomes. Prior to the COVID-19 pandemic, a lack of local workers was addressed by a supply of international labour. The pandemic forced organisations to be creative about recruitment and retention. It is important to now build on what was learned. Collaborative efforts and innovative solutions to the staff shortage will require a certain level of maturity across the system and a co-ordination of the labour supply through sector-leadership so that sector competition does not deter development.

We only heard second-hand information about why people were leaving. While we heard reasons such as ‘people could not handle the work in horticulture’, there are likely more factors to consider. Engagement with workers who leave would help us understand what is leading to people leaving and how these issues might be addressed.

RSE workforce

It is not in the scope of this work to review the RSE scheme (or any other employment scheme), and its effectiveness at keeping workers safe. However, understanding and addressing any potential vulnerabilities this group experiences may also improve the working conditions for all. The recently announced government review of the RSE scheme is an opportunity to better understand how the scheme is being implemented on a larger scale and provide solutions to protect the labour for New Zealand horticulture.

7.2.4. Positive safety culture

As mentioned earlier, this is an important time for horticulture to build on a relatively safe environment by reflecting, learning and taking the next step towards sector health and safety maturity. It will be important to gather examples of improved positive safety culture and make health and safety more collective in the sector. Organisations with a positive safety culture were engaging in the following actions, among others.

- Toolbox meetings and/or regular OHS meetings and conversations
- No-blame culture, workers were empowered to speak up
- Increased focus on building trust among the workforce
- Transparent communication
- Feedback loops, ensuring information was shared from the top down but also from the bottom up
- Early intervention of injury and support for reporting
- Trying to make the work easier where possible
- Use of WhatsApp or another app/tech to communicate. Information was spread immediately and OHS concerns uploaded in real time
- Investigation wider than the individual when an incident occurs e.g., the Five Why's, PEEPO, Safety Differently.
- An ongoing curiosity for how things can be done better.

7.2.5. Safety equipment and PPE

There appears to be varied and inconsistent use of PPE and equipment throughout the sector. Not everyone agreed on best practice use around certain types of equipment, there is often a large cost involved, and not all PPE was designed with horticulture in mind. These factors make it difficult to recommend one option over another.

Refinement of equipment and development of automated solutions are continuing. There is a role for the sector in feeding information to designers and manufacturers to ensure safety equipment and PPE are functioning more suitably. Developing consistency in guidance, standards, and practices throughout the sector is a logical next step.

7.2.6. Mental harm

There is a growing awareness in the sector about the impact of mental harm. Previous sections have shown examples of the stress, pressure and mental overload experienced, particularly

among managers, owners and operators. Initiatives such as Farmstrong are beginning to address this, and these will be important to surmount external pressures such as the increased cost of living, this is likely to require increased and continued focus.

Support for mental health issues needs to be normalised and accessible. The COVID-19 pandemic highlighted a lack of social and mental health support at both the organisational and government levels. While larger organisations reported having services such as employee assistance programmes, smaller organisations relied on publicly available services which were difficult to access. The pastoral care required of managers needs to be acknowledged if nothing else. They (and others) are carrying the weight of an ill-functioning support system. Managers are stepping in and doing roles that many assume should be completed by government agencies.

7.2.7. Weather

The recent extreme weather conditions brought uncertainty, loss, unsafe working conditions and delays along the supply chain. A predicted increase in future extreme weather events means that a level of resilience needs to be built into the system. This is happening already. Many within the sector were engaged in preventative planning, and there are practices worth sharing.

Engagement with local councils and government agencies may also strengthen the resilience of the system. Improved infrastructure such as roading may help alleviate pressure during an already stressful time.

7.2.8. Regulations and OHS resources

Compliance requirements can often contradict one another and are not always designed with the New Zealand horticulture sector in mind. Compliance required a lot of attention and took focus away from activities such as health and safety-related matters. Health and safety inspectors were reportedly taking a box-ticking approach and the managers, owners, operators wanted someone they could discuss more process-based approaches with. For this reason and others, the sector asked for more sector-specific guidance on health and safety and improved relationships with inspectors.

