



**Resilient Organisations
Research Report 2011/04**

**The Recovery of Canterbury's Organisations:
A comparative analysis of the 4 September 2010, 22
February and 13 June 2011 Earthquakes**

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EXECUTIVE SUMMARY

The 4 September, 22 February, and 13 June earthquakes experienced in Canterbury, New Zealand would have been significant events individually. Together they present a complex and unprecedented challenge for Canterbury and New Zealand. The repetitive and protracted nature of these events has caused widespread building and infrastructure damage, strained organisations' financial and human resources and challenged insurer and investor confidence. The impact of the earthquakes was even more damaging coming in the wake of the worst worldwide recession since the great depression of the 1930s. However, where there is disruption there is also opportunity. Businesses and other organisations will drive the physical, economic and social recovery of Canterbury, which will be a dynamic and long-term undertaking. Ongoing monitoring of the impacts, challenges and developments during the recovery is critical to maintaining momentum and making effective mid-course adjustments.

This report provides a synthesis of research carried out by the Resilient Organisations (ResOrgs) Research Programme¹ at the University of Canterbury and Recover Canterbury in collaboration with Opus Central Laboratories (part of Opus International Consultants). The report includes discussions on the general state of the economy as well as data from three surveys (two conducted by ResOrgs and one by Recover Canterbury) on business impacts of the earthquakes, population movements and related economic recovery issues.

This research and report offers two primary benefits:

1. Comparing results following the September, February and June earthquakes allows us to identify trends and points of differentiation in the impact of these three events on Canterbury organisations.
2. After analysing these and other data collected by Resilient Organisations and Recover Canterbury, the authors have compiled several recommendations to facilitate business and economic recovery².

Impacts on revenue and employment

The findings from the three surveys suggest that after the February earthquake, organisations experienced a more polarising effect on their revenue. Greater numbers of organisations indicated changes in revenue after the February earthquake than after the September earthquake. Overall after both earthquakes more organisations reported lower revenue than higher revenue. Similarly, more organisations reduced staff as a result of the

¹ To learn more about Resilient Organisations' history, people, and previous and ongoing research visit their website: www.resorgs.org.nz.

² In addition to the recommendations from this report, ResOrgs also created a short paper articulating a vision and tipping points for the success or failure of Christchurch's recovery. This report can be found at <http://resorgs.org.nz/pubs/Resilience%20Retreat%20-%20Articulating%20the%20vision%20and%20tipping%20points%20for%20recovery.pdf>.

February quake. The data collected indicates, at an aggregate level, revenue and staff change impacts were not exacerbated following the 13 June earthquakes.

Analysis of the three surveys indicates that smaller organisations, those with fewer than 20 full-time equivalent employees (FTE), were more vulnerable to negative revenue impacts following the disasters. Conversely, larger organisations (greater than 20 FTE) were more likely than smaller organisations to hire staff following the disasters. Also organisations in retail, wholesale trade, accommodation and food services were more likely to experience downturns in revenue following these events and were also more likely to reduce staff numbers following the events.

Disruption

Of the organisations surveyed, the impact of the 22 February and 13 June earthquakes resulted in approximately 32% having staff who temporarily relocate where they lived and 13% having employees who permanently relocated. The large majority of those organisations with staff who permanently relocated (80%) were located in the Christchurch CBD.

The most disruptive factor following the February and June earthquakes was “customer issues” (e.g. decreased customer numbers, decreased spending, or customers needing additional or different services).

The second most disruptive factor following the February and June earthquakes was ‘changes in staff emotional wellbeing’. Organisations were struggling to support staff emotionally while also trying to maintain their businesses and navigate the post-earthquake environment.

Following the February and June earthquakes, road network problems were found to be the most disruptive critical service issue for organisations.

Population movements

According to the NZ Post redirection services, after the 4 September earthquake, 1,320 households relocated within the Canterbury region in the months of September and October 2010. In contrast, 7,006 households (19,742 people) relocated within the region in the six weeks following the 22 February 2011 earthquake. A further 1,553 households shifted to other parts of New Zealand and 73 households shifted overseas in the six weeks following the February earthquake.

A little more than half (54%) of mail redirections were requested for less than 2 months duration, suggesting that many people envisaged their move was only short-term.

In summary, based on information on population movements out of the region, from:

- long-term permanent migration patterns in to and out of Christchurch and Canterbury (less than a 1% decline),
- primary and secondary school re-enrolment figures of Canterbury students to schools outside the Canterbury region (up to a 3.7% decline of families with school age children) and
- the duration and destination of mail redirections for Christchurch residents after the September 2010 and February 2011 earthquakes (approximately 1% decline),

- the intentions of Christchurch residents following the 13 June quake indicating a significant increase in the potential for loss of population (potential 11% decline)

There does not appear to have been a large population decline but has been some population transfer from Christchurch out to the broader Canterbury region. However the situation is fragile and there is a significantly increased potential for population loss following 13 June. It should be noted that these population movement data are not exhaustive, but give a good indication of the post-earthquake population status for the city and region.

The crucial nature of population movements suggests that this area should be closely followed for ongoing changes.

Other items of note

Organisations' level of satisfaction with insurers has decreased only slightly following the February and June earthquakes.

Organisations with 20 or more FTEs are more likely to finance their recovery with cash flow than smaller organisations. Organisations with 0-19 FTE are more likely than larger organisations to finance their recovery with savings and money borrowed from family or friends. This indicates that in many instances smaller organisations did not have sufficient funds to absorb the financial impacts of the earthquake.

Of the organisations indicating their relocation would be permanent following the February/June earthquakes, 78% had been located within the Christchurch CBD prior to the earthquakes. Organisations were asked how likely the business was to relocate within the central city within the next 18 months. Of those organisations not currently located within the four avenues approximately 92% of organisations were "very unlikely" or "unlikely" to relocate to the central city within the next 18 months.

Summary

An overall summary of these results indicate that the vast majority of businesses (in excess of 95%) are still operating within the region, although, on average, with reduced income, reduced employees and higher costs. This picture is less negative than might have been expected given the devastation caused by the series of earthquakes. However countering this outlook is the prospect that up to 11% of the population (according to UMR survey) may leave the city permanently, potentially causing shrinkage in the local marketplace and creating skills shortages that will be crucial to the recovery and rebuild of the city ^[1]. Complicating the recovery picture further is the fact that local businesses will be facing significant competitive disadvantages presented by major disruptions caused by the reconstruction over the next decade or more. The fact that most of the regional businesses are small and thus relatively more fragile underscores the need for ongoing concern and effective action in supporting these organisations through a very difficult period that will extend for more than a decade.

Effective business recovery will be dependent on creative use of existing services available through both central and local government as well as sectoral collaboration and the innovative self-reliance that New Zealanders are so well known for. Also important in this mix is the need for the revived CBD to be highly business friendly. The following section includes recommendations for areas where existing services could be focused to support

business recovery as well as recommendations for further research in support of the long term recovery effort.

Recommendations

From these results and others, the author's have developed a list of recommendations to help guide organisational recovery in Christchurch and Canterbury. These recommendations are included below.

Recommendations related to Services provided by central and local government:

Service Recommendation #1: The increased impact of business disruption due to customer and supplier related issues supports the evidence that the effects of 22 February and 13 June earthquakes have compounded the impact of the 4 September earthquake. Organisations may need assistance to determine how to improve the resilience of their supply chain to disruption. This may include identifying alternate suppliers or suppliers that are outside of the region and unlikely to be affected in a regional disaster prior to a crisis. Organisations can also set up mutual aid agreements or collaborations with other organisations where appropriate to ensure critical supplies can be accessed from other organisations if there are further disruptions. In addition assistance in marketing the region could provide a boost to the eroded customer base.

Service Recommendation #2: Following the 22 February and 13 June earthquakes, road network problems were found to be the most disruptive critical service issue for organisations. As reconstruction continues road networks are likely to continue to be disrupted. Also long-term changes in road networks, such as the decision to delay repairing the Sumner Road, are likely to have major impacts on some organisations. Organisations will need accurate and up-to-date information on road network disruptions and planned road works.

Service Recommendation #3: Organisations need access to information and expertise that will help them minimise disruptions associated with the reconstruction process while finding ways to take advantage of the opportunities that may be available.

Service Recommendation #4: Given the relatively negative disposition of organisations to relocate to the Central City in 18 months, it is important that the Canterbury Earthquake Recovery Authority (CERA), the Christchurch City Council (CCC) and other decision makers work collaboratively with businesses to ensure that Christchurch is rebuilt in a way that is attractive to businesses and future development of the city. The consultation process needs to go far beyond keeping businesses informed. Small businesses especially need to be engaged and empowered through the reconstruction process in order to improve and maintain investment confidence.

Service Recommendation #5: The draft of the Christchurch City Plan has been developed with care and extensive community consultation and will be a useful guide for many aspects of Christchurch's reconstruction and redevelopment. However, more needs to be done to convey the importance, future development and level of involvement of the commercial and businesses sectors. We recommend that the CERA and the Christchurch City Council work with Canterbury Employer's Chamber of Commerce, The Canterbury Development Corporation, Recover Canterbury, property owners and related business associations to review the Christchurch City and Canterbury region Economic Development Plans. Sectors

should be identified as focal points of future growth for Christchurch and the region and efforts should be made to incorporate the development and promotion of these sectors as part of the redevelopment of Christchurch.

Recommendations related to further research:

Research Recommendation #1: Data should continue to be collected on revenue changes and operational cost changes periodically over the next few years. There is some indication that smaller organisations are more likely to see greater downturns in organisational revenue, and that certain sectors will experience increases while others experience decreases. It is therefore recommended that this data collection include a large enough sample to allow effective sectoral analysis to permit targeted strategies to support more impacted sectors and organisations of different sizes.

Research Recommendation #2: Organisations struggling to hire employees and an outward migration of important skills are likely to be growing concerns in Canterbury. Data gathering on this is urgently needed to determine the extent of this potential problem, including who is leaving, whether relocations are permanent and how organisations can be assisted in recruiting qualified workers when they are ready to reopen or commence reconstruction projects.

Research Recommendation #3: Given the high level of disruption regarding customers and employee well being there is a need for qualitative research as well as on-going survey work to give more understanding of the issues surrounding this disruption and the development of steps to assist businesses impacted

Research Recommendation #4: More research and consultation is needed to understand how to help organisations forecast demand, deal with uncertainty and adapt to change in the post-earthquake environment.

Research Recommendation #5: Further information on the impact of insurance coverage and timely claims completion would be beneficial in understanding how fragile the finances are for Canterbury organisations.

Research Recommendation #6: The insurance landscape has been altered by the recent earthquakes in Canterbury. If premiums increase to the point that they are not financially sustainable then organisations may want to consider spending money on other mitigation measures (such as seismic retrofitting). Research (including cost-benefit modelling) needs to be done to help organisations determine the future of private insurance in Canterbury, and how much organisations should invest in other loss mitigation measures. As mitigation is best done during the reconstruction phase, the need for this information is urgent.

Research Recommendation #7: Data dealing with staff loss from organisations and complementary data on employee intentions to stay in the Canterbury area should continue to be collected as a leading indicator of skill availability and thus recovery.

Research Recommendation #8: The migration trends for Christchurch and Canterbury are a significant issue. The levels of permanent outward migration do not appear to be extreme so far however an aspect to be considered is the possible out migration of people after they receive their insurance payouts for damaged land or homes. As a result of this and the need

to retain a qualified workforce to support business recovery, reconstruction and maintenance of essential services, migrations trends should continue to be followed closely.

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A special acknowledgement is offered to the many organisations that participated in the three surveys synthesised in this report. These organisations were dealing with the huge disruption represented by the 2010-2011 series of earthquakes and aftershocks, and yet were willing to take the time to help us. Without their cooperation we would not have been able to gain the insights available through their responses.

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1. RESEARCH CONTEXT

On the 4th of September 2010 the city of Christchurch and the Canterbury region were hit by an M_w 7.1 earthquake. This devastating event came while the region, nation and the world were still reeling from the worst recession since the Great Depression of the 1930s. What was not known on the 4th of September, however, was that this was simply the beginning of a series of seismic events that would leave this beautiful city shattered. Table 1 provides key statistics relating to the 4 September, earthquake as well as the 22 February 2011 and 13 June 2011 aftershocks. Notable is the dramatically greater damage done by the 22 February event.

This report provides a synthesis of research carried out by the Resilient Organisations Research Programme at the University of Canterbury and Recover Canterbury with input from OPUS Consulting and the SME Research Group at Massey University. The report includes information on the general state of the economy, data on business impacts of the earthquakes, population movements and related economic recovery issues.

Table 1: Key information about the Canterbury earthquakes

4 September 2010	22 February 2011	13 June 2011
7.1 Richter ^[2]	6.3 Richter ^[3]	6.3 Richter ^[4]
VIII on the Modified Mercalli scale ^[2]	X on the Modified Mercalli scale ^[3]	VIII on the Modified Mercalli scale ^[4]
PGA (Peak ground acceleration) = 1.3 ^[2]	PGA (Peak ground acceleration) = 2.2 ^[3]	PGA (Peak ground acceleration) = 2.1 ^[4]
10 km deep, ~40 km from Christchurch ^[2]	5 km deep, ~13 km from Christchurch ^[3]	6 km deep, ~9 km from Christchurch ^[4]
54,000 tons liquefaction/silt removed by Christchurch City Council ^[5]	322,000 tons liquefaction/silt removed by Christchurch City Council ^[5]	Additional liquefaction/silt, (unquantified)
CBD cordoned for 1 week	CBD cordoned for 4- 27+ weeks	No change in CBD cordon
CBD: 100s of businesses with 1000s of employees disrupted for days to weeks ^[6]	CBD: 6000 businesses and 52,000 employees disrupted for weeks to years ^[6]	CBD: some limited amount of additional disruption
Dozens of buildings destroyed, hundreds damaged, infrastructure damaged	A thousand+ commercial buildings destroyed or badly damaged, infrastructure devastated	Up to 200 buildings sustained further or new damage, some demolished. Some further infrastructure damage
Cost of damage = ~\$4-5 B ^[7]	Cost of damage = ~\$12 B ^[7]	Cost of damage = \$3-5 ³ B ^[8]

³ Estimate from EQECAT catastrophic risk modelling, not yet confirmed by official estimates [8] Quantifying Incremental Damage and Losses from the June 13 Christchurch Earthquake [http://www.eqecat.com/catWatchRev/secureSite/report.cfm?id=326: EQECAT, Inc.24 August, 2011]. Available.

