Understanding Public Perception and Literacy of Coastal Climate Risk

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Executive Summary

This report investigates the current public perceptions of coastal risks and identifies key concerns, expectations, and areas of misconceptions regarding coastal hazards. The central research question that was developed and answered was *How do residents of at-risk suburbs perceive coastal hazards and risks, and what factors influence their perceptions and understanding?* This project worked in collaboration with the Christchurch City Council and provided them with recommendations on how to effectively communicate climate risk. Literature reviews were conducted to provide a thorough background to the topic and provide an outline of what has already been done by the Christchurch City Council. The methodology included qualitative methods, which gathered information about public perception of coastal hazards, such as levels of awareness, and preferred methods of learning. ArcGIS was used to map the spatial distribution of respondents. Results found that respondents perceive coastal hazards and associated risks as a significant concern and want a multi-faceted approach to learning. Various limitations were encountered throughout the process, including survey size, limited study location and public perception may be skewed by misconception in the past. Future research could include conducting this study at a larger scale, allowing the findings to be applied more broadly across other regions of New Zealand.

Introduction

This report aims to investigate the current public perceptions of coastal risks and identify key concerns, expectations, and areas of misconceptions regarding coastal hazards. This research is based in the South Island of New Zealand, with a key focus on coastal Christchurch. The central research question explored was: *How do residents of at-risk suburbs perceive coastal hazards and risks, and what factors influence their perceptions and understanding?* This project was conducted in collaboration with community partner Maiki Andersen from the Christchurch City Council (CCC) and aims to provide insights and recommendations for improved climate-related communication.

Christchurch is located along the east coast of the South Island of New Zealand and is home to just under 400,000 residents (Christchurch City Council, 2023a). The study location selected for this project includes areas of the Coastal Ward, along with some suburbs in the Burwood and Linwood Ward (Figure 1). Some of the suburbs include Avondale, Bromley, Parklands, Aranui, Shirley, Waimairi Beach, and North and South New Brighton. This study area is not the only coastal suburb within Christchurch and New Zealand likely to experience coastal impacts and was chosen as it represents a small part of a much broader issue. This location is relevant to this research due to the high exposure to hazards and the many key community facilities and infrastructure located in this area. For example, schools, early childhood centres, libraries, parks, sports facilities, emergency services and over 9,000 dwellings (Christchurch City Council, 2023). These coastal suburbs will likely face the effects of climate change in the future. The Avon catchment which includes an interconnected combination of coastal risks from both the open coast and tidally affected river, was also analysed in this report. Both coastal and inland areas were analysed to provide a deeper understanding of coastal hazards and to explore how communities further inland, particularly along the Avon River, perceive risk.

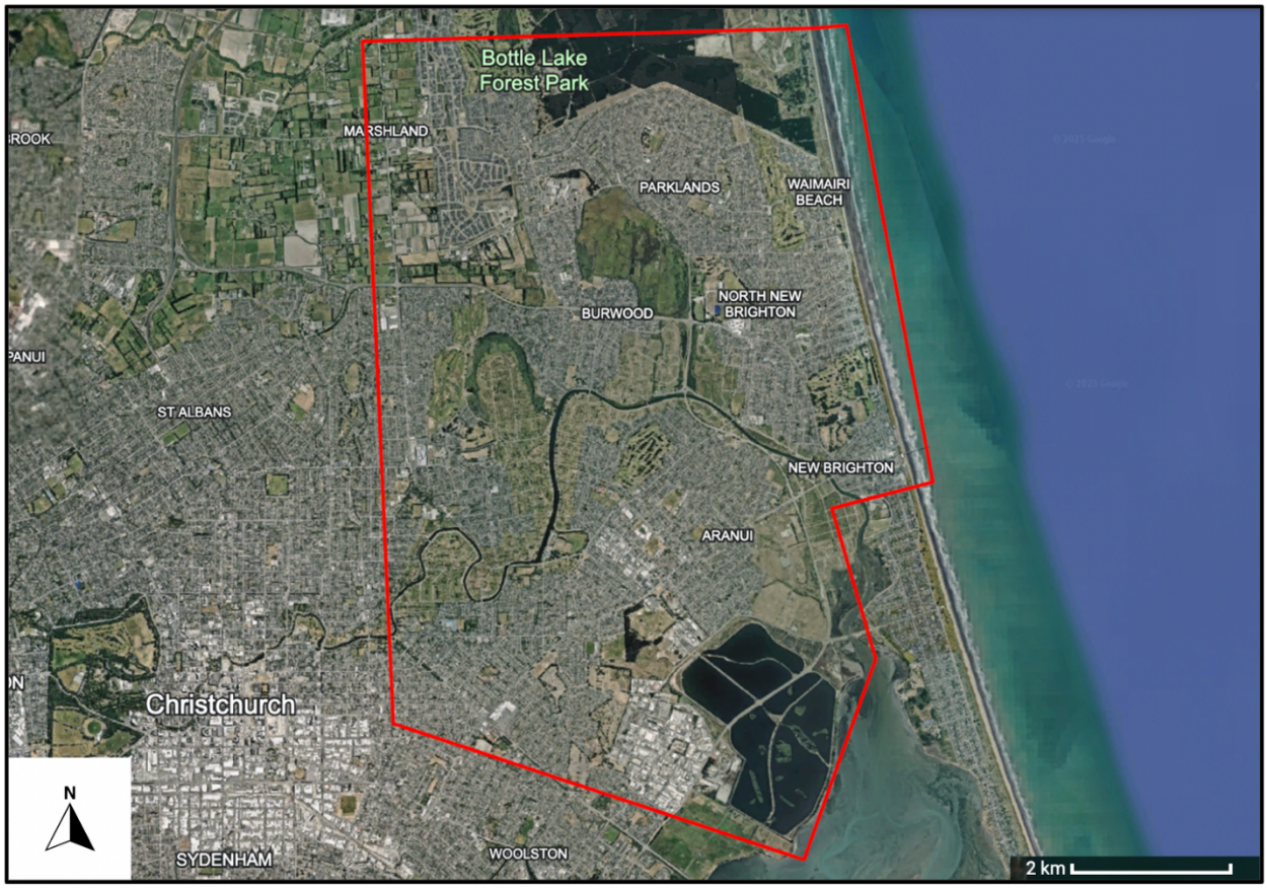

Figure 1: The location of the study area in Coastal Christchurch.

The Christchurch coast is expected to experience a range of climate change impacts such as, increased frequency and magnitude of extreme weather events and rising sea levels (Christchurch City Council, 2025). These changes are likely to impact both the natural and cultural environment of the coast. The coastline from Waimairi Beach to the Southshore spit will likely be affected by storm surges, high ocean swells, wind-generated waves, sea level rise, coastal inundation, rising groundwater, as well as coastal erosion (Tonkin and Taylor, 2021). These hazards are expected to significantly impact the coastline, ecosystem, habitats and nearby infrastructure, with some areas more vulnerable than others. Rullens et al., (2022) suggest other impacts such as the loss of the intertidal zone and coastal squeeze will also occur. As a result, local communities will also be affected, facing disruption to daily life, increased risk to property and potential displacement.

Ensuring that the public understands coastal hazards and their potential impacts is essential for implementing effective adaptation and securing a sustainable future for coastal communities (National Academies of Sciences, 1997). People perceive risk differently leading to misalignment between public understanding and expert information. Additionally, some residents experience barriers to engaging with the Council, including trust and communication challenges, which can limit the reach and impact of risk communication efforts. Therefore, gaining insights

into how the public perceives and understands these risks will be critical in creating effective communication methods and reducing the impacts on coastal residents.

The report is composed of critically assessed literature reviews to provide a well-established background to coastal hazards and public perceptions. These were divided into four key themes: what are coastal hazards, public perception of risk, effective risk communication, and review of the council and government efforts. Next, the report outlines the survey methodology and presents the results. The significance, limitations and recommendations of this report are analysed in the discussion, followed by future research and the conclusion.

Literature Review

What are coastal hazards?

An estimated 10% of the global population lives in low-elevation coastal zones (LECZs), making these people more likely to be impacted by coastal hazards (Mukhopadhyay et al., 2012; MacManus et al., 2021). Coastal hazards including, erosion, storm surges, flooding and tsunamis can inflict significant damage to coastal communities, resulting in widespread economic loss, the destruction of homes and key infrastructure and serious health issues (Mukhopadhyay et al., 2012; Laino & Iglesias, 2023; Irish et al., 2016). Laino & Iglesias (2023) found that these hazards have the potential to cause substantial and permanent damage, often displacing communities, disrupting livelihoods and intensifying inequalities among vulnerable populations.

Much of the literature agrees that the risk for coastal areas is increasing due to a combination of natural processes and human-induced climate change (Gornitz, 1991; Mukhopadhyay et al., 2012; Laino & Iglesias, 2023). Climate change is impacting the coasts by increasing the magnitude and frequency of weather events and altering the mean sea level (Mukhopadhyay et al., 2012; Irish et al., 2016). As a result, this intensifies the extent of coastal erosion and heightens the risk of coastal flooding, erosion and storm surges (Gornitz, 1991; MacManus et al., 2021). In addition, Gornitz (1991) suggests that rising sea levels will contribute to erosion and saltwater intrusion, contaminating drinking water, as well as the inundation of cities, ports, and wetlands, putting people in danger.