7.3. What's going right? How horticulture is preventing harm

During each of the data collection activities we heard a great deal about all the efforts the sector is already taking to reduce harm. This section covers these initiatives and programs with the goal of sharing this information to a wider audience and exposing those that could be scaled up for sector-wide use. There was excitement in mixed groups when an innovative solution was mentioned. Many of the activities listed below are undertaken by the larger organisations who have available health and safety resources.

Occupational health and safety videos and materials for training: Several larger organisations discussed alternative training options instead of the written standard operating procedures. It reportedly helped to overcome literacy barriers and provided a different medium for learning.

Information packs to take to healthcare professionals: Some organisations are creating information packs which employees can take to their healthcare professionals when they are injured. These packs provide the healthcare professionals with a list of alternative duties the employee could do if they were deemed to have an injury which required time off their regular tasks. The packs were in direct response to workers being given time off by healthcare professionals who organisations felt did not understand the nature of their work, or the option of lighter duties.

Matching the worker to tasks: Organisations talked about the importance of matching workers to the task. They discussed the importance of understanding the physicality of jobs but also the mental requirements too. For example, a quality control job is a detailed task which takes a lot of patience. Similarly, the person who is lifting full 20kg boxes and stacking them needs to be tall enough to reach the top of the stack.

Strengthening and building safety culture within organisations: We saw and heard about the various actions that organisations were taking to strengthen and build a positive safety culture. A culture of safety was seen to be fostered through constant and regular communication which included toolbox meetings, walk arounds, and frequent opportunities for workers to speak up. Where workers may not have felt comfortable to do so, some organisations had worker representatives and other channels for participating. We heard the importance of allowing workers to speak up without punishment. Feedback throughout the organisation (both from the top down and bottom up) was also thought to be important in fostering a positive safety culture.

In some organisations, health and safety matters were responded to with haste and as a priority with any needed changes being made accordingly. The workers in such cases reported feeling heard and valued, and improvements to their working conditions made work easier. Many organisations fostered a sense of family and suggested that the team dynamics improved their working experience. Some organisations appeared to genuinely care about their workers and each other. Relationships within teams or organisations helped improve wellbeing.

Improvement in crop varieties, growing and pruning methods: Many crop developments have been made to improve the way the work is done. For example, 2D trees are easier to pick and prune, and work around. Broccoli that snaps easily results in workers not needing to use knives to pick them.

Finding technological solutions to reduce musculoskeletal strain: Organisations reported investing in technological solutions to reduce heavy labour tasks such as stacking boxes. This was viewed as a way to make the sector more attractive to work in, and provide more highly skilled jobs (e.g. engineers to service and maintain equipment rather than manual box stackers).

Early intervention to reduce severity of an injury: Some organisations had an early intervention plan/policy in place. They had pain checklists for staff, with the goal to reduce the risk of an injury progressing to the point where it needed time off work. The first step was usually to

review how people were completing their job and correct any incorrect movements or postures. In some organisations, physiotherapists came on site to assess and work with staff in pain.

Positive impact/learnings from the COVID-19 pandemic: The COVID-19 pandemic has put significant stresses on the horticulture sector. However, several innovations have resulted. Organisations discussed improved ways of working, including employees being much more educated about the importance of hand washing. While the border closure has exacerbated labour shortages, organisations reported using innovative methods to attract and retain staff. Organisations were reportedly improving technology to entice younger workers and adopting working patterns such as flexible work shifts to accommodate a wider workforce.

App-based solutions to spreading information/feedback: Organisations of all sizes reported moving to apps for health and safety information as well as sharing and reporting any relevant hazards. These ranged from custom built solutions which recorded all health and safety information including standard operating procedures, to a group messaging chat where managers can quickly share information and request help as needed. Some of the apps integrated with payroll, and could record training expiry dates, as well as who was onsite at any given time.

Equipment to keep lone workers safe: The safety of lone workers was often discussed during the site visits. The context of lone work, often in areas with limited to no cell phone reception clearly weighed on people's minds. Some solutions discussed involved apps which allowed check-ins, and custom installed radio systems which provided communication to remote areas in a property. Other workers were required to have a booklet with GPS locations on them at all times.