This report is a synthesis of three surveys carried out since September 2010. The first is a survey carried out by the Resilient Organisations Research Programme (ResOrgs) at the University of Canterbury following the 4 September earthquake. The second is a survey conducted by Recover Canterbury following the 22 February earthquake. This was carried out with assistance from ResOrgs on the survey design, and assistance from Research First Ltd on implementation of the survey. The third survey was produced by ResOrgs to follow up with organisations following the 22 February earthquake. Results from this survey collected after the 13 June earthquakes are included here to give an indication of the impacts of the 13 June earthquake. In addition the report provides context regarding the Canterbury Economy, as well as information on population movements following the earthquakes.

This research and report offers two primary benefits. First, comparing results following the 4 September, 22 February, and 13 June earthquakes, allows us to identify trends and points of differentiation in the impact of these three events on Canterbury organisations. Second, after analysing these and other data collected by Resilient Organisations and Recover Canterbury, the authors have compiled several recommendations relevant to facilitating business and economic recovery.

2. BACKGROUND ON THE CANTERBURY ECONOMY

The Christchurch and Canterbury economies are currently experiencing two recoveries: from the economic recession and from the earthquake events. It is likely that the impact of the earthquakes will continue for some time with changes in activity in some sectors, especially construction, and possible long-term population changes.

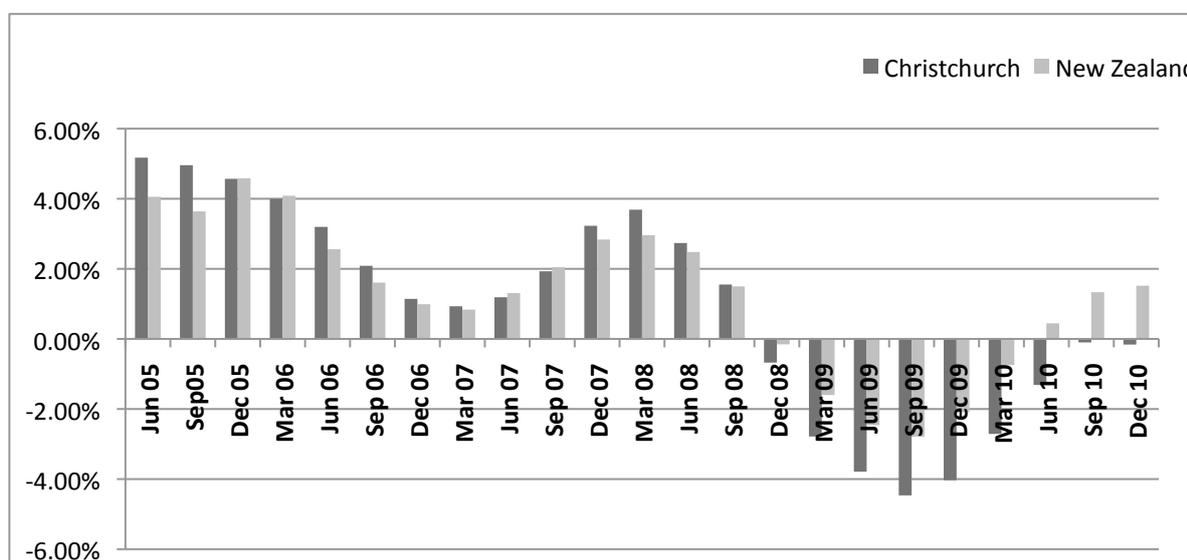


Figure 1: Gross Domestic Product for Christchurch and New Zealand (Annual Average Percent Change) (Source: Statistics New Zealand, Infoshare^[9])

Tourism has traditionally been a major earner of foreign exchange for the region. While the number of guest nights held up reasonably well during the recession, compared to New Zealand as a whole, this sector has seen significant decline since the February earthquake. Initially there were strong increases in visitors assisting with the recovery which kept

occupation rates high in the establishments that were able to continue operating. These visitors, however, were largely domestic and did not spend as much money in the city as the international and recreational visitors they replaced. This has had a significant impact on recreation activity providers for the city. It is likely that this sector will continue to see reduced numbers for some time. Not only is capacity significantly reduced in Christchurch, but the city will not be attractive to visitors while aftershocks continue and the rebuild takes place. This will have major implications for areas of the economy such as entertainment, retail trade, accommodation, restaurants and bars.

Canterbury has traditionally enjoyed a low unemployment rate but along with the rest of the country saw increases in the number of jobless people during the recession (Figure 2). The city unemployment was impacted by the earthquakes; however the data shown in Figure 2 indicates that impact has been short lived so far, perhaps indicating new jobs created as the reconstruction unfolds. As of March 2011 the unemployment rate for Christchurch was sitting just under 7% (unadjusted). It is also interesting to note that Canterbury as a whole since the September earthquake has continued to have lower unemployment than the national average. Predictions based on these numbers should be approached with caution due to the high level of uncertainty around forecasting of business performance and population movements given the continuing level of seismicity. While some sectors will see strong employment growth following the earthquakes, construction in particular, it is likely that other sectors in the city and region will continue to struggle.

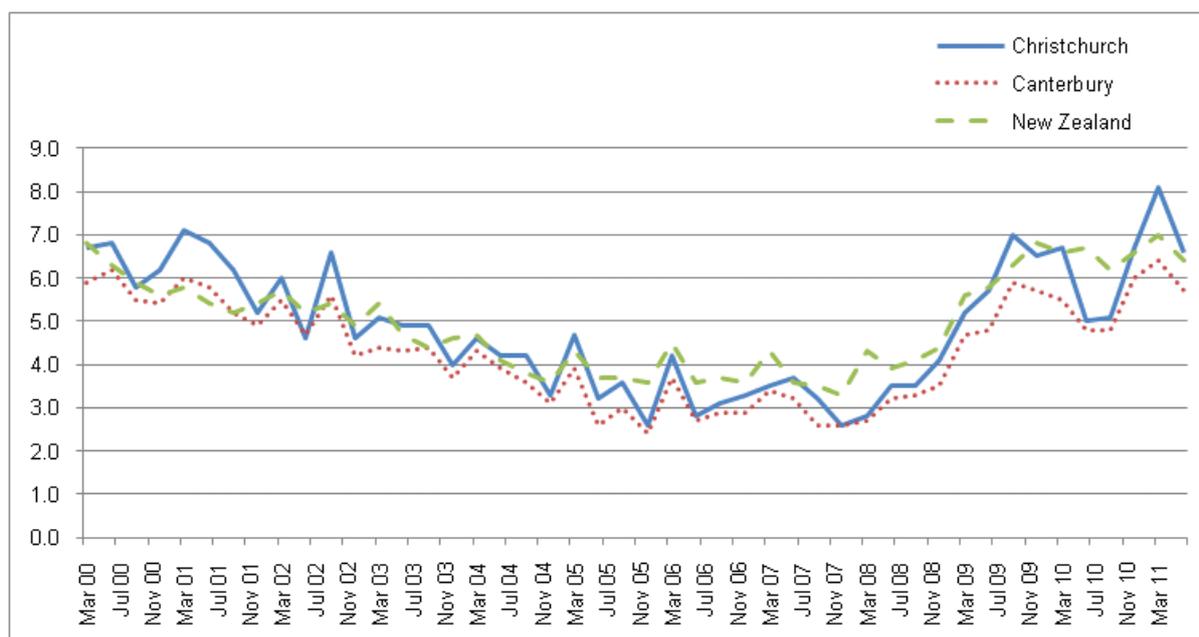


Figure 2: Percent of labour force unemployed (Source: Statistics NZ Household Labour Force Survey^[10])

The construction sector suffered heavily during the recession. Building consents fell markedly (Figure 3). As a result of the earthquakes, however, this sector will see strong growth in coming years, growth that is likely to absorb all spare capacity for the sector in the city for the foreseeable future. The commercial building sector in particular is likely to be repaired and rebuilt over a long time horizon due to the complexity and long lead times for commercial building projects. This activity will likely create growth in gross domestic product for the city and region as well as a reduction in the unemployment rate, especially if skills supply can be efficiently matched to skills demand.

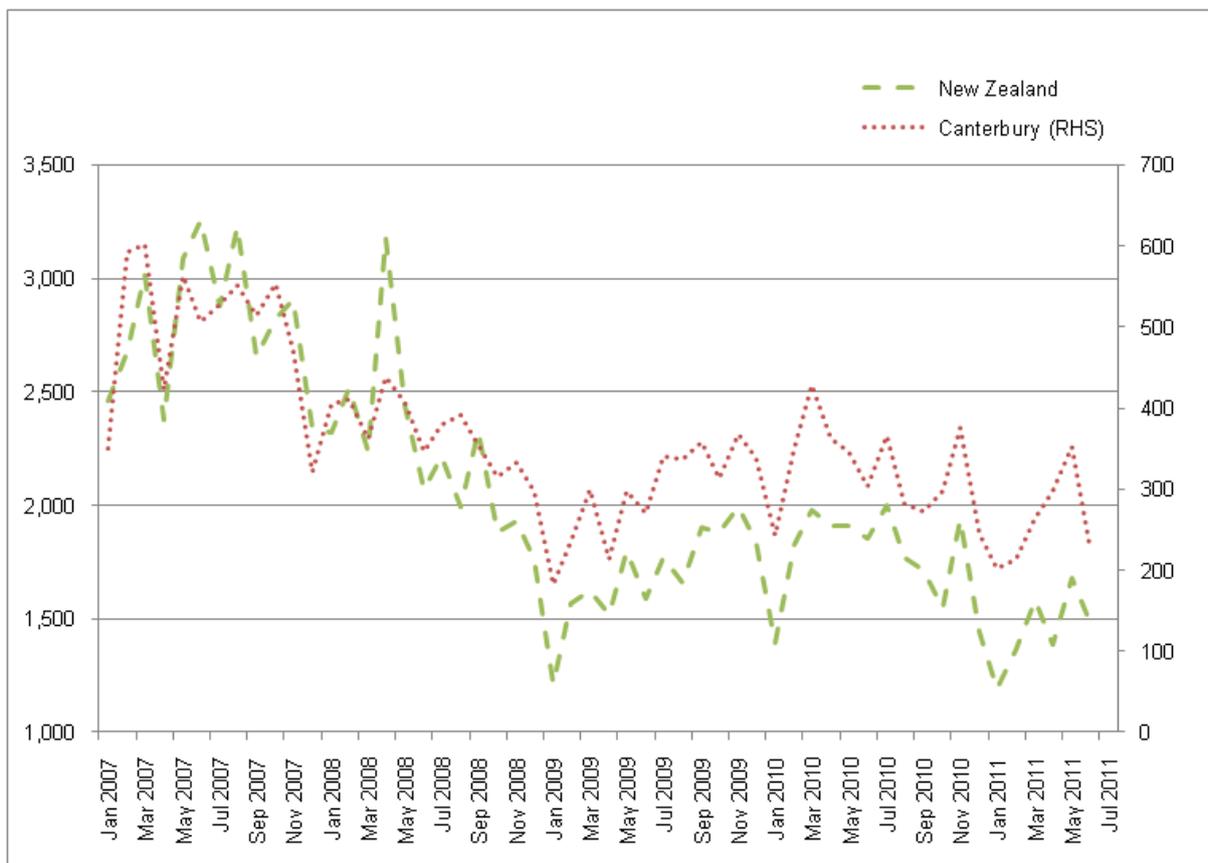


Figure 3: Number of consents, all buildings (Source: Statistics New Zealand, Infoshare [9])

The current situation in Christchurch and Canterbury will be hard for many businesses. Many companies are suffering from lack of customers, structural and non-structural damage, and interruptions in their supply chain. While service providers in areas of the city that suffered little damage may be performing well, and the construction sector will see strong growth for many years, it is likely that the recovery from the earthquakes and the recent recession will take some time.

3. METHODS, STUDY AREA, & SAMPLES

This report presents the results of three surveys conducted in Canterbury following the 4 September 2010, 22 February, and 13 June 2011 earthquakes in Canterbury. The first survey was issued between 17 November 2010 and 18 February 2011 by Resilient Organisations (ResOrgs) and the University of Canterbury. The purpose of this study was to document the impacts to and recovery of organisations from the 4 September earthquake. This survey will be referred to as the ResOrgs survey 1 throughout this report.

The sample for ResOrgs survey 1 was stratified by industry sector, specifically targeting industries that were identified as key growth sectors in Canterbury’s regional economic plan, indicators of post-disaster discretionary and non-discretionary spend, or key players in Canterbury’s recovery. Specific geographic areas were also targeted for sampling, including

the Christchurch CBD, Kaiapoi CBD (town centre), and rural areas around the Greendale fault trace in the Selwyn District.

In May 2011 Research First on behalf of Recover Canterbury surveyed organisations in Canterbury about the impacts and recovery of their organisations following the 22 February earthquake. This survey will be referred to as the Recover Canterbury survey. The Recover Canterbury sample was drawn from a random sample (non-sector specific) of organisations in the greater Christchurch area. More information about the sector/industry type breakdown and locational breakdown of the survey samples can be found in Appendix A.

In June 2011, ResOrgs and the University of Canterbury initiated a follow-up survey with the organisations sampled for ResOrgs survey 1. Organisations throughout Canterbury that had completed ResOrgs survey 1 and opted to remain part of the study (approximately 200 organisations) as well as approximately 100 organisations from Lyttelton⁴ compose the sample for the follow-up survey (ResOrgs survey 2).

ResOrgs survey 2 was intended to achieve three aims: follow the recovery progress of organisations affected by the 4 September earthquake, measure any new impacts and challenges caused by the 22 February earthquake, and administer a tool to benchmark each organisation's resilience⁵. On 13 June 2011, less than two weeks after the initial launch of ResOrgs survey 2, Canterbury was struck by M_w 5.6 and 6.3 aftershocks, centred approximately 13km east-southeast of Christchurch^[4]. These aftershocks caused aggravation of existing damage and some new damage to buildings and infrastructure throughout Canterbury, widespread business interruption, and significantly affected the psycho-social well-being of the population.

Although ResOrgs survey 2 wasn't designed to measure the impacts of the 13 June aftershocks, the surveys returned after these events would have captured many of the effects experienced by organisations as a result of these aftershocks. Therefore this survey is useful for identifying trends experienced by organisations subject to these disruptions. All responses from ResOrgs survey 2 collected between 14 June and 5 August are included for analysis in this report. Data collection for this survey is ongoing.

⁴ The town of Lyttelton was effectively the epicentre of the 22 February earthquake, and experienced extensive damage to its town centre. It has been, therefore, added as a geographic subsector to the ongoing ResOrgs research. However, data collection in Lyttelton was in its early stages at the time of writing this report.

⁵ The Benchmark Resilience Tool is a survey tool developed by Resilient Organisations to measure key indicators of organisational resilience to disruptions and crises of all kinds. The outcomes from this portion of the study are not discussed in this report, however more can be found out about the tool at www.resorgs.org.nz.

Table 2: Comparison of three surveys methods and samples

Earthquake	Data Collection	Survey	Method	Study area	Sample Size	Response Numbers	Response Rate
4 Sep 2010	Nov 2010 to Feb 2011	ResOrgs Survey 1	Random sample: postal, email, phone	Canterbury	869	366	42%
22 Feb 2011	May 2011	Recover Canterbury Survey	Random Sample: by phone	Canterbury	1012	201	20%
13 June 2011	June to August 2011	ResOrgs Survey 2	Random sample: postal, email, phone	Canterbury	200	99 (75 ⁶)	50%

As shown in Table 2, all three surveys were conducted with a random sample of organisations in Canterbury. The ResOrgs survey 1 response rate was 42%, while the response rates for the Recover Canterbury survey and ResOrgs Survey 2 were 20% and 50% respectively. This response rate is comparable with other disaster recovery studies. The response rate for the Recover Canterbury survey was lower due to a large number of disconnected, inactive phone numbers which is partly a result of relocations, temporary closures, and altered contact information. Of the calls which were connected with qualified respondents, over 77% agreed to take the survey.

As seen in Table 3, both ResOrgs survey samples tended to have organisations with larger numbers of full-time equivalent employees (FTE)⁷. ResOrgs' strategic selection of industry sectors with higher average numbers of employees, such as critical service organisations (lifelines) and supermarkets, skewed the average FTE numbers for both ResOrgs surveys. However, the median number of FTEs for all the samples is 9 or less, and the majority of all the respondents had fewer than 20 FTE. The distribution of organisation size in this study is reflective of the number of SMEs under 20 FTE throughout Canterbury^[11].

⁶ This number is a subset of the responses that were gathered following the 13 June earthquake, 24 surveys were returned before that date and are excluded from further analysis to allow for trend analysis of the three earthquakes. Data collection is still in progress at the time of writing. Therefore the full sample size will be over 300 by the time the sampling is complete, and the number of responses will also be greater.

⁷ Throughout this report full-time equivalent (FTE) is calculated as the number of full time employees plus 0.5 times the number of part-time employees.

Table 3: FTE numbers of survey samples

	Full-time equivalent employees (FTEs)							
	Mean	Median	Range	Std. Dev.	0- 5	6-19	20-100	>100
ResOrgs survey 1 (4 Sep)	47	6	0-1500	151	49%	27%	13%	10%
Recover Canterbury survey (22 Feb)	11	3	0-270	30	69%	19%	9%	2%
ResOrgs survey 2 (13 Jun)	85	9	0-1500	227	36%	25%	18%	20%

Studies have shown that smaller organisations tend to suffer disproportionately high impacts from disasters and have greater challenges in their recovery ^[12-14]. Other post-disaster research has found that organisations in certain sectors, such as retail, professional services and real estate, tend to suffer disproportionately during and after disasters ^[12, 15-17]. The relationship between organisation size and industry type with other factors relevant to recovery are explored throughout this report.

Both research groups made an effort to reach closed and relocated organisations to avoid bias in the sample. However, it is a typical problem with post-disaster research that often these organisations are difficult to locate and contact. Therefore, the authors acknowledge that these results may be biased toward organisations that were open or at least still receiving phone or mail communications for their business following the earthquakes.

Additionally, in order to minimise non-response bias, organisations contacted for the ResOrgs surveys were offered several response options. Respondents were offered the option of returning the survey booklet by mail, completing the survey over the telephone, via an online survey engine, in softcopy and emailing it back, or via face-to-face meeting with a researcher. The use of these multiple data collection methods was necessary to accommodate organisations that had relocated and not received the original paper copy of the survey, or organisations that were too busy to complete the survey over the phone or return it by mail.

It is important to note that these surveys were not designed with trend analysis of different earthquake events in mind. While the researchers have made their best efforts to align and compare the data, not all findings are directly comparable. It is important to continue to have a close collaborative relationship between research teams to attempt to maximise data comparability in the future.

4. COMPARATIVE FINDINGS

This section integrates the results from the three surveys, and draws comparisons between the impacts of the 4 September, 22 February and 13 June earthquakes. The ResOrgs surveys had several more questions than the Recover Canterbury survey. Therefore,

additional data is presented, and its potential relevance to the situation following 22 February and 13 June is discussed.

Throughout this section ResOrgs survey 2 is intended to reflect organisational data following the 13 June aftershocks. The survey was originally deployed to measure the impacts following the 22 February earthquake; therefore the wording of the survey asked respondents to reflect on changes following the 22 February earthquake and subsequent aftershocks. However all questions are written so the organisation is reporting on its current situation as it is known. As all of the ResOrgs survey 2 respondents included in this report responded following the 13 June, we are assuming that their answers reflect changes and disruptions caused by the 13 June aftershocks.

4.1 Organisational Revenue & Costs

This section outlines the aggregate changes in the revenue of organisations following the various earthquakes. We also discuss how operation costs were affected following the earthquakes.

4.1.1 Revenue impacts

Following the earthquakes, organisations throughout Canterbury experienced varying impacts on their revenue. ResOrgs survey 1 (4 September earthquake) asked organisations what impact the earthquake had on their revenue. At the time of sampling 44% of all organisations indicated no change to their overall revenue, whilst 42% reported a decrease in revenue (Figure 4). Only 14% of organisations indicated an increase in revenue after the September earthquake.

Compared to the 4 September earthquake, the 22 February earthquake (Recover Canterbury Survey) had a more polarising effect on organisations' revenue. Following the 22 February earthquake, far fewer organisations reported "no change" to their revenue (12%) compared to the 44% of organisations who experienced "no change" in revenue after the 4 September earthquake. More organisations indicated either decreased revenue (64%) or increased revenue (24%) following the 22 February earthquake than following the 4 September earthquake.

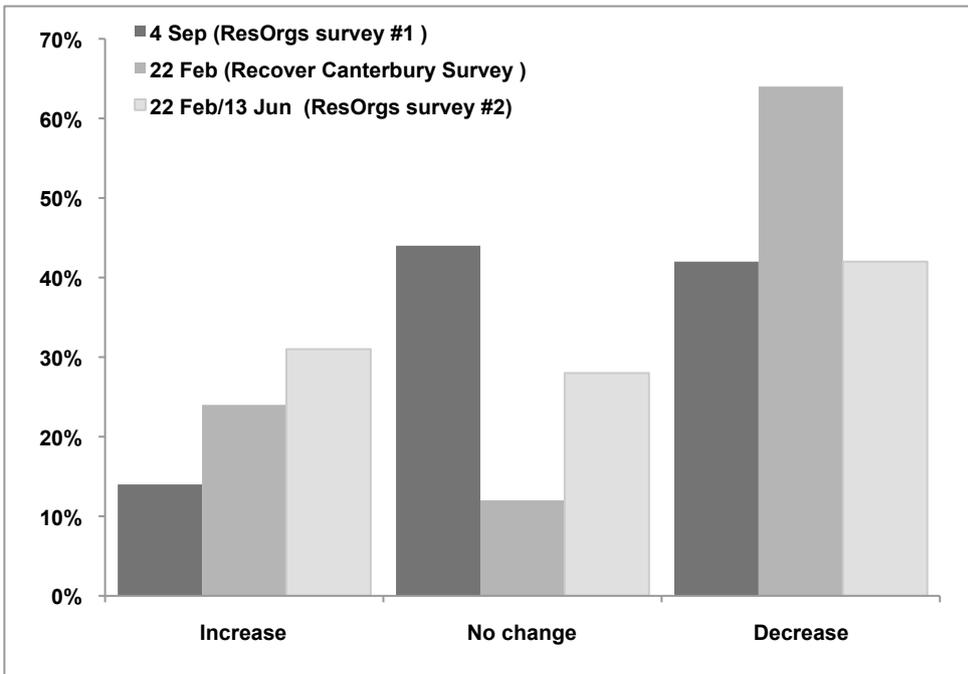
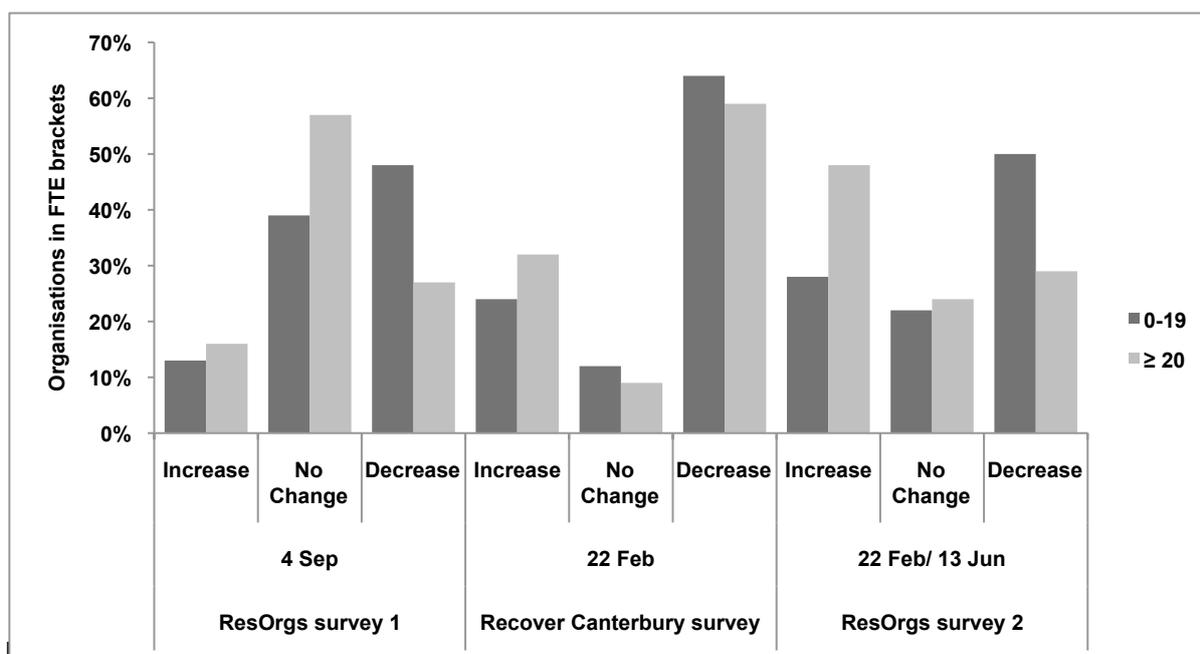


Figure 4: Percent of organisations experiencing revenue change

ResOrgs survey 2 also asked whether organisations experienced a change following the 22 February earthquake, but due to the timing of the survey this includes changes following the 13 June aftershocks. While the polarising effect on revenue is still apparent for organisations following the 13 June aftershocks, more organisations (28%) reported experiencing no change in their revenue. The 13 June aftershocks did not appear to have a further overall detrimental effect on organisational revenue at the time of surveying.

These changes are broken down by the number of FTE across each sample in Figure 5. In all three samples, organisations with less than 20 FTEs experienced more decreases in revenue than increases.



A majority (57%) of organisations with 20 or more employees experienced no change to their revenue following the 4 September earthquake and 16% experienced an increase. Similarly 32% of organisations with 20 or more employees, following 22 February earthquake, and nearly half (48%) of organisations with 20 or more employees following the 13 June events experienced increased revenues.

Industry type may also play a role in how an organisation's revenue is affected post-disaster. As seen in Table 4, some industries such as 'Construction' and 'Information media and telecommunications' show an improving trend over the series of earthquakes.

Table 4: Organisational revenue change by industry type⁸

Industry Type	4 Sep (ResOrgs survey 1)			22 Feb (Recover Canterbury)			22Feb/13 Jun (ResOrgs survey 2)		
	<i>n</i>	Increase	Decrease	<i>n</i>	Increase	Decrease	<i>n</i>	Increase	Decrease
Accommodation and food services	40	18%	58%	11	27%	64%	7	33%	67%
Construction	9	33%	33%	8	63%	25%	5	60%	40%
Electricity, gas, water and waste services	15	29%	21%	7	57%	29%	8	67%	33%
Information media and telecommunications	29	10%	25%	8	38%	38%	4	50%	0%
Manufacturing	39	13%	32%	19	42%	47%	8	0%	50%
Professional, scientific and technical services	26	0%	50%	23	9%	87%	4	25%	0%
Rental, hiring and retail estate services	8	33%	50%	11	9%	82%	2	50%	50%
Retail trade	86	15%	47%	27	30%	67%	17	54%	38%
Transport, postal and warehousing	23	33%	33%	7	43%	43%	5	0%	100%
Wholesale trade	21	9%	73%	18	17%	56%	4	0%	67%

⁸ In some cases there are a limited number of cases in each industry sector. Data gathered from a very small number of organisations is not representative of a sector and generalisations should not be made based on such small sample sizes. However, the data is included to give a general picture of what is known.

Surprisingly, many of the retail trade organisations sampled in ResOrgs survey 2, have experienced increased revenue. Some retail organisations that either remained open or were able to reopen quickly following the February earthquakes have been able to capture the spending that was diverted from closed retail organisations. Similarly, it is interesting to note that the construction industry has been more likely to experience revenue increases, while building suppliers in the wholesale and retail trade categories have largely experienced revenue decreases.

Organisations were also asked to estimate the amount their revenue changed⁹ (as a percent of total revenue). After 4 September the cumulative impact on revenue was negative for the sample. This means that the average decrease in revenue was greater than the average increase in revenue. Following the 22 February earthquake, organisations saw an even more pronounced negative effect on their revenue (Table 5), for those organisations who reported a decrease the overall average reduction was 45%.

Again, the ResOrgs survey 2 only specifically asked about per cent of revenue change following the 22 February earthquake, but answers recorded following 13 June should reflect any additional revenue changes experienced as a result of these aftershocks.

Table 5: Estimated Percentage Change in Business Revenue Following Earthquakes

Earthquake	Report	Increased Revenue		Decreased Revenue	
		Average	Range	Average	Range
ResOrgs survey 1 (4 Sep)	Nov 2010- Feb 2011	23%	0-198%	33%	0-99%
Recover Canterbury survey (22 Feb)	May 2011	27%	0-100%	45%	0-100%
ResOrgs survey 2 (13 Jun)	Jun 2011- Aug 2011	23%	0-100%	45%	0-100%

As seen in Table 5, there is no indication that revenue impacts are getting more extreme in either direction with the ongoing aftershocks. The average revenue change for those experiencing increased revenue following the 13 June earthquakes is 23% while the average decreased revenue is 45%.

Statistical tests¹⁰ were run to determine whether there was a statistically significant difference in the amount of revenue change between organisations with 0-19 FTE and 20 or more FTE. While the difference was not found to be significant between groups in the Recover Canterbury sample (perhaps because there were few larger organisations), there was a significant difference in revenue change experienced by organisations with 0-19 and 20 or more employees in both of the ResOrgs samples. This result indicates that following the 4 September and 13 June earthquakes, there was a statistically significant difference in the

⁹ It should be kept in mind that the economy was just recovering from a severe recession and this may have some impact on reported revenue changes. It would be difficult for business owners to differentiate changes caused by the earthquake and other fluctuations in the economy.

¹⁰ Non-parametric Mann-Whitney U tests were used to test for significant differences between the two independent samples (1. organisations with less than 20 employees and 2.) organisations with 20 or more employees).

revenue impacts experienced by small (0-19 FTE) and larger (≥ 20 FTE) organisations, meaning that in some cases size is a factor in the type of revenue impacts felt.

Organisation size is by no means the only or even the most important factor in determining the level of impact from disaster. However, considering the large number of small organisations in the affected area it is important to consider the ability of different sized organisations to absorb impacts from ongoing disruptions.

Research Recommendation: Data should continue to be collected on revenue changes and operational cost changes periodically over the next few years. There is some indication that smaller organisations are more likely to see greater downturns in organisational revenue, and that certain sectors will experience increases while others experience decreases. It is therefore recommended that this data collection include a large enough sample to allow effective sectoral analysis to permit targeted strategies to support more impacted sectors and organisations of different sizes.

4.1.2 Cost impacts

Tracking change in costs post-disaster can capture flow-on effects from disruptions in the supply chain. For example, if suppliers are affected, supplies may become limited, driving up prices. If road networks are disrupted, transport can become less efficient and more expensive.

The Recover Canterbury survey asked respondents whether their organisation's costs had been influenced by the February earthquake. More than half of the organisations (52%) identified "no change" in business costs (Table 6). Organisations that did experience an increase or decrease in operational costs were asked to estimate the total change as a percentage of their total costs. On average, organisations that experienced decreased costs, decreased a substantial amount (45%), while organisations that experienced increased costs, increased to a lesser extent (27%).

Table 6: Change in Business Costs after February 22

	Increase	Decrease	No Change
Organisations reporting change in costs	41%	7%	52%
	Average increase	Average decrease	
Average amount of change	27%	45%	

Both the decreased costs and increased costs may be due to the impact of adapting to the limited commercial space post-earthquakes, with some working from home or sharing space (resulting in decreased costs) while others are renting higher priced space due to limited options (resulting in increased costs). Travel costs and telecommunications costs may also be simultaneously affected by positive and negative pressures.

Organisation operational costs are bound to be influenced by the reconstruction environment in Canterbury for years following the earthquakes. Insurance for many organisations will likely increase and rents for new buildings may be higher than before. However, new buildings may also offer energy savings and more efficient infrastructure. Similarly, organisations affected by the earthquakes may develop more resilient systems, such as

enabling staff to work from home, minimising business interruptions (e.g. from adverse weather events) in the future.

4.2 Closure and Disruption

Of those organisations that were affected by the 4 September earthquake, the majority (64%) were forced to close at least temporarily. The median length of closure was seven days. Three organisations (approximately 1% of the affected organisations in the sample) indicated that closure was indefinite at the time of surveying, meaning that 99% of the affected organisations were either open and trading or planning to reopen when surveyed following the 4 September earthquake. As discussed earlier, however, it is important to note that despite efforts by researchers to reduce bias in the sample, it was more difficult to reach closed organisations and, at the time of sampling, organisations may not have known whether their closure would be permanent. Therefore, the number of permanent closures due to the September earthquake was likely somewhat higher than 1% of all businesses.

Despite the greater damage and disruption caused by the February earthquake, the number of permanent closures was similar to the September earthquake. At the time of the Recover Canterbury survey, 95% of the businesses surveyed were open and trading. Ten organisations indicated that they were closed and not trading; seven of those organisations planned to reopen, two were not yet sure of their plans, and only one organisation indicated permanent closure.

For ResOrgs survey 2, organisations were asked whether and how long they closed following the 22 February earthquake and aftershocks, which includes the 13 June earthquakes. Organisations that closed temporarily were closed for median of 15.5 days. This median length of closure is more than double the median length of closure following the 4 September event. Approximately 14% of ResOrgs survey 2 respondents indicated that they were either closed at the time of surveying (3% of respondents) or permanently closed (11% of respondents). Of the 11% of organisations that indicated permanent closure, a majority (75%) of these had previously been located in the Christchurch CBD. Meaning that, in this sample, organisations previously located in the Christchurch CBD area were much more likely to close permanently than organisations not located in the Christchurch CBD.

ResOrgs survey 2 also asked whether specific types of closure effects were experienced by organisations any time following the February earthquakes (including after the 13 June aftershocks). The responses are shown in Figure 6.

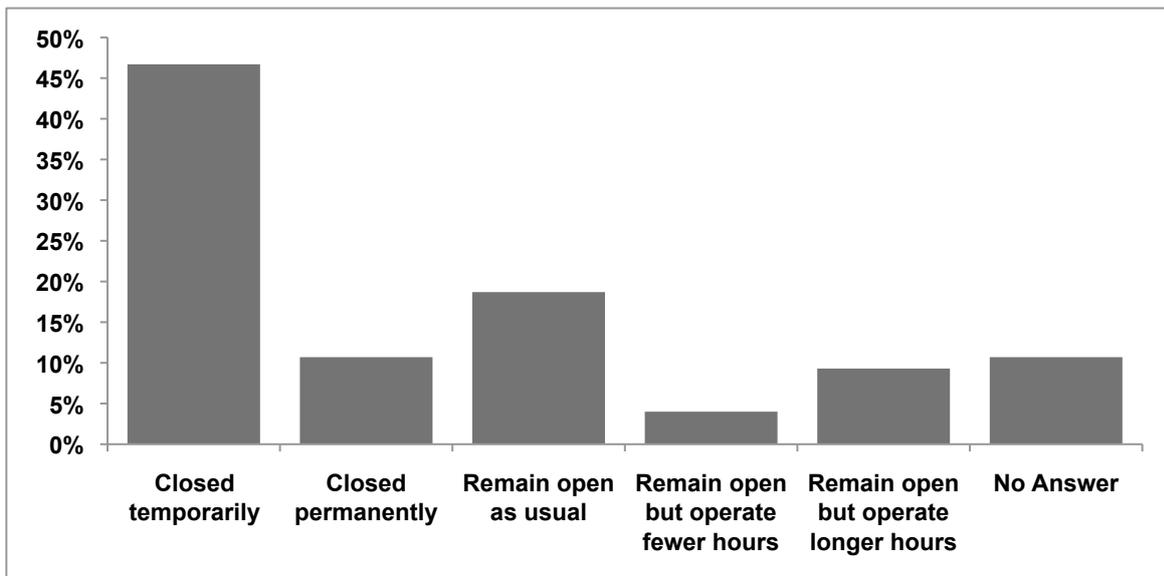


Figure 6: Organisation closure following 22 February & 13 June earthquakes

Approximately 9% of respondents indicated that they remained open and were required to operate for longer hours. This can have varying effects on organisations. Organisations may stay open longer because of increased demand for their goods or services which can increase revenue. However, following a disaster this can put additional strain on already stretched workforce and resources.

Understanding why organisations close (i.e. are not currently trading either temporarily or permanently) is an important aspect of identifying ways to improve organisational preparedness, response and recovery. In the ResOrgs surveys, organisations that closed (temporarily or permanently) as a result of the earthquakes were asked to indicate whether certain factors contributed to their closing. Organisations were allowed to select as many reasons as applicable. As seen in Table 7, the most common reason for closure following the 4 September earthquake was “building waiting to be structurally assessed” (24%), and the second most common reason was the need to “clear up damage to interior” (21%). Following the later earthquakes several more reasons for closure were experienced by organisations.

Table 7: Reasons for closure following 4 Sep earthquake

Reasons for closure	% of organisations indicating reason	
	ResOrgs survey 1 (4 Sep)	ResOrgs survey 2 (post-22 Feb/13 Jun)
Building waiting to be structurally assessed	24%	35%
Needed to clear up damage to interior	21%	42%
Stock loss or damage	17%	39%
Damage to immediate locality	15%	23%
Could not deliver supplies/services	14%	33%
Employees unable to get to work	12%	30%
Building waiting to be repaired	8%	21%
Building declared unsafe	7%	25%
Needed to clear up damage to exterior	7%	21%
Office equip loss or damage	5%	28%
Could not obtain replacement supplies or materials	5%	12%
Machinery loss or damage	4%	23%
Owner or manager had family or other commitments	2%	9%
Building located in cordoned off area ¹¹	-	32%
Other reason	7%	7%

Business interruption caused by waiting for structural assessments was disruptive for more organisations following the February earthquake than the September earthquake. However, 'needed to clear up damage to interior' was the most common reason for closure following the February earthquake. Ongoing large aftershocks, such as the M_w 5.1 and 6.3 aftershocks on the 13 June, 2011 caused many organisations to stop operations, reassess their buildings and clear up damage to the interior. Similarly, issues that were not major concerns following the 4 September earthquake, such as the need to clear up damage to the exterior and office equipment and machinery loss or damage were more pertinent in Christchurch and the surrounding areas after 22 February.

4.2.2 Customer, supplier, and employee issues

While closure is a major impact following a disaster, there are several other factors that disrupt or hinder an organisation's ability to do business, even if it does not cause the business to close. For example regardless of direct damage to an organisation's property or stock, business interruption can also be caused by supply-chain and neighbourhood effects. If the buildings near to an organisation's premises are red-tagged, this has a bearing on access and the perception that an organisation might not be open for business.

The earthquake may also impact an organisation's customers and their ability or desire to spend. Following the earthquakes, employees of organisations were in many cases stressed with personal issues (including having to deal with residential damage) and concerned about their personal and family safety. These types of disruptions can be detrimental to an

¹¹ This option was not included in ResOrgs survey 1.

organisation’s ability to operate post-disaster. These “human” factors can be much more complex for business owners and managers to deal with than damaged buildings and lost stock, and are difficult to quantify.

Organisations were asked whether their customer numbers had changed following the 4 September earthquake. As seen in Table 8, a majority of organisations (52%) had experienced no change to their customer numbers, while approximately 34% of organisations experienced decreases and 15% experienced increased customer numbers.

Table 8: Changes to the number of customers following 4 September

	Decreased substantially	Decreased moderately	Increased moderately	Increased substantially	No change
Change to customer number	14%	20%	11%	4%	52%

Organisations were also asked if they had to change suppliers following the 4 September earthquake. Only 35 organisations (12% of the sample) affected by the earthquake indicated that they needed to change suppliers. Of those, a large majority (94%) found their new suppliers to be somewhat or completely capable of meeting their needs post-earthquake as seen in Table 9.

Table 9: New supplier performance following 4 September

Completely incapable	Somewhat capable	Completely capable	Our organisation is still closed
3%	54%	40%	3%

Following the February earthquake, organisations were asked how disruptive issues with suppliers, customers, and employees were to their organisations. The results can be seen in Figure 7. Lack of customers was the most disruptive with 25% of respondents finding it “very disruptive” and 18% finding it “moderately disruptive”.

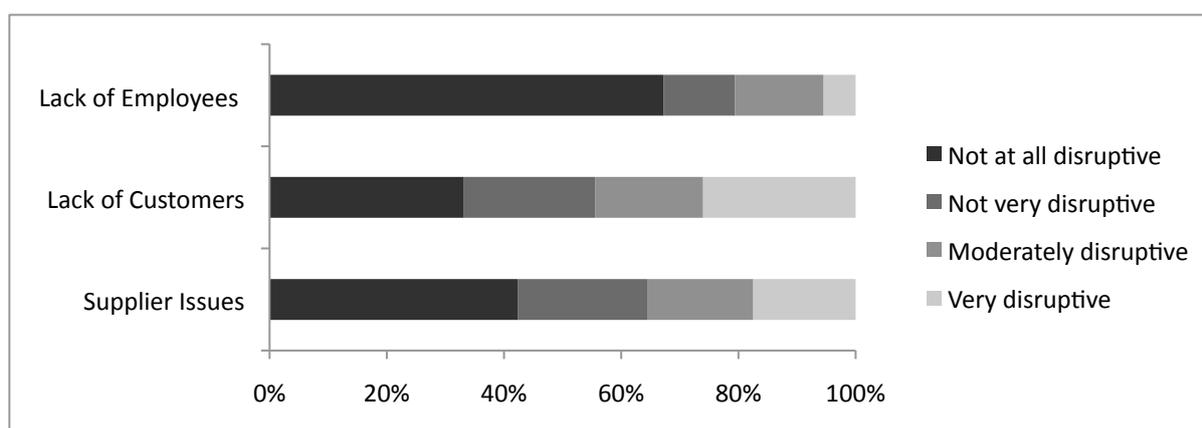


Figure 7: How disruptive were issues with suppliers, customers, and employees following 22 February

While the Recover Canterbury survey did not ask respondents to specify the kind of “supplier issues” experienced, the results indicate that supplier issues may be more widespread or more problematic following the 22 February earthquake compared to the 4 September earthquake. About 33% of organisations found “supplier issues” to be moderately to very disruptive following the February event, suggesting that these may be local suppliers also affected by the earthquake.

Compared to lack of customers and supplier issues, a lack of employees was proving to be less disruptive when the Recover Canterbury survey was issued. However, it was still a significant issue with over 16% of respondents finding a lack of employees to be moderately to very disruptive. In ResOrgs survey 2, organisations were asked if staff temporarily or permanently relocated following the 22 February earthquake (and subsequent aftershocks). Of organisations surveyed after 13 June, approximately 32% had staff temporarily relocate from the area they lived and 13% had employees who permanently relocated from the area they lived.

While this data suggests that most employees are either remaining with their current organisations or finding work within the Christchurch area, the survey and anecdotal evidence suggests that some employees are looking for jobs outside of Canterbury after the 13 June quake. Often, it is skilled workers who are more mobile and able to find jobs in different regions or overseas. The loss of skilled workers is a real concern for Canterbury as the rebuild will require skilled workers. There is also reason to believe from the data that organisations in the Christchurch CBD may be particularly vulnerable to the permanent relocation of staff, and this may become a consideration as the organisations try to either relocate or reopen in the CBD. Data gathering on this is urgently needed to determine the extent of this potential problem.

Research Recommendations: Organisations struggling to hire employees and an outward migration of important skills are likely to be growing concerns in Canterbury. Data gathering on this is urgently needed to determine the extent of this potential problem, including who is leaving, whether relocations are permanent and how organisations can be assisted in recruiting qualified workers when they are ready to reopen or commence reconstruction projects.

Service Recommendations: The increased impact of business disruption due to customer and supplier related issues supports the evidence that the effects of 22 February and 13 June earthquakes have compounded the impact of the 4 September earthquake. Organisations may need assistance to determine how to improve the resilience of their supply chain to disruption. This may include identifying alternate suppliers or suppliers that are outside of the region and unlikely to be affected in a regional disaster prior to a crisis. Organisations can also set up mutual aid agreements or collaborations with other organisations where appropriate to ensure critical supplies can be accessed from other organisations if there are further disruptions. In addition assistance in marketing the region could provide a boost to the eroded customer base.

4.2.3 Lifeline and Other Disruptions

Even if organisations are undamaged and capable of operating, lifelines¹² may be disrupted, their building could be deemed unsafe due to nearby damaged buildings, traffic flows can be disrupted, and people's perceptions of the safety and appeal of patronising and working in the area can be altered. Organisations are part of a wider system, and it is therefore important to consider the way disruptions to other organisations, infrastructure, and social components affect organisational functioning.

¹² Lifelines is a term used for critical services such as roading, power, water, sewage and telecommunications.

In the ResOrgs surveys following the 4 September and 13 June earthquakes, organisations were asked “how disruptive were the following on your ability to do business?” and provided with a list of potentially disruptive factors. The degree to which a factor was disruptive to an organisation was quantified using a 4-point Likert scale. The organisations were asked to rank earthquake-related disruption effects on a scale of “not at all disruptive” (assigned a score of 0) to “very disruptive” (assigned a score of 3). These scores were averaged across the sample, and then divided by the maximum score of 3 to calculate the severity of the disruption to all affected organisations. This score was then multiplied by 100 to allow the score to be represented as a percent¹³ (see Table 10 and Table 11).

Overall the most disruptive factor identified following the 4 September earthquake was “electricity disruption” (42%). Comparisons between the levels of disruption to organisations caused by issues with various lifelines are shown in Table 10. While electricity was restored relatively quickly to most parts of Canterbury following the 4 September earthquake, the vast majority of organisations would be completely incapable of operating without electricity. Very few organisations indicated having backups or alternatives to electricity prior to 4 September.

Table 10: Lifeline disruption scores

Reason for organisational disruption	Disruption Score	
	4 Sep (ResOrgs survey 1)	22 Feb / 13 Jun ResOrgs survey 2
Electricity disruption	42%	55%
Water supply disruption	32%	59%
Communications disruption	31%	59%
Sewage or effluent disruption	19%	55%
Road network disruption	N/A	67%

Many organisations also found ‘road network’ problems particularly disruptive following the 22 February and 13 June earthquakes. This is especially pertinent for organisations that have aspects of transport or delivery as part of their service. One transport organisation reported that deliveries to customers were taking twice their normal time due to road network disruptions.

In ResOrgs survey 2 organisations were also asked whether they felt their organisation had ‘done sufficient planning for disruption’ to various lifeline services. As seen in Figure 8, even though electricity was particularly disruptive to organisations following the 4 September earthquake, 29% of organisation felt they had not done enough planning for electricity supply disruption and 23% either didn’t answer or were unsure.

¹³ A score of 100% would mean that all responding organisations found the item ‘very disruptive’ while a score of 0% would mean that all responding organisations found the item ‘not at all disruptive’. A score of 50% indicates a diverse range of responses that averages to a mid-point on a scale between ‘very disruptive’ to ‘not at all disruptive’ (including ‘moderately’ and ‘not very’ disruptive).

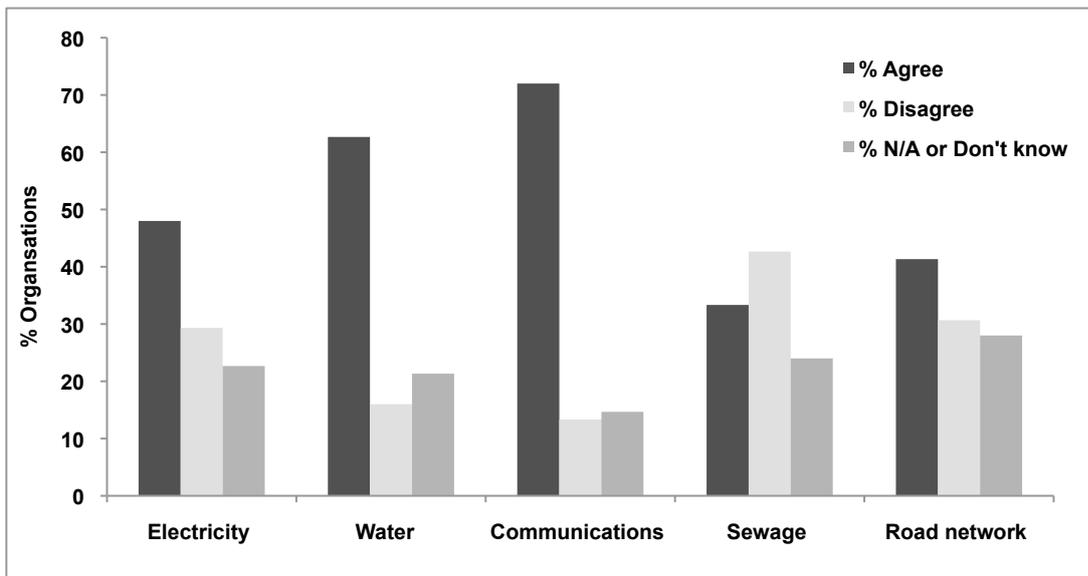


Figure 8: Organisations indicating they have done sufficient planning for disruptions to lifelines (ResOrgs survey 2)

A substantial majority of organisations agreed that they had sufficiently planned for disruptions to water (63%) and communications (72%). Organisations were less likely to feel that they had adequate planning for sewage and road network disruptions. Some respondents commented that they were unsure of how to plan for these kinds of disruptions.

Respondents were asked about disruptions to several other facets of their organisation's operations in ResOrgs surveys 1 and 2. Several items that were not asked in ResOrgs survey 1 were added to ResOrgs survey 2. As seen in Table 11, following the 4 September earthquake, organisations found 'damage to or closure of nearby organisations' to be the most disruptive factor.

Table 11: Average organisational disruption scores following 4 September

Reason for disruption	Disruption Score ¹⁴	
	4 Sep (ResOrgs survey 1)	22 Feb / 13 Jun (ResOrgs survey 2)
Damage to or closure of nearby organisations	37%	49%
Damage to inventory or stock	35%	58%
Damage to or closure of adjacent organisations or buildings	34%	37%
Non-structural damage	31%	56%
Unable to access site	28%	N/A
Organisation was located within cordoned-off area	N/A	43%
Structural damage to building(s)	25%	43%
Damage to equipment	24%	53%
Damage to ground surface	16%	42%
Damage to computers	13%	38%
Injury/physical harm to employees	1%	11%
Supplier issues	N/A	59%
Customer issues	N/A	80%
Staff temporarily relocated	N/A	34%
Staff permanently relocated	N/A	21%
Staff did not feel safe returning to building	N/A	38%
Changes in staff emotional wellbeing	N/A	68%
Other	12%	6%

The most disruptive factor following the 22 February and 13 June earthquakes was “customer issues”. This could refer to a number of problems, including decreased customer numbers or customers needing additional or different services. This indicates a need for qualitative research as well as the on-going survey work to give more understanding of the issues. In ResOrgs survey 1, several organisations in the badly affected town of Kaiapoi reported having to spend a substantial amount of staff time with customers who wanted to talk about earthquake related problems or trauma.

The second most disruptive factor following the 22 February and 13 June earthquakes was ‘changes in staff emotional wellbeing’ (68%). Staff, including owners and managers, were in many cases dealing with disruptions and challenges at home and work following the ongoing earthquakes. Organisations often find themselves poorly equipped to support staff emotionally while also trying to maintain their businesses and navigate the post-earthquake environment.

It is important to note that all of the factors listed for this question were found more disruptive overall following the 22 February quake. This relates in part to the greater damage and physical disruption caused by the 22 February event, but it also likely reflects a potential cumulative build-up of actual and perceived impacts during ongoing aftershocks and uncertainty.

¹⁴ A score of 100% would mean that all responding organisations found the item ‘very disruptive’ while a score of 0% would mean that all responding organisations found the item ‘not at all disruptive’.

Service Recommendations: Following the 22 February and 13 June earthquakes, road network problems were found to be the most disruptive critical service issue for organisations. As reconstruction continues road networks are likely to continue to be disrupted. Also long-term changes in road networks, such as the decision to delay repairing the Sumner Road, are likely to have major impacts on some organisations. Organisations will need accurate and up-to-date information on road network disruptions and planned road works.

Research Recommendations: Given the high level of disruption regarding customers and employee well being there is a need for qualitative research as well as on-going survey work to give more understanding of the issues surrounding this disruption and the development of steps to assist businesses impacted.

4.2.4 Biggest Challenges

ResOrgs surveys 1 and 2 asked organisations to identify the ‘biggest challenges’ faced by their organisation following the 4 September earthquake (survey 1) and the 22 February earthquake and subsequent aftershocks (survey 2). As this question was open for respondents to write whatever they felt was pertinent, it elicited a wide range of responses. These responses, some of which highlighted more than one issue, can be grouped into several broad categories. These can be seen in Table 12 which shows the percent of affected organisations whose comments fit into each category.

Table 12: Biggest challenges facing organisations, percentage of organisations identifying as an issue

Challenges	4 Sep (ResOrgs survey 1)	22 Feb/13 Jun (ResOrgs survey 2)
Staff & customer wellbeing, coping with aftershocks/ uncertainty	30%	41%
Cash flow, costs, decreased customer numbers, decreased customer spending	30%	29%
Neighbourhood affects & public perception	13%	1%
Supply chain issues	12%	4%
Managing increased demand & Planning/adapting	10%	19%
Logistics & road access	10%	8%
Physical damage & disruption	9%	13%
Insurance and building inspections	8%	5%
Regulatory issues & inter-organisational relationships	7%	11%
Site access	5%	8%
Relocation	5%	11%
Closure	4%	3%
Other	4%	4%
IT & computer issues	1%	1%

In both surveys, issues with staff and customer well-being and coping with the emotional strain of aftershocks and ongoing uncertainty were the most common themes across the sample. Some of the challenges highlighted following the February and June events include: keeping staff motivated; heightened levels of stress and fatigue especially for organisations whose workload has increased as a result of the disasters; and staff trying to

balance work with damaged homes and disrupted families. Following the 4 September earthquake some organisations mentioned difficulties with customers who needed to spend a lot of time talking about the earthquakes. Following the 22 February earthquake one hair salon described their biggest challenge as, “The personal hours involved in maintaining, comforting, supporting, and finding all existing clients.” Another organisation, working in real estate, was finding it particularly difficult to work with clients dealing with high stress issues such as finances, insurance uncertainty, and damaged houses.

Similarly, concerns about cash flow, customer numbers, and decreased customer spending were, and continue to be, major issues following both earthquakes. One building supply manufacturer indicated that their company is relying completely on customers outside of Canterbury for their income following the February earthquake. Several organisations indicated that people are either not spending or spending less because they are unsure about their futures.

Road disruption was highlighted as a major challenge more frequently following the 4 September earthquake, but will likely become a major issue as the reconstruction progresses in Canterbury following the 22 February and 13 June earthquakes. For some organisations reconstruction is likely to be just as, if not more disruptive than the initial earthquake.

Similarly, more organisations following the 22 February earthquake are finding it challenging to deal with increased demand for their services. A large number of the organisations that mentioned this concern were in the ‘Electricity, gas, water and waste services’ industry. For these organisations they are often doing more work, attending to extensive repairs and outages, without increased revenues. Planning and adapting to new post-earthquake markets and anticipating supply needs were expressed by organisations in several different sectors. One retailer wrote that:

“Due to the constantly changing environment it was impossible to make a concrete plan. [We] could only deal with one problem at a time, solve that, then move on. Sometimes the same problem presented itself 3 or 4 times”.

Organisations need clear lines of communication with decision makers, especially regarding anticipated start and finish dates for road works and other major construction. With the massive demolition and reconstruction process that will occur in Canterbury over the next decade, it is important that organisations understand how reconstruction may affect them or disrupt their operations and plan accordingly. Additionally, investigating and developing ways organisations can find opportunities in the reconstruction period will help Canterbury organisations recover more successfully. Disaster recovery specialists ^[18] have argued that reconstruction should be understood as a social process which shapes and is shaped by the larger context of recovery. They contend that a failure to recognise the interdependence of reconstruction and wider community and economic recovery is likely to lead to a failed reconstruction.

