

**An Examination of the Contribution of
Specific Water-Based Activities to Recent Trends in
Death by Drowning in New Zealand**

**Report to the
Accident Compensation Corporation**

Dr Melissa Purnell

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November 2008

Acknowledgements

The authors would like to acknowledge the valuable input of Dr Pamela Smartt into the study proposal phase of this research; Associate Professor David Chalmers (IPRU) as an advisor to this project; Water Safety New Zealand for the DrownBase™ data; Dr Pauline Gulliver (IPRU) for statistical advice and age-standardised drowning rates; and Dr Andrew Tait for the data from the National Climate Centre.

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Executive Summary

Background

Death by drowning is the third leading cause of unintentional death in New Zealand¹. In 2005, the Accident Compensation Corporation (ACC) launched the Drowning Prevention Strategy to coordinate the efforts of those involved in water safety and establish a water safety culture in New Zealand. This study is part of a program of research commissioned by the ACC to help achieve the objectives of the first five years of the Strategy.

Objectives

The main objectives of this descriptive study were to examine the contribution of specific water-based activities to recent trends in drowning fatalities in New Zealand for the period 2000 to 2007, and to identify policy and program areas for further development.

Main Findings

- Overall, the frequencies and rates of unintentional and intentional drowning deaths in New Zealand have declined over the period 2000 to 2007.
- The combined contribution of drowning fatalities as a result of recreational swimming, recreational underwater activities, recreational fishing and non-recreational immersion incidents (including motor vehicle incidents) to the total death by drowning toll has increased between 2005 and 2007.
- The frequency of drowning deaths associated with non-recreational immersion incidents (including motor vehicle incidents), has declined over the study period, but this group continues to contribute to over a third of all drowning fatalities.
- The frequencies and percentage contribution of recreational swimming related drowning fatalities declined between the years 2003 to 2006, but increased in 2007.
- Recreational underwater and fishing activities have shown no clear direction of change over the study period, and each contribute to less than 10% of the annual drowning death toll.

Conclusions

- Non-recreational immersion and recreational swimming activity groups should receive priority attention.
- Program areas that could benefit from further development include parental supervision, alcohol use, safe diving practices, and lifejacket use during land-based fishing.

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1. Introduction

Drowning has been defined as “the process of experiencing respiratory impairment from submersion/immersion in liquid”² and is the third leading cause of unintentional injury death in New Zealand¹. Although the rates are reducing there is concern that New Zealand’s record compares poorly with other comparable countries such as Australia^{1,3}. In 2005, the New Zealand *Drowning Prevention Strategy: Towards a Water Safe New Zealand 2005-2015* (DPS)⁴ was launched by the Accident Compensation Corporation (ACC) to provide a framework for coordinating the efforts of those involved in water safety and establish a water safety culture in New Zealand. A key objective of the DPS was “to improve our water safety knowledge through research and development” (Objective 4)⁴. This report was commissioned by the ACC to contribute to the achievement of this objective.

1.1 Objectives

The main objectives of this research were to:

1. Examine the contribution of specific water-based activities to recent trends in drowning deaths in New Zealand over the period 2000 to 2007.

The specific activity groups were:

- A. Non-recreational immersion incidents including road vehicle incidents
- B. Recreational swimming
- C. Recreational angling, net and shell fishing
- D. Recreational underwater activities

2. To identify policy and program areas for further development.

The descriptive analysis was to be informed by using environmental data from the National Institute of Atmospheric Research (NIWA), legislative action and time of year data.

1.2 Activity Groups

Table 1 shows the categories used by Water Safety New Zealand in the DrownBase™ drowning fatality database for “activity groups” and “activities”. Those categories highlighted in **bold** are the focus of this study. More detail concerning DrownBase™ is given in the methods section 2.1.

Recreational	Non-Recreational	Other
Land Based Fishing	Immersion Incident	Other Activities
Angling	Accidental Immersion	Aircraft
Net Fishing	Flood/Civil Emergency	Homicide
Shellfishing	Rescuing Others	Other Commercial
Non Powered Boat	Occupational Related	Passenger Ship
Canoeing	Commercial Fishing	Road Vehicle
Kayaking		Suicide
Rowing Craft/Dinghy		
Powered Boats		
Jet Boat		
Jet Skis		
Over 4m		
Under 4m		
Sailing		
Fixed Keel Boat		
Offshore Sailing		
Sailing Dinghy		
Trailer Sailer		
Underwater		
Free Diving		
Scuba Diving		
Snorkelling		
Water Sport/Recreation		
Board Riding		
Boogie Boarding		
Diving/jumping		
Non-water related		
Swimming		
Tubing		
Water Skiing		
Windsurfing		

Table 1: DrownBase™ drowning fatalities activity group categories.

Non-Recreational Immersion Incidents including Road Vehicle Incidents

This activity group includes drowning fatalities that (primarily) occur when there was no intention of entering the water i.e. a slip and fall into a river, a child wandering away and being found in a swimming pool. The activities are accidental immersion, flood/civil emergency and rescuing others. Drowning fatalities associated with motor vehicles are recorded in DrownBase™ under the activity group “other activities” (Table 1). For the purposes of this study, however, they will be incorporated into non-recreational immersions.

Recreational Swimming

Recreational swimming is one of eight activities under the broad activity group of “water/sport and recreation”.

Recreational Angling, Net and Shell Fishing

These activities are part of the activity group “Land-Based Fishing”.

Recreational Underwater

This activity group includes free diving, scuba diving and snorkelling activities.

1.3 Activity Group Drowning Statistics 2007

In 2007 there were 43 non-recreational immersion (including motor vehicle) fatal drowning incidents and 10 of these were from road vehicle incidents. These 43 deaths represent 39% of all deaths by drowning in New Zealand for that year (DrownBase™ - WSNZ). There were: 15 deaths (14%) from recreational swimming; 9 deaths (8%) from recreational angling/net and shell fishing; and 8 (7%) deaths resulting from recreational underwater activities.

The deaths in these three activity groups represented 29% of all fatal drowning deaths for 2007 (DrownBase™ - WSNZ). In summary, two thirds (68%) of drowning deaths in New Zealand in 2007 were associated with the four activity groups that are the focus of the present analysis. Between 1994 and 2007, the overall trends in death by drowning frequencies and rates have showed a decline⁵. The question is, what has been the contribution of the above four activity groups between 2000 and 2007?

1.4 Activity Group Modifiable Risk Factors

The companion literature review to this study summarised the results of thirteen studies published since 2004 that examined potential modifiable risk factors for unintentional drowning associated with the four activity groups under focus in the present study⁶. Alcohol use, lack of parental supervision, use of bath seats and risk-taking behaviour, and combinations of these, were the main modifiable potential risk factors for these activity groups highlighted by the review.

Alcohol use and risk taking behaviour were shown to be factors in unintentional fatal and non-fatal drowning associated with recreational swimming and non-recreational immersion incidents including motor vehicle incidents. In an analysis of New Zealand data, 28% (219/767) of young adult (aged 15 – 24) drowning deaths in the period 1980 to 2002 were considered to be alcohol related. Of alcohol related drowning deaths, 98 (45%) were due to motor vehicle incidents⁷.

Lack of quality parental supervision is a major risk factor for non-recreational immersion incidents in young children⁸. Access to water, and the use of bath seats by young children when unsupervised have also been shown to be risk factors for accidental immersion⁸. Risk-taking behaviours such as solo diving, buddy separation and underlying medical conditions have been linked to recreational underwater diving drowning fatalities⁶.

1.5 Non-Modifiable Risk Factors for Drowning

The World Health Organisation (WHO) Fact Sheet on Drowning lists the main non-modifiable risk factors for drowning as sex, age, occupation, floods, epilepsy, socioeconomic status and access to water (www.who.int/violence_injury_prevention/).

1.6 Recent Legislation

A new standard for pool fencing in New Zealand came into force in 2007, as a first step to resolving conflicting requirements of the Fencing of Swimming Pools Act and the Building Act. The Safety Barriers and Fences around Swimming Pools, Spas and Hot Tubs (NZS 8500:2006) Standard requires that for new pools, all doors opening into a pool area will need to have self-closers that can close the door from any open position. The quality standard for building fences has also been made more specific.

(From <http://www.standards.co.nz>).

2. Methods

2.1 DrownBase™

In New Zealand, all drowning deaths are captured by DrownBase™. This database was developed in 1990 and contains records of all fatal drowning incidents in New Zealand since 1980 and is the official database of Water Safety New Zealand (WSNZ). Deaths are included in DrownBase™ if the primary cause of death was drowning, or if drowning was a contributing cause of death and the primary cause of death was potentially survivable⁷. Water Safety New Zealand collects information from police reports, coroners files and media clippings and matches their data with that of the New Zealand Health Information Service, Maritime New Zealand records and the Injury Prevention Research Unit⁷. The data provided by Water Safety New Zealand were in an excel spreadsheet with 32 fields for each case. The data under the following headings were used for the analysis in the present study: date of fatality; year of fatality; activity group (see section 1.1 of this report); and activity.

The original aim of this study was to carry out a time series analysis and to compare age-standardised fatal drowning rates for the four different activity groups. However, the numbers were found to be too small to permit meaningful analyses using these methods. Frequencies and percentages of drowning fatalities in each of four activity groups were determined. Age standardised rates were calculated for *total* fatal drowning deaths for the period 2000 to 2007⁵. Population data from Statistics New Zealand population estimates were used to calculate the age standardized rates⁵. The rates were age-adjusted to compensate for societal changes in the age distribution of the population over time⁵. Ninety-five percent confidence intervals for the age-standardised rates were calculated.

2.2 Climate Data

The analysis was informed by climate data from the New Zealand National Climate Centre (NCC) (<http://www.niwa.cri.nz/ncc>). A dataset of average monthly values (averaged over all of NZ) of maximum daily temperature was provided by Dr Andrew Tait from the NCC. The values for each month were averaged for the 8 year period 2000 – 2007 and 95% confidence intervals calculated. The data were sub-divided into land above and below 500m elevation (plus all elevations combined). For the purposes of this study it was advised that we use the below 500m elevation data because that is generally where people live and where the majority of the climate data are collected. The data were derived from interpolated monthly temperature data observed at climate stations

located throughout NZ, using a thin plate smoothing spline interpolation which takes into account the proximity to the input climate stations and the topography.

3. Results

3.1 All drowning fatalities 2000 – 2007

In total, 961 people died from drowning in the period 2000 to 2007. Figure 1 shows that drowning frequencies have declined at various times over this period. In 2000, 132 people lost their lives by drowning compared with 110 in 2007, a decrease of 17%. For the period 2000 to 2006 fatal drowning rates show a decline from 3.4 to 2.2 deaths per 100, 000 person-years at risk⁵ (Figure 2). However, the most recent calculation, for the year 2007 was up on the previous year at 2.6 deaths per 100, 000 person-years at risk.

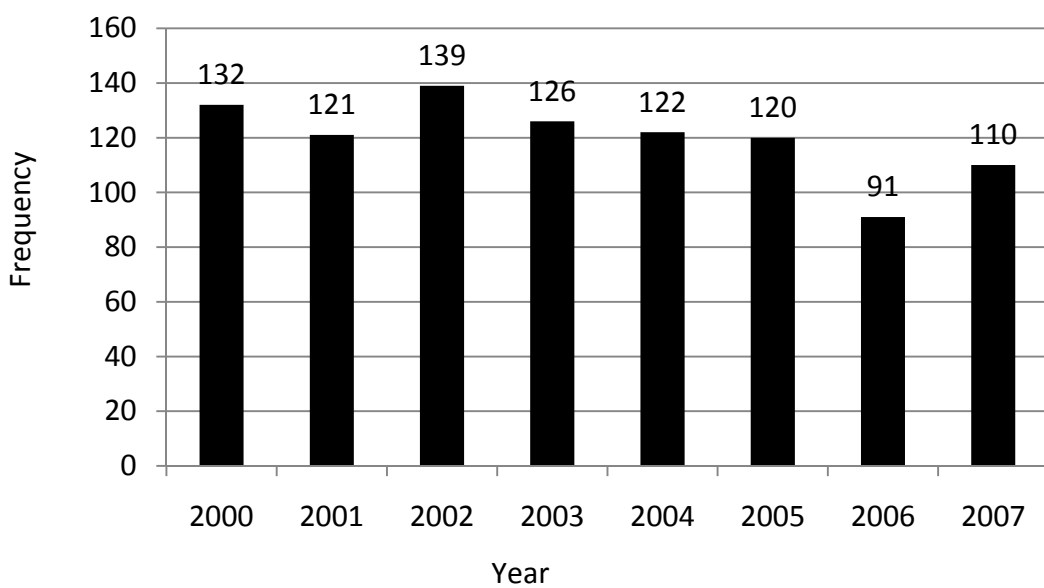


Figure 1 Frequency of drowning fatalities in New Zealand 2000 – 2007 for all activities

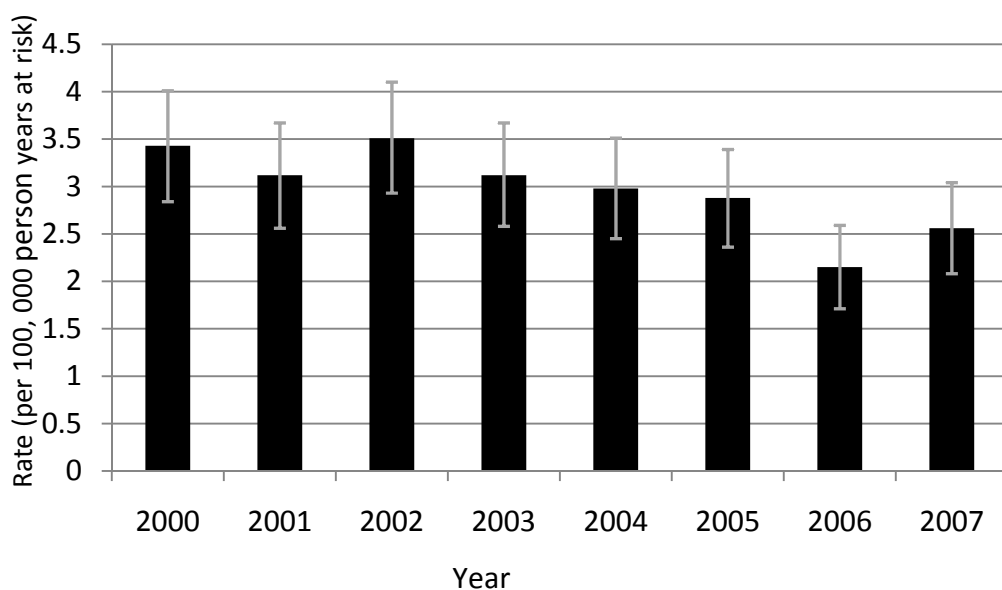


Figure 2 Age-standardised rates for drowning fatalities in New Zealand 2000 – 2007 with 95% confidence intervals

3.2 All Four Activity Groups Combined

Figure 3 shows that the frequency of drowning fatalities for the four activity groups combined, has ranged between 56 and 80 deaths per annum for 2000 – 2007. The lowest death frequency occurred in 2004 but since then the death toll has risen. Figure 4 displays the percentages of drowning fatalities attributed to each of the four activity groups for 2000 – 2007. The lowest percentage for the four groups combined occurred in 2004 (46%), but there has been a steady increase since then.

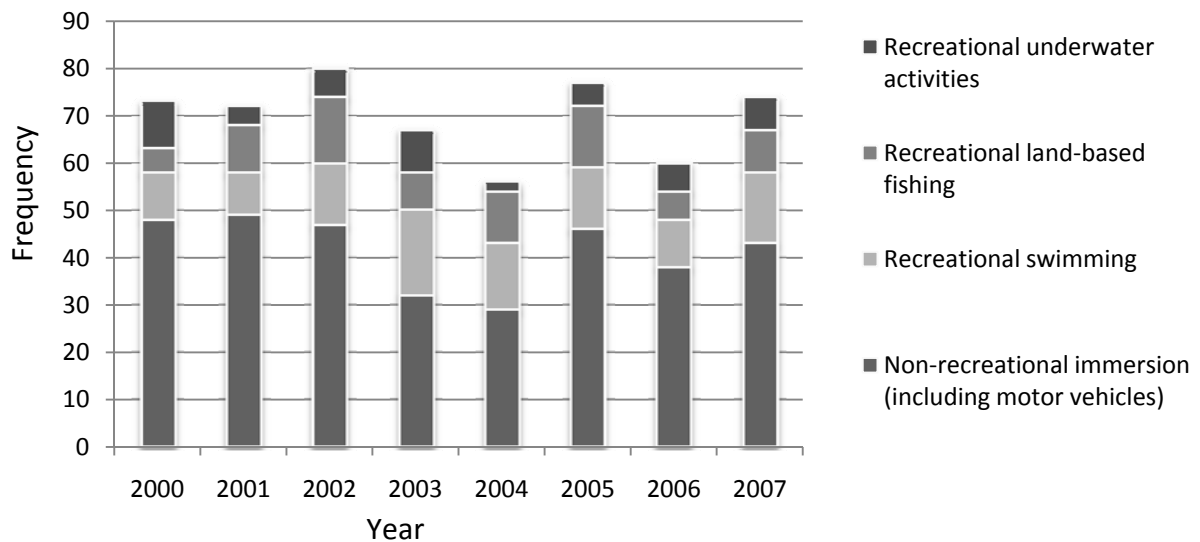


Figure 3 Frequencies of drowning fatalities in New Zealand for all four activity groups 2000 to 2007

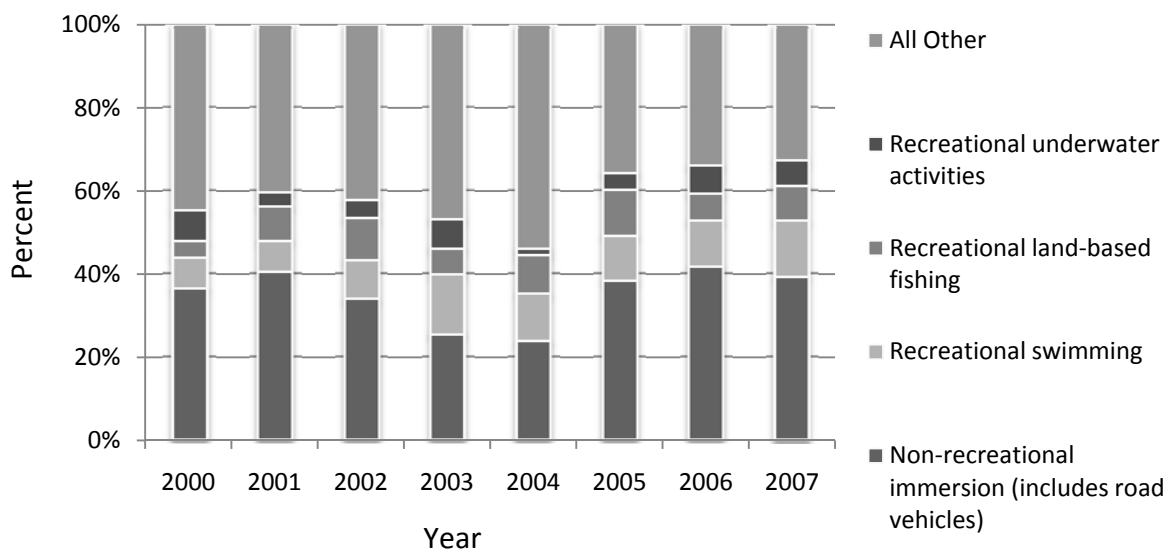


Figure 4 Percentages of drowning fatalities in New Zealand 2000-2007 for four activity groups

3.3 Non-Recreational Immersion including Motor Vehicle Incidents

Figure 5 shows that the frequency of drowning fatalities in this activity group peaked in 2002, at 49 deaths, and has been declining since then. Since 2000, the frequency of death by drowning from non-recreational activities has decreased by 10%. Figure 6 shows that non-recreational immersion incidents including motor vehicle incidents have consistently contributed to over a third (range 36% to 42%) of all drowning fatalities over the last 8 years.

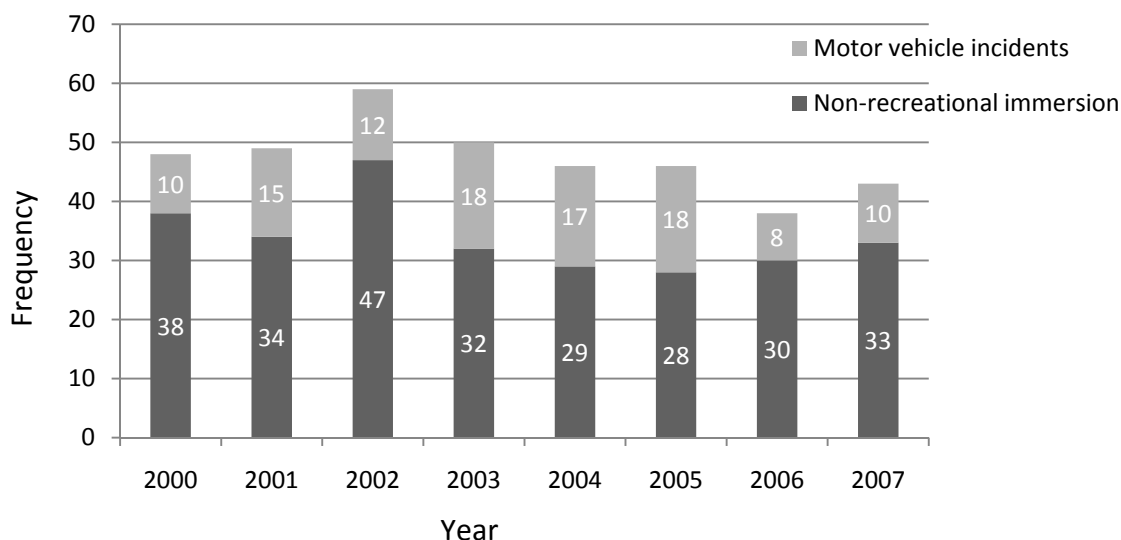


Figure 5 Frequencies of drowning fatalities in New Zealand 2000-2007 from non-recreational immersion incidents including motor vehicle incidents.

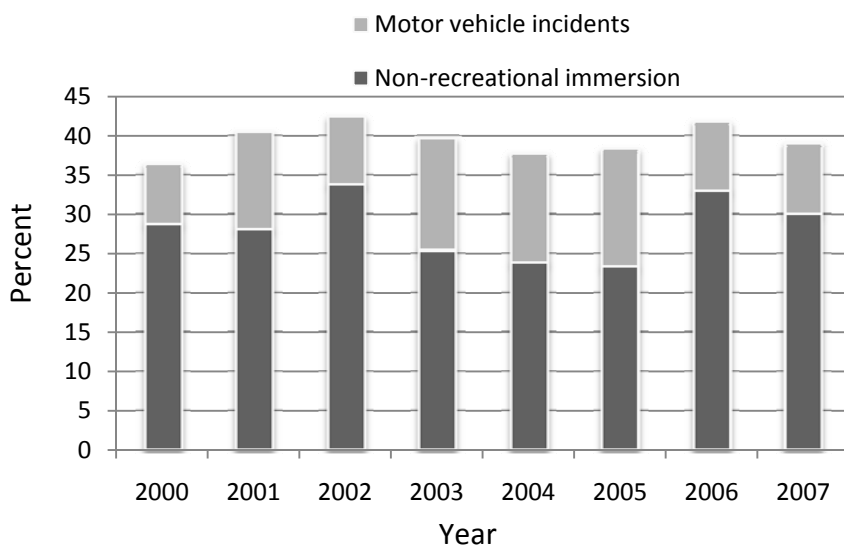


Figure 6 Percentages of drowning fatalities in New Zealand 2000-2007 from non-recreational immersion incidents including motor vehicle incidents.

3.4 Recreational Swimming

The numbers of people drowning while swimming recreationally have been variable, but appeared to be decreasing for the period 2003 to 2006 (Figure 7). However, the 2007 death toll as a result of recreational swimming increased relative to the previous 3 years. In Figure 8 it is clear that the percentage of drowning deaths attributable to recreational swimming has climbed steadily over the last 8 years, ranging from 8% in 2000 to 14% in 2007. This will be partly attributable to declines occurring in other activity groups.

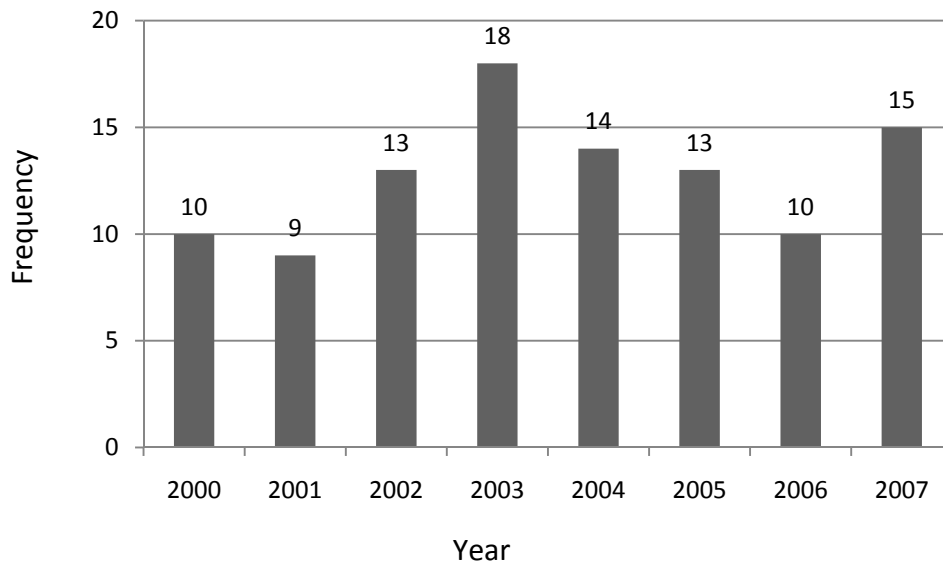


Figure 7 Frequencies of drowning fatalities in New Zealand 2000-2007 from recreational swimming.

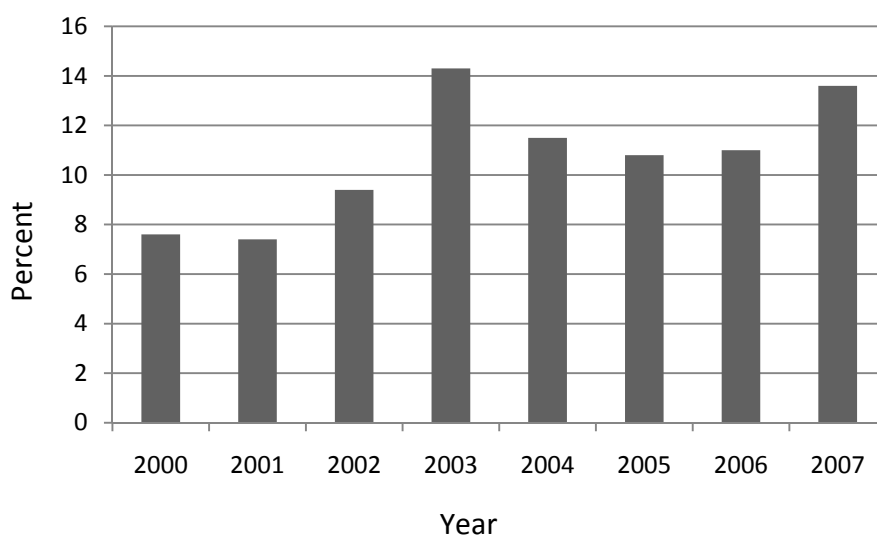


Figure 8 Percentages of drowning fatalities in New Zealand 2000-2007 from recreational swimming.

3.5 Recreational Land-Based Fishing

The numbers of deaths associated with recreational land-based fishing show no clear increasing or decreasing trend over the period of 2000 to 2007 (Figure 9). The same is true of the percentage of drowning deaths attributable to this activity group (Figure 10). This may partly reflect the small numbers. With the year 2000 being the notable exception, land-based fishing incidents have contributed to between 6% and 11% of unintentional drowning fatalities in New Zealand.

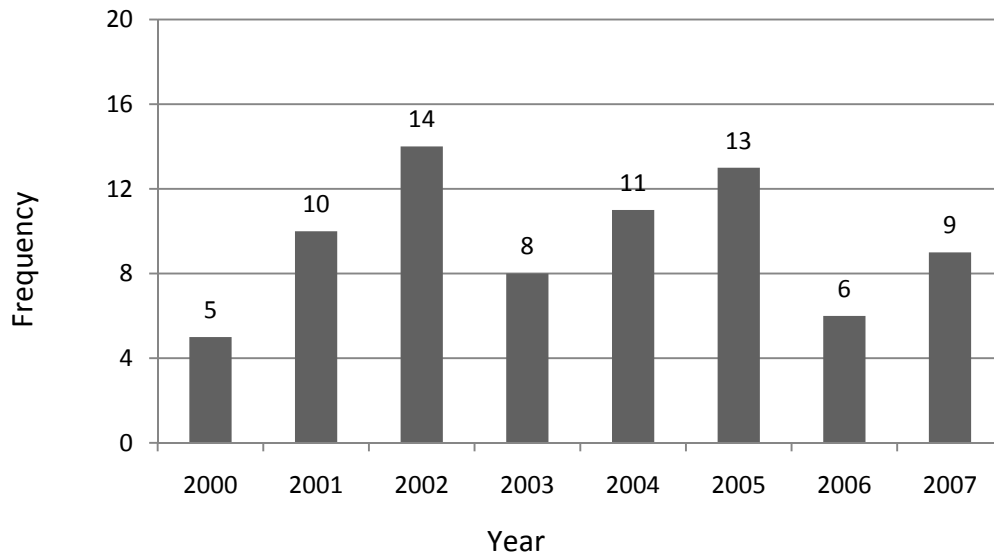


Figure 9 Frequencies of drowning fatalities in New Zealand 2000-2007 from recreational land-based fishing.

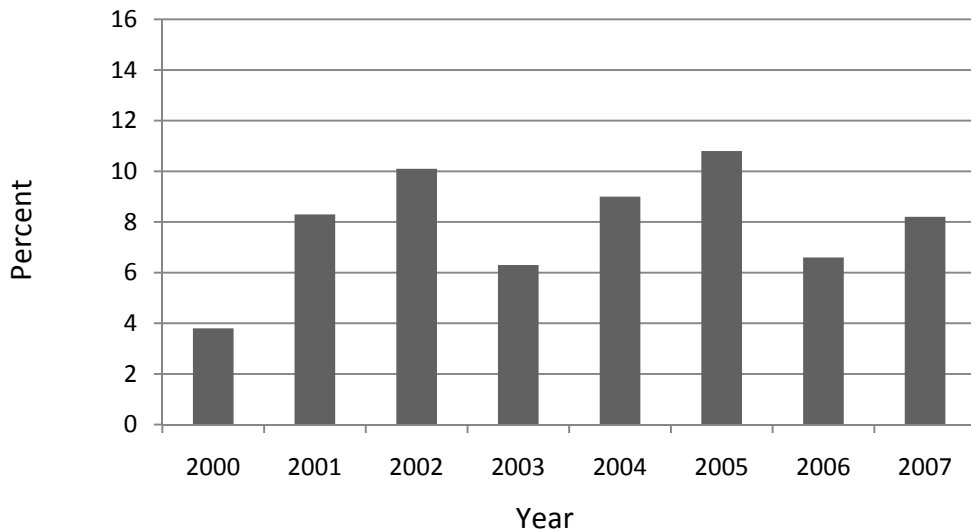


Figure 10 Percentages of drowning fatalities in New Zealand 2000-2007 from recreational land-based fishing.

3.6 Recreational Underwater Activities

The numbers and percentages of deaths associated with recreational underwater activities show no clear increasing or decreasing trend of improvement or decline over the 2000 to 2007 period (Figures 11 and 12). Again, this may partly reflect the small numbers occurring each year.

Recreational underwater activities have contributed to between 1.6% and 7.9% of unintentional drowning fatalities in New Zealand over the period 2000 to 2007.

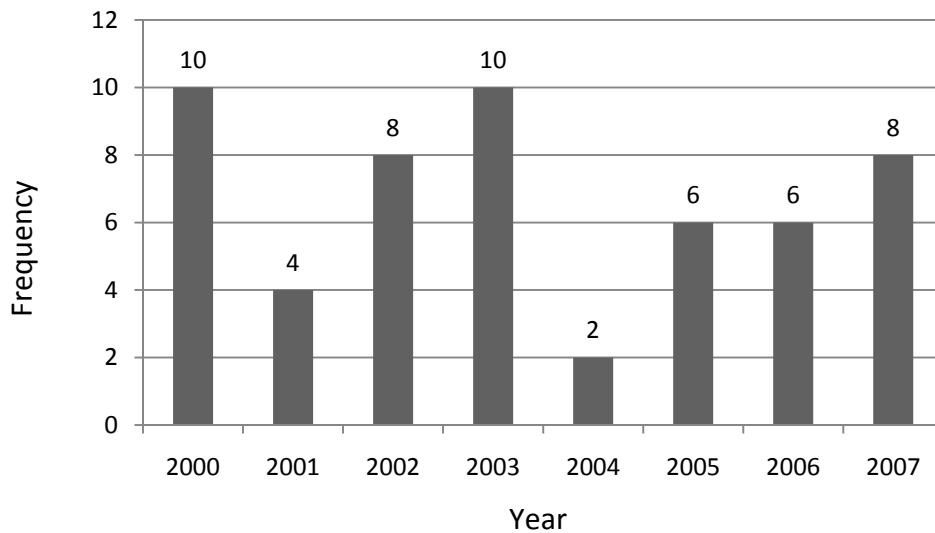


Figure 11 Frequencies of drowning fatalities in New Zealand 2000-2007 from recreational underwater activities.

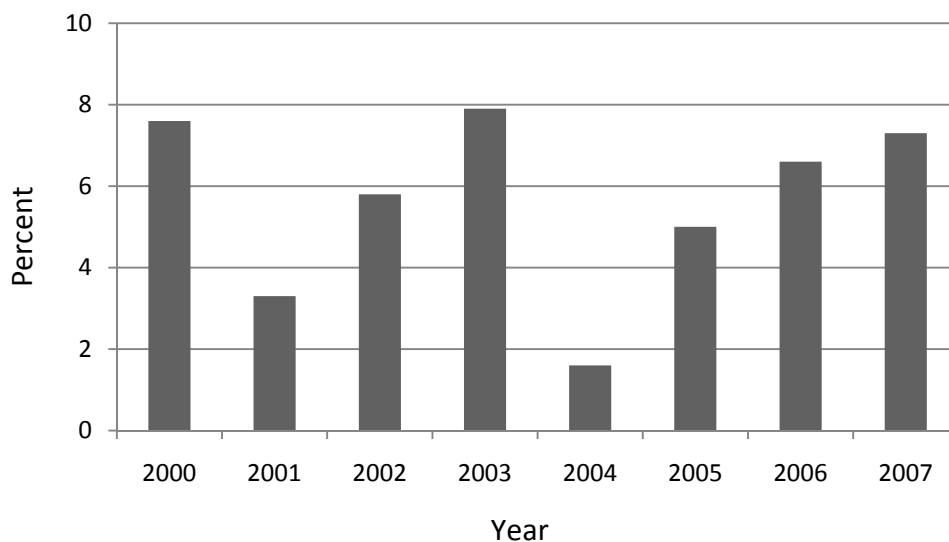


Figure 12 Percentages of drowning fatalities in New Zealand 2000-2007 from recreational underwater activities.

3.7 Climate and Time of Year Data

Figure 13 displays boxplots of the average monthly maximum temperatures for New Zealand for the period 2000 to 2007. The four months with the warmest maximum temperatures, from highest to lowest, were February, January, March and December. Figures 14 and 15 show time of year trends for the frequency of drowning fatalities (2000 to 2007) for the four activity groups. For recreational swimming, there was a clear time of year trend with the highest number of fatalities occurring in the warmer months of December, January and February. January, February and March attracted the highest numbers of drowning deaths associated with recreational underwater activities (diving). The trends were not so apparent for non-recreational immersion and land-based fishing, although the month of January was associated with a peak in non-recreational immersion drowning deaths (Figure 14).

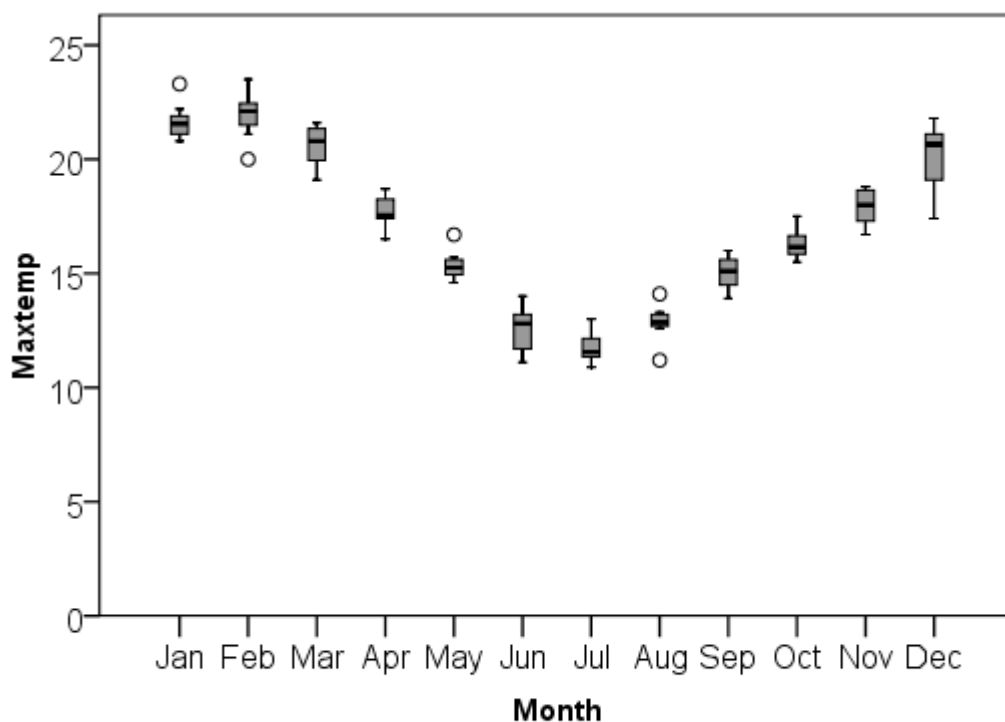


Figure 13 Boxplots of average monthly values (averaged over all of NZ) for the period 2000 – 2007 of maximum daily temperature (°C) (circles represent outliers) (Source: National Climate Centre, NZ)

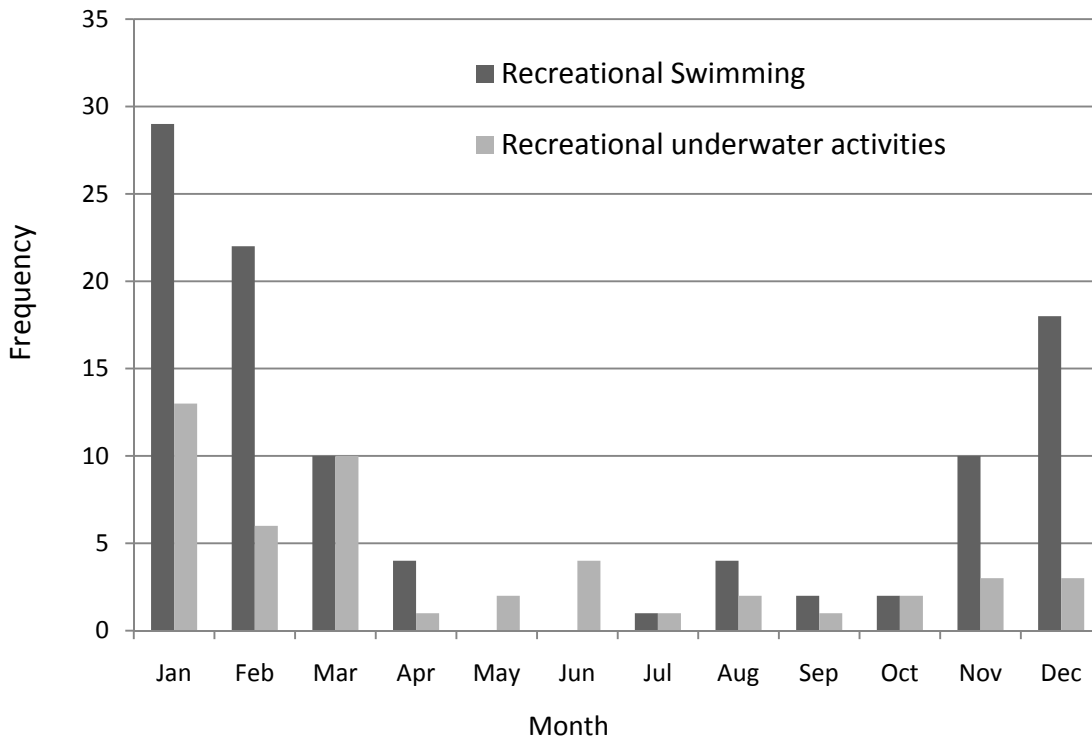


Figure 14 Frequencies of drowning fatalities in New Zealand 2000-2007 from recreational swimming, and recreational underwater activities by month of the year.

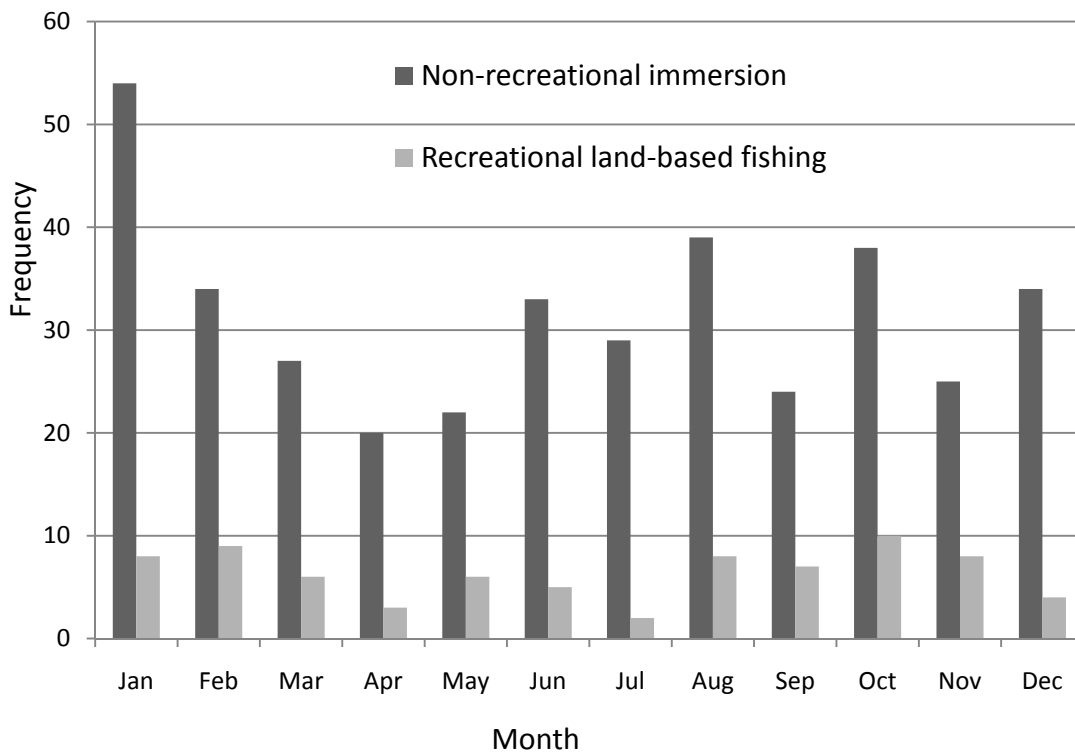


Figure 15 Frequencies of drowning fatalities in New Zealand 2000-2007 from non-recreational immersion incidents and recreational land-based fishing by month of the year.

4. Discussion

What was the contribution of specific water-based activities to recent trends in drowning deaths in New Zealand 2000 to 2007?

Overall, the number and rates of unintentional and intentional drowning deaths in New Zealand has steadily declined over the period 2000 to 2007⁵. Yet the combined contribution of recreational swimming, recreational land-based fishing, recreational underwater activities and non-recreational immersion incidents (including motor vehicle incidents) to the overall drowning death toll, has increased. Over the last three years (2005 – 2007) these four activity groups combined have contributed to at least two thirds of unintentional fatal drowning deaths.

Individually, the four activity groups differed greatly in their relative contribution to the unintentional drowning toll over the study time period. Deaths associated with non-recreational immersion are a risk to all New Zealanders, and this activity group was associated with over a third of all unintentional drowning deaths annually, contributing the most out of the four activities. Three-hundred and seventy-nine drowning fatalities (39.4% of the total number of deaths) over the period 2000 to 2007 were attributed to non-recreational immersion incidents. Over the study period, on average, 14 people died by drowning each year as a result of a motor vehicle incident. Unintentional drowning deaths peaked overall in this activity group in 2002 at 59 deaths, but in 2007 the death toll was much reduced at 43. The frequency of drowning deaths associated with non-recreational immersion declined 10% between 2000 and 2007, contributing to the overall decrease in drowning deaths in New Zealand.

The frequency and percentage of unintentional drowning deaths from recreational swimming showed a decrease for the four year period 2003 to 2006, but increased again in 2007. Over the 8-year period of this study, between 9 and 18 people have died annually from drowning while swimming recreationally (102 in total; 10.6%). Compared to the other three activity groups, recreational underwater activities contributed the smallest number of unintentional drowning deaths of between 2 and 8 annually (54 in total; 5.6%), and showed no clear direction of change over the 8-year study period. There was also no clear direction of change for unintentional fatal drowning associated with recreational land-based fishing for the period 2000 to 2007. This activity contributed between 5 and 14 drowning fatalities per year and 76 deaths for the whole study period (7.9%).

The highest number of drowning fatalities resulting from recreational swimming and underwater activities occurred during the warmer months of December, January, February, and March over the 8-year period. However, the time of year trends were not so apparent for non-recreational immersion and land-based fishing groups.

What policy and program areas can be identified for further development based on the research findings?

This was a descriptive study, designed to describe the pattern of drowning fatalities by activity group, over the time period 2000 to 2007. It was beyond the scope of this study to analyse the factors associated with the drowning deaths in each activity group in any detail. The features inherent in this type of epidemiological design usually preclude the ability to test hypotheses, but constitute an important first step in the search for determinants or risk factors that can be altered or eliminated to reduce the risk of disease, injury or death⁹. This being the case, the present research findings can only be used to formulate hypotheses concerning the relationship between drowning and the activity preceding the fatal incident. In the companion study to the present one⁶, a review of the scientific and grey literature was carried out for the period 2004 to 2007 to identify the main modifiable risk factors for drowning fatalities associated with non-recreational immersion, recreational immersion, recreational underwater activities and recreational land-based fishing⁶. These findings will be used in conjunction with the present study results to aid in identifying the policy and program areas that require development.

The results of this study suggest that the two activity groups that should receive priority focus are non-recreational immersion and recreational swimming. Although the frequency of drowning deaths associated with non-recreational immersion has declined, the actual numbers of people dying from this cause continues to make a substantial contribution to the overall toll. With regard to recreational swimming, this activity group continues to contribute to an increasing percentage of the annual drowning burden.

Non-recreational immersion

The main modifiable risk factors for unintentional fatal drowning as a result of non-recreational immersion, are alcohol use, risk taking behaviour and lack of parental supervision⁶. Related to parental supervision is access to water by young children⁸. All of these areas require further development with regard to policies and programs in New Zealand.

Pool fencing that adequately prevents children reaching the pool unsupervised can prevent about three-quarters of all child drownings in pools¹⁰. Fencing which completely encircles the pool and isolates it from the house is much more effective than methods where children can still gain access to the pool through the house¹⁰. The number of toddler deaths in New Zealand has declined, coinciding with legislation requiring fencing of domestic swimming pools (Fencing of Swimming Pools Act 1987)⁷. However, compliance and enforcement issues continue to act as a barrier to this intervention in New Zealand¹¹. The new standard for pool fencing designed to overcome inadequacies in the Act that came into force in 2007, is likely to have occurred too recently to have affected unintentional immersion statistics to date. The effect of this important development on drowning statistics should be monitored closely.

Recent research has highlighted a misconception held by many parents/caregivers that swimming lessons or people *other than* parents/caregivers provide better protection for their children near water than supervision from parents/caregivers^{12 13}. Although promotional activity regarding parental supervision is currently occurring in the form of the “Under Five Water Wise”, “Be WaterWise Programmes” and the “Pool Alone Policy”⁶, this area is one that could benefit from further attention in the New Zealand context.

Alcohol consumption is one of the most frequently reported contributory factors associated with adolescent and adult drowning in many countries⁸, including New Zealand⁷. Twenty-eight percent (219/767) of young adult (aged 15 – 24) drowning deaths in the period 1980 to 2002 were considered to be alcohol related in New Zealand⁷. Of the alcohol related drowning deaths, 98 (45%) were due to motor vehicle incidents⁷. Development of policies and/or programs regarding alcohol use in and around water is needed. A way forward has been suggested in the form of a recent New Zealand study that examined the context in which youth alcohol consumption and aquatic recreation occurs¹⁴. The following recommendations were made:

To WaterSafe Auckland and injury prevention and other water safety organisations:

1. Highlight the dangers of mixing alcohol consumption and aquatic activity amongst youth and make it a key priority area for action.
2. Investigate possible education campaigns, especially those focused on young adult males that promote self safety rather than reliance on others.
3. Educate parents about correct supervisory behaviour where alcohol is involved, and the importance of parents promoting safe youth behaviours around water.

To local territorial authorities:

4. Investigate procedures in place around alcohol free public events.
5. Investigate current risk management practices implemented at public events near water.
6. Investigate potential safer alternatives for underage youth during the New Year period celebrations.

To Alcohol Healthwatch and other alcohol advisory groups:

7. Advocate for stronger monitoring and safety policies at public events, especially alcohol free events and events near water.
8. Advocate for stronger enforcement of legal purchase age identification.

Recreational Swimming

Modifiable risk factors for recreational swimming include alcohol use and risk-taking behaviour⁶. It has been shown in New Zealand that overall, males report a higher level of water confidence, exposure to risk behaviours and unsafe locations and more non-fatal drowning incidents than females, and those males who are most confident in the water are more likely to engage in water-related activities (but not boating) after drinking alcohol¹⁵. The recommendations outlined above by Moran (2008) regarding alcohol and aquatics are particularly applicable in the recreational swimming context.

Recreational Underwater Activities

McClelland (2007) retrospectively analysed diving-related fatalities for the period January 2000 to December 2006 using Water Safety New Zealand's Drownbase™ data¹⁶. The circumstances of each case, the method of the accident investigation and the coroner's reports were reviewed. In total, 56 diving-related fatalities (40 scuba divers and 16 snorkellers) were identified and analysed. Of the 40 scuba divers, 50% were inexperienced (less than 2 years of experience) and only 40% were following standard safe diving practice and diving with a buddy at the time of the incident. Eleven out of the 40 scuba divers were solo diving and in 13 other cases buddy separation had occurred. Thirty percent (12 out of 40) had significant medical conditions that may have disqualified them from diving. In summary, risktaking behaviour in the form of diving alone, buddy separation and diving while medically unfit was associated with unintentional diving drowning fatalities in New Zealand¹⁶. These behaviours could be more aggressively targeted in drowning prevention programs.

Recreational Land-Based fishing

The Auckland Regional Council (ARC), WaterSafe Auckland Inc (WAI) and Surf Life Saving Northern Region (SLNR) jointly conducted the final year of a 3-year project that built on the rock fishing safety campaign entitled West Coast Fishing Safety initiated in the summer of 2006 and developed in 2007¹⁷. A cross-sectional study of 235 fishers at high risk locations on Auckland's West Coast was undertaken at the end of the summer safety campaign in April 2008. Over the course of the campaign, fewer fishers reported never wearing a life jacket (2006, 72% / 2008, 52%) and more reported wearing them often (2006, 4% / 2008, 22%). However, more than half of fishers (53%) reported *never* wearing any life jackets or flotation aids. Almost half (44%) of fishers in 2008 reported *sometimes* or *often* consuming alcohol while fishing. The rock fishing community was shown to be predominately male (86% - 92%) with almost half of the respondents of Asian origin (455 - 49%), transient in their participation in rock fishing and 25% of fishers were of recent residency. The author suggests that any of the above factors may make the task of changing risky attitudes and behaviour challenging¹⁷. From the results of the study, nine detailed recommendations were made by the author.

1. To the Auckland Regional Council (ARC):

- a. Given the transient nature of the rock fishing population and the persistence of risky attitudes and behaviours as reported, retain the services of the safety advisors for a 2009 summer campaign. Explore ways of maintaining a fishing safety presence on the West Coast beyond 2009.
- b. Given the ethnic diversity of the rock fishing population, retain the multilingual advisory service.
- c. Maintain a regional leadership role in the collaborative venture by allocating funds to support future fishing safety promotion, including the installation of angel rings and safety signage at high risk sites thereby affirming ARC's commitment to its mandate to maintain harbour and coastal safety.

2. To WaterSafe Auckland, Surf Life Saving Northern and other safety organisations:

- a. Consider ways of addressing the concerns highlighted in this report by reinforcing and extending the current provision of public safety information and resources.
- b. Commit resources and personnel to the ongoing work collaboratively with all partners to promote best practice for the West Coast fishing safety education beyond 2008.

- c. Disseminate the findings of the study to member organisations, national water safety organisations, community organisations (especially migrant community organisations), recreational fishing groups and businesses and the public at large.
3. To recreational fishers, fishing clubs and fishing organisations:
- a. Learn and implement the fishing safety messages promoted by the West Coast Fishing Safety Project.
 - b. Encourage others in the rock fishing fraternity to adopt safe practices – especially the wearing of inflatable lifejackets when fishing at Auckland’s high-risk west coast locations.
 - c. Support the work of frontline fishing advisors and lifeguards in their efforts to make rock fishing a safe and happy experience without undue risk for all concerned.

5. Summary of Policy and Program Areas Identified for Further Development:

Given the findings of previous local and international research⁶, several areas for program development have been identified:

1. The effect of the new Safety Barriers and Fences around Swimming Pools, Spas and Hot Tubs Standard (NZS 8500:2006) on pre-school drowning fatalities should be monitored.
2. Promotion of parents and caregivers as the most important supervisors of children in and around water, as part of national water safety programs, at swimming schools and at aquatic locations.
3. Development and piloting of policies and/or programs regarding alcohol use, in and around water, are needed. Priority target groups are young males and parents/caregivers supervising young children.
4. Promotion of key messages for divers: diving with a buddy; remaining with a buddy while diving; and obtaining regular medicals prior to diving.
5. Promotion of the wearing of inflatable lifejackets at high risk rock fishing locations¹⁷.
6. It would be of benefit to examine the epidemiology of drowning deaths *within* each of the four activity groups over the study period paying particular attention to the following variables: age; gender; ethnicity; environment; environment group; buoyancy; medical condition; alcohol involvement; and pool fencing. This approach would further assist program and policy development in all four activity groups.

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