Case study: using administrative data to better understand deaths and near misses

SOCIAL WELLBEING AGENCY | TOI HAU TĀNGATA

- The Social Wellbeing Agency (SWA) has developed a new method in the Integrated Data Infrastructure (IDI) to generate insights into rare events resulting in death.

- Deaths resulting from rare events are hard to analyse, particularly in a small country like New Zealand as these events often occur in very low numbers each year. While analysing the causes of deaths from rare events is important, given the small numbers it can be difficult to identify patterns to determine where to best focus prevention efforts. Analysing 'near miss' incidents where people survived alongside those that resulted in death can tell us more about the total size of the problem and better inform prevention activities.

- Using the IDI, we developed a method that enables us to look at a broad range of data that identifies incidents resulting in death and those linked to similar incidents that resulted in hospitalisation or some other interaction with the health system. To test this method, we investigated fatal and non-fatal drowning events in New Zealand between 1 January 2009 and 31 December 2018. We identified drowning incidents by linking person, date, and time to drowning outcomes in the IDI, reconciling drowning events for which there were multiple data points (e.g. hospitalisation records and ACC claims) to a single event. Previously, non-fatal drownings have been reported as the sum of all non-fatal drowning-related hospitalisations and ACC claims. However, collating these events does not account for those who may have multiple hospitalisations or ACC claims relating to a single drowning. Drowning events are incidents where a person has experienced respiratory impairment resulting from submersion or immersion in liquid. Drowning has three possible outcomes, death, morbidity and no morbidity. Here, we define fatal drowning events as those resulting in death and non-fatal events as those resulting in hospitalisation or an ACC claim. Drowning events that do not result in an interaction with the health system are not readily captured in IDI data and are not included in this analysis.

- We calculated combined rates for all drowning events (fatal and non-fatal) for the 10-year period between 2009 and 2018 to ensure adequate numbers for investigation of differences by age, sex, ethnicity, location, and socioeconomic factors (income and educational attainment).

These A3s present our findings, focussing on total (fatal and non-fatal) drowning rates, and rates of survival (non-fatal drowning) by age, sex, ethnicity and local authority. This summary of findings is intended to prompt further questions and inform further analysis, rather than present the full picture of water-related harm in Aotearoa.
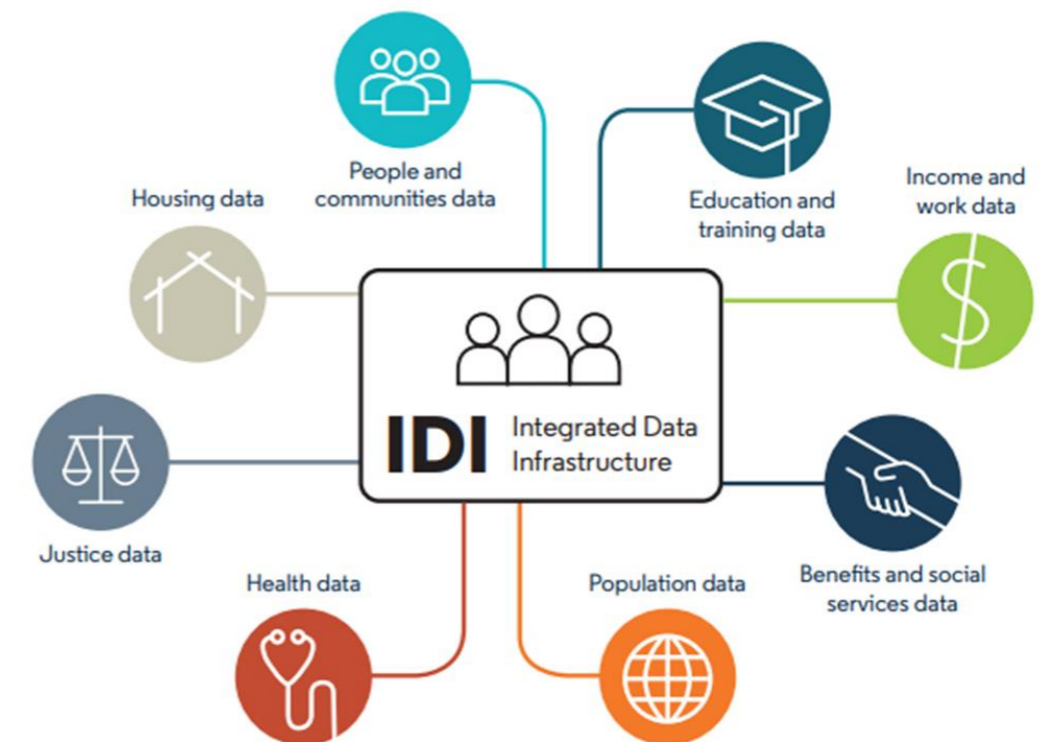
Implications for further research using this method
- This method may have applications for other injury prevention research and could be used to explore suicide and intentional self-harm, work-related injuries, or maternal and neonatal morbidity and mortality.