Service Recommendations: Organisations need access to information and expertise that will help them minimise disruptions associated with the reconstruction process while finding ways to take advantage of the opportunities that may be available.

Research Recommendations: More research and consultation is needed to understand how to help organisations forecast demand, deal with uncertainty and adapt to change in the post-earthquake environment.

4.3 Insurance & Financing Recovery

Organisational resilience to disasters requires adequately preparing for a range of disruptions and being able to access adequate resources following a disaster. Private insurance is one of the main sources of recovery funding for organisations affected by disaster. Respondents were asked to report the types of insurance held by their organisation following the September and February earthquakes. These results are broken down in Table 13. Following the 4 September earthquake, fewer than 3 per cent of the affected organisations listed no insurance.

Table 13: Organisational insurance, percentage of organisations holding insurance by type 4 September and 22 February

	Cash flow, income protection and business interruption ¹⁵	Property and buildings	Organisation assets and equipment	Motor Vehicles	Public liability	Commodities and goods	Business Continuity	Other
% with insurance (4 Sept)	45%	49%	59%	49%	60%	43%	N/A	13%
% with insurance (22 Feb)	N/A	39%	58%	29%	54%	33%	40%	N/A ¹⁶
% with insurance (22 Feb/13 Jun)	29%	49%	67%	59%	68%	N/A	N/A	13%

Differences between the insurance holdings of organisations after the 4 September earthquake and the 22 February earthquake are likely due to variation in the samples. In all samples, there is a significant positive correlation¹⁷ between FTEs and property and buildings insurance, meaning that larger organisations are more likely to have that type of insurance. Similarly, in the Recover Canterbury survey sample FTE is significantly and positively correlated with all types of insurance, again showing that larger organisations tend to also be better insured.

Following the 4 September and 22 February/13 June earthquakes, organisations were also asked about their relationships with their insurer on a scale from “very dissatisfied” to “very satisfied”. The results of this analysis are shown in Figure 9.

¹⁵ The ResOrgs surveys included ‘business interruption’ in this item whereas the Recover Canterbury survey enquired about ‘business continuity’ insurance separately.

¹⁶ Organisations were not asked to report ‘other’ types of insurance in the Recover Canterbury survey and organisations were not asked whether they had ‘commodities and goods’ insurance in ResOrgs survey 2.

¹⁷ Significance is based on an $p=.001$, which means that there is only a 1 in 1000 chance that this is a random occurrence.

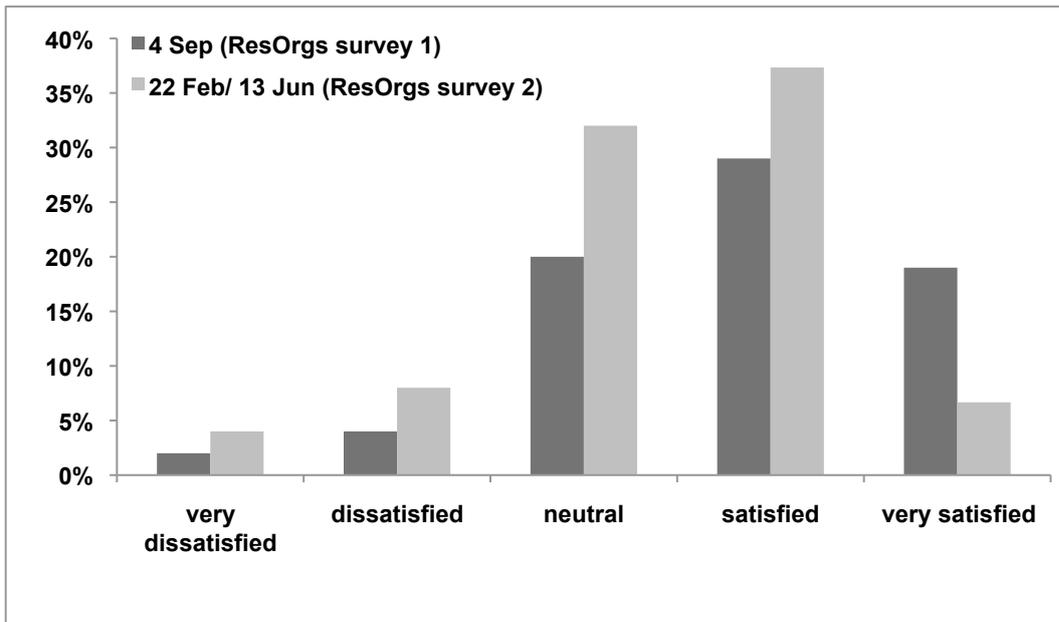


Figure 9: Degree of satisfaction with insurer

When ResOrgs survey 1 was deployed after the September earthquake, approximately 19% of organisations reported feeling “very satisfied” with their insurer while 29% were “satisfied”. Following the 22 February and 13 June events, there was slightly more reported dissatisfaction (12% “dissatisfied” or “very dissatisfied”) than following the 4 September event (6% “dissatisfied” or “very dissatisfied”) and far fewer reported feeling ‘very satisfied’ (7%). It is unclear whether there is a general movement toward growing dissatisfaction as insurance issues become protracted. However these results do show that months after the 4 September earthquake only a minority of organisations were dissatisfied with their insurers, painting a more positive picture than may have otherwise been expected.

However, in meetings held for SMEs and insurers affected by the earthquakes, several issues pertinent to the role of insurance in the rebuild have been discussed. Organisations that have already started rebuilding and organisations that would like to rebuild are finding it difficult, if not impossible, to get insurance coverage. Organisations noted that claims processing for business interruption and assistance with relocation costs have been unduly slow and are affecting the ability of organisations to recover and adapt post-earthquake. Similarly, insurers are requiring assessors to visit an organisation’s premises multiple times, delaying the processing of claims. Natural disaster insurance excesses and premiums have increased for many organisations, and some businesses have indicated that it may be uneconomic to maintain this type of insurance despite the potential risk.

Organisations have also expressed a desire for insurance companies to present more of a human face. SMEs are finding it difficult to access an actual person with whom to discuss insurance issues and they do not receive feedback following assessor visits. Insurers at the meeting acknowledged that they are trying to improve these processes, however, more may need to be done to improve communication and between organisations and insurers.

4.3.1 Continuity insurance

In addition to broader questions about insurance types, the Recover Canterbury survey asked specifically whether organisations had business continuity insurance and how long this coverage lasts. Just over half of respondents (52%) did not have business continuity insurance, and 8% were unsure whether they held this type of insurance.

Organisations were then asked to identify the period of time the insurance would cover their business. As seen in Table 14, 28% of organisations surveyed after 22 February, who did have continuity insurance had less than 6 months of coverage. Therefore at the time of surveying these organisations would have been nearing the end of their business continuity insurance. Of the 40% who did have business continuity insurance, 63% had business continuity insurance for a period of a year or less.

Table 14: Duration of business continuity insurance following 22 February

Duration	< 6 months	6 months	12 months	18 months	>18 months
% of respondents	28%	11%	24%	4%	9%

Some organisations indicated that they had coverage for a monetary value rather than a time period, and some organisations noted that they were unsure about the length of their coverage because they had either not needed to use it or only needed it for a short time.

4.3.2 Status of claims after 22 February

Following the 22 February earthquake, the Recover Canterbury survey asked organisations whether they were “waiting for a business insurance claim to be settled”. Approximately 36% of respondents indicated that they were waiting for a claim to be settled.

Those organisations were then asked to report the size (monetary value) of the claim to be settled (Figure 10). Of the organisations waiting on a claim 25% reported that the claim was for less than \$10,000, while just over a quarter (26%) reported a claim of over \$100,000, and 43% reported a claim between \$10,000 and \$100,000.

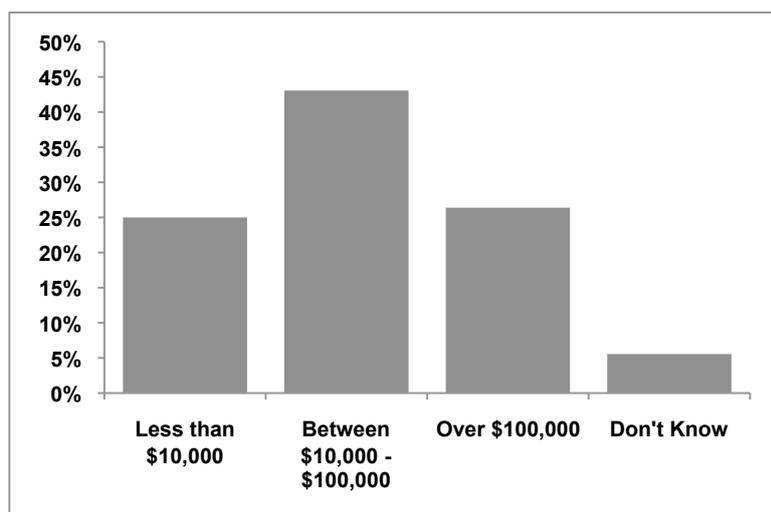


Figure 10: Size of insurance claim to be settled

4.3.3 Recovery finance options

Organisations were also asked how they planned to finance recovery. Survey respondents were given a list of options and asked to select all that applied. The results from these

options can be seen in Table 15. A majority (69%) of organisations from all sectors indicated that they would fund recovery, at least in part, with organisational cash flow.

Table 15: Recovery finance options

	Organisational cash flow	Savings	Money borrowed from family or friends	Bank loan	Credit cards	Insurance claim	Earthquake wage subsidy	Other
4 Sep	69%	22%	5%	13%	5%	40%	15%	13%
22 Feb	57%	11%	<1%	12%	<1%	7%	13%	21%
22 Feb/ 13 Jun	61%	20%	5%	15%	1%	40%	25%	7%

In the Recover Canterbury survey, a surprisingly small number of organisations (7%) indicated that they would finance recovery with an insurance claim following the February earthquake. This disparity may be a consequence of the way the question was interpreted as 36% of respondents actually had an insurance claim for their organisation pending (see Section 4.3.2 above), and approximately 40% of organisations had continuity insurance (see 4.3.1 above). Thus, the 7% obviously does not reflect the number of organisations who have placed an insurance claim or plan to do so as a result of the earthquakes and is likely to explain the high “Other” category. This could be resolved with further qualitative research.

In ResOrgs surveys 1 and 2 FTE correlates¹⁸ significantly and positively with organisations financing their recovery with organisational cash flow. In ResOrgs survey 1, FTE also correlates significantly and negatively with organisations financing with their savings, and in survey 2 with money borrowed from friends and family. This indicates that larger organisations may also be more likely to finance their recovery with cash flow, while smaller organisations are more likely than larger organisations to finance their recovery with savings and money borrowed from family or friends. This indicates that in many instances smaller organisations did not have sufficient cash flow to absorb the financial impacts of the earthquake.

Given the predominance of small organisations in the Canterbury economy, the likelihood of a fast and robust recovery are rather fragile. The phasing out of the Earthquake Wage Subsidy may also have some negative impact on recovery, in particular for smaller firms with limited resources.

Research Recommendations: Further information on the impact of insurance coverage and timely claims completion would be beneficial in understanding how fragile the finances are for Canterbury organisations.

¹⁸ Non parametric Kendall Tau B correlations were run and all data with a significance of p=0.05 are reported.

Research Recommendations: The insurance landscape has been altered by the recent earthquakes in Canterbury. If premiums increase to the point that they are not financially sustainable, then organisations may want to consider spending money on other mitigation measures (such as seismic retrofitting). Research (including cost-benefit modelling) needs to be done to help organisations determine the future of private insurance in Canterbury, and how much organisations should invest in other loss mitigation measures. As mitigation is best done during the reconstruction phase, the need for this information is urgent.

4.4 Staff numbers

Organisations were asked to report whether the staff levels increased or decreased in the aftermath of the earthquake¹⁹. Table 16 shows the number and percent of earthquake affected organisation in each sample who reported staff changes.

Table 16: Organisation staff changes

	4 Sep (ResOrgs survey 1)		22 Feb (Recover Canterbury survey)		22Feb/13 Jun (ResOrgs survey 2)	
	Number	Percent	Number	Percent	Number	Percent
Increased Staff	71	25%	22	11%	11	37%
No change	203	69%	145	72%	34	48%
Decreased Staff	16	6%	34	17%	26	15%

In both ResOrgs surveys more organisations increased staff than decreased staff in the aftermath of the earthquakes. However, more organisations decreased staff levels following the February earthquake in the Recover Canterbury sample.

Following the September earthquake several organisations that reported redundancies identified the reasons for the decisions were not due to the earthquake. However, following the February earthquake many organisations indicated that staff reduction was a result of earthquake related reasons. Of organisations that reduced staff in the Recover Canterbury sample, 41% indicated that it was due to a lack of work, money, or lost business; and 38% indicated that it was because “staff left”, displacement, or a “result of the quake”.

Statistical tests showed that organisation size was a significant factor in staff change. In both ResOrgs survey 1 and 2 larger organisations (greater than 20 staff) were more likely to decrease staff than smaller organisations (19 or fewer staff). In addition larger organisations were also more likely to increase staff numbers.

As seen in Table 17, in all surveys a greater number of larger organisations increased staff than smaller organisations. However, in the Recovery Canterbury survey, a greater number of larger organisations (45%) decreased staff than smaller organisations (13%).

¹⁹ In the ResOrgs survey the questions asked whether the organisation “hired any staff” or “made any staff redundant” in the aftermath of the respective earthquakes.