Reducing fatigue: Fatigue was identified as a clear risk that organisations were looking to reduce. Solutions included encouraging pickers to not overfill buckets, investing in technology that made work less physically demanding, scheduling compulsory breaks when working outside in the sun, and training enough people to do the roles so that there is cover, allowing for appropriate breaks.

7.4. What the sector wants more of

During the data collection we heard about where the sector sees roadblocks in keeping their staff safe at work. The suggestions below are from participants and show what the sector thinks still needs to be done.

Co-ordination of labour: To address the labour shortage, the sector is actively seeking more co-ordination of labour. Some ideas for this included joint ventures for RSE workers, sharing crews among orchards and creating partnerships.

Information on how common injuries can be prevented: Those who had been in the sector for a longer period mentioned ACC resources that existed in the past. These guidance materials showed workers how to stretch before and after certain tasks. While some in the sector have

worked with physiotherapists and occupational therapists to create these themselves, there was a hunger in sector for more of these resources.

Harm data gathering and reporting at the sector level: Many organisations expressed a desire to be able to benchmark themselves against others in the sector using their harm statistics. Currently, the data from government sources is collated with agriculture, and private organisations do not share it. There was a desire for an anonymous way to participate in harm data sharing within the sector. Tools such as a yearly survey could be used to gather information of interest to the sector.

Well-functioning and better designed PPE: Organisations reported that some non-compliance issues with PPE was related to its design not being specifically for horticulture-related tasks. Those we spoke to in the sector expressed a desire for information on which PPE would perform better in horticulture, as well as equipment specifically designed for the types of tasks undertaken in horticulture.

Reduce ladder use: Almost every site visited talked about their work in reducing and eventually eliminating ladder use in orchards. Some discussed pruning trees differently to slowly bring their height down, and others have invested in platforms and hydraladas. Ladders reportedly increase the risk of injury while climbing and carrying. The sector was clear throughout this research they would like ladders eliminated. However, guidance is needed on how to do this. Not every organisation has the resources to invest in platforms and hydraladas nor does everyone agree that ladders should be eliminated.

Improved reputation and recognition in the media: On several occasions the sector's reputation and recognition in the media was raised. Many in the sector see the media as a roadblock in attracting workers due the negative coverage. The sector would like to see horticulture's reputation improved in the media.

Horticulture New Zealand to lobby the government on social issues: Participants suggested that HortNZ had a role to play in lobbying the government on social issues such as housing, improved social services and healthcare (particularly mental health services). The issue of limited accommodation was raised during several data collection activities. Many managers and owners understood that their workers were living in conditions that were below expectations, with housing insecurity and over-crowding. Some suggested this project had a role in highlighting the importance of adequate housing on harm outcomes. Further, improved support in mental health may reduce the burden felt by managers.

8. SUGGESTED NEXT STEPS

The previous discussion has led to five recommendations for next steps in building system capability to reduce harm in horticulture. These, shown in Figure 8.2, capitalise on work already happening within horticulture alongside new data collected. The suggested next steps are:

- 1. Collecting and sharing knowledge:** The system will be strengthened when there is consistency of health and safety practices across the sector – from the small operations through to the large. There is a lot of innovative work already happening in the sector, and creating channels for sharing, developing and distributing this information would improve health and safety consistency and maturity. Section 7.2.1 provides more detailed information on data and knowledge sharing. Sections 7.2.5 and 7.2.8 discuss how knowledge sharing could improve regulation, health and safety resources and equipment. Industry associations such as HortNZ have a key role to play in facilitating knowledge sharing across the sector.
- 2. Building on learnings from recent events:** While COVID-19 and extreme weather have caused a great deal of stress, there have been some resulting innovative solutions. Capitalising and building on these solutions will help increase system resilience. The events have reinforced the need to build system capability around mental health acceptance and access to resources. Sections 7.2.3, 7.2.6, 7.2.7 provide more detailed information about building on recent events.
- 3. Workforce development:** The AcciMaps, provided in section 5.4, show how system factors are impacting the ability to attract and retain staff. As interventions occur across the system, staff retention should be monitored and evaluated because other interventions could impact retention. Other suggestions relating to workforce development and maintenance are covered by suggestion two.
- 4. Māori engagement:** Some preliminary engagement with Māori has commenced throughout this study, laying the groundwork for further engagement. This would allow the sector to understand how Māori perspectives can be further incorporated in harm management, within the context of Te Tiriti obligations.
- 5. Building a positive safety culture:** Horticulture is experiencing a time of rapid growth which provides an opportunity to examine and understand the impacts of sector norms on system capability. It provides the sector an opportunity to be proactive and put systems in place that make the work more sustainable. It also provides the opportunity to guide the sector and organisations towards a more positive safety culture. Sections 7.2.2 and 7.2.4 provide more context to this.
- 6. Social and pastoral care:** The rapid growth within horticulture increases the need to build on systems to improve mental health and social support. The aim will be to reduce the burden of social and pastoral care on individual managers and organisations and improve the health of workers. Improvements in this area may also help attract and retain workers to the sector. Sections 7.2.2, 7.2.6, 7.3 and 7.4 provide more context to this recommendation.