About the IDI

The Integrated Data Infrastructure (IDI) is a large research database that collects individual level data about people and households. It includes administrative data about education, income, benefits, migration, justice, and health and comes from government agencies, Stats NZ surveys, and non-government organisations (NGOs).

There are eight main data categories in the IDI:

- Health data including cancer registrations, chronic conditions, B4 school checks, pharmaceuticals, mental health and addiction, laboratory claims, and mortality.

- Education and training data including education levels from early childhood education participation, through primary, secondary, tertiary, adult competency assessments, and industry training.

- Benefits and social services data including benefits, youth services, CAP, WFF, CYF, ACC injury claims, student loans and allowances, and family start.

- Justice data including individual level data from corrections, Ministry of Justice, and police records.

- People and communities data including data from Auckland City mission and transportation (drivers licences and motor vehicle registrations), as well as data from the following surveys: Immigration NZ's migrant surveys, Longitudinal Immigration Survey of New Zealand, general social survey, disability survey, and Te Kupenga.

- Population data including information on border movements, visa applications, departure and arrival cards, as well as personal details such as births, deaths, marriages, and civil unions.

- Income and work data including individual level data on tax and income, as well as survey data on income (from New Zealand income survey); household labour force (HLFS); family, income, and employment (SoFIE); and household economics (HES).

- Housing data including tenancy and social housing information.

Findings: Water-related harm in Aotearoa New Zealand

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SOCIAL WELLBEING AGENCY | TOI HAU TĀNGATA

The Social Wellbeing Agency (SWA) used the Integrated Data Infrastructure (IDI) to generate insights into water-related harm in Aotearoa. We identified drowning events and their outcomes to better understand the characteristics of communities and population groups who are most likely to experience fatal or non-fatal drowning events.

Summary

- For every fatal drowning, there are four non-fatal events. Between 2009 and 2018 there were 4,890 distinct drowning events including 1,071 fatal and 3,819 non-fatal drownings.
- Drowning rates were highest among children aged 0-4 years and young people aged 15-24 years.
- Drowning rates were higher among males than females across all age groups.
- Drowning rates were highly patterned by age but ethnic differences are less apparent.
- Living close to water may not predict drowning risk.
- Further analysis on the activity immediately prior to the drowning events, and their location will inform the generation of insights and the final data products.

## Drowning and survival rates decline with age

Total (fatal and non-fatal) drowning and survival rates 2009-2018
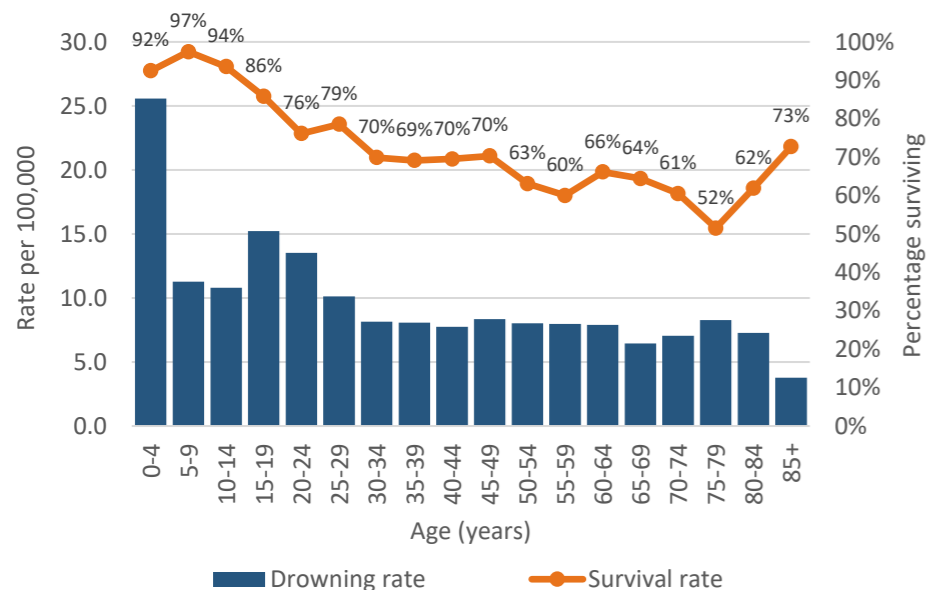
- Total (fatal and non-fatal) drowning rates are highest among 0–4-year-olds and 15–24-year-olds.
- Drowning rates reduce with increasing age.
- Survival rates are highest among children and young people aged 0-14 years and then decline with age.