Studies have reported that living near the coast can be advantageous for many people resulting in the ongoing urbanisation of coastal areas (Mukhopadhyay et al., 2012). However, this is increasing people's vulnerability by exposing them to many hazards (Mukhopadhyay et al., 2012; MacManus et al., 2021). Additionally, Laino & Iglesias (2023) found that many vital sectors such as tourism, commercial, energy, agriculture and transport operate near or along the coast, concentrating populations and infrastructure in high-risk areas, heightening the potential impacts of coastal hazards.

Public perception of risk

Risk can be defined as the “potential shocks and stresses to affect in different ways in the state of systems, communities, households, or individuals” (Feng, 2022). Outreville (1998) found that risk is the “uncertainty of loss”. This closely aligns with Knight's (2014) definition of “measurable uncertainty”. Across the literature, it can be understood that risk is defined in several ways, but they all underline the idea of uncertainty. Athearn (1971) supports this common theme in risk definitions. Morgan (1997) demonstrates that risks can be viewed differently for people with differing “social position, cultural beliefs or values” as these factors shape a person's perception of the risk.

Public perception is seen to have multiple definitions. Dowler et al. (2006) find it to be “the type of information obtained from a public opinion survey”. Morgan (1997) suggests surveys to be the most effective way to obtain the public's perceptions. A person's perception can be dependent on several categories (Morgan, 1997). Renn (1989) summarizes these into the following, “controllability, voluntariness, catastrophic potential, delay of consequences, tendency to kill rather than endure, perceived threat to future generations, equal exposure to risk, and familiarity with risk”. These factors may work to influence communities' perceptions. Morgan (1997) demonstrates the importance of public perception for the success of initiatives and projects, stating that ignoring public perceptions may cause “failure in technically good innovations”.

How the public perceives risks and uncertainties will determine their ability to take action against them. Morgan (1997) illustrates this through a flood example, revealing that someone's perception of flood risk will impact the action or support they take. Those who have been affected in the past are more likely to take more action for future events and has been called “availability heuristic” (Morgan, 1997). Feng (2022) also discusses the availability heuristic, describing it as a “short cut people unconsciously and widely rely on to make decisions”. It is also learned that this influences the perceived level of risk and the hazard (Feng, 2022).

Public perception of risk is multi-dimensional, influenced by several factors and differing across many different countries, cultures, and communities. It is crucial to understand public perception when implementing change within an area, to gain the most success of a project.

Effective Risk Communication

A successful example of effective communication is the UK government program, the Energy Saving Trust (EST), which provides advice, and funding, and promotes the reduction of energy consumption through behavioural change. This change begins with simple adjustments that gradually lead to more significant actions or the acceptance of associated costs. Achieving this change requires strong engagement, considering factors such as knowledge, concerns, attitudes, risk perceptions, and behaviour. This method tries to recognise and understand the limits of behavioural change, like cost-benefit balance (Whitmarsh et al., 2011).

Another excellent example was the engagement process that involved Māori representatives and local authorities in the decision-making of formulating the Clifton to Tangoio Coastal Hazards Strategy 2120 (Ryan et al., 2022). This collaboration improves the engagement in understanding of risks and hazards and builds resilience in the community (Ryan et al., 2022).

Lyytimäki et al. (2013) analysed climate change communication through six campaigns in Finland, which utilized various channels such as websites, newsletters, television, face-to-face interactions, and collaborative projects. Some campaigns proved effective, such as National Telework Day, which successfully saved 89 tons of carbon dioxide with strong participation. In contrast, others were ineffective at reaching a wide audience. Lyytimäki et al. (2013) study highlights key factors that could improve climate change communication. These include the use of diverse communication channels, partnerships between organizations, a focus on solutions and fostering interaction among experts or individuals with similar interests or knowledge. Another important finding is the need for accessible information and diverse interactive methods to communicate science, promoting public participation rather than relying on traditional one-way communication (Lyytimäki et al., 2013).

A relevant local example of effective risk communication is the Christchurch City Council's recently released Coastal Hazards Adaptation Plan for Whakaraupō and Koukourarata (Christchurch City Council, 2025). This plan was well received and is notable for its inclusive and accessible design, as it used plain language and clear visuals. This allowed for a wider community engagement and understanding. A key feature of this process was the use of the community coastal panel, which included local community members within the adaptation process, allowing them to influence the outcomes (Christchurch City Council, 2025). This example demonstrates how meaningful engagement can improve public trust and can result in effective risk communication.

Review of Council and Government Efforts

Local studies such as Life in Christchurch survey demonstrate the value of understanding public perceptions in planning for urban resilience as the council can rely on that data to prioritise policy and resources and allocate funding (Christchurch City Council, 2024). Results from the 2024 Life in Christchurch survey outline that Christchurch residents believe that the climate risks that they are most concerned about are wildfires and strong winds (Christchurch City Council, 2024). However, within the Coastal Ward rising groundwater and coastal flooding are the hazards that residents are most concerned about (Christchurch City Council, 2024).

Within New Zealand, the Ministry for the Environment (2024) revealed that only 19% of people are highly worried about climate change and 48% do not agree that climate change will impact them. This highlights a disconnect between the understanding of climate change and expected impacts, particularly as more than 65% of New Zealand's population lives in coastal areas (GNS, n.d.). Contradicting findings between this report and the Life in Christchurch survey were also revealed. It stated that 34% of respondents think that coastal erosion will have the most negative

effects, whereas erosion ranked the lowest in terms of concern for residents of Christchurch (Ministry for the Environment, 2023; Christchurch City Council, 2024). The majority of New Zealanders expect to see more frequent and extreme floods (91%) and storms (88%), as well as the inundation of coastal locations due to sea-level rise (90%) (Ministry for the Environment, 2023a).

The Ministry for the Environment (2023a) found that media is the most common source for obtaining information about climate change and residents would like to get more information from environmental leaders. Only a small fraction of Christchurch residents (27%) feel that the Christchurch City Council is a reliable source for understanding local climate change impacts (Christchurch City Council, 2025b). Finally, there also tends to be a misalignment of action that coastal residents can take to reduce the impacts of climate change on their communities (Ministry for the Environment, 2023a).

Methods

Survey Design

Qualitative data was used to address the various aspects of the research question. The data was collected using an online survey which was developed using Qualtrics. This was chosen as it is a cost-effective, efficient and a user-friendly way to gain responses. A range of questions were crafted which aimed to understand how residents perceive coastal hazards. These questions explored participants' current understanding of risk, what specific hazards worry them the most and what resources or support they think is necessary to enhance risk awareness. A mixed-method approach was used in the creation of the questions to ensure a more comprehensive understanding of the resident's perspective. This included open-ended questions, multiple choice and single-answer questions. Respondents were also encouraged to add additional thoughts or insights at the end of the survey, which allowed for the inclusion of other perspectives that may have been missed in the questions.

Data Collection Methods

The primary data was collected in April 2025 over 10 days using various distribution approaches. First, posters were put up in libraries, supermarkets, pharmacies and golf clubs throughout the study location which displayed a QR code for the survey. Second, in-person surveys were undertaken at the Shirely and New Brighton libraries, where the majority of the surveys were completed. These locations were chosen as they attract a diverse range of people and have high foot traffic. Lastly, the survey link was shared to over 5 community Facebook pages within the study location, as well as the 'University of Canterbury Student Association Noticeboard' page to reach a diverse range of people. The target audience for the survey was residents of coastal Christchurch, particularly in communities near the Avon River mouth, New Brighton and areas north, who are aged 18 and above. Secondary data was sourced from the *Life in Christchurch*

survey which is undertaken by the Christchurch City Council. This is used to provide additional context and support to strengthen the findings from the primary data.

Data Analysis

The data was exported from Qualtrics to Excel, which was used to analyse the quantitative data. Excel was used to display the data in graphs and tables to enhance clarity. Results from the open-ended questions that were not relevant to this research were removed for this analysis.

The proportional symbol map displaying where respondents live within the study area was created using ArcGIS. The Land Information New Zealand (LINZ) data set 'NZ Suburbs and Localities Dataset' was downloaded and imported into ArcGIS. Counts were then added to the attribute table for the suburbs where respondents live. The size of the point corresponds to the number of respondents from that suburb. The respondents who said they lived in 'other' areas were excluded from this map, but their data was still analysed in the report. This visualisation is beneficial to identify the spatial distribution of respondents and identify geographical trends in the data. Finally, thematic analysis was undertaken on the open-ended questions to identify key themes and patterns within the responses.

Results

The survey received a total of 35 complete responses, with ages ranging from under 20 to 65+.

Table 1. The age of the respondents.