Each step could lead to a range of interventions, depending how the sector may like to address harm hotspots, and grow in health and safety maturity. However, it will be key to design

outcome measures that can show progress within the timeline of this project. The use of logic models would help ensure the measures provide the best representation of impact.



Figure 8.1: Closed cab tractor with air conditioning and filters to allow workers to spray without the need for additional PPE

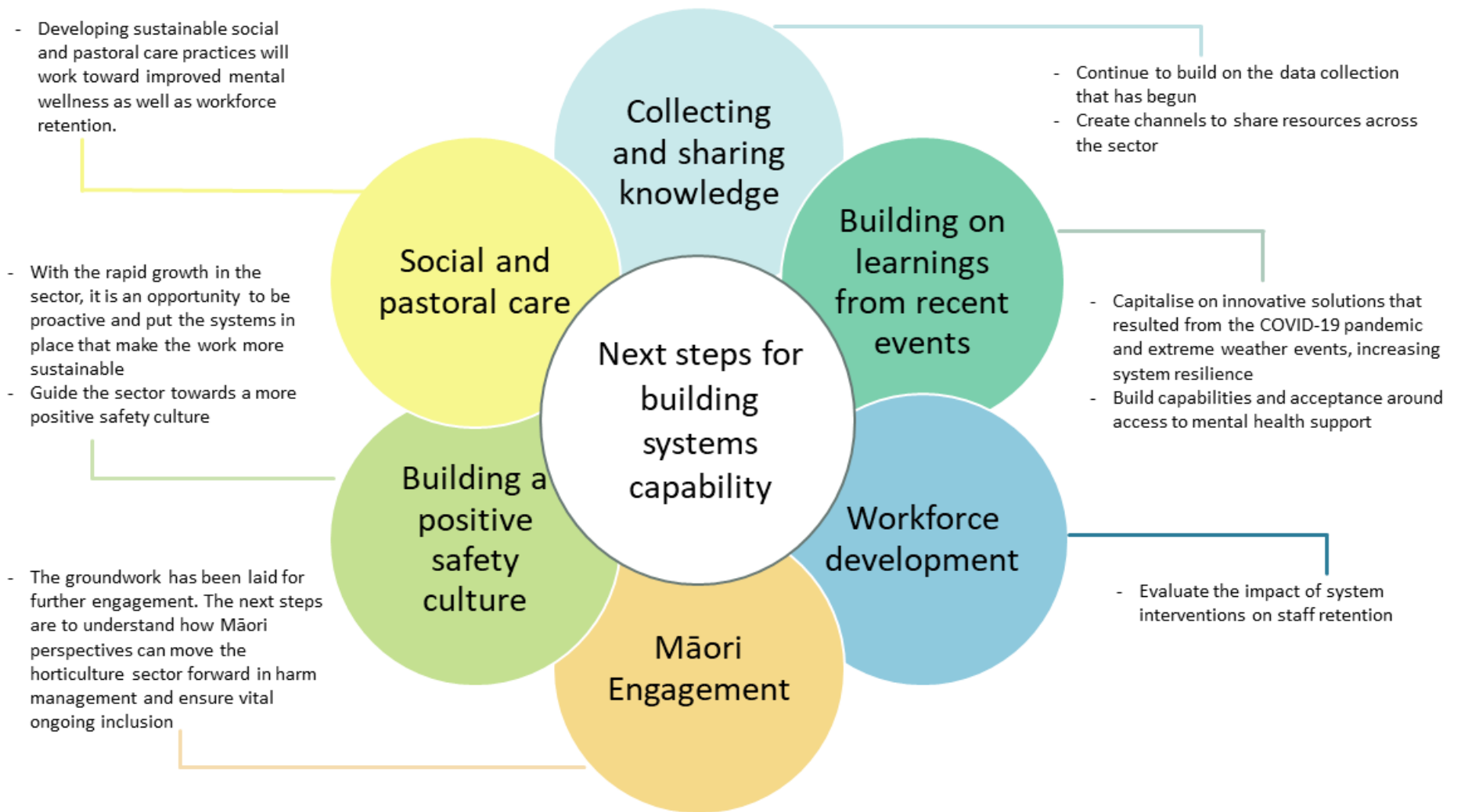


Figure 8.2: Suggested next steps summarised from the data

Research limitations

While every effort was made to gather a wide set of experiences within the New Zealand horticulture sector, the nature of the research project meant there are limitations.

- Participation in the research was voluntary so it is likely we engaged with those who spend time considering health and safety. It was outside the scope of this project to look for risky and dangerous working conditions and, as such, it was not part of the methodology. The experiences seen during site visits did not always line up with secondary data sources which have been acknowledged throughout the report where appropriate.
- COVID-19 restrictions made access to sites challenging. Worksites were under pressure during this time. The COVID-19 pandemic has been a focus of this report. Although it has posed a significant disruption, it has also highlighted some of the weaknesses in the system that will have been there prior to the pandemic.
- The sites were selected by HortNZ, and although their coverage is wide, it will have impacted the sample. Additionally, a member from HortNZ always escorted the researchers while on site, as did a representative from the organisation that was being visited. This may have impacted what was said, or not said, in various ways (including providing increased trust for researchers).
- Most of the survey respondents were in managerial roles, so the results will reflect the views of this group. To address this, worker perspectives were gathered on the site visits so the data should be read as a whole, rather than selected results from any one activity.
- Through this project, engagement with Māori has begun but further efforts are required, and have been planned, to gather further insights, input and knowledge. The New Zealand system is bi-cultural and it's essential to have a complete picture.
- While much care was taken to separate horticulture data from agriculture, in some data sources it was impossible to confirm every agriculture case had been removed. Any remaining issues with secondary data are likely minimal and it should be considered representative of horticulture.
- Due to some language barriers, some of the worker's perspectives were gathered through a translator.