Males are more likely to experience a drowning event …
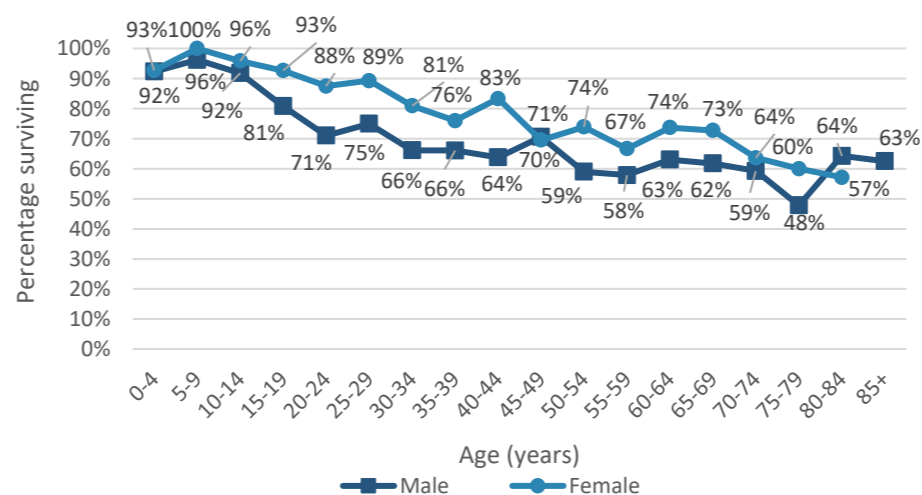
Total drowning rates 2009-2018 by sex
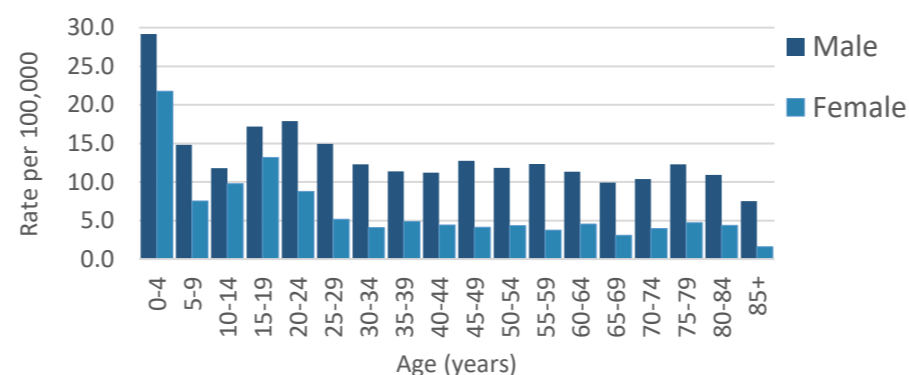
- Drowning rates are higher for males than females across all age groups.
- Differences in overall drowning rates between males and females are most pronounced among those aged 25 years and above, and are most similar in the 0-4- and 10-19-year age groups.

…and are less likely to survive

Drowning survival rate 2009-2018 by sex

- Drowning survival is higher in younger age groups regardless of gender
- In general, survival rates were higher among females than males.
- Children aged 0-14 years had the highest survival rates while those aged 65 and over had the poorest survival rates.