Age of respondents	**Response (%)**
Under 20	3%
21-30	26%
31-40	9%
41-50	26%
51-64	11%
65+	26%

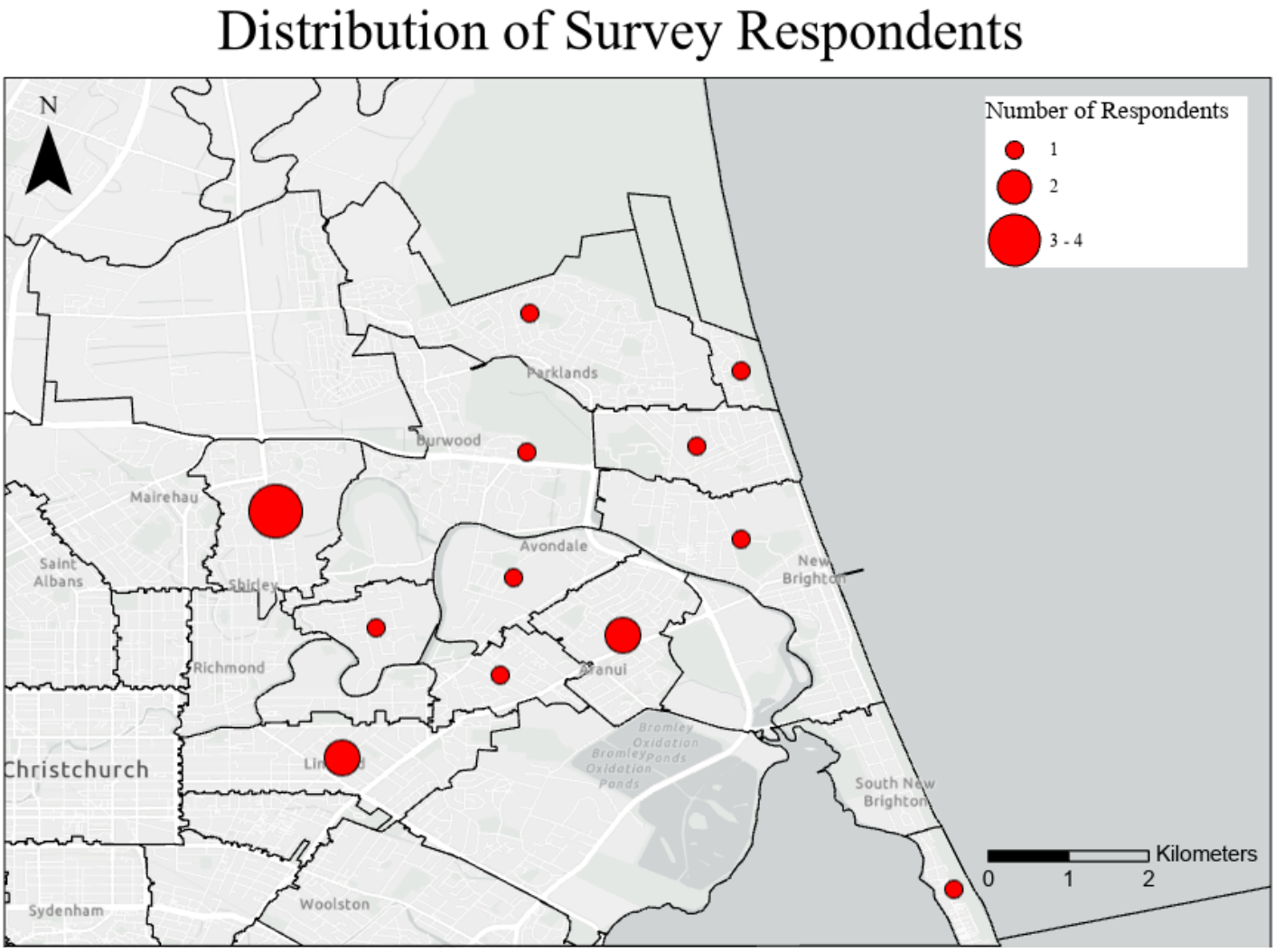

Figure 2. Geographical distribution of survey respondents across coastal Christchurch. The symbol size is proportional to the number of respondents in each area.

This map provides a visual overview of where respondents live within the study area. The size of the circle corresponds to how many people within that area completed the survey. Shirely received four responses, Linwood and Aranui received two and Avondale, Southshore, Burwood, Dallington, Parklands, Waimairi Beach, Wainoni, North New Brighton and New Brighton received one response.

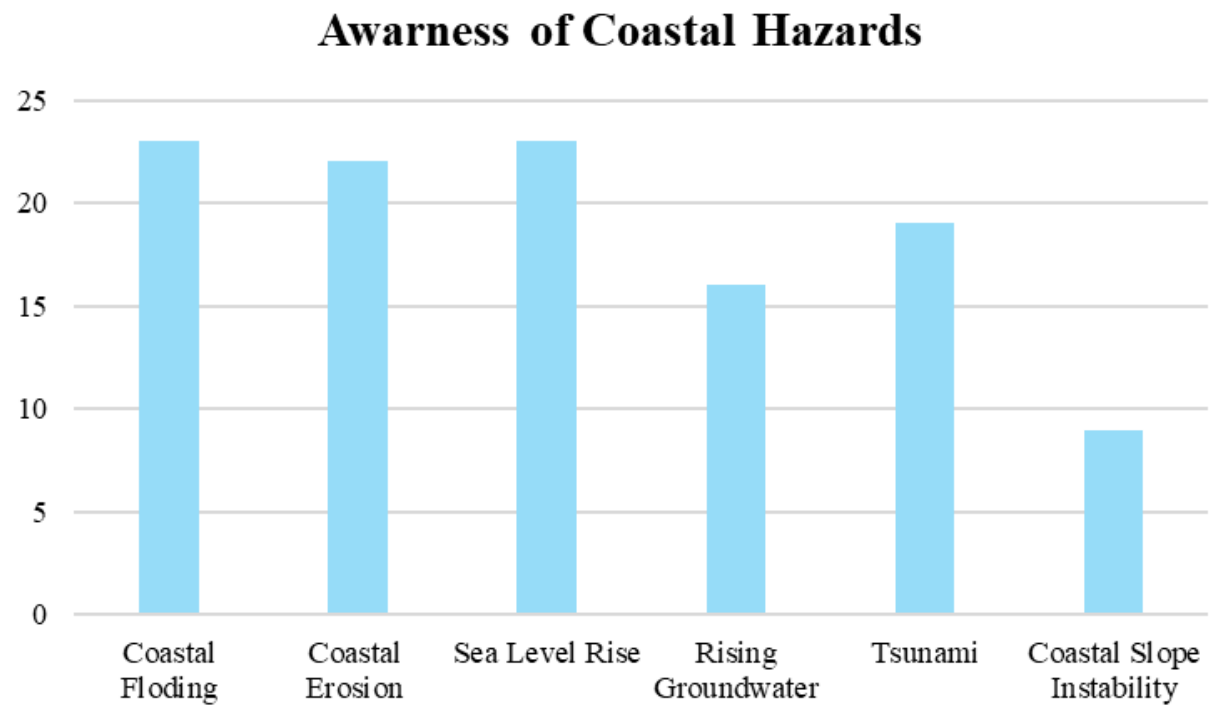

Figure 3. The number of coastal hazards that respondents are aware of. These include coastal flooding, coastal erosion, sea level rise, rising groundwater, tsunamis and coastal slope instability.

Respondents were asked to identify which coastal hazards they were most aware of in their local area. Sea level rise and coastal flooding were the most recorded answers with 23 responses each, closely followed by coastal erosion (22), then tsunami (19). This indicates that residents are somewhat aware of coastal hazards within their area and acknowledge that these coastal hazards are a possibility from climate change. Respondents collectively have a wide range of awareness of hazards, which is shown through the almost equal distribution of results. Coastal slope instability is the hazard that residents are least aware of, receiving only nine responses.

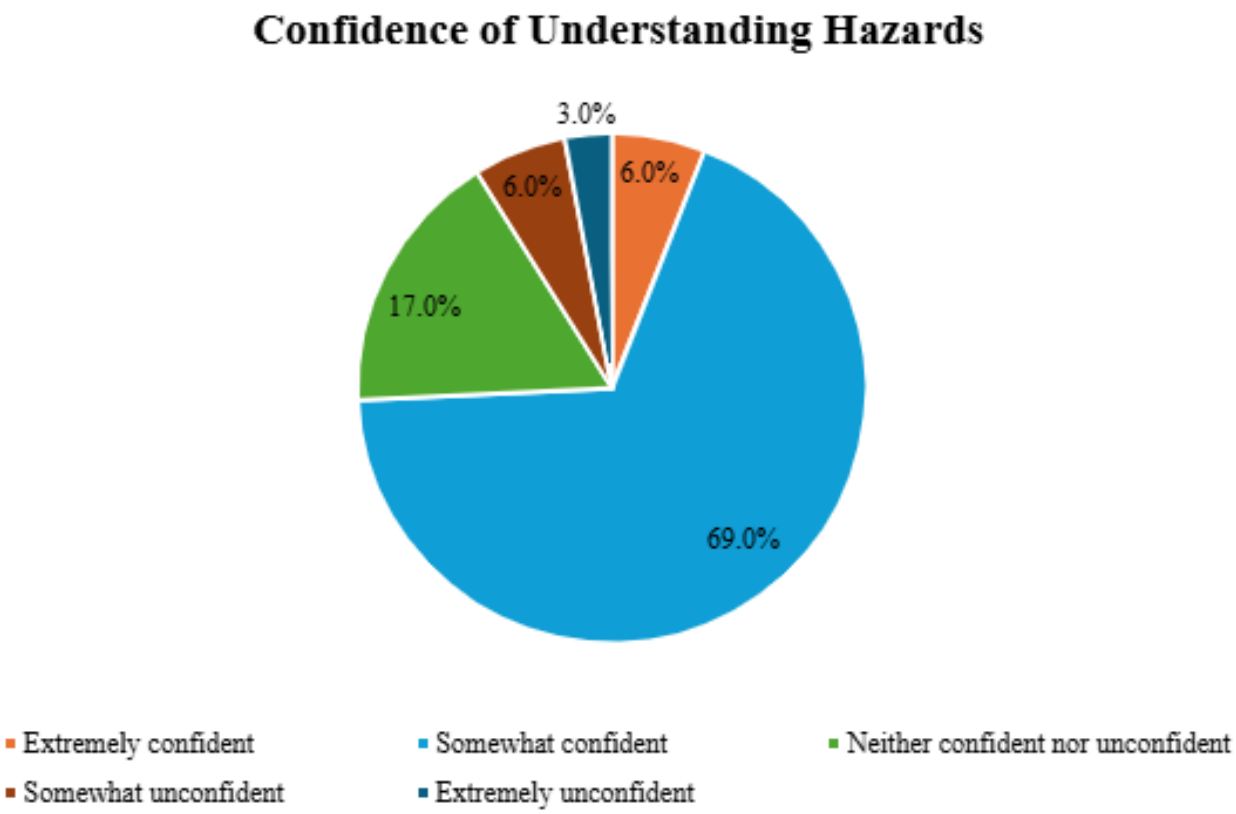

Figure 4. Distribution of respondents' confidence level regarding their understanding of coastal hazards.

Most survey respondents (69%) expressed being somewhat confident in their understanding of coastal hazard risks and consequences. Following this, 17% feel neither confident nor unconfident about the hazards. One respondent felt extremely unconfident about their understanding of the hazards. Finally, 6% feel extremely confident and another 6% somewhat unconfident. Overall, this graph highlights that most respondents have some level of confidence in understanding, with only a small group of people highly confident. A notable proportion feel neutral and very few feel extremely unconfident.

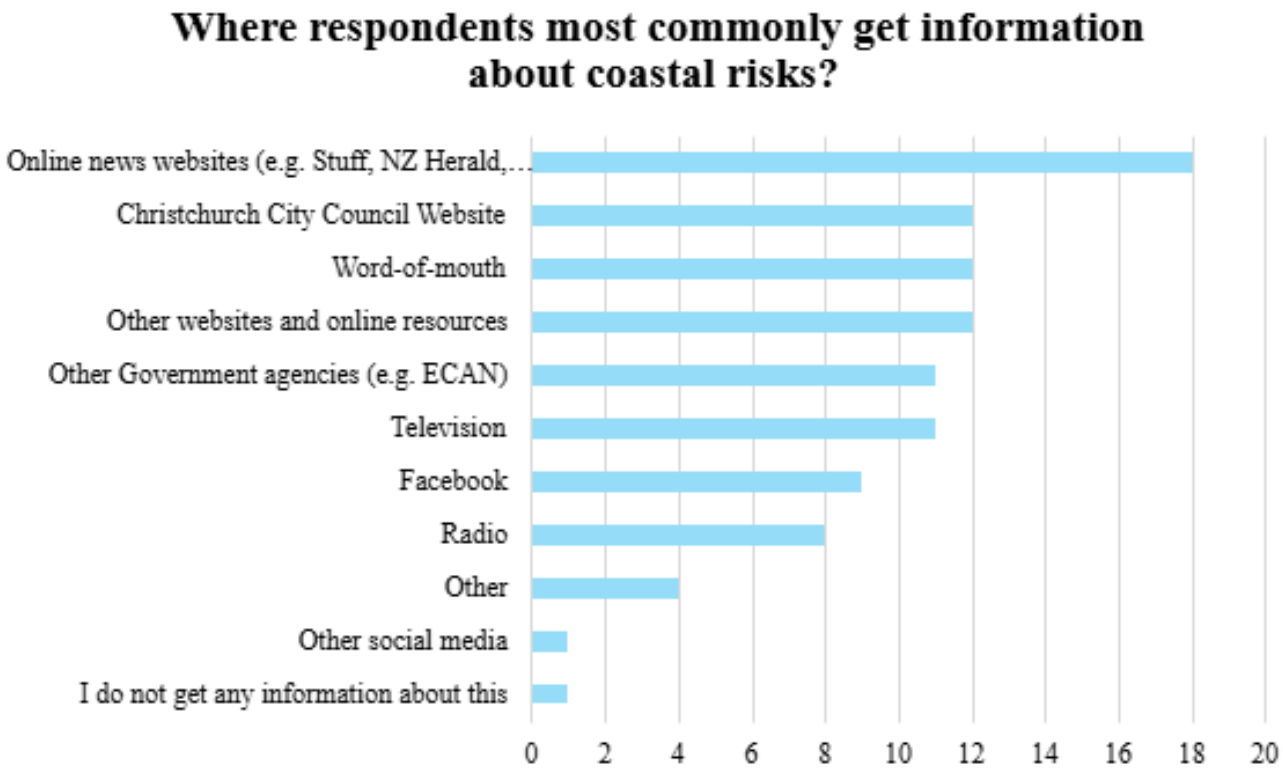

Figure 5: The most common sources to gather information on coastal risks.

The survey findings reveal that respondents most commonly rely on multiple sources for information about coastal risks. This is evident from the total number of selections exceeding the number of respondents, as the question allowed for multiple responses. Figure 3 reveals that the most common source of information is online news websites such as Stuff, NZ Herald, and Newsline with 18 responses. Next, the Christchurch City Council websites, word-of-mouth, and other websites and online resources all received 12 responses. Traditional outlets such as television and radio got 11 and 8 responses. Other social media platforms only got one response and Facebook received nine responses. The 'other' category was the least frequently selected, indicating that most respondents tend to rely on the recognisable and established information sources provided in the survey options. Finally, two respondents indicated that they do not get any information about coastal risks at all.

Table 2: The most effective method for gaining coastal risk information.

Methods	Response (%)
Online news websites (e.g. Stuff, NZ Herald, Newsline)	31%
Television	14%
Facebook	14%
Other	9%
Word-of-mouth	6%
Radio	6%
Other social media	6%
Christchurch City Council website	6%
Tik Tok	3%
Other websites and online resources	3%
Other government agencies (e.g. ECAN)	3%

Table 2 presents respondents' views on the most effective source for spreading coastal risk information. Unlike the previous question, which allowed multiple selections, this question asked respondents to select only one option. As a result, table 2 reflects what participants consider the single most effective method for communicating coastal risks.

Online news websites were chosen as the most effective source by almost 1/3 (31%) of the respondents. The second most selected methods were Facebook and Television, with 14% of respondents believing these to be the most effective. Methods such as word of mouth, radio, and other social media all received fewer responses with 6% each. The Christchurch City Council website also received 6% compared to government websites which received 3%, indicating that people think that local bodies are more effective than national ones. Noticeably, ‘other’ responses made up 9%, indicating there are other communication methods that people think are more effective than were not captured in our listed options. These responses included ‘phone alerts’ and ‘experience’.

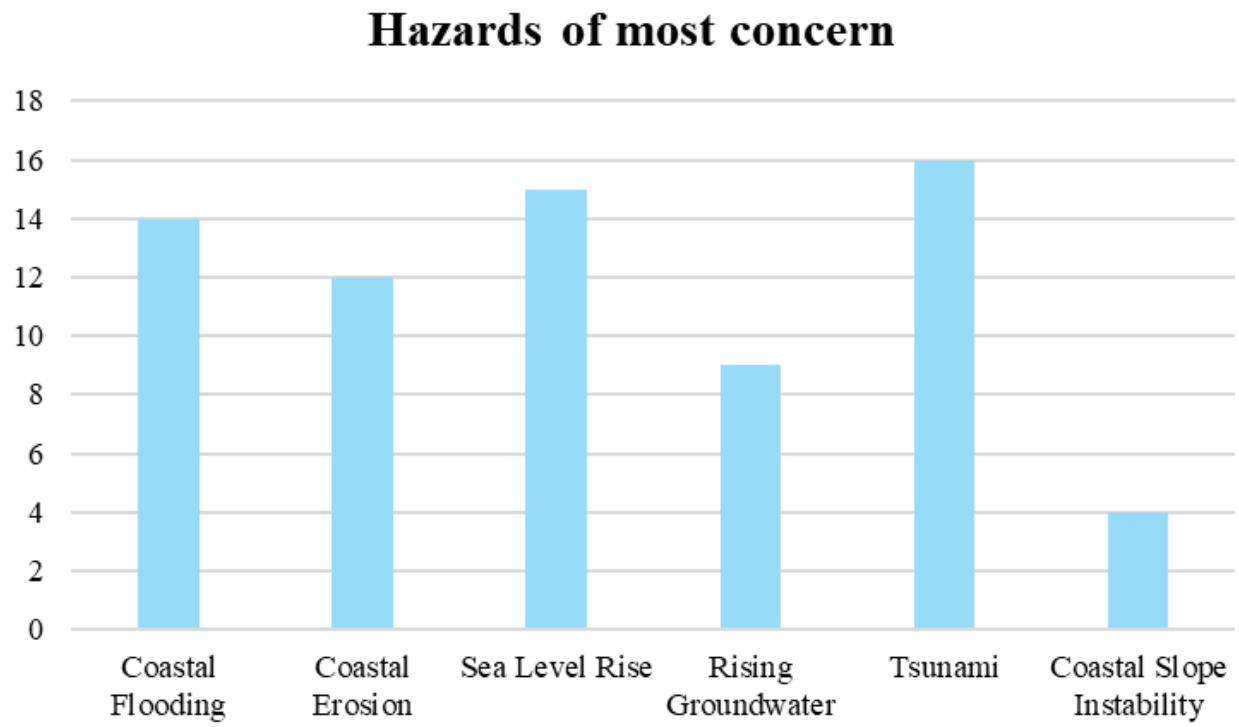

Figure 6: The number of coastal hazards that respondents are most concerned about. These include coastal flooding, coastal erosion, sea level rise, rising groundwater, tsunamis and coastal slope instability.

Figure 6 effectively illustrates the perceived significance of various coastal hazards. Tsunami stands out at the hazard that most people are concerned about, receiving 16 responses. Following closely was sea level rise with 15 responses. Coastal flooding received 14 responses, and coastal erosion was the fourth most selected hazard, with 12 responses. In contrast, rising water and coastal slope instability were identified as less concerning, with nine and four responses respectively. The results show that tsunamis, sea level rise, and coastal flooding are the primary concerns among respondents, compared to other hazards.

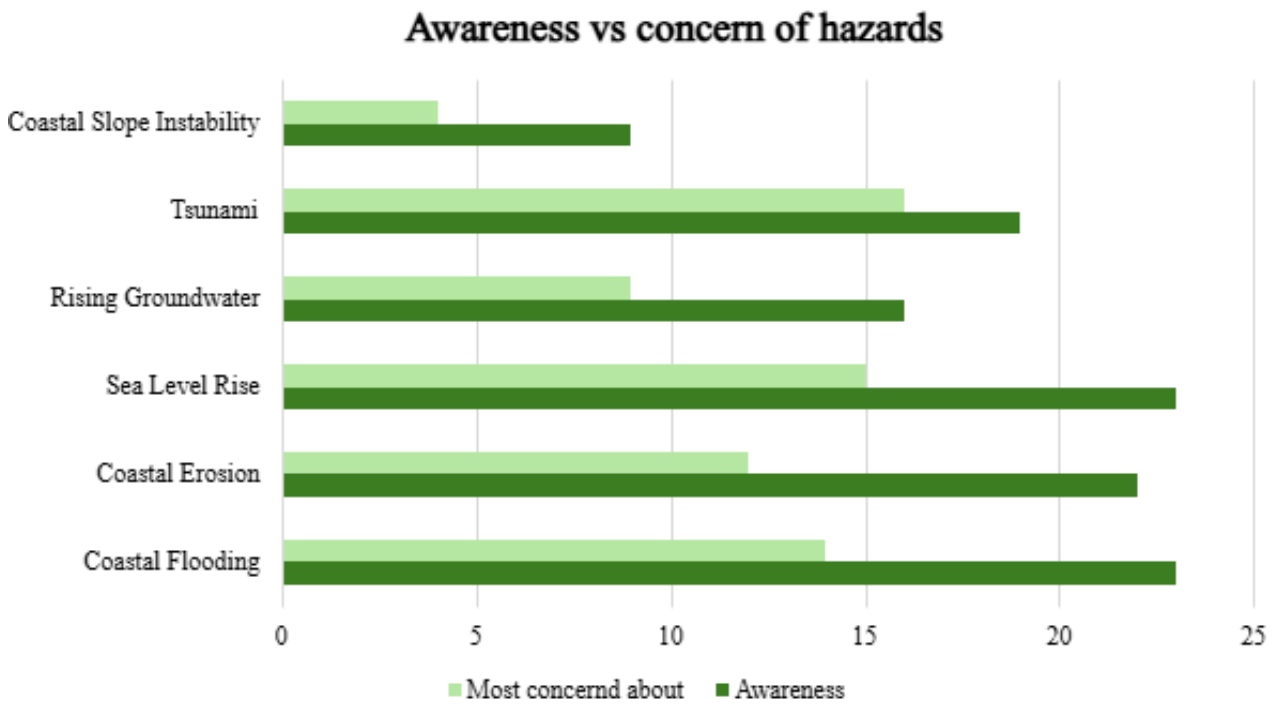

Figure 7. Comparison between awareness and concern for coastal hazards.

The more aware respondents are of hazards the more concerned they are about them. Coastal slope instability displays the lowest number of both awareness and concern. Sea level rise is the hazard that respondents are most aware of and concerned about. Tsunami has a lower level of awareness but a higher level of concern than all other hazards. People tend to be more aware of hazards than they are concerned about them.

Table 3: The Likelihood of respondents' communities being impacted by coastal hazards.

Likelihood	**Response (%)**
Extremely unlikely	9%
Somewhat unlikely	29%
Neither likely nor unlikely	12%
Somewhat likely	38%
Extremely likely	12%

Table 3 presents respondents' views on the likelihood of their communities being affected by coastal hazards. Unlike the previous question, which allowed multiple responses, this question required participants to select only a single option. As a result, the findings more clearly reflect participants' overall perceptions of risk.

According to the data, 38% of respondents believe that an impact from coastal hazards is somewhat likely, while 29% consider it somewhat unlikely. A smaller proportion (12%) think such an impact is extremely likely. Interestingly, another 12% chose neither likely nor unlikely, indicating uncertainty or neutrality. Meanwhile, 9% believe an impact is extremely unlikely, suggesting that some individuals may lack accurate information or awareness regarding the risks associated with coastal hazards.

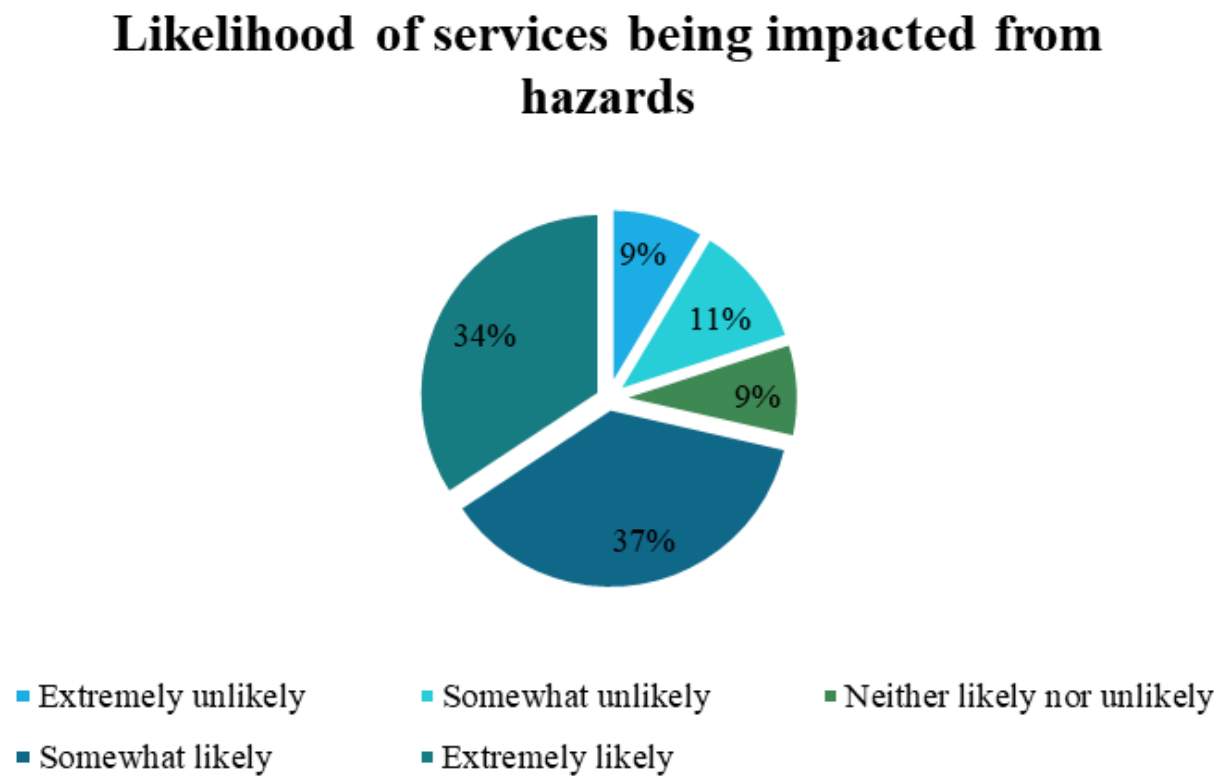

Figure 8: Respondents' assessment of the likelihood that services in Christchurch will be impacted by hazards.

Figure 8 shows the perceived probability that services in their communities could be impacted by coastal hazards. Most of the respondents (37%) believe that such impacts are somewhat likely, followed by 34% who consider them extremely likely. Meanwhile, 11% view the likelihood as somewhat unlikely, and 9% remain neutral. Another 9% of respondents think it is extremely unlikely that their services will be affected. These results show that while most participants perceive some level of risk, a smaller portion remains uncertain or sceptical about potential impacts.

Table 4: Summary of the key suggestions that would assist with gaining a deeper understanding of coastal risks.

Theme	Key Focus
Accessible Local Information	• Flyers in libraries or letterboxes • Printed materials such as posters • Clear diagrams
Diverse Media Use	• TV • Social media • Newspapers • Online platforms
Community Engagement	• Council events • Walking groups • Informal education sessions
Targeted Education	• Youth-focused content • Home-buyer education
Scientific Communication	• Evidence-based information • Projections • Avoid speculation
Trust and Clarity	• Honest • Transparent • Communication from reliable sources

Participants were asked what strategies they think could help them gain a deeper understanding of coastal risks. A key theme was the need for accessible and localised information. Respondents said that information needs to be easily accessible and distributed in various locations. For example, many respondents suggested that flyers or newsletters could be distributed in local libraries, supermarkets, community notice boards and letter boxes. Another key theme was the use of diverse communication channels. Information could be in local newspapers, regularly broadcasted on TV, on social media or on displays in public spaces. There was also strong support for the council to host interactive and in-person community events such as workshops, presentations or informal events including morning teas and walking groups. These events allow people to ask questions and provide an interactive way for residents to gain a deeper understanding. Additionally, some respondents highlighted the importance of education for home buyers about the specific risks associated with the area they may be considering. As well as, incorporating suggestions and methods to help residents prepare and minimise the impacts to both them and their community. Respondents recommended using evidence-based messaging and visuals to help show the likely impacts. Finally, respondents suggested that information should outline what the risk is, the probability of occurrence and the steps people can take to respond.

Table 5. Summary of the preferred methods for communicating coastal risk information.

Key Themes	Methods
Communication outlets	• TV • News Articles • Social Media • Emails • Phone calls • Flyers
In Person Engagement & Education	• Meetings • Workshops • Videos • Learning from trusted locals • Engaging community groups, schools, rest homes
Government & Experts	• Information from the government and council • Accessible scientific studies

This question captures respondents' preferred method of learning about coastal hazards and risks. This was broken down into three key themes. Various communication outlets were one of the key preferred methods of communicating risk. These include television, news articles, social media, emails, phone calls and flyers. In-person engagement and education were also identified as a preferred method of communicating risk. This involved activities such as meetings, workshops and community events. People identified that they wanted to learn from trusted locals in a community environment and suggested that events should be held in public locations such as libraries, town halls or community centres. Engaging communities such as schools, retirement homes and community groups was also suggested.

Distributing information through the council, government and scientific experts was indicated as another important theme. Information from government officials and council members was more trustworthy than social media sources and believed to be more transparent and credible. As well as this, many respondents highlighted the need for easily accessible scientific public material.

Table 6. Summary of the key concepts and terminology that respondents suggested should be incorporated into effective risk communication.

Concepts and Terminology	Description
Clarity and Simplicity	• Plain language • Explanation of key terms • Understandable

	• Large print • Easy-to-read materials.
Visual and Sensory Aids	• Use of photos • Eye-catching colours • Audio format
Localisation and Relevance	• Tailoring messages to local context • Showing direct impact to the community • Use of worst-case scenario
Transparency	• The use of facts • Non-alarmist communication
Risk Quantification	• Explanation of key terms • Use of examples (e.g. in the next 50 years)

Participants shared a range of concepts and terminology that could be incorporated into effective risk communication. The most mentioned theme was clarity and simplicity. Participants suggested that plain and accessible language should be used which is free of jargon and technical complexity, making it easy to understand. Large print should be used for those who have vision impairments, while bright colours can help draw attention and enhance visibility. Additionally, including clear explanations of key terminology, such as return periods, can enhance understanding, as some people may find these terms confusing. Many respondents emphasised the importance of using visuals, such as photos, maps and diagrams, as these help to make risk feel more relevant to individuals. Another key term identified was the importance of localised information. Having the information framed within the community context shows how the hazards may directly impact the community. Finally, suggestions also included avoiding fear-generating words such as 'climate crisis' or 'danger', which some audiences may dislike, as well as, backing up information with evidence to reduce speculation.

Few respondents provided additional information when asked if they had anything else to add. The key takeaway points included framing information around the worst-case scenarios and ensuring that risk information is incorporated in the Land Information Memorandum (LIM) report and is regularly updated.

Discussion

How do residents of at-risk suburbs perceive coastal hazards and risks?

The results indicate that residents of at-risk suburbs in Christchurch perceive coastal hazards and associated risks as a significant concern. A variation in responses was still reported with half of respondents acknowledging the likelihood of their community being impacted by coastal hazards and a substantial 38% still perceive it as unlikely (Table 3). This highlights the differing levels of risk perception, which could be influenced by personal experience, proximity to the coast and

access to information. The high level of awareness for hazards such as coastal flooding, coastal erosion and sea level rise indicates that these hazards must be more frequently discussed and visible to residents (Figure 3). Results have also shown that the more aware people are of risks, the more concerned they are about them (Figure 7). This insight is valuable as it highlights that if the council provides more information on specific hazards, this can result in increased public awareness and encourage a more informed and proactive response. The coastal hazards that have lower awareness and concern such as coastal slope instability and rising groundwater could result in the underestimation of their potential impacts (Figure 3). This is particularly important in the context of Christchurch where rising groundwater poses a significant threat. It is projected to rise 1-3 km inland as a result of sea level rise, with potentially severe impacts on coastal suburbs (Christchurch City Council, 2021). This highlights a significant gap in public understanding of the risks associated with rising groundwater.

A small proportion of people (7%) reported lacking confidence in understanding coastal hazards (Figure 4). This shows that as some residents of at-risk suburbs have a poor understanding of risks, this could lead to misinterpretations of risk information, reduced preparedness, and increased anxiety. Additionally, this lack of confidence may have hindered their ability to accurately assess the likelihood and consequences of these threats. Perception of service vulnerability was pronounced as 71% of people felt that it was somewhat or extremely likely that their services would be impacted. This indicates that residents are worried about the impacts coastal hazards may have on their services such as water, power, roads and emergency services. These perceptions may have been gained from lived experiences of disasters, such as the Christchurch earthquakes, as well as media coverage of similar situations or a greater understanding of the vulnerability of the services in the area. Overall, respondents perceive coastal hazards as a concern and are mostly aware of the impacts they have on their community and services.

What factors influence their perceptions and understanding?

Findings from the survey suggest several key factors that influence the public's perceptions of coastal hazards. First, respondents get their information from a wide range of sources (Table 5). Results suggest there is a clear preference for online resources, with many people relying on the internet to access news. Traditional media outlets such as television and radio did not gain many votes from respondents. This shift could indicate the growing culture of using online platforms as a new way to live.

The Life in Christchurch survey, also surveyed residents on where they most commonly get their information about climate change. The findings from this research closely align with the results from the Life in Christchurch survey. In both cases, online news platforms such as Stuff and NZ Herald are identified as the primary sources of information on climate change and related hazards. On the other hand, platforms including TikTok and other forms of communication are among the least commonly used sources. This alignment strengthens the reliability and relevance

of the research findings. A graph of the results from this question in the Life in Christchurch survey is in the appendix.

Table 2 shows similar results to Figure 5. Online news websites gained 31% of responses, and television and Facebook gained 14%. However, there is a 25% difference between online news websites and the Christchurch City Council website. This is important to note as it shows a low engagement with the website and is similar to the results seen in the Life in Christchurch survey. This offers room for improvement as the council can adapt their risk communication strategies to fit within the results reported here. This highlights that outlet visibility and usability influence respondents' perception of hazards.

Following this, Table 4 demonstrates how risk communication should be effectively distributed. Common methods include using a variety of media outlets to reach a wider audience, as well as offline approaches, such as flyers and posters, to ensure that people without internet access can still receive the information. Other ways include community events which allow members of the public to interact with council members and ask questions to clear up any misinformation. Creating a multi-faceted approach to risk communication will help build trust within the community, will raise awareness of coastal risks, and will result in people being more receptive to changes within their community.

Another factor contributing to public perception is the clarity and presentation of information. Table 6 highlights the need for clear, concise, and accessible communication. These include plain language, easy-to-read materials, photos, local context, and to avoid fear-generating language. This highlights the way information is communicated will heavily impact how the public responds to it. Ensuring they understand what is being communicated to them is essential, especially with technical information such as coastal hazards.

Trusting in the information being told is critical. Table 5 shows that respondents want the government and experts to communicate the risks and hazards. Table 4 also highlights this, suggesting scientific communication can be more reliable and transparent. This could indicate that the wider public would be more willing to listen and learn from government and officials when talking about coastal hazards. This would help eliminate misinformation from other sources and help the public know exactly what is happening and what is correct.

From the results of the survey, to gain effective risk communication, a multi-faceted approach is required. From the results this can be achieved by incorporating the suggestions from Table 4, the preferred methods as mentioned in Table 5, while ensuring the key concepts and terminology outlined in Table 6 are carried throughout (Table 7).

Key Misconceptions

This project aimed to identify key misconceptions about coastal hazards. However, this proved challenging, as it is difficult to determine what people are unaware of or misunderstand. While

many individuals expressed high levels of confidence in their understanding of coastal risks, this confidence may not accurately reflect their actual knowledge. Cognitive biases, such as overconfidence, may have influenced their self-assessments. For example, only 50% of respondents believed their community was somewhat or extremely likely to be impacted by coastal hazards, yet 75% reported feeling somewhat or extremely confident in their understanding of these risks. This gap suggests that while people may feel informed, they often underestimate the likelihood of these hazards affecting them personally. The multiple-choice format also made it challenging to identify specific misconceptions. To more effectively identify misconceptions, it may be necessary to present respondents with information first, followed by agreement-based questions. This approach would help pinpoint areas of misconception or confusion.

Recommendations

Table 7. Multiple recommendation pathways proposed to answer the research question.

Recommendation	**Purpose**	**Target Audience**	**Method**
Workshops/community engagement activities	This will allow the community to gather and discuss a range of perspectives and facilitate in-person learning for the community. It is accessible for all community members and will help foster inclusive and informed engagement.	Community groups, elderly, youth groups, vulnerable populations	Host events at local libraries or community centres. Walking, coffee or reading groups. Educational sessions.
News articles	This will reach a wider audience and distribute news rapidly across Christchurch.	Everyone online	Posting them on popular online news websites (Stuff, NZ Herald).
Improve Council Engagement	Attracting more residents to the council website would create a central hub for reliable information on coastal risks and practical steps for mitigation. It could also serve as a platform to share trusted scientific literature in a more	Christchurch Residents and vulnerable populations	Placing flyers in at-risk communities' letterboxes or local libraries. Place posters around the city to promote the website. Use plain language, explanation of key terms and provide easy-to-read (large print) information on the website.

	accessible format for the public.		
Multi-Faceted Approach	Utilise a mix of methods to inform the public. This will allow for people both online and offline to access the same information.	General Public and local communities	Online news websites (Stuff, NZ Herald), social media, TV, flyers, and community boards.
Simplifying and localising information	This helps the public better understand the information. It ensures the information is clear and relevant to their community. It provides local examples to put it into perceptive of the risks in their area.	General Public	Using visual aids (pictures, videos, diagrams), simple language, keywords, and less scientific jargon.

This table presents five recommendations for the Christchurch City Council to improve their coastal risk communication. News articles would be the easiest method to implement. It is leveraging of existing platforms like Stuff or NZ Herald, is low cost and fast. These platforms already have a broad reach, and articles can be written and shared quickly. This would allow for communication to effectively reach a large portion of the vulnerable communities within Christchurch.

Workshop and community engagement activities would be the most difficult to implement. This recommendation would require funding, more time, staff and coordination. It is also dependent on the community's willingness to attend. However, this approach would result in a large impact for those who do not use online platforms and an opportunity for individuals to clear misconceptions.

The most important recommendation would be to improve the Council website engagement. Establishing the website as a central, trusted hub for all information regarding coastal hazards would improve the access to credible information. It would help to bridge the gap in public uncertainty and create more trust between the community and the council. Information could be presented in a variety of formats to suit the diverse needs of the community. This would require sustained effort to enhance engagement and further develop the website.

Limitations

The project has several limitations that may affect the interpretation of its findings. One key limitation is the small survey size, due to time constraints. This limited sample reduces the statistical power of the results and may not accurately represent the broader population living in coastal areas. As such, the findings should be interpreted with caution. Additionally, the survey

was conducted in only two locations, which restricts the geographic diversity of responses. This may result in an incomplete understanding of perceptions across different coastal communities.

The New Brighton area, where the survey was conducted can be a tourist area. This could have potentially resulted in individuals from non-coastal regions or those who do not live in Christchurch participating in the survey. This could potentially skew the data and reduce the relevance of their responses to the target population. Additionally, the day and time of data collection may have influenced the demographic makeup of respondents, particularly limiting participation from age groups likely to be at work, school, or university during those hours. It is also important to consider that public perceptions, especially on topics related to climate change, may be influenced by personal beliefs and values.

Future Research

Further research should focus on gaining a deeper understanding of what people know about coastal hazards. This could involve conducting in-depth interviews using open-ended questions to explore individuals' perceptions and identify gaps in their knowledge. Spending more time with participants would also create opportunities to observe their reactions to accurate but potentially surprising facts. For example, that some streets are intentionally designed to flood during heavy rain as part of secondary stormwater management. This is something that could easily become a source of misconception and be seen as negative but giving individuals the chance to respond and share their opinion may help clarify these misunderstandings.

Larger-scale studies would also be beneficial, rather than gathering data in place-specific settings (e.g. at the local library), distributing flyers directly to households across the entire study area could help reach a broader and more representative sample. This approach would ensure that respondents primarily live in the intended coastal area, as those living further inland may not see coastal risks as relevant and, therefore, be less informed about them.

Future research could include focus groups to engage directly with communities and provide better insights into how knowledge and misconceptions are formed and shared. If prominent local figures and children (who are often very susceptible to learning and great sources of information) can be educated, this knowledge could spread quickly throughout the community.

It is important to recognise that the findings from this project may be specific to the study area and not necessarily applicable to other regions. For instance, although Sumner is also a coastal community, it has different land features and demographics compared to our study area of the eastern coastal ward. However, the insights gained from this research can serve as a useful guide for future research in other communities within Canterbury and across New Zealand.

Conclusion

This project explored how residents of coastal Christchurch perceive coastal hazards and risks and identified the factors influencing those perceptions. Understanding public risk perception of coastal hazards is essential for developing effective risk communication strategies. This report has highlighted the complex interplay between scientific knowledge, individual experience, media influence, and trust in authorities which shape the way people perceive risk.

The results show while coastal communities are aware of coastal hazards, their perception is primarily shaped by the most visible and immediate threats, such as tsunamis and coastal flooding. Public perception of coastal hazards varies significantly, with half of respondents viewing impacts as likely, while nearly a third were doubtful. These divergent perceptions reflect differences in lived experience and access to credible information. While most respondents felt somewhat confident in their understanding, a small, but important minority reported low confidence. This highlights the need for more inclusive communication and education to ensure that all community members can engage effectively.

The low reliance on the CCC website highlights the need for improved engagement or alternative communication channels. Online news sources such as Stuff, NZ Herald, and Newsline are the most frequently used and the most trusted sources for coastal risk information. A multi-channel strategy, combining printed flyers, social media, TV and in-person events, will reach diverse audiences. Building trust and strengthening engagement can build relationships between community groups and the council. Building partnerships with community groups can help bridge trust gaps and foster two-way dialogue, rather than one-way communication.

Recommendations include interactive formats such as workshops, walking groups and community meetings, as well as information that uses plain language and clear visuals. Information should be simplified and localised, and news platforms should be used to distribute information. Finally, the CCC should improve their website by making it a central hub for hazard information.

Future research could build on this study by surveying a larger group of people within a larger study area. This would enhance the accuracy and reliability of the results, allowing the findings to be more confidently generalised in other coastal areas.

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References

Athearn, J. L. (1971). What is Risk? *The Journal of Risk and Insurance, 38*(4), 639. https://doi.org/10.2307/251578

Christchurch City Council. (2021). *Coastal Hazards Assessment 2021: Summary report.* https://ccc.govt.nz/assets/Documents/Environment/Coast/CHA/Coastal-Hazards-Assessment-2021-Summary-Report.pdf

Christchurch City Council. (2023). *Coastal Ward Profile.* https://southerncentre.com/assets/Documents/Culture-Community/Stats-and-facts-on-Christchurch/2023-Community-profiles/2023-Community-Profiles-Coastal-Ward.pdf

Christchurch City Council. (2023a). *Facts, stats and figures.* https://ccc.govt.nz/culture-and-community/statistics-and-facts/facts-stats-and-figures

Christchurch City Council. (2024). *Life in Christchurch: Climate change 2024.* https://ccc.govt.nz/assets/Documents/The-Council/How-the-Council-works/Life-in-Christchurch/LiC_Climate_Change_2024.pdf

Christchurch City Council. (2025). *Coastal Hazards.* https://ccc.govt.nz/environment/coast/adapting-to-coastal-hazards/coastalhazards

Christchurch City Council. (2025a). *Coastal hazards adaptation in Whakaraupō and Koukourarata: Coastal Hazards Adaptation Plan (CHAP).* https://ccc.govt.nz/assets/Documents/Environment/Coastal-hazards/CHAP-Whakaraupo-Lyttelton-Harbour-and-Koukourarata-Port-Levy-2025.pdf

Christchurch City Council. (2025b). *Life in Christchurch: Neighbourhoods 2024.* https://www.ccc.govt.nz/assets/Images/The-Council/Life-in-Christchurch/Life-in-Christchurch-Neighbourhoods-2024-Report-11.02.2025.pdf

Dowler, E., Bauer, M. W., Green, J. M., & Gasperoni, G. (2006). *(PDF) Assessing public perception: issues and methods.* ResearchGate.

https://www.researchgate.net/publication/30528118_Assessing_public_perception_issues_and_methods

Feng, R. (2022). *Risk and Availability Heuristic: The Role of Availability in Risk Perception and Management.* Proceedings of the 2022 7th International Conference on Social Sciences and Economic Development (ICSSED 2022). https://doi.org/10.2991/aebmr.k.220405.127

GNS Science | Te Pū Ao. (n.d.). *Land Use Change.* https://www.gns.cri.nz/our-science/environment-and-climate/coastal-change/land-use-change/#:~:text=Land%20use%20and%20coasts,our%20coasts%20will%20be%20changing

Gornitz, V. (1991). Global coastal hazards from future sea level rise. *Palaeogeography Palaeoclimatology Palaeoecology, 89*(4), 379–398. https://doi.org/10.1016/0031-0182(91)90173-o