Table 17: Staff change by organisation size and industry type

	4 Sep (ResOrgs survey 1)		22 Feb (Recover Canterbury survey)		22Feb/13 Jun (ResOrgs survey 2)	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
0-19 FTE	20%	22%	10%	13%	19%	7%
≥ 20 FTE	60%	7%	23%	45%	37%	1%
Electricity, gas, water, and waste services	43%	0%	43%	0%	88%	0%
Construction	8%	0%	38%	0%	80%	0%
Retail trade	32%	7%	22%	19%	29%	24%
Accommodation and food services	29%	11%	0%	27%	0%	50%
Information, media and telecommunications	40%	10%	13%	0%	100%	0%

Some staff decreases, however, may not be captured in the ResOrgs survey due to question wording. The ResOrgs surveys asked whether the organisation “hired any staff” or “made any staff redundant” in the aftermath of the respective earthquakes, whereas the Recovery Canterbury survey asks whether organisations staff increased or decreased staff. Therefore, if staff left the organisation for reasons other than being made redundant, respondents may have not reported the reduction. This is especially pertinent after the February and June earthquakes, where staff may have had to relocate and leave their job.

Industry type also seemed to influence staff number changes. In all of the samples, the retail industry had the largest number of organisations that decreased staff numbers; however, the retail industry also had higher numbers of organisations hiring staff. This may in part be a reflection of normal staff turnover in some industries.

It must be noted that different industries require staff at different times of year and it is difficult to distinguish normal fluctuations and changes due to the ongoing recession, from impacts of the earthquake. However, it is clear that organisations in critical services and construction have consistently had to take on more staff in the aftermath of the earthquake. Similarly, organisations in information, media, and telecommunications have mostly expanded post-earthquakes. Organisations in retail trade and hospitality have had greater decreases and more overall fluctuations.

Research Recommendation: Data dealing with staff loss from organisations and complementary data on employee intentions to stay in the Canterbury area should continue to be collected as a leading indicator of skill availability and thus recovery.

4.5 Relocation

Following the 4 September earthquake organisations were also asked to report whether their organisation relocated as a result of the earthquake. At the time of surveying, only 6% of all affected organisations had relocated. Overall, the majority of organisations were not

significantly impacted by structural damage, which may also explain why relatively few organisations had relocated their entire organisation at the time of sampling. Following the February and June earthquakes 12% of organisations surveyed had permanently relocated and 8% indicated that they had temporarily relocated. Approximately 4% of organisations had to relocate permanently or temporarily after both the September and the February earthquakes.

Of the organisations that indicated permanent relocation following the February/June earthquakes, 78% (7 of the 9 organisations) had been located within the Christchurch CBD prior to the earthquake. While the Recover Canterbury survey following 22 February did not collect general information on whether organisations relocated all or parts of their organisation, the survey did collect information about organisations' intentions and perceptions about relocating to the Christchurch central city.

Organisations were asked how likely the business was to relocate into the central city within the next 18 months. Five businesses were located within the Christchurch city centre (within the four avenues²⁰) at the time of surveying. Of those organisations not currently located within the four avenues approximately 92% of organisations were “very unlikely” or “unlikely” to relocate to the central city within the next 18 months (Table 18).

Table 18: Intention to relocate to within central city within next 18 months

	Number of Businesses	% of Businesses
Very Unlikely	179	89%
Unlikely	6	3%
Neutral	7	3%
Likely	0	0%
Very Likely	2	1%

Respondents were also asked as part of the Recover Canterbury survey, “Regardless of your own intentions regarding business location, what is your impression of the Central City as a future business location?” As seen in Table 19, these results depict a more favourable impression of the central city than Table 18 would indicate. Out of all organisations sampled 38% think that the central city will be a “good” or “excellent” business location in the future. This compares to 54% of central city organisations being positively disposed toward the Central City.

²⁰ The Christchurch Central City is defined as the area bound by the four avenues, which include Bealey Ave., Fitzgerald Ave., Deans Ave., and Moorehouse Ave)

Table 19: Perceptions of Central City as business location

	Organisations	Central City Organisations²¹
Very Poor	36 (18%)	2 (18%)
Poor	32 (16%)	1 (9%)
Neutral	54 (27%)	2 (18%)
Good	30 (15%)	2 (18%)
Excellent	46 (23%)	4 (36%)

Though this statistic could be an artefact of the smaller number of central city organisations sampled, more needs to be understood about why 46% of central city organisations don't feel positively about the future of the central city, if and where organisations are relocating, and whether new organisations or organisations from other areas will be moving into Canterbury as the recovery progresses.

Service Recommendation: Given the relatively negative disposition of organisations to relocate to the Central City in 18 months, it is important that the Canterbury Earthquake Recovery Authority (CERA), the Christchurch City Council (CCC) and other decision makers work collaboratively with businesses to ensure that Christchurch is rebuilt in a way that is attractive to businesses and future development of the city. The consultation process needs to go far beyond keeping businesses informed. Small businesses especially need to be engaged and empowered through the reconstruction process in order to improve and maintain investment confidence.

Service Recommendations: The draft of the Christchurch City Plan has been developed with care and extensive community consultation and will be a useful guide for many aspects of Christchurch's reconstruction and redevelopment. However, more needs to be done to convey the importance, future development and level of involvement of the commercial and businesses sectors. We recommend that the CERA and the Christchurch City Council work with Canterbury Employer's Chamber of Commerce, The Canterbury Development Corporation, Recover Canterbury, property owners and related business associations to review the Christchurch City and Canterbury region Economic Development Plans. Sectors should be identified as focal points of future growth for Christchurch and the region and efforts should be made to incorporate the development and promotion of these sectors as part of the redevelopment of Christchurch.

21 One respondent declined to respond to this question

5. MIGRATION AND POPULATION ISSUES – EFFECTS ON RECOVERY

After a major event, such as the Canterbury earthquakes, it is common and understandable for people to wish to leave the affected area. The reasons for moving include damage to accommodation or other infrastructure as well as to escape from subsequent aftershocks. The important points to consider are how many people leave, what skills they have, the rate of outmigration and if that migration is short-term or permanent.

5.1 Implications of outward migration

In the context of the rebuild of Christchurch, there are two primary concerns about the effects of possible depopulation. The first is that if a large enough number of people leave, regardless of age and skill level, the remaining population may not be sufficient to drive the general economy of Christchurch/Canterbury. The second concern is that people with the skills required for the rebuild leave, creating a skills shortage. How staff are emotionally, physically and economically affected by the earthquakes are contributing factors to their leaving for other areas or other jobs.

One example of a sector under threat from the outward migration is the hospitality sector. In interviews with industry representatives in Christchurch, the hospitality sector (bars, cafes and restaurants) identified that the earthquakes have exacerbated a pre-earthquake trend of insufficient numbers of skilled personnel in supervisory and chef positions in the city. Qualified people in supervisory and chef positions have taken up employment opportunities elsewhere, leading to a potential skills shortage when the employers in this sector reopen. In another example, the transport sector forecasts an increase in work, partly as a result of the earthquakes, and yet does not have sufficient qualified personnel. This could act as a bottleneck in the rebuild and has the possibility to impede other sectors dependent on roading. In a 2011 report on likely areas of growth in employment opportunities, the Department of Labour ^[19] cites the services industry as having the “strongest intentions to increase staff of any industry”. Both hospitality and transport are part of the services industry, but if outward migration from Canterbury negatively affects the availability of skilled staff, these sectors will be ill-equipped for the anticipated future expansion.

5.2 Quantifying net migration

Anecdotal evidence suggests that between 26 000 and 70 000 people left Christchurch after the 22 February earthquake ^[20, 21], but are these numbers accurate? After the 2006 Census, Statistics NZ calculate the population of Canterbury as 521,832 and Christchurch City as 348,435. The upper estimate of the number of people who left Christchurch is approximately 20% of Christchurch’s pre-earthquake population. Population data that can be used to verify migration trends into and out of Christchurch and Canterbury are available from a number of sources including: electoral enrolment information, migration data collected by Statistics NZ, school enrolment data, and NZ Post redirections.

Electoral re-enrolment information, available from Statistics NZ, is one possible source of population migration data, especially as 2011 is an election year. However, using these data as a predictor of migration trends has some drawbacks as a lot of people (those who have moved and those who have not moved) leave it until very close to an election to re-enrol, making the migration information inaccurate. In addition, electoral re-enrolment data does

not capture the numbers of minors who have relocated whilst some people (e.g. students in tertiary education) may choose to enrol in a location in which they are not living.

A second source that can be used to track population movement are the figures for long-term permanent population migration from New Zealand, also available from Statistics NZ. This migration information is routinely collected from points of entry into and departure out of NZ. Figures for June 2011 (using the 15 – 65 year age groups) show that overall for both Christchurch and Canterbury, more people left than arrived but the decline was significantly less than 1%. This is shown in Table 20 below. Table 20 also shows net permanent and long-term migration for the months of March (2009, 2010, 2011), June (2009, 2010, 2011), September (2009, 2010, 2011) and December (2009, 2010, 2011).

Table 20: Net permanent and long-term migration statistics for Christchurch and Canterbury

		<i>Mar</i>	<i>Jun</i>	<i>Sep</i>	<i>Dec</i>
Christchurch	2009	733	1,063	1,437	1,589
	2010	1,739	1,455	1,208	911
	2011	168	-711	*	*
Canterbury	2009	722	1,155	1,561	1,782
	2010	1,927	1,490	1,112	696
	2011	-130	-1,194	*	*

Source: Statistics New Zealand²². *Figures not available at the time of writing report

Statistics NZ has also compiled school re-enrolment figures from data obtained from the Ministry of Education. Using July 2010 school enrolment numbers as the baseline, as at 5th July 2011 only 3.7 per cent of primary and secondary school students had shifted their enrolment to schools outside Christchurch, Selwyn and Waimakariri districts of Canterbury [22].

Another source that can be used to follow people’s movements after the earthquakes is the postal service provider, NZ Post’s, mail redirection database in which people can register their change of address. Following both earthquakes, this database was analysed to provide an indication of household migration due to the earthquakes²³. In the report published after the September 2010 earthquake [23], analysis was undertaken of the household relocations within and to the region for the months of September and October 2010. Records were not acquired for Canterbury households that relocated outside the region. Statistical comparisons, using Chi-Square analysis, were made between the two post-earthquake months with the same months in 2008 and 2009.

Based on what was statistically expected, during September and October 2010 there were fewer relocations recorded for Christchurch and Timaru. These changes might be explained

²² Figures calculated from international travel and migration (ITM) “permanent and long-term migration by age, sex and NZ area” reports.

²³ This analysis is based on the NZ Post relocation data, and it should be noted that there are a number of limitations. The first is that not every person that moves address notifies NZ Post. For example, it is possible that some may have relocated in the area but continue to collect their mail from their previous address. NZ Post also suggest that 65% of people who redirect their mail agree to have their details included in relocation databases, which means 35% of our potential sample may have been lost prior to the analyses. In addition, there is a possibility that business relocations are included in the dataset as it does not distinguish between households and businesses. It is thought likely, though, that the number of businesses will be small as many firms rely on PO Boxes for their mail delivery.

by uncertainty in the housing markets. According to Real Estate Institute of New Zealand (REINZ), house sales for the entire region were at their lowest for two years during September and October 2010. Certainly there were people in Christchurch who were forced out of their homes by the earthquake, but overall household movements were less than the anticipated baseline data. On the other hand significantly more relocations were recorded for Selwyn District, of which Darfield and Rolleston are part. As the earthquake was centred on Darfield, it might be anticipated that there would be significantly more household movements from or within the Selwyn District because of the earthquake.

After the 4 September earthquake, 1,320 households relocated within the Canterbury region in the months of September and October 2010. This compares to 7,006 households (19,742 people) that shifted within the region in the six weeks after the 22 February 2011 earthquake. A further 1,553 households shifted to other parts of New Zealand following the second earthquake and 73 households shifted overseas²⁴ with a net reduction for the region of approximately 1%. The total number of residents that relocated in the six weeks after 23 February according to NZ Post data was 24,892 (equivalent data is not known for the period after the September earthquake).

In contrast to the aftermath of the September earthquake, in the six weeks after the February earthquake, the movements from Christchurch City were significantly greater than would be expected statistically²⁵. As discussed previously, this is not unexpected as this earthquake caused far more damage to housing in the city than the September earthquake. Relocations within Christchurch were also significantly higher than would have been expected. Key areas within the Christchurch territorial authority (TA) affected by outward evacuation were the Burwood-Pegasus and Hagley-Ferrymead wards. Key destinations within the Christchurch City wards showing greater migration than would be expected were the Shirley-Papanui and Spreydon-Heathcote wards. The key destination locations outside the Canterbury region in order of significance were Auckland, Otago and Wellington. It is worth noting that a little more than half (54%) of mail redirections durations were less than two months²⁶, suggesting that many people envisaged their move was only short-term.

Additional analysis also based on the NZ Post mail redirection data for the six-week periods preceding and following the 22 February earthquake is illustrated in Table 21. This shows migration information for the Canterbury region in six weeks prior to (used as a control sample) and the six weeks after the 22 February earthquake. The table shows the numbers of households and individuals who relocated, their age group, where they relocated to and if the relocation was permanent or temporary.

²⁴ With NZ Post supplying the records for no charge after the February earthquake, all relocations within, to and from the region were analysed. After the second earthquake, relocations for the 6 weeks after the quake were statistically compared to the 6 weeks prior.

²⁵ This is based on the control sample calculated by Opus using information from the six-week period immediately before the earthquake (11 January – 22 February 2011).

²⁶ The redirect service is free for up to 2 months but only for people 65 years and over.

Table 21: Household and individual relocation data based on pre- and post- 22 February earthquake samples for movements from the Canterbury region only

Key Variable	Migration group	
	Control sample (11 Jan – 22 Feb 2011) 6 weeks prior to 22 February	Post-earthquake sample (23 Feb – 6 April 2011) 6 weeks after to 22 February
Relocation frequencies		
Number of households relocated	2397	8632
Number of people relocated	7474	24892
Average number of people in household	3.12	2.88
Relocation permanence		
Permanent	2281 (95.2%)	7111 (82.4%)
Temporary	116 (4.8%)	1521 (17.6%)
Age group		
People under 16 years	1177 (15.7%)	2268 (9.1%)
Other (age not specified)	6297 (84.3%)	22624 (90.9%)
Relocation destination location		
Canterbury region	2072 (86.4%)	7006 (81.2%)
Other New Zealand region	287 (12.0%)	1553 (18.0%)
Overseas	38 (1.6%)	73 (0.8%)

Source: Opus Central Laboratories based on mail re-direction data provided by NZ Post [16]

Following the 13 June earthquake there was a UMR Research^[1] survey conducted. This survey found that a large majority (81%) of respondents living in Christchurch answered “yes” to the question “Do you expect to keep living in Christchurch for the next few years”, while 11% responded “no” and eight per cent were “unsure”.