Patterns of drowning by age are similar across all ethnic groups

Total drowning rates 2009-2018 by ethnic group
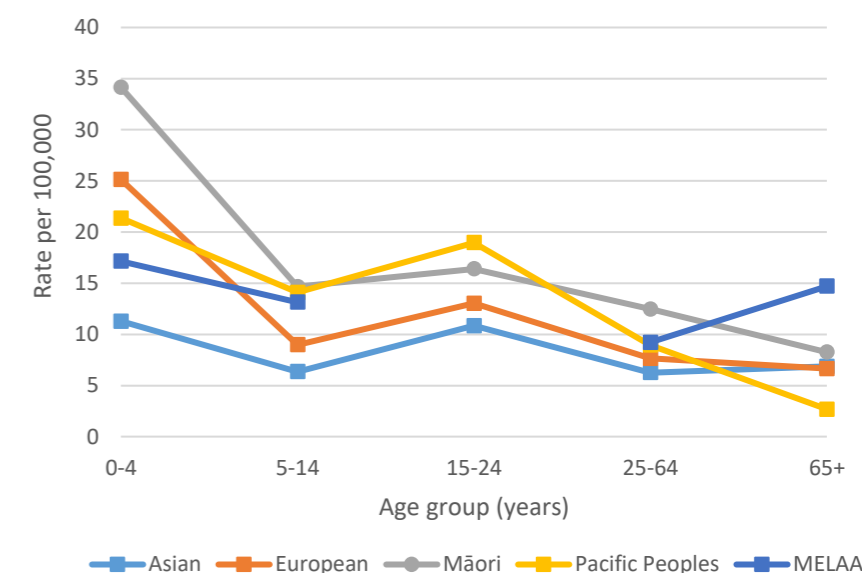
- Drowning rates are strongly patterned by age across all ethnic groups.
- Drowning rates were highest among young children and those aged 15-24 years. The exception was for those in the Middle Eastern/Latin American/African (MELAA) group where drowning events among those age 15-24 years were rare (<6 events during the study period) and are therefore not shown in the above figure.
- The drowning rate among Māori and Pacific people declines steeply in the 65+ age group compared to other ethnic groups which may reflect the younger age structure of these populations.

Notes

[1] The IDI is a large research database that collects individual level data about people and households. It includes administrative data about education, income, benefits, migration, justice, and health and comes from government agencies, Stats NZ surveys, and non-government organisations (NGOs)

Where there are missing data points, there were fewer than six drowning events during the period from 1 January 2009 to 31 December 2018 and the counts have been supressed during the IDI data outputting process.

IDI disclaimer: These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/. Access to the data used in this study was provided by Stats NZ under conditions designed to give effect to the security and confidentiality provisions of the Data and Statistics Act 2022. The results presented in this study are the work of the author, not Stats NZ or individual data suppliers.