Irish, J. L., Weiss, R., & Resio, D. T. (2016). Physical characteristics of coastal hazards. In *Springer eBooks* (pp. 549–566). https://doi.org/10.1007/978-3-319-16649-0_25

Knight, F. (2014). *Risk, uncertainty, and profit - online library of liberty.* Libertyfund.org. https://oll.libertyfund.org/titles/knight-risk-uncertainty-and-profit

Laino, E., & Iglesias, G. (2023). Extreme climate change hazards and impacts on European coastal cities: A review. *Renewable and Sustainable Energy Reviews, 184*, 113587. https://doi.org/10.1016/j.rser.2023.113587

Lyytimäki, J., A., N. N., Ulla, A.-K., Sirpa, P., Virpi, R., & and Inkinen, A. (2013). Climate Change Communication by a Research Institute: Experiences, Successes, and Challenges from a North European Perspective. *Applied Environmental Education & Communication, 12*(2), 118–129. https://doi.org/10.1080/1533015X.2013.821869

MacManus, K., Balk, D., Engin, H., McGranahan, G., & Inman, R. (2021). Estimating population and urban areas at risk of coastal hazards, 1990–2015: how data choices matter. *Earth System Science Data, 13*(12), 5747–5801. https://doi.org/10.5194/essd-13-5747-2021

Ministry for the Environment. (2023). *New Zealanders' Environmental Attitudes 2022: Findings from the New Zealand Environmental Attitudes Survey.* https://environment.govt.nz/assets/facts-and-science/science-and-data/new-zealanders-environmental-attitudes.pdf

Ministry for the Environment. (2023a). *New Zealanders' perception of climate change information: An information audit.* https://environment.govt.nz/assets/publications/climate-change/New-Zealanders-perception-of-climate-change-information-audit.pdf

Morgan, M. G. (1997). *The National Academies Press.* Www.nap.edu. https://nap.nationalacademies.org/read/4982/chapter/18

Mukhopadhyay, A., Dasgupta, R., Hazra, S., & Mitra, D. (2012). Coastal hazards and vulnerability: A review. *International Journal of Geology, Earth and Environmental Sciences, 2*(1), 57–69. https://www.cibtech.org/J-GEOLOGY-EARTH-ENVIRONMENT/PUBLICATIONS/2012/Vol%202%20No%201/7-JGEE-11-Anirban%20M.pdf

National Academies of Sciences, Engineering, and Medicine. (1997). *The Industrial Green Game: Implications for Environmental Design and Management.* National Academy Press. https://nap.nationalacademies.org/read/4982/chapter/1

Novackova, M. (2018). *Effects of sea level rise in the United States and climate change perception in the United Kingdom.* University of Sussex. http://sro.sussex.ac.uk/76891/

Outreville, J. F. (1998). The Meaning of Risk. *Theory and Practice of Insurance,* 1–12. https://doi.org/10.1007/978-1-4615-6187-3_1

Renn, O. (1989). *Risk perception and risk management.* https://core.ac.uk/download/pdf/147554823.pdf

Rullens, V., Stephanie, M., Fabrice, S., E., C. D., H., B. R., Anna, B., Josie, C., V., G.-G. R., Sam, T., I., E. J., & and Pilditch, C. A. (2022). Understanding the consequences of sea level rise: the ecological implications of losing intertidal habitat. *New Zealand Journal of Marine and Freshwater Research, 56*(3), 353–370. https://doi.org/10.1080/00288330.2022.2086587

Ryan, E. J., Owen, S. D., Lawrence, J., Glavovic, B., Robichaux, L., Dickson, M., Kench, P. S., Schneider, P., Bell, R., & Blackett, P. (2022). Formulating a 100-year strategy for managing coastal hazard risk in a changing climate: Lessons learned from Hawke's Bay, New Zealand. *Environmental Science & Policy, 127*, 1–11. https://doi.org/10.1016/j.envsci.2021.10.012

Tonkin and Taylor. (2021). *Coastal Hazard Assessment for Christchurch District.* C. C. Council. https://ccc.govt.nz/assets/Documents/Environment/Coast/CHA/Coastal-Hazards-Assessment-2021-Summary-Report.pdf

Whitmarsh, L., O'Neill, S., & Lorenzoni, I. (2011). *Engaging the public with climate change: behaviour change and communication.* Earthscan.

Appendix:

Appendix A: Survey Questions

Which age group do you belong to?

- ○ Under 20
- ○ 21-30
- ○ 31-40
- ○ 41-50
- ○ 51-64
- ○ 65+

What suburb do you live in?

What coastal hazards are you aware of in your local area?

- ☐ Coastal Flooding
- ☐ Coastal Erosion
- ☐ Sea Level Rise
- ☐ Rising Groundwater
- ☐ Tsunami
- ☐ Coastal Slope Instability

How confident do you feel in your understanding of the risks and consequences of coastal hazards?

- ◯ Extremely confident
- ◯ Somewhat confident
- ◯ Neither confident nor unconfident
- ◯ Somewhat unconfident
- ◯ Extremely unconfident

Where do you most commonly get your information about coastal risks?

- ☐ Facebook
- ☐ Online news websites (e.g. Stuff, NZ Herald, Newsline)
- ☐ Other websites and online resources
- ☐ Instagram
- ☐ TikTok
- ☐ Word-of-mouth
- ☐ Television
- ☐ Radio
- ☐ Christchurch City Council Website
- ☐ Other Government agencies (e.g. ECAN)
- ☐ I do not get any information about this
- ☐ Other social media
- ☐ Other

Which method do you think is most effective at spreading coastal risk information?

- ◯ Facebook
- ◯ Online news websites (e.g. Stuff, NZ Herald, Newsline)
- ◯ Other websites and online resources
- ◯ Instagram
- ◯ TikTok
- ◯ Word-of-mouth
- ◯ Television
- ◯ Radio
- ◯ Christchurch City Council Website
- ◯ Other Government agencies (e.g. ECAN)
- ◯ Other social media
- ◯ Other

What specific coastal hazard(s) are you **most** concerned about? (Choose up to 3)

- ☐ Coastal Flooding
- ☐ Coastal Erosion
- ☐ Sea Level Rise
- ☐ Rising Groundwater
- ☐ Tsunami
- ☐ Coastal Slope Instability

How likely do you think your community is to experience these hazards?

- ◯ Extremely unlikely
- ◯ Somewhat unlikely
- ◯ Neither likely nor unlikely
- ◯ Somewhat likely
- ◯ Extremely likely

How likely do you think that your services you rely on will be impacted from these hazards? (e.g. roads, footpaths, water supply)

- ◯ Extremely unlikely
- ◯ Somewhat unlikely
- ◯ Neither likely nor unlikely
- ◯ Somewhat likely
- ◯ Extremely likely

What suggestions do you have for gaining a deeper understanding of these risks?

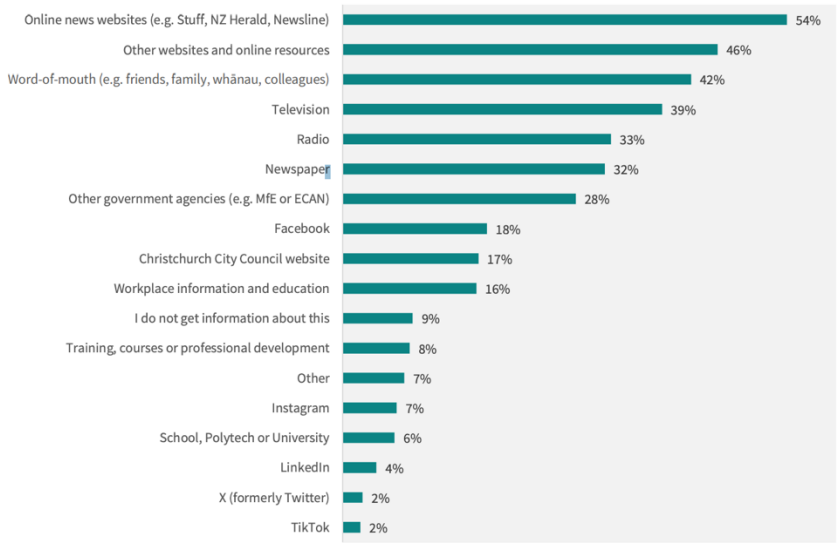
What would be your preferred method for learning about risks?

What key concepts and terminology should be incorporated into effective risk communication?

Is there anything else you would like to add?

Appendix B: Life in Christchurch Survey

Where respondents are getting information about the things they can do to take climate action and reduce emissions



Roughly the same number of respondents get information about the things they can do to take climate action and reduce emissions from Facebook (18%, n=691), and the Council's website (17%, n=651).

However, when considering the helpfulness and trustworthiness of these two information sources, 46% of respondents who utilise Facebook find it to be the least helpful or trustworthy.

Conversely, 46% of respondents who utilise the Council's website find it the most trustworthy source of climate related information.

43% of respondents who visit the Council website for information also find it the most helpful in supporting specific climate action.

Online news websites (54%, n=2130) and other websites and online resources (46%, n=1797) are the top two most reported places that respondents go to get information regarding what they can do to take climate action and reduce their emissions.

42% (n=1670) of respondents get this information by word-of-mouth from whānau, friends, family, and/or colleagues.

Amongst respondents who normally access other websites and online resources for information regarding climate action, 46% (n=717) find this information source to be the most helpful in supporting specific climate action.