In summary, based on information for population movements out of the region, from:

- long-term permanent migration patterns in to and out of Christchurch and Canterbury (less than a 1% decline),
- primary and secondary school re-enrolment figures of Canterbury students to schools outside the Canterbury region (up to a 3.7% decline of families with school age children) and
- the duration and destination of mail redirections for Christchurch residents after the September 2010 and February 2011 earthquakes (approximately 1% decline),
- the intentions of Christchurch residents following the 13 June quake indicating a significant increase in the potential for loss of population (potential 11% decline)

There does not appear to have been a large population decline but has been some population transfer from Christchurch out to the broader Canterbury region. However the situation is fragile and there is a significantly increased potential for population loss following 13 June. It should be noted that these population movement data are not exhaustive, but give a good indication of the post-earthquake population status for the city and region.

Research Recommendation: The migration trends for Christchurch and Canterbury are a significant issue. The levels of permanent outward migration do not appear to be extreme so far however an aspect to be considered is the possible out migration of people after they receive their insurance payouts for damaged land or homes. As a result of this and the need to retain a qualified workforce to support business recovery, reconstruction and maintenance of essential services, migrations trends should continue to be followed closely.

6. SUMMARY AND CONCLUSIONS

The devastating series of earthquakes that struck the city of Christchurch and the Canterbury region of New Zealand in 2010 and 2011 have severely tested the resilience of local organisations, both large and small. The impact of the earthquakes was even more damaging coming in the wake of the worst worldwide recession since the great depression of the 1930s. This report has synthesised the results of three studies demonstrating the differential impacts of the 4 September, 22 February and 13 June events.

The analysis has compared the impacts on organisations from a range of perspectives, including organisation size and industry sector. Impacts on organisations' revenue, costs and employment have been looked at as well as disruption, relocation and closure of business, insurance impacts and financing the business recovery. The picture presented is rounded out with evidence from public sources on the migration and population impacts of the earthquakes, a fundamental issue affecting the employment pool, customer base and thus both business and community recovery.

The 22 February earthquake had a compounding affect on most organisations surveyed. This impact resulted in more depressed revenues, reduced employment, greater and more extended disruption to operations and increased migration away from the earthquake impacted areas. It is noteworthy that the 13 June quake did not seem to exacerbate the negative consequences of the earlier events, with the important exception of intended permanent migration away from the region.

An overall summary of these results indicate that the vast majority of businesses (in excess of 95%) are still operating within the region, although, on average, with reduced income, reduced employees and higher costs. This picture is less negative than might have been expected given the devastation caused by the series of earthquakes. However countering this outlook is the prospect that up to 11% of the population (according to the UMR survey) may leave the city permanently, potentially causing shrinkage in the local marketplace and creating skills shortages that will be crucial to the recovery and rebuild of the city ^[1]. Complicating the recovery picture further is the fact that local businesses will be facing significant competitive disadvantages presented by major disruptions caused by the reconstruction over the next decade or more. The fact that most of the regional businesses are small and thus relatively more fragile underscores the need for ongoing concern and effective action in supporting these organisations through a very difficult period that will extend for more than a decade.

Effective business recovery will be dependent on creative use of existing services available through both central and local government as well as sectoral collaboration and the

innovative self-reliance that New Zealanders are so well known for. Also important in this mix is the need for the revived CBD to be highly business friendly. The following section includes recommendations for areas where existing services could be focused to support business recovery as well as recommendations for further research in support of the long term recovery effort.

7. RECOMMENDATIONS

The following recommendations flow from the synthesis of the three surveys this report covers and the reflections on those results.

Recommendations related to Services provided by central and local government:

Service Recommendation #1: The increased impact of business disruption due to customer and supplier related issues supports the evidence that the effects of 22 February and 13 June earthquakes have compounded the impact of the 4 September earthquake. Organisations may need assistance to determine how to improve the resilience of their supply chain to disruption. This may include identifying alternate suppliers or suppliers that are outside of the region and unlikely to be affected in a regional disaster prior to a crisis. Organisations can also set up mutual aid agreements or collaborations with other organisations where appropriate to ensure critical supplies can be accessed from other organisations if there are further disruptions. In addition assistance in marketing the region could provide a boost to the eroded customer base.

Service Recommendation #2: Following the 22 February and 13 June earthquakes, road network problems were found to be the most disruptive critical service issue for organisations. As reconstruction continues road networks are likely to continue to be disrupted. Also long-term changes in road networks, such as the decision to delay repairing the Sumner Road, are likely to have major impacts on some organisations. Organisations will need accurate and up-to-date information on road network disruptions and planned road works.

Service Recommendation #3: Organisations need access to information and expertise that will help them minimise disruptions associated with the reconstruction process while finding ways to take advantage of the opportunities that may be available.

Service Recommendation #4: Given the relatively negative disposition of organisations to relocate to the Central City in 18 months, it is important that the Canterbury Earthquake Recovery Authority (CERA), the Christchurch City Council (CCC) and other decision makers work collaboratively with businesses to ensure that Christchurch is rebuilt in a way that is attractive to businesses and future development of the city. The consultation process needs to go far beyond keeping businesses informed. Small businesses especially need to be engaged and empowered through the reconstruction process in order to improve and maintain investment confidence.

Service Recommendation #5: The draft of the Christchurch City Plan has been developed with care and extensive community consultation and will be a useful guide for many aspects of Christchurch's reconstruction and redevelopment. However, more needs to be done to convey the importance, future development and level of involvement of the commercial and

businesses sectors. We recommend that the CERA and the Christchurch City Council work with Canterbury Employer's Chamber of Commerce, The Canterbury Development Corporation, Recover Canterbury, property owners and related business associations to review the Christchurch City and Canterbury region Economic Development Plans. Sectors should be identified as focal points of future growth for Christchurch and the region and efforts should be made to incorporate the development and promotion of these sectors as part of the redevelopment of Christchurch.

Recommendations related to further research:

Research Recommendation #1: Data should continue to be collected on revenue changes and operational cost changes periodically over the next few years. There is some indication that smaller organisations are more likely to see greater downturns in organisational revenue, and that certain sectors will experience increases while others experience decreases. It is therefore recommended that this data collection include a large enough sample to allow effective sectoral analysis to permit targeted strategies to support more impacted sectors and organisations of different sizes.

Research Recommendation #2: Organisations struggling to hire employees and an outward migration of important skills are likely to be growing concerns in Canterbury. Data gathering on this is urgently needed to determine the extent of this potential problem, including who is leaving, whether relocations are permanent and how organisations can be assisted in recruiting qualified workers when they are ready to reopen or commence reconstruction projects.

Research Recommendation #3: Given the high level of disruption regarding customers and employee well being there is a need for qualitative research as well as on-going survey work to give more understanding of the issues surrounding this disruption and the development of steps to assist businesses impacted

Research Recommendation #4: More research and consultation is needed to understand how to help organisations forecast demand, deal with uncertainty and adapt to change in the post-earthquake environment.

Research Recommendation #5: Further information on the impact of insurance coverage and timely claims completion would be beneficial in understanding how fragile the finances are for Canterbury organisations.

Research Recommendation #6: The insurance landscape has been altered by the recent earthquakes in Canterbury. If premiums increase to the point that they are not financially sustainable then organisations may want to consider spending money on other mitigation measures (such as seismic retrofitting). Research (including cost-benefit modelling) needs to be done to help organisations determine the future of private insurance in Canterbury, and how much organisations should invest in other loss mitigation measures. As mitigation is best done during the reconstruction phase, the need for this information is urgent.

Research Recommendation #7: Data dealing with staff loss from organisations and complementary data on employee intentions to stay in the Canterbury area should continue to be collected as a leading indicator of skill availability and thus recovery.

Research Recommendation #8: The migration trends for Christchurch and Canterbury are a significant issue. The levels of permanent outward migration do not appear to be extreme so far however an aspect to be considered is the possible out migration of people after they receive their insurance payouts for damaged land or homes. As a result of this and the need to retain a qualified workforce to support business recovery, reconstruction and maintenance of essential services, migrations trends should continue to be followed closely.

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APPENDIX A: ORGANISATION DEMOGRAPHICS

This appendix provides further information on the sampling methodologies and organisational characteristics from the three surveys discussed in this report (ResOrgs survey 1, ResOrgs survey 2, and the Recover Canterbury survey).

Samples by Location

The ResOrgs surveys 1 and 2 used stratified sampling, specifically targeted organisations in the Christchurch CBD and Kaiapoi town centre. This is reflected in the distribution of organisations seen in Table 22. For these studies, the Christchurch CBD is defined as the area bound by the four avenues (Bealey Ave., Fitzgerald Ave., Deans Ave., and Moorehouse Ave). Christchurch is the largest city in the South Island and the Christchurch CBD is the driver of much of the economic activity of the region. After the 4 September earthquake the Christchurch CBD had localised areas of damage, particularly areas with a large number of unreinforced masonry buildings^[24]. Following the 22 February earthquake the Christchurch CBD experienced significant damage and parts were cordoned off from the public for over 8 months.

Table 22: Survey samples broken down by location

	ResOrgs survey 1 (4 Sep)	Recover Canterbury survey (22 Feb)	ResOrgs survey 2 (13 Jun)
Christchurch CBD	22%	6%	24%
Kaiapoi	11%	0%	12%
Other	66%	94%	61%

Kaiapoi is a small town of approximately 11,000 people located in the Waimakariri District of Canterbury. Kaiapoi was built on filled land over a historic channel of the Waimakariri River, and as a result was one of the most extreme examples of liquefaction and lateral spread damage in Canterbury following the 4 September earthquake, making it an interesting study area for the ResOrgs research. Kaiapoi escaped with relatively little additional damage following the 22 February earthquake, aside from the worsening of pre-existing damage.

Samples by Industry Type

The ResOrgs study employed a stratified sampling technique. A cross-section of industry sectors was strategically selected for this study to reflect various elements of the Canterbury economy. The sample was divided into two portions. The geographically selected samples were selected based both on their importance to the economy, but also on their spatial characteristics to exemplify the importance of environmental context on organisational recovery. More broadly, several industry sectors were selected based on various criteria that justified their importance to the Canterbury economy or relevance as indicators of recovery. Within each of these areas and sectors, organisations were randomly selected to be invited to take part in the study.

The geographically selected samples included were:

- Christchurch CBD (CHCH CBD) – represents an important retail and service hub in the Canterbury region. Both CBDs represent an aggregation of organisations in one locality, and allow analysis of challenges faced by organisations that are part of this spatial and economic unit.
- Kaiapoi CBD – a smaller retail and service centre hub that was severely affected by liquefaction and lateral spread following the 4 September earthquake.
- Rural farm - organisations proximal to the fault trace in and around Darfield (Selwyn District) and also a high-growth sector part of Canterbury’s regional economic plan
- Rural non-farm –rural farm support organisations and were also selected on the basis of proximity to the fault trace.

The industry sectors included were:

- Information and Communication Technology (ICT) – a high-growth sector identified as a key component of Canterbury’s regional economic plan
- Critical infrastructure (lifelines) – for provision of services vital to recovery
- Hospitality (cafes, restaurants and bars) – to analyse recovery through consumer discretionary spend
- Fast moving consumer goods (FMCG) – including product producers, supermarkets, dairies, and petrol stations to analyse recovery through consumer non-discretionary spending
- Trucking – important part of supply chain for many industry sectors and
- Building Suppliers – for their involvement in the rebuilding process.

ResOrgs survey 2 and the Recover Canterbury survey respondents were also asked to indicate their ‘Industry Type’ as part of the respective surveys. All survey responses, including ResOrgs survey 1, were retrospectively coded to ensure that similar organisations were assigned the same Industry Type. Thus the sector categories identified for sampling ResOrgs survey 1, were reclassified to fit the Industry Type categories. This results in a slightly different division of the sample. For example, organisations identified as “Building Suppliers” for ResOrgs survey 1, were placed in the Construction, Manufacturing, Retail trade, or Wholesale trade Industry Type categories, depending on the company’s description of its services. The results of this Industry Type breakdown for all three surveys can be seen in Table 23.

Table 23: Survey samples broken down by industry type

Industry Type	ResOrgs survey 1 (4 Sep)		Recover Canterbury survey (22 Feb)		ResOrgs survey 2 (13 Jun)	
	n	%	n	%	n	%
Accommodation and food services	40	11%	11	5%	7	9%
Administrative and support services	0	-	0	-	0	-
Agriculture, forestry and fishing	29	8%	3	1%	1	1%
Arts and recreation services	6	2%	8	4%	2	3%
Construction	9	2%	8	4%	5	7%
Education and training	5	1%	7	3%	0	-
Electricity, gas, water and waste services	15	4%	7	3%	8	11%
Financial and insurance services	4	1%	9	4%	1	1%
Health care and social assistance	9	2%	10	5%	1	1%
Information media and telecommunications	29	8%	8	4%	4	5%
Manufacturing	39	11%	19	9%	8	11%
Mining	0	-	0	-	0	-
Professional, scientific and technical services	26	7%	23	11%	4	5%
Public administration and safety	4	1%	1	0.5%	0	-
Rental, hiring and retail estate services	8	2%	11	5%	2	3%
Retail trade	86	23%	27	13%	17	23%
Transport, postal and warehousing	23	6%	7	3%	5	7%
Wholesale trade	21	6%	18	9%	4	5%
Other	13	4%	23	11%	6	8%

Organisation Size

Throughout the report organisations size (number of FTE employees) is reported as the number full-time employees plus 0.5 times the number of part-time employees. However, some organisations also have a large number of temporary employees as seen in Table 24.

Table 24: Organisation part-time and temporary employees by sample

	Part-time employees				Temporary employees			
	Mean	Median	Range	Std. Dev.	Mean	Median	Range	Std. Dev.
ResOrgs survey 1 (4 Sep)	17	3	500	47	26	1	1300	161
Recover Canterbury survey (22 Feb)	4	1	70	9	1	0	49	6
ResOrgs survey 2 (13 Jun)	10	1	170	28	1	0	10	2