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REFERENCES

- Ang, A, Lamm, F. & Tipples, R. (2008) The impact of stressors on the psychological wellbeing of New Zealand farmers and the development of an explanatory conceptual model. *Policy and Practice in Health and Safety*, 6(1), p. 79-96.
- Bailey, T.S., Dollard, M.F., McLinton, S.S., & Richards, P.A.M. (2015) Psychosocial safety climate, psychosocial and physical factors in the aetiology of musculoskeletal disorder symptoms and workplace injury compensation claims. *Work & Stress*, 29(2), 190-211, DOI: 10.1080/02678373.2015.1031855
- Employment New Zealand (2022). Previous minimum wage rates: Minimum wage rates from 1997–2021. Retrieved from <https://www.employment.govt.nz/hours-and-wages/pay/minimum-wage/previous-rates/>
- Farmstrong (2021). Wellbeing in Horticulture and Viticulture: Research Summary 2021. Retrieved 22.06.22 from <https://farmstrong.co.nz/wp-content/uploads/2021/07/Summary-Report-Horticulture-Viticulture-Wellbeing-Research-2021.pdf>
- Horticulture New Zealand annual report 2022 Retrieved 4.06.22 from <https://www.hortnz.co.nz/assets/About-Us/HortNZ-Annual-Report-2021-22.pdf>
- Johnstone, R. (2016). The changing nature of work and the regulation of health and safety. In D. Brodie, N. Busby & R. Zahn (Eds.), *The future regulation of work: New concepts, new paradigms* (p. 82). London, U.K.: Palgrave Socio-legal Studies.
- Kirkhorn, S., Earle-Richardson, G & Banks, R.J. (2010). Ergonomic Risks and Musculoskeletal Disorders in Production Agriculture: Recommendations for Effective Research to Practice. *Journal of Agromedicine*. 15. 281-99. 10.1080/1059924X.2010.488618.
- Kuorinka I., Jonsson B., Kilbom A., Vinterberg, H., Biering-Sørensen, F., Andersson, G., & Jørgensen, K. (1987). Standardized Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied Ergonomics*, 18(3) p. 233-237.
- Mackie, H. (2020). Forklift/pedestrian operations review: An industry scan for the Bay of Plenty Kiwifruit Health and Safety Forum. Mackie Research.
- Mishra, N. Mayatra, I., Patel, K., & Mishra, A. (2020). A study to find work related musculoskeletal disorders and associated risk factor among dairy workers. *International Journal of Yoga, Physiotherapy and Physical Education*, 5(2), p.21-24.
- Morgaine, K., Langley, J.D. & McGee, R.O. (2006). The FarmSafe Programme in New Zealand: process evaluation of year one. *Safety Science*; 44 (4): 359–371.
- New Zealand Wine (n.d.), Presentation on Potential impact of BMSB on the New Zealand wine industry retrieved from <https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP203336/f2df442fe6/APP203336-NZ-Winegrowers-Hearing-presentation.pdf>
- New Zealand Winegrowers (2022) Vineyard Report retrieved from <https://www.nzwine.com/media/22001/1-vineyard-report-2022.pdf>
- OHSA, (2022). Landscape and Horticultural Services. Retrieved 22.06.22 from <https://www.osha.gov/landscaping/hazards>

- Rasmussen, J. (1997). Risk management in a dynamic society: A modelling problem. *Safety Science* 27(2-3): 183-213
- Simpson, D. *Salads, Sweat and Status: Migrant Workers in UK Horticulture*. Doctoral Thesis; University of Sussex
- StatsNZ (2022). Income. Retrieved from <https://www.stats.govt.nz/topics/income>
- Sturm, E.T., Castro, C., Mendez-Colmenares, A., Duffy, J., Burzynska, A.A.Z., Stallones, L., Thomas, M.L. (2022). Risk Factors for Brain Health in Agricultural Work: A Systematic Review. *International Journal of Environmental Research and Public Health*;19(6):3373. doi: 10.3390/ijerph19063373. PMID: 35329061; PMCID: PMC8954905.
- Tappin, D.C., Bentley, T.A. & Vitalis, A., (2008). The role of contextual factors for musculoskeletal disorders in the New Zealand meat processing industry. *Ergonomics*, 51(10), pp.1576-1593.
- Tipples, R. & Whatman, R. (2010). Employment standards in world food production – The place of GLOBALGAP supply contracts and indirect legislation. *New Zealand Journal of Employment Relations* 35(3): 40-60.
- Tüchsen F, Jensen AA. (2000). Agricultural work and the risk of Parkinson's disease in Denmark, 1981-1993. *Scandinavian Journal of Work Environmental Health*. 26(4):359-62. doi: 10.5271/sjweh.554. PMID: 10994803.
- Underhill, E. & Rimmer, M. (2015) Itinerant foreign harvest workers in Australia: The impact of precarious employment on occupational safety and health, *Policy and Practice in Health and Safety*, 13:2, 25-46, DOI: 10.1080/14774003.2015.11667816
- Underhill, E., & Quinlan, M. (2011). How precarious employment affects health and safety at work: The case of temporary agency workers. *Relations Industrielles*, 66(3), 397-421
- WorkSafe New Zealand & Horticulture New Zealand (2017). Keep Safe, Keep Growing. Retrieved 22.06.22 from <https://www.worksafe.govt.nz/topic-and-industry/horticulture/keep-safe-keep-growing-how-to-be-healthy-and-safe-in-horticulture>
- WorkSafe New Zealand (2021). Prototype workshop to support health, safe, well, & productive RSE workers: Pre-read pack for July 22nd online meeting to determine focus areas