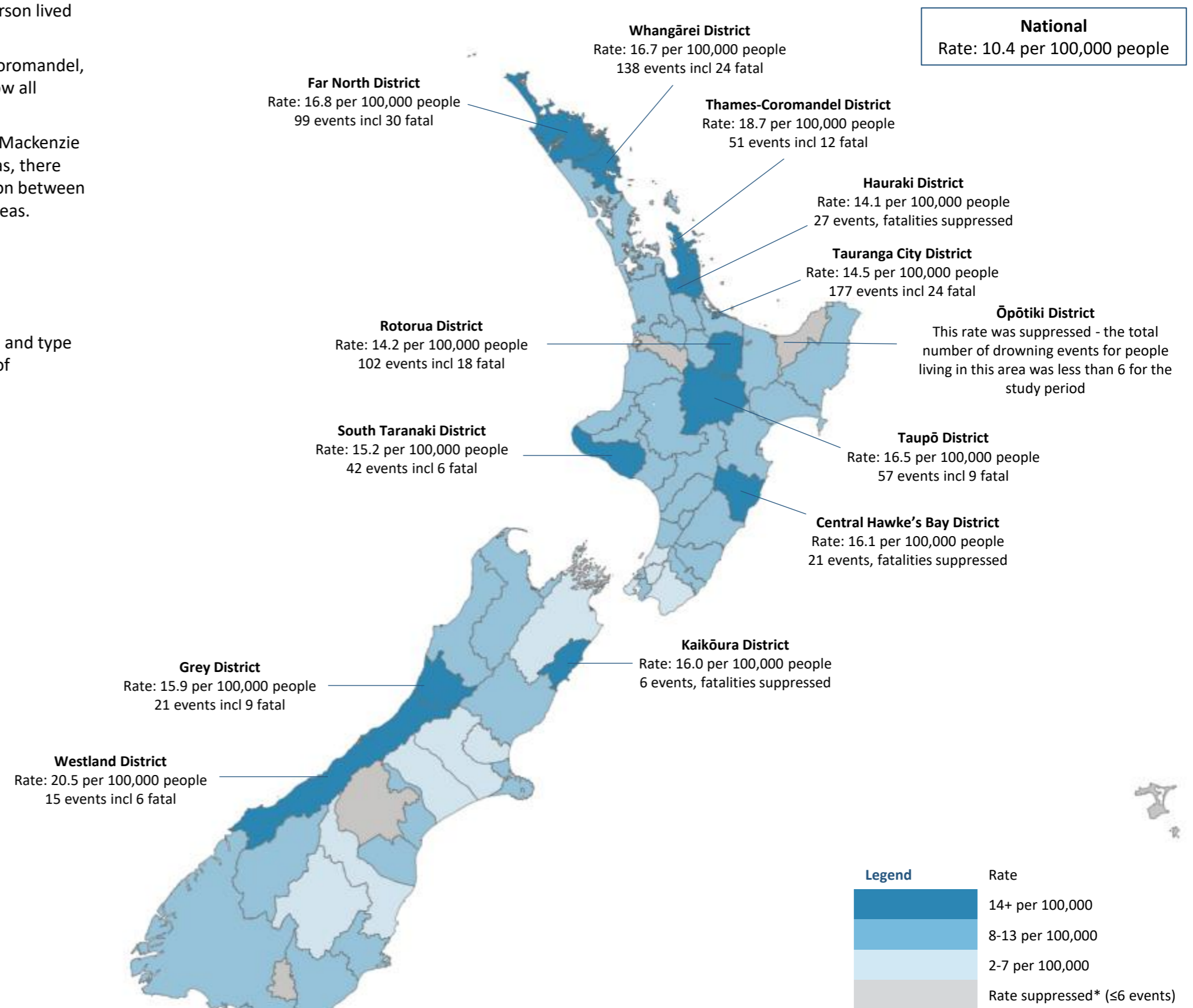# Findings: Water-related harm in Aotearoa New Zealand

Living close to water may not predict drowning risk

- This map shows the total (fatal and non-fatal) 10-year drowning rates for individuals by their local authority of residence (i.e. where the person lived rather than where the incident occurred).

- Areas with the highest drowning rates were Westland, Thames-Coromandel, Far North, Whangārei and Taupō. Dark blue areas on the map show all districts with high drowning rates.

- Areas with the lowest drowning rates were Ōpōtiki, Ōtorohanga, Mackenzie and Gore districts, and the Chatham Islands. In each of these areas, there were fewer than 6 drowning events among the resident population between 2009 and 2018. All of these areas include river, lakes or coastal areas.

Next Steps

- Future analyses could look at drowning events by activity, location and type (fatal or non-fatal) and whether events occurred in the local area of residence or away from home.

10-year total (fatal and non-fatal) drowning rate and number 2009-2018 by local authority of residence

National
Rate: 10.4 per 100,000 people

Whangārei District
Rate: 16.7 per 100,000 people
138 events incl 24 fatal

Far North District
Rate: 16.8 per 100,000 people
99 events incl 30 fatal

Thames-Coromandel District
Rate: 18.7 per 100,000 people
51 events incl 12 fatal

Hauraki District
Rate: 14.1 per 100,000 people
27 events, fatalities suppressed

Tauranga City District
Rate: 14.5 per 100,000 people
177 events incl 24 fatal

Ōpōtiki District
This rate was suppressed - the total number of drowning events for people living in this area was less than 6 for the study period

Rotorua District
Rate: 14.2 per 100,000 people
102 events incl 18 fatal

Taupō District
Rate: 16.5 per 100,000 people
57 events incl 9 fatal

South Taranaki District
Rate: 15.2 per 100,000 people
42 events incl 6 fatal

Central Hawke's Bay District
Rate: 16.1 per 100,000 people
21 events, fatalities suppressed

