Out-of-Hospital Cardiac Arrest Registry

Rēhita Mate Manawa mō waho i te Hōhipera

Aotearoa New Zealand, National Report 2022/23

Hato Hone St John

WELLINGTON FREE AMBULANCE
kia ora te tangata

AUT

Contents

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List of figures

List of tables

Introduction
Whakatakinga

Every year in New Zealand over 2,000 people are treated for a cardiac arrest that occurs in the community.

Cardiac arrest is the sudden loss of heart function, where the heart cannot effectively pump blood to vital organs. Without rapid intervention, cardiac arrest will always result in death. For every minute without CPR or defibrillation, a patient's chance of survival falls by 10–15 percent. Every New Zealander can make a difference in the chain of survival.

I ia tau i Aotearoa nei, nui ake i te 2,000 tāngata e haumanu ana i te mate manawa i te hapori.

Ko te mate manawa te ngaro ohorere o te mahi manawa, ā, tē taea e te manawa te whakarere toto pai ki ngā whēkau whakahirahira. Nā te korenga o te hāpaiora wawe, ko te otinga nui, ko te mate i ngā wā katoa. I ia miniti me te korenga o te CPR, o te whakahihiko manawa rānei, ka heke iho te āheinga o ngā tūroro ora tonu ai i te 10–15 paihēneti. He mana tō ngā tāngata katoa o Aotearoa i te raupapa whakaora.

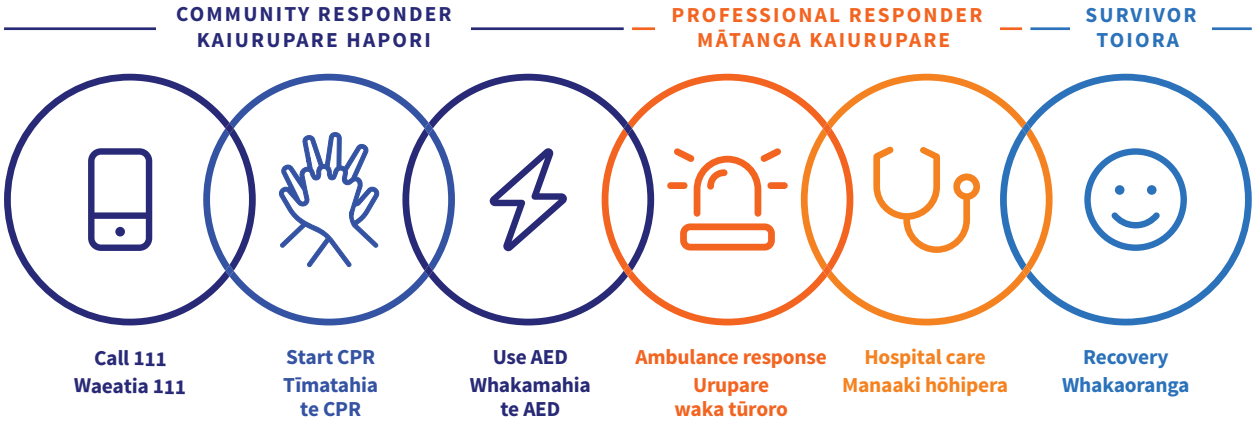

Figure 1: Chain of survival.[A]

Survival from out-of-hospital cardiac arrest (OCHA) is largely due to the quick actions of bystanders who initiate CPR and use a defibrillator (or AED). Community initiatives such as free CPR awareness training, Restart A Heart Day, CPR in schools and the GoodSAM smartphone application prepare and enable everyday New Zealanders to respond.

Alongside the community, the ambulance service has a strong influence on outcomes. In this report, we benchmark ourselves internationally on our resuscitation performance, from the community response to advanced life support.

We are very pleased to present the 2022/23 Aotearoa New Zealand, National Out-of-Hospital Cardiac Arrest Registry Annual Report.

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A Chain of survival adapted from: https://www.sca-aware.org/about-sudden-cardiac-arrest/the-chain-of-survival

About this report
Mō tēnei pūrongorongo

Cardiac arrest remains a considerable public health issue, with ischaemic heart disease being the second most prevalent cause of death in New Zealand.

Internationally, survival rates following out-of-hospital cardiac arrest (OHCA) are highly variable and can range from less than 6% to greater than 50%. Benchmarking survival from OHCA is a key measure of the clinical quality of an Emergency Ambulance Service (EAS) and is fundamental to making improvements in OHCA survival. Knowledge of New Zealand OHCA outcomes is a key driver to help identify and address areas for improvement in clinical care.

The data presented in this report are for all OHCA attended by the Hato Hone St John and Wellington Free Ambulance EAS in the period from 1 July 2022 to 30 June 2023.

The data presented in this report primarily relate to events that were either 'attended' or where there was a 'resuscitation attempted' by EAS personnel. 'Attended' refers to all OHCA where EAS personnel arrived at the scene regardless of whether or not a resuscitation attempt was made. 'Resuscitation attempted' refers only to those events where an attempt at resuscitation was made by EAS personnel.

Unless otherwise stated, all analyses exclude cardiac arrests witnessed by EAS personnel. In cases where it was not recorded whether the patient was an adult or a child, the patient was assumed to be an adult and was included in that category.

Unless otherwise stated, survival refers to survival to 30 days post cardiac arrest.

All population figures in this report are derived from either Statistics New Zealand population data or the Manatū Hauora Ministry of Health Primary Health Organisation (PHO) enrolment data[1].

Executive summary
Tuhinga whakarāpopoto nui

7 people a day

(approx) were treated for an out-of-hospital cardiac arrest in New Zealand (more than 2,000 per year)

32% female
68% male

76%
of patients received bystander CPR

6%
received defibrillation by a Community Responder prior to ambulance arrival

The median time in which an EAS ambulance reached a patient was **9 minutes** in urban communities and **11 minutes** in rural and remote communities

94%
of events were co-responded to and attended by Fire and Emergency New Zealand

23%
of patients survived the event (had a pulse on arrival at hospital)

11%
of patients survived

All events, adult, resuscitation attempted: includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

Benchmarking executive summary

Tuhinga whakarāpopoto Panekiretanga

Key figures for all-cause events

Table 1: Key figures for all-cause events[A]

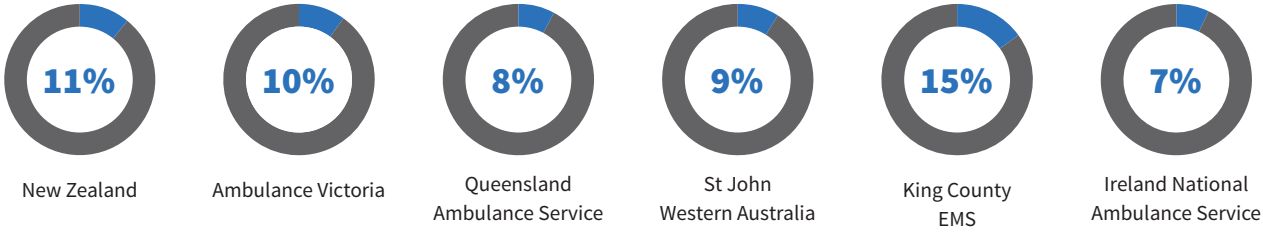
Year	Total number events	% Bystander CPR	% Community Responder AED use	Urban median response time	Rural & remote median response time	% Attended by Fire & Emergency New Zealand	% ROSC on handover	% Survival
2019/20	2,212	75%	5%	8	12	95%	25%	13%
2020/21	2,184	75%	5%	8	12	96%	25%	11%
2021/22	2,348	76%	5%	9	11	97%	22%	11%
2022/23	2,458	76%	6%	9	11	94%	23%	11%

Benchmarking (all-cause events)

The outcomes of OHCA for international benchmarking compare rates of return of spontaneous circulation (ROSC) sustained to hospital handover and survival. This group requires that the following criteria be met: includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

Table 2: Benchmarking survival outcomes for all-cause events[A]

Ambulance Service	Collection period	Total number events	% ROSC on handover	% Survival[B]
New Zealand	1 July 2022 to 30 June 2023	2,458	23%	11%
Ambulance Victoria[2]	1 July 2022 to 30 June 2023	2,601	30%	10%
Queensland Ambulance Service[3,C]	1 January 2021 to 31 December 2021	2,057	25%	8%
St John Western Australia[4]	1 July 2022 to 30 June 2023	1,058	19%	9%
King County EMS[5,E]	1 July 2022 to 30 June 2023	1,019	42%	15%
Ireland National Ambulance Service[6,C,D]	1 January 2022 to 31 December 2022	2,802	19%	7%



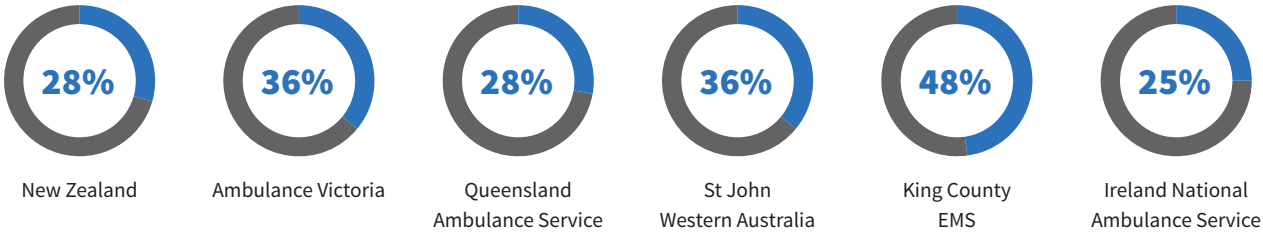
A **All events, adult, resuscitation attempted:** includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.
B New Zealand, St John Western Australia, and Queensland report on survival to 30-days, all other services report survival to hospital discharge.
C The Queensland Ambulance Service and Ireland National Ambulance Service report on all ages.
D Ireland National Ambulance Service data includes EAS personnel witnessed events.
E King County EMS exclude cardiac arrests with penetrating or blunt trauma mechanisms.

Benchmarking (Utstein Comparator Group)[A]

One important international comparison uses a carefully standardised subgroup of patients known as the 'Utstein Comparator Group'. This subgroup requires that the following criteria be met: includes adults (≥15 years old), all-cause, resuscitation attempted, shockable presenting rhythm and bystander witnessed. Excludes children, EAS witnessed and no resuscitation attempt.

Table 3: Benchmarking survival outcomes for adults (Utstein Comparator Group)[A]

Ambulance Service	Collection period	Total number events	% ROSC on handover	% Survival[B]
New Zealand	1 July 2022 to 30 June 2023	654	44%	28%
Ambulance Victoria[2]	1 July 2022 to 30 June 2023	545	59%	36%
Queensland Ambulance Service[3,C]	1 January 2021 to 31 December 2021	338	49%	28%
St John Western Australia[4]	1 July 2022 to 30 June 2023	207	45%	36%
King County EMS[5,E]	1 July 2022 to 30 June 2023	152	72%	48%
Ireland National Ambulance Service[6,D]	1 January 2022 to 31 December 2022	396	39%	25%



A **Utstein Comparator Group:** includes adults (≥ 15 years old), all-cause, resuscitation attempted, shockable presenