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# The unexplored role of surfers in drowning prevention: Aotearoa, New Zealand as a case study

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**ABSTRACT**

Every year people drown while visiting coastal beaches. Increasingly, studies indicate that bystanders play a critical role in rescuing people from drowning. However, very limited research has explored the contribution surfers make to reducing fatal drowning. This research examined aquatic bystander rescues conducted by surfers in Aotearoa, New Zealand. It analysed their characteristics and the conditions under which they took place. The study draws upon an online survey disseminated through several social media platforms which gathered 418 complete responses. The findings indicate that male and female surfers conducted an average of three rescues across their surfing career. Surfers typically perform rescues at their local surfing spot. Three quarters of the rescues were completed either at unpatrolled beaches or outside patrolled hours, thus filling a critical gap. In 46% of the rescues, surfers felt they had saved the person's life. Overall, the research emphasises the significant, yet under-estimated, role of surfers in coastal drowning prevention and water safety. It concludes that organisations involved in drowning prevention should work closely with surfing communities on ways to reduce fatalities at coastal beaches.

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**KEYWORDS**
Drowning prevention; water safety; coastal hazards; emergencies; risk reduction

## Key policy highlights

(A) The paper provides novel information about surfers' rescues and roles in drowning prevention in Aotearoa, New Zealand.
(B) Surfers play a significant role in saving lives and preventing drowning on coastal environments, which to date is under-estimated by policy makers and practitioners.
(C) It is critical that policy makers and practitioners work closely with surfers in their drowning prevention and water safety strategies.

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## 1. Introduction

Each year, 236,000 people die from drowning worldwide (World Health Organization, 2021). This equates to 27 drownings every hour. Drowning ranks as the third leading cause of injury-related death globally (Franklin et al., 2020). It is a complex issue which has become so severe that, in 2021, the United Nations General Assembly, backed by over 80 countries worldwide, adopted a resolution on drowning prevention. This is the first time in the organisation's 75-year history, it has acknowledged the magnitude of drowning as a global issue (United Nations General Assembly, 2021).

While any body of water where drowning happens contributes to drowning statistics (i.e. coastal beaches, rivers, lakes, and flood events), beaches are frequently recognised as a prominent location for drowning (Koon et al., 2021; WHO, 2021). Beach hazards constantly evolve with tidal changes, wind velocity and direction, wave size and strength, as well as beach users' activities (Brewster et al., 2019; Short & Hogan, 1994). Drownings often result from such environmental conditions, as well as age, gender, ethnicity, people's socio-economic background, knowledge, swimming skills and the availability of rescue services. The latter element is particularly critical as most drowning fatalities happen outside lifeguards-patrolled areas and times (Branche & Stewart, 2001; Peden et al., 2018; World Health Organization, 2014). In such circumstances, the only form of help for a drowning victim generally comes from bystanders, who are people on site, such as family members, friends, or strangers, who conduct rescues.

Several studies show that bystanders play a critical role in drowning prevention and water safety (Barcala-Furelos et al., 2021; Brander et al., 2019). The initial response from bystanders often saves lives, not only by rescuing a person from the water, but also by providing help post-rescue such as the delivery of Cardiopulmonary Resuscitation (CPR), contacting emergency services, or transporting victims to health facilities (Venema et al., 2010; Wigginton et al., 2006). It is nonetheless difficult to obtain accurate figures about bystanders' rescues as these are generally unreported (Lawes et al., 2020) and research on bystander aquatic rescues is limited (Brander et al., 2019; World Health Organization, 2014). Though, the existing literature suggests bystander rescues account for a significant portion of rescues conducted on coastal waters (Attard et al., 2015). For example, a study conducted in Brazil indicates that for every fatal drowning five successful rescues are performed (Barcala-Furelos et al., 2021).

Bystanders' rescues are not without risk and can lead to fatal drowning of bystanders while attempting to save others (Franklin et al., 2019; Moran, 2014; Pearn & Franklin, 2018). Several factors have been identified that place bystanders at risk during rescue: overestimation of swimming ability, relationship to the person rescued (i.e. parent–child), gender, age, and lack of buoyancy aid regularly contribute to fatal rescue attempts (Brander et al., 2019; Lawes et al., 2020). In New Zealand, between 1980 and 2012, a total of 81 people died trying to rescue others from drowning (Franklin et al., 2019). Işın et al. (2021) found that in Turkey, male bystanders drown almost nine times more frequently than females when trying to rescue others. For these reasons, the World Health Organization (WHO) recognises bystanders' rescues as critical and often the only form of assistance in the absence of lifeguards, while also recommending training of bystanders in safe rescue and resuscitation techniques (World Health Organization, 2014; 2017).

In the last few years, a few studies have examined the role of surfers in rescuing people and contributing to drowning prevention. These studies suggest that surfers, as bystanders, may conduct as many rescues as trained lifeguards (Attard et al., 2015; Berg et al., 2021; Brander et al., 2019; Lawes et al., 2020; Uebelhoer et al., 2021). Existing research points out that surfers generally possess the skills and knowledge required to safely conduct rescues (Attard et al., 2015; De Oliveira et al., 2023). They have detailed knowledge of beach hazards and in-depth understanding about environmental conditions at their local beaches, such as tides, winds, and rip currents. In a study conducted in New Zealand, Pitman et al. (2021) found that while 68% of the participants could not identify rip currents, 22% could, from which two thirds were either surfers or body-boarders. Experienced surfers have a level of comfort in water environments that many beach users do not have. Surfers are attracted by moderate- to large-size waves which is when most drownings occur (Attard et al., 2015). Importantly, surfers are equipped with a floatation device (i.e. a surfboard) and are generally experienced swimmers.

When someone is drowning, surfers are often already in the water and have proven competent at both identifying people requiring assistance and acting quickly. This is advantageous as the drowning process, from immersion to cardiac arrest, usually occurs between seconds to a few minutes (Barcala-Furelos et al., 2021; Tipton & Montgomery, 2022). Research suggests that surfers are often willing to receive training in rescue and resuscitation (Berg et al., 2021). In addition, surfers are often surfing outside the flagged areas and patrolled hours. The International Surf Association estimates the global surf population to be between 17 and 35 million (Brander et al., 2019). The breadth of their coverage is potentially enormous when one considers the time spent by surfers at numerous surf beaches globally. The role surfers play in drowning reduction and water safety is under-researched, with limited data on the contribution surfers make to reducing fatal drowning and the circumstances in which these occur. This research aimed to begin filling this knowledge gap.

The focus of this research is on Aotearoa, New Zealand. The country has 15,000 km of coastline, with an estimated 12 million beach visitations annually (Coasts – Te Ara Encyclopaedia of New Zealand, 2005). Surf Life Saving New Zealand (2021) figures show the highest visitation, rescue and drowning frequency occurs in Auckland, Waikato, and Bay of Plenty regions, which are all in the upper half of the North Island. This is also where most of the surfing population is located. The statistics indicate that about 70 persons die each year from drowning, with 22% of fatal drownings between 2012 and 2021 occurring at surf beaches. In total, 167 of 357 fatal drownings (47%) in the last 10 years have occurred during December, January, and February, the warmest months of the year (Surf Life Saving New Zealand, 2021). New Zealand's 10-year average coastal fatal drowning rate per capita (per 100,000 Pop.) is constantly rising: it is now 44% higher than Australia, its neighbouring country (Surf Life Saving New Zealand, 2021). Surfing New Zealand (2022) estimates that there are 145,000 surfers in the country. Currently no data exists that quantifies or characterises the bystander rescues conducted by the surfing community in the country. The research objectives were twofold; (1) to assess the contribution surfers make to reducing fatal drowning statistics at New Zealand beaches; and (2) to examine the attributes and patterns that characterise aquatic bystander rescues conducted by surfers.

The next section details the methodology used while Section 3 provides the results of the study. Finally, section 4 discusses those findings, including the implications for drowning reduction and water safety.

## 2. Methodological approach

The research involved an online survey to cater for surfers across Aotearoa New Zealand. Ethics approval was obtained by the Auckland University of Technology with number reference number 22/66. The questionnaire was designed in collaboration with Surf Life Saving New Zealand (SLSNZ) and Surfing New Zealand. The final questionnaire contained 39 questions involving three main parts. Part 1 of the questionnaire asked for demographic details about the respondent such as gender, age, their local surf break and how many beaches they might visit annually. Part 2 aimed at gathering data on the respondent's rescue experiences. It focused on the number of rescues conducted and the circumstances of the rescue such as the location, if rip related, gender of person rescued and age. Finally, part 3 was related to respondents' most recent rescue. The intention of this section was to uncover a deeper understanding of characteristics of the rescue, person rescued and outcomes of the situation. This included the relationship to the person they rescued, whether they conducted a risk assessment and if they believed they saved the person's life.

A pilot test of the survey was conducted before rolling out the survey nationwide. It involved five participants who took approximately 5 to 15 min to complete the questionnaire. Their feedback on categorical variable options and survey flow was used to finalise the questionnaire-based survey. A survey URL link was created and promoted though SLSNZ and Surfing NZ social media channels. Once respondents clicked on the URL link, they were taken to the survey homepage. An information sheet provided the respondent details on the research, before obtaining consent to complete the survey. Convenience sampling was used to target the surfing population. It is well recognised that convenience sampling cannot be used to 'generalise' a population or to draw inference but can have high validity if findings are deemed trustworthy (Etikan et al., 2016). Three inclusion criteria were stipulated for those wanting to participate in the survey, including (1) to be a surfer which is understood as being someone that uses a board to ride waves toward the shore; (2) being aged 16 years or older; (3) having rescued a person in the surf before.

Respondents were recruited by advertising the survey through Surfing New Zealand and SLSNZ, with the URL and an advertisement posted on their social media. The potential reach on social media included 43,600 Facebook followers and 25,000 Instagram followers. It was also share on the SLSNZ newsletter sent to 4,000 subscribers and 30 board riders' clubs. It is assumed most surfers are online, as information on surf reports and conditions is typically accessed this way. The survey advertisement was used consistently across all platforms and offered the incentive of a $1000 prize toward a custom-made surfboard. The use of incentives in surveys is widely recognised as having positive effects on response and completion rate (Deutskens et al., 2004; Groce-Niehoff, 2002). The potential disadvantage of providing incentives is motivation for respondents to falsify responses, thus creating the opportunity to enter the prize draw. Conversely, research suggests incentives do not have a detrimental effect on response quality and in some cases

stimulate more complete answers and fewer incomplete surveys (Goeritz, 2004; Singer & Ye, 2013). Only those respondents who fully completed the entire survey were allowed to enter the prize draw. Security settings were in place that allowed respondents a single entry to the draw. These settings also prevented those who had answered 'no' to a qualifying question from re-attempting the survey and falsifying answers to enter the prize draw.

The survey opened on May 19th 2022 and closed on the 25th of July 2022. There were a total of 1026 clicks on the URL link. Initial cleaning of the data (i.e. removing spoilt samples) was conducted through Microsoft Excel. The completed questionnaires were then uploaded for further cleaning and analysis in IBM SPSS Statistics Version 28 (Figure 1). Once the cleaning process was complete the data was ready for statistical analysis with a total of 418 questionnaires. Frequency tables were generated for all survey questions, providing both frequency (*n*) and percentage (%). Chi-Square Tests of Independence, odds ratios and Chi-Square Goodness of Fit Tests were used to test relationships between variables. The following section presents the results of the questionnaire-based survey.

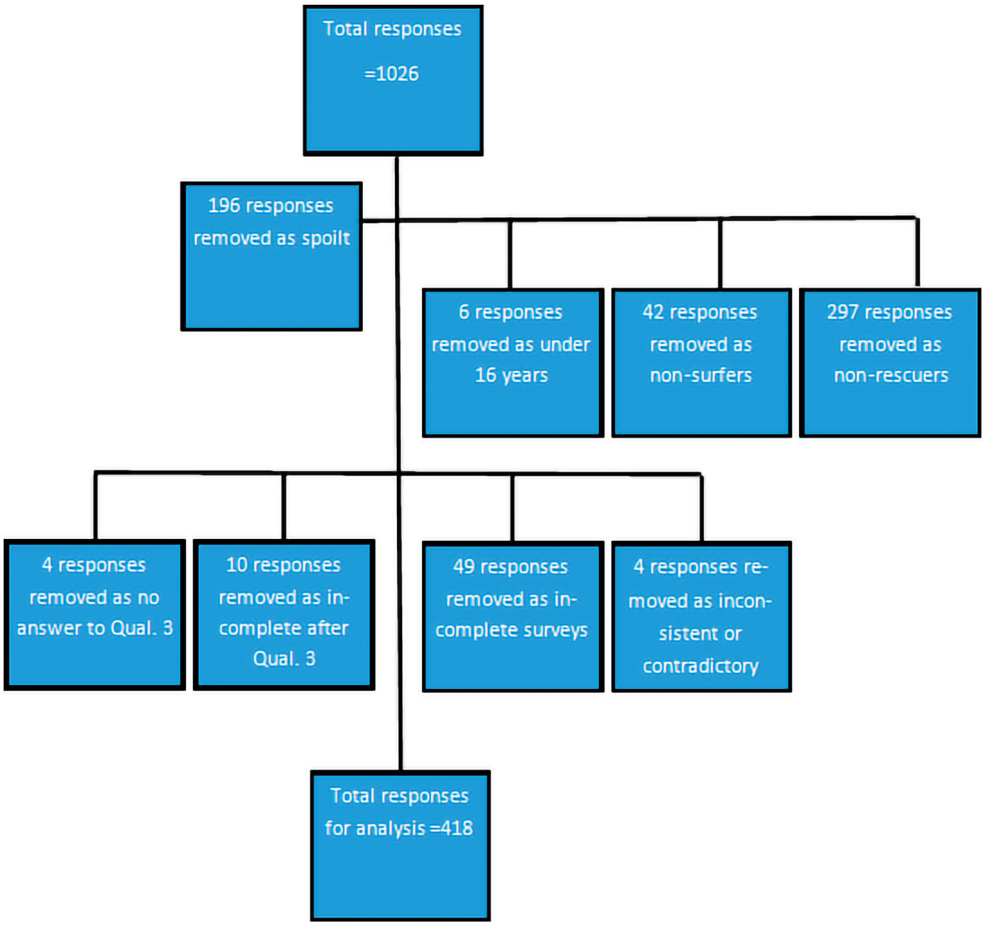


**Figure 1.** Cleaning process of the questionnaire-based survey.

## 3. Results

Most respondents were male (87.3%; $n = 365$) with a similar age distribution across the survey. The most prominent age group was 40–49 (29.9% $n = 125$), followed by 20–29, 30–39 and 50+, with all age categories being within 2% of each other. New Zealand European represented 81.3% ($n = 340$) of respondents followed by Māori (11.2%; $n = 47$). Collectively, 67% ($n = 280$) of respondents reported their local surf break as north of Waikato/Bay of Plenty, which is reflective of the current New Zealand population distribution (Figure 2). Almost half the respondents had 21 + years of experience (49.5%; $n = 207$). In total, 84.9% ($n = 355$) of respondents self-rated as 'advanced' or 'professional' ability. Surfing regularity showed 42.8% ($n = 179$) of the respondents surf 1–2 times per week and 30.6% ($n = 128$) 3–6 times per week. Furthermore, 47.1% ($n = 197$) of the respondents visit between 4 and 10 different beaches per year. In total, 75% ($n = 314$) of the respondents had not completed any surfer-specific rescue training.

Chi-Square Tests of Independence were performed to assess the relationship between having undergone rescue training and increased frequency of rescues, which did not show statistical significance. However, analysis between age and completion of formal rescue training showed a statistically significant relationship between the two variables $X^2$ (4, $N = 418$) = 20.421, $p = <.001$, suggesting surfers may be more willing to undertake rescue training as they get older. Of the respondents that answered the question ($n = 776$) 'Have you ever rescued someone from the surf as a bystander', 62% responded positively. Most of the rescues happened in the Auckland, Bay of Plenty, Waikato, and Northland regions totalling 69% of the rescues. A Chi-Square Goodness of Fit Test was performed to determine whether the proportion of respondents' home surf break was similar to the locations where they conducted rescues. The result showed that surfers are more likely to conduct rescues at their home break.

An analysis of the number of rescues respondents had conducted in their lifetime revealed a mean of three rescues per respondent ($M = 3.05$, SD = 1.52). There was little difference in terms of rescue by gender. A Chi-Square Test of Independence showed a statistically significant relationship between self-assessed advanced/professional surfers and increased frequency of rescue (rescuing 4 + people) $X^2$ (1, $N = 418$) = 23.172, $p = . < 001$. Further to this, odds ratio showed that if respondents self-rated as advanced/professional, they were six times the odds to rescue 4 + people than someone who describes themselves as beginner/intermediate (OR = 6.059, 95% CI [2.687, 13.666]). Lifeguards were present and on duty during 26.7% ($n = 109$) of the rescue occurrences. In contrast, 73.3% ($n = 299$) of rescues occurred either at a beach where there were no lifeguards (44.9%; $n = 183$) or at a beach where lifeguards patrolled but were not on duty (28.4%; $n = 116$). Swimming was the prominent activity (Figure 3) done by victims prior to being rescued (56.5%, $n = 319$).

The common causes initiating rescue were rip currents (35.33%; $n = 319$), poor swimming ability (24.14%; $n = 218$) and a lack of knowledge/hazards (26.47%; $n = 239$). Surfers from the sample population conducted rescues under a multitude of circumstances, such as boating incidents and medical events (Figure 4). Notably, nearly half (45.5%; $n = 190$) of the respondents indicated that between 75% and 100% of their rescues were related to rip currents. Table 1 provides a snapshot of the different circumstances under which rescues were performed, highlighting surfers' skills and knowledge, but also the very diverse and complex conditions involved.

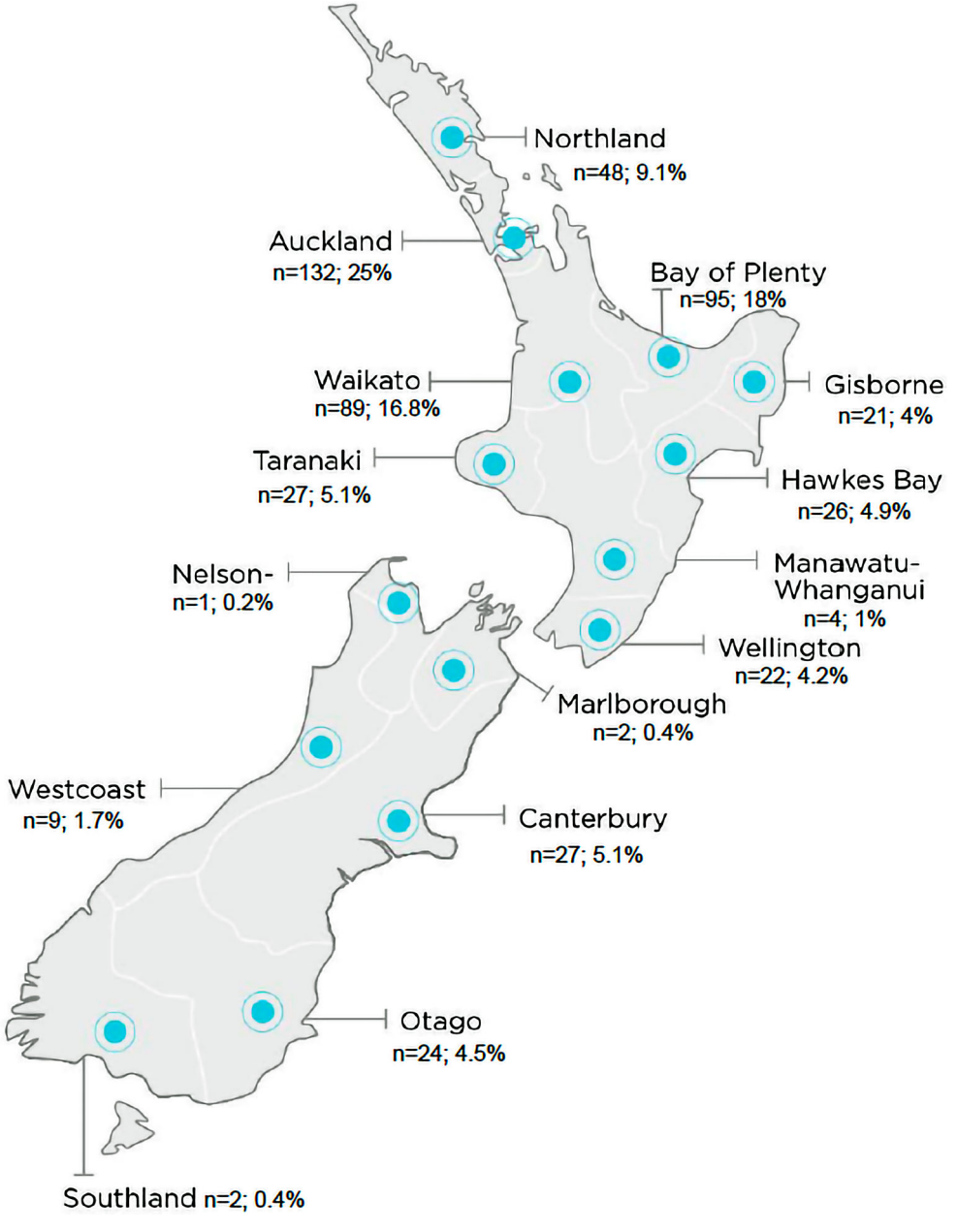


**Figure 2.** Regional comparison of location of rescues performed by the respondents.

Surfers were asked to report the gender of the person/s they had rescued. Only 9% (*n* = 36) of rescuers stated they have only rescued females. In total, 52% (*n* = 218) of rescuers say they have rescued both males and females. However, the gender comparison from rescuers' 'most recent rescue', highlights with more clarity the prominence of male rescue victims. Results show an increased frequency of rescues conducted for people aged between 15 and 25 years old. This aligns with earlier suggestions from Koon et al. (2021) and Moran (2014) that this age, particularly amongst males, is over-represented

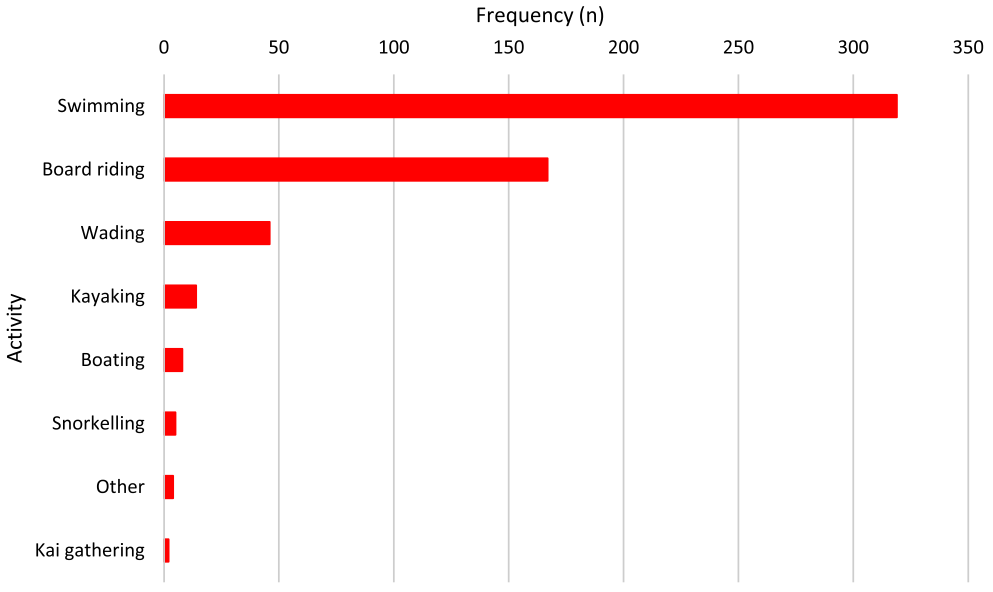


**Figure 3.** Activities people were doing at the time the rescue was conducted.

in drowning statistics due to more excessive risk taking and overconfidence. The number of persons rescued per age group peaks at 15–25 years (36.25%; $n = 643$) and then significantly decreases in the remaining age groups of 26–39 and 40 + years old.

In Part Three of the survey, respondents were asked about their most recent rescue and the circumstances within which it happened (Table 2). Over 82% of these rescues occurred in the past 5 years, with a similar distribution of approximately 20% per time period, from

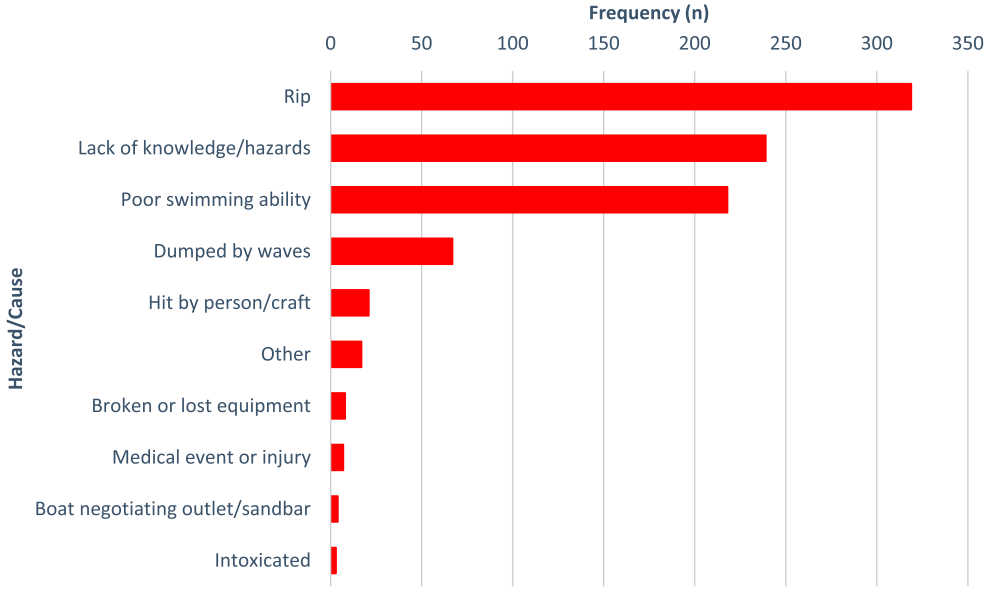


**Figure 4.** Cause of the rescue according to rescuers' opinion.

**Table 1.** Free text examples from respondents commenting on rescue circumstances.

| Surfer # | Extract from free text survey answers |
|---|---|
| 85 | Two young children were in the water and parents were not paying attention to them at all. |
| 210 | I live remotely. No beaches I surf at have lifeguards but on good surf days or sunny days there will be up to 200 surfers in the water and many swimmers with no flags and no lifeguards and an hour's drive in any direction to emergency services etc. |
| 229 | Trouble was pulling him in to shore on board safely with waves. Need possible way of getting Lifeguard attention if nearby. |
| 251 | Back Beach New Plymouth was not patrolled and the 2 Asian people were quite a way out in a rip and calling for help and luckily for them I noticed the situation. I am also a surf life saver and had to get off my surfboard and let 2 people hang onto the board while I kicked and stroked back to the beach. |
| 255 | Obviously, a surfer's surfboard is the best tool at hand for rescues. It was what I used in the rescues I found myself in. |
| 268 | In this situation the man had torn his hamstring and was really struggling to reach the shore. |
| 278 | I should have taken fins as well because only the victim could fit on the board, and I had to hang off the back trying to get him in a strong rip. |
| 281 | This swimmer got picked up by the lifeguards after I rescued from a rip by floating him on my board (eventually). |
| 286 | The two people I rescued both had absolutely no idea of the power of the ocean. |

6 months to 5 years. The highest proportion of recent rescues was conducted within the last 6 months (22.5%; $n = 94$) and occurred during daylight hours. Moderate swell (2–4 foot) was the prominent wave size (62.4%; $n = 261$) during rescue. Lifeguards were on duty at the beach for 14.1% ($n = 59$) of the recent rescues conducted. The remainder (85.9%; $n = 350$) of rescues occurred in the absence of lifeguards, with the most significant proportion (30.1%; $n = 126$) occurring at a patrolled beach but outside of patrol hours.

**Table 2.** Circumstances surrounding respondent's most recent rescue.

| Characteristic | Frequency (*n*) | Percentage (%) |
|---|---|---|
| **How long ago did your most recent rescue occur?** | | |
| 0 = 12 months | 175 | 41.9 |
| 1–5 years | 170 | 40.7 |
| 5–10 years | 35 | 8.4 |
| More than 10 years | 38 | 9.1 |
| **Approximately what time of day did the rescue occur?** | | |
| 12 am–12 pm | 122 | 29.2 |
| 12 pm–4 pm | 183 | 43.8 |
| 4 pm–12 am | 107 | 25.6 |
| Unsure | 6 | 1.4 |
| **What was the wave height when the rescue took place?** | | |
| Gentle | 65 | 15.6 |
| Moderate | 261 | 62.4 |
| Large | 79 | 18.9 |
| Massive | 13 | 3.1 |
| **What were the surf conditions like when the rescue took place?** | | |
| Smooth and glassy | 204 | 48.8 |
| Choppy/messy | 209 | 50 |
| Flat | 5 | 1.2 |
| **Were there lifeguards on duty patrolling the area?** | | |
| Yes | 59 | 14.1 |
| No, it was outside patrol area or time | 350 | 83.7 |
| Don't know | 9 | 2.2 |
| **What were you doing at the time of rescue?** | | |
| Surfing | 315 | 75.4 |
| Swimming | 37 | 8.9 |
| Other inc. Sunbathing, Walking, Training, etc. | 65 | 15.5 |
| **Did other people help you with the rescue?** | | |
| No | 223 | 53.3 |
| Yes | 195 | 46.7 |

When asked what activity the respondents were doing prior to the rescue, 75.4% ($n = 314$) were surfing. Of the respondents who rescued people while lifeguards were on duty, 78% ($n = 46$) of them were surfing at the time. This highlights the benefit of surfers being in the water close to people needing to be rescued, versus lifeguards who typically patrol from the beach. Lastly, in this section, respondents were asked if someone assisted them with the rescue(s) they conducted. The data showed a relatively even distribution of assisted rescues (46.7%; $n = 195$) versus unassisted rescues (53.3%; $n = 223$).

Finally, surfers were asked for specific details about the rescue they had conducted recently. Males represented 71% ($n = 450$) of the total number of persons rescued ($n = 638$). Most people rescued were NZ/European, representing 62.4% ($n = 239$) of the rescued sample. Māori and Asian were the only other single ethnicities to exceed 5% representation, at 12.27% ($n = 47$) and 11.23% ($n = 43$) respectively. A total of 91.4% ($n = 382$) of rescuers did not know the person they rescued. The only other relationships of note were those who rescued a sibling (1.4%; $n = 6$), child (1%; $n = 4$) or friend (5.3%; $n = 22$).

Respondents were asked if they had seen the situation as it developed such as a person entering a rip or other dangerous conditions. Overall, 45% ($n = 188$) said they had not seen the situation develop, while 55% ($n = 230$) had. This does suggest an ability amongst surfers to act preventatively, as well as to quickly assess a situation and respond rapidly. Preventative actions were not specifically addressed in this research which focused mainly on rescues. More than 73.4% ($n = 307$) of the respondents were confident in their ability to conduct a rescue. The remaining group of 25.1% ($n = 105$) said they were somewhat confident and only 1.4% ($n = 6$) said they were not confident. However, when asked how difficult the actual rescue was, three quarters of the surfers said they had some or a lot of difficulty. An odds ratio test was conducted to determine if males had a higher confidence level to rescue than females. No significant difference was found (OR = 0.69, 95% CI [0.95, 1.03]), which suggests males were not more confident to rescue than their female counterparts.

Respondents were asked if they had conducted any kind of risk assessment before performing the rescue. The answers from the participants generally implied risk assessment that pertained to the rescuer and whether or not placing themselves at risk before enacting the rescue. Almost half of the respondents (47.4%; $n = 198$) acknowledged that a risk assessment had been done either before acting or on their way to rescue someone. Surfers' knowledge about their local surf break and its hazards was somewhat reflected in the data, in that 40.4% of respondents ($n = 169$) felt they did not need to conduct such an assessment, as they were familiar with the risks in their local environment. Only 12.2% ($n = 51$) of the respondents said they acted impulsively without doing a risk assessment. The use of a buoyancy aid has been identified as a key element helping successful rescue (Brander et al., 2019). Respondents used a buoyancy aid during their most recent rescue on 84% ($n = 351$) of occasions. A surfboard was the most common item used (82.8%; $n = 346$), which is not surprising since 75.4% ($n = 314$) of the rescues occurred while surfing. This also means that in 16% of the rescues did not involve a buoyancy aid and that surfers used their swimming skills and coastal environment knowledge such as rip currents, waves, and tides (amongst other aspects) to conduct the rescue. When asked if they thought the person(s) rescued knew they were in trouble, 55% ($n = 232$) of the respondents said the person(s) was both aware of the danger and was panicked. The second most common answer was 'aware but relieved to have been

helped' (27.5%; $n = 115$). However, even with most people being in a high emotional state, 86.4% ($n = 361$) were able to walk away from the incident without any further treatment required. This may support existing research that asserts panic and other highly emotive responses are common escalating factors in rescue and drowning incidents (Tipton & Montgomery, 2022).

Of the people that did require further medical care, 7.2% ($n = 30$) required an ambulance, 3.6% ($n = 15$) required first aid and 2.6% ($n = 11$) required CPR. Respondents were asked if they thought they had saved the person's life. Almost half (46.4%; $n = 194$) believed they had, while 38.5% ($n = 161$) did not know and 15.1% ($n = 63$) did not believe they had. When these statistics are applied to the total number of recent rescues ($n = 638$), this suggests 296 lives and an additional 245 possible lives may have been saved by this group of surfers through the rescues, they conducted. This is of course a subjective assessment by the respondents, which nonetheless suggest surfers save a considerable number of lives from drowning every year.

## 4. Discussion

Results from this study show that surfers conduct a significant number of rescues across multiple beaches of Aotearoa New Zealand. The surfing community is mostly composed of males and therefore males perform a higher volume of rescues. However, this study found that females conducted the same average number of rescues as male surfers. Mean and median for all gender groups were approximately 3 rescues across their surfing career. This differs from Brander et al.'s (2019) study where results suggest the average number of rescues for males is twice that of females. This finding is particularly interesting since males are more prone to drowning and for many women the average size and weight of a male drowning victim would be significantly larger than themselves, making rescue more difficult without utilisation of proper technique and training. Although surfing is a male-dominated sport, women surfers too contribute to water safety, and they should be involved in initiatives geared to reduce drowning.

Only a quarter of the respondents undertook formal rescue training.[1] The survey shows no association between having completed rescue training and frequency of rescues, which contrasts with other studies, particularly Attard et al. (2015) and Brander et al. (2019) done in Australia, finding that those who received rescue training conducted more rescues. Surfers aged between 40 and 49-year-old represented the highest proportion (29.9%) of respondents, while respondents under 20-years-old represented the lowest (8.1%). This is not surprising since older surfers would have been exposed to more opportunities to rescue. Most respondents have surfed for 21 + years, surf between one to six times per week, self-rate as advanced to professional in ability and visit between four and ten different beaches annually. All these factors, added to the strong knowledge surfers have of their local break and coastal hazards, potentially positions them amongst the most knowledgeable and skilled sources of surf rescue available. International studies such as De Oliveira et al. (2023), Attard et al. (2015) and Brander et al. (2019) all drew similar conclusions to the present research in that, the more capable and experienced a surfer is, the higher frequency of recues they conduct. Three quarters of the rescues were completed either at unpatrolled beaches or outside patrolled hours, which is where and when most fatal drownings occur (Attard et al., 2015; Berg et al., 2021; Brander

et al., 2019; Surf Life Saving New Zealand, 2021). The presence of experienced surfers outside of patrolled areas and times further highlights surfers as a major informal rescue response in the absence of lifeguard services, thus filling a critical gap in water safety and drowning reduction.

The study finds that surfers typically perform rescues at their local surfing spot. The density of rescues was contained to Auckland, Waikato, and Bay of Plenty regions which findings match with SLSNZ's report identifying these regions as high density for coastal fatalities and rescues (Surf Life Saving New Zealand, 2021). This is critical information since it enables the adoption of a community-based approach with local surfers on how to best support them and tackle the issue of drowning risk. Community-based approaches, while seldom adopted for drowning prevention, are increasingly used in emergency preparedness: they enable context-specific and socio-culturally adapted initiatives to reduce risk and foster resilience (Gaillard & Mercer, 2013; Maskrey, 2011; Van Niekerk et al., 2017). New Zealand European represented most of the rescuer sample (81.3%; $n = 340$) while Māori also had significant representation in this study (11.2%; $n = 47$). These figures mirror the data from the national surfer survey conducted by New Zealand Sport Research Group in 2005 (NZ European 83%, Māori 14%) (Sport Research Group, 2005). Regardless of the prominent New Zealand/European group within this study, engagement with the surf community should involve multiple ethnicities, including Māori. The familiarity, affinity, and values Māori have with their coastal environment could play a critical role in hazard identification and water safety awareness amongst the public (Phillips, 2020). This is particularly important since Māori are over-represented in fatal drowning statistics (SLSNZ, 2021).

This study indicates that 70% ($n = 450$) of people rescued during respondents' recent rescues were male and almost 60% aged between 10 and 29 years old. These results are in line with the existing literature which indicate that males are more prone to drowning than females (Koon et al., 2021; SLSNZ, 2021). Males, particularly 30 years or younger, often lack an appreciation for coastal drowning risk and/or overestimate their abilities, resulting in higher fatal drowning statistics (Moran, 2010, 2014; Willcox-Pidgeon et al., 2018). In total, 62% of people rescued were New Zealand European, while 12% were Māori and 11% were Asian. The significant representation of Māori and Asian within this study speaks further to the well-recognised issue of high fatal drowning amongst indigenous and minority populations. SLSNZ data shows fatal drowning rates amongst these two groups are twice as high as New Zealand Europeans (Surf Life Saving New Zealand, 2021).

Swimming represented the most common activity for victims at the time of the rescue (56%; $n = 319$) and board riding was the second most common (29%; $n = 167$) activity. Poor swimming ability is widely recognised as a contributing factor in coastal drowning (Moran, 2014; Surf Life Saving New Zealand, 2021; World Health Organization, 2014) and increasing swimming skills, particularly amongst youth, is critical to reducing downing statistics (WHO, 2017). Brewster et al. (2019) find that when board riders are rescued from drowning it is often because they are inexperienced. Interestingly, most published research on the topic of bystander rescue do not address victim activity at the time of rescue. One of the only studies focusing on this aspect is that of Attard et al. (2015) which shows very similar findings to the present research regarding both swimming and board riding activity when rescued.

In total, the respondents to this survey conducted 1274 rescues and potentially saved the lives of 296 people. More than 46% of the respondents felt they had saved the person's life during their recent rescue while 38% were unsure if they saved the victim's life. Although placing a financial value on human lives is both highly debatable and difficult, the current estimated value of a human life in New Zealand is $4.42M (Ministry of Transport, 2020). The findings of this study suggest these surfers' rescues alone may prevent a financial burden of approximately $213M + per year being absorbed by the national economy. In addition, New Zealand's average fatal drownings across all water environments per annum is 74 and SLSNZ average 1923 rescues and assists[2] annually. When one considers the sample surfer population (0.28% of the NZ surf population) is potentially saving on average 48.4 lives per year (2.5% of SLSNZ figure), this further supports the idea that surfers have a significant impact on the reduction of fatal drowning statistics within the country. Without these surfers' rescues there would be 65% more fatalities linked to drowning every year and close to 120 fatalities annually. If only 1% ($n = 1450$) of New Zealand's surfers were conducting one lifesaving rescue per year, it would currently be preventing an economic cost to New Zealand of over $6.4 billion.[3]

Three quarters of the respondents were surfing when they encountered the victim. This information is of critical importance since the drowning process, from immersion to cardiac arrest, can occur within seconds (Barcala-Furelos et al., 2021). Over 73% of rescuers felt confident in their ability to conduct the rescue. Despite respondents' high confidence level, they still faced difficulties during execution. Only 24% found the rescue to be easy, while the remaining 76% encountered varying levels of difficulty. This is not surprising since results show surfers were often rescuing more than one person at a time ($M = 1.52$, $SD = 0.97$). Such findings suggest that surfers regularly conduct mass rescues, which is when several people get into difficulty at the same time. Mass rescue usually requires specific training, a multitude of people, and often inflatable rescue boats. Lifeguards often receive formal recognition for their participation in mass rescue, whereas the performance of surfers in this area is widely unrecognised (Surf Life Saving New Zealand, 2021).

A country like Australia has been one of the first to recognise the significant role surfers can play in reducing fatal drownings and, as a result, has engaged with surfers to complete rescue and CPR courses to improve rescue capacities (Uebelhoer et al., 2021). One of the most popular initiatives is Surfers Rescue 24/7, a course that teaches surfers rescue and resuscitation techniques (Surfers Rescue 24/7 – Surfing New Zealand, 2021). This approach aligns with WHO's recommendations to equip local communities with skills and resources so they can be more resilient and help others (World Health Organization, 2014). Surfing New Zealand currently delivers Surfers Rescue 24/7 training with the aim to prevent drowning. Surfers Rescue 24/7 is in its infancy in Aotearoa New Zealand and further research is sought to establish the efficacy of the course and its outcomes. There is nonetheless a broad consensus that an increasing knowledge of hazards, rescue techniques, and resuscitation training amongst bystanders will lead to less fatal drowning (Koon et al., 2021; Moran, 2010; WHO, 2017). Free text submissions from respondents in this study advocate for greater availability to specifically tailored rescue training for surfers. This leaves a compelling opportunity for organisations involved in drowning prevention and water safety in working closely with the surfing community of Aotearoa New Zealand. It is nonetheless important to note that the intellectual property of the

surfers rescue 24/7 course is owned by Surfing New South Wales and cannot be adapted or customised to suit local needs (Surfing New South Wales, 2022). This reflects the dominant top-down and one-size-fits-all approaches that have characterised drowning prevention strategies (Koon et al., 2021) and raises questions about contextualising the training programme to certain regions.

The impact of surfers on drowning prevention largely goes un-noticed. The present study finds that 86% ($n = 361$) of people rescued were able to walk away without further treatment required. This figure speaks to the number of rescues that go unreported and appears to be an issue not isolated to Aotearoa New Zealand. De Oliveira et al. (2023) who focus on bystanders rescues in Spain and Portugal draw similar conclusions, highlighting that most people rescued walk away without any reporting. When a bystander rescue is conducted, and no medical treatment is involved, there is no record of it. This makes it extremely difficult to quantify the number of surfers' rescues being conducted every year, while pointing out the need for a mechanism that accounts for surfers' rescues, including the location, time, and conditions of the rescue. For victims who did not walk away without treatment, 14% required medical attention, be it first aid, ambulance or, in 11 cases, CPR. The outcome for those who provided CPR was not obtained but results from this study found that, in some instances, the outcome was fatal. Given the critical timeframe for rescue to be affected successfully, access to free training in CPR for surfers is paramount to increase bystander rescuer capacity and is an initiative widely recognised by water safety organizations (Szpilmana et al., 2014; Venema et al., 2010; World Health Organization, 2017). More generally, this highlights the need for policy makers and practitioners working in drowning prevention to closely work with surfers.

## 5. Concluding remark

This study aimed at examining surfers' contribution to reducing fatal drowning statistics at New Zealand beaches. The research indicates that the role of surfers in coastal drowning prevention and water safety is highly significant, yet it has been dramatically overlooked. This study provides foundational data that helps better understand the conditions within which rescues occur, as well as the characteristics of the rescuers and rescued, which ultimately might help inform drowning prevention strategies developed by local and national organizations. As illustrated in this study, surfers have a wealth of knowledge about coastal hazards, in-depth experience about dealing with rip currents, and generally display appropriate behaviour in rescuing those at risk of drowning. To date, the dominant approaches to drowning prevention and water safety have focused either on top-down education programmes such as 'swim between the flags' and 'wear a lifejacket' campaigns (Brander et al., 2019; Willcox-Pidgeon et al., 2018; Pitman et al., 2021; Phillips, 2020) with limited approaches drawing upon local resources and skills. The importance of collaboration between stakeholders has been discussed at length in the public health and emergency management literature, with the recognition that top-down approaches are often ineffective and unsustainable (Gaillard & Mercer, 2013; Heijmans, 2009; Marshall & Mcgregor, 2016; WHO, 2014). In turn, community-based approaches from the bottom-up often prove successful in that they are grounded locally and capitalise on local resources, skills, and knowledge in their diversity. This

study suggests there is potential to work more closely with surfers from the bottom-up and unlock opportunities for more effective drowning prevention, water safety and awareness raising strategies.

## Notes

1. The term 'formal rescue training' was not defined in the survey question. However, the Rescue 24/7 course was used as an example of what could constitute formal rescue training.
2. Rescue – Where a person requires immediate help to return to shore (or place of safety) and who without intervention would have suffered distress, injury or drowning.
   Assist – Where a person requires assistance to return to shore but would most likely be able to get themselves out of danger if unaided.
3. Current estimated value of a human life $4.42M x 14500 (1% of 145,000 surfers) = $ 6,409,000,000

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No potential conflict of interest was reported by the author(s).

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