Kaikōura District
Rate: 16.0 per 100,000 people
6 events, fatalities suppressed

Grey District
Rate: 15.9 per 100,000 people
21 events incl 9 fatal

Westland District
Rate: 20.5 per 100,000 people
15 events incl 6 fatal

Legend | Rate

14+ per 100,000

8-13 per 100,000

2-7 per 100,000

Rate suppressed* (≤6 events)

*IDI confidentiality rules prevent the outputting of sensitive information for which there is a count of 6 or fewer. Where there were 6 or fewer drowning fatalities in a district across the 10-year study period, these have been suppressed.

Relationship between water-related harm and age, education and income

60% of drownings relate to under 5s, young adults, and middle-aged adults

### Fatal and non-fatal drowning incidents 2009-2018
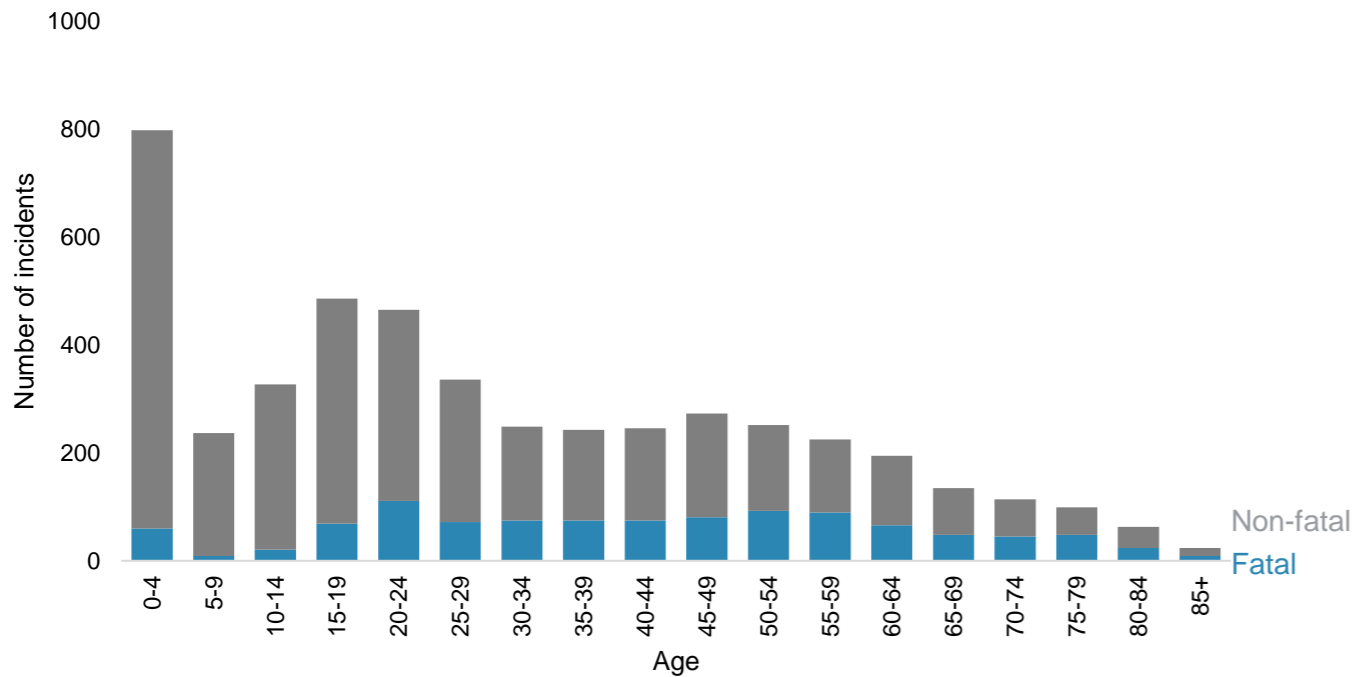
There are three key age segments, who all represent different risk profiles and are likely to respond to different interventions

- Children under 5 have substantially higher rates and numbers of drowning incidents than all other age groups, but account for only 5.6% of all fatal incidents.
- There is a spike (especially in fatal incidents) at ages 15-24. These young adults account for almost a quarter of all fatal drownings. This is consistent with the literature about tendency toward risk-taking behaviours.
- There is a further increase in fatal incidents among people aged 45-64. This group accounts for a similar number of deaths as young adults, but these are likely to be driven from different risk behaviours.

Income and educational attainment appear to have some effect on drowning

Adult (25-64 years) (fatal and non-fatal) drowning rates and counts 2009-2018
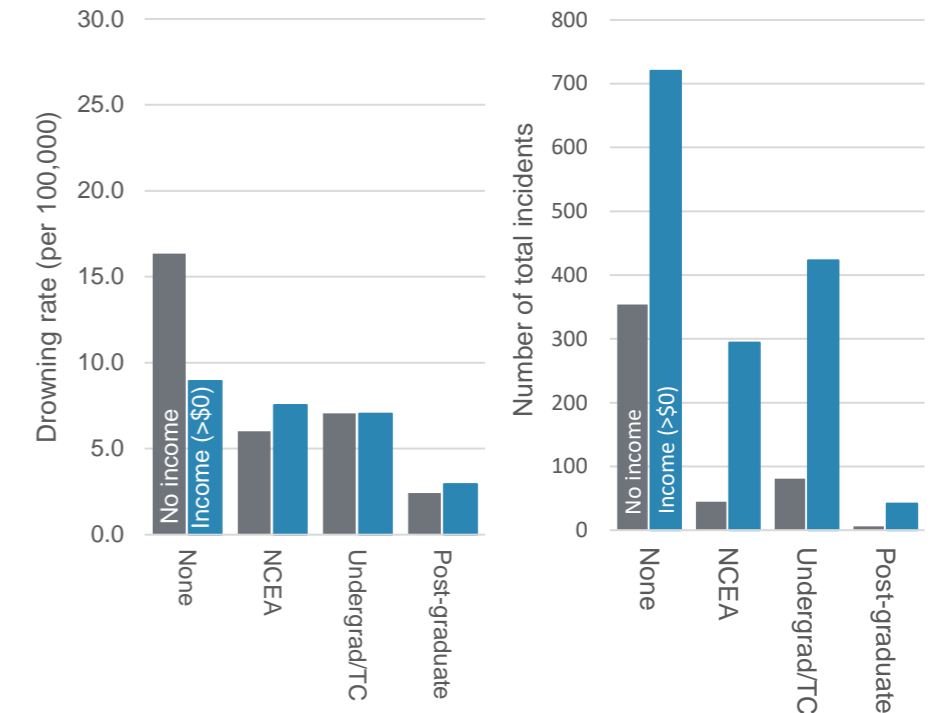
- Adults with no income source and no formal qualifications have the highest rate of drowning incidents for those aged 25-64. This group accounts for 18% of all drowning incidents.
- Wage earners with either no formal qualification or Bachelor's degrees account for 58% of all drowning incidents.

## Drowning rates decline with individual income

Total (fatal and non-fatal) drowning rates and counts 2009-2018
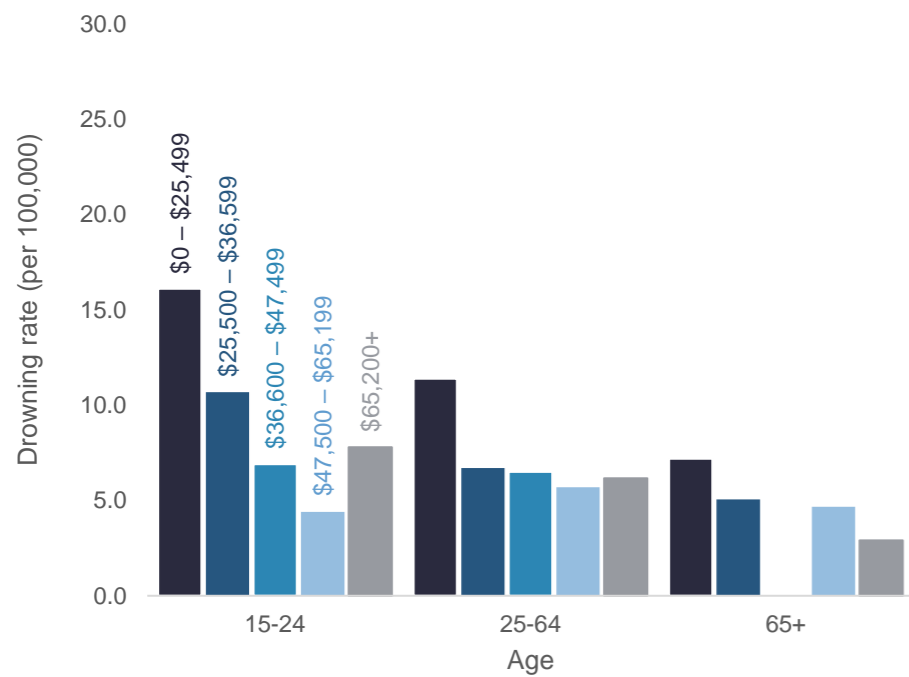
- Rates of drowning are highest for the lowest band of income earners (<$25,000 p.a.)
- However, the rate remains steady from $25,500+ in the 25-64 age group suggesting that the relationship between income and risk is not straightforward.

Drowning rates decline with education

Total (fatal and non-fatal) drowning rates and counts 2009-2018
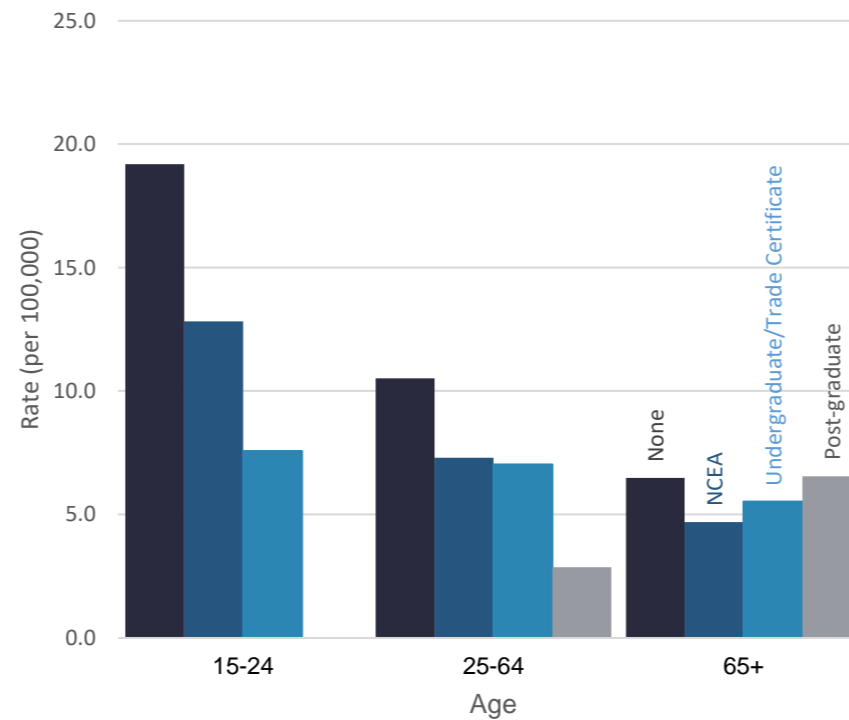
- Drowning rates decline as level of educational attainment increases, except among people 65+.
- However, these educational effects may be relatively small: people with the same qualifications of different ages have greater differences in drowning rates than people of similar age with different qualifications.

Considerations when interpreting these results

These results show a relationship between drowning risk and age, education, and income. These factors are correlated with many other characteristics, and so these differences might have many causes. This could include the lack of swimming lessons, limited access to swimming facilities, more exposure to open bodies of water, and lower supervision. However, a wide body of research indicates that these risks can also be influenced by various socio-economic, cultural, and environmental factors.

To gain a comprehensive understanding of the higher risk of drowning in groups with low income and lower education, researchers and policymakers should consider these various factors in combination. Effective solutions to reduce drowning rates should involve a holistic approach that addresses both the physical barriers (such as access to swimming lessons and facilities) and the underlying social and cultural factors that influence behaviour and risk perception around water.

Such efforts may include community-based swimming programs, water safety education campaigns, targeted outreach to high-risk populations, and policy interventions to improve access to water-safe environments and emergency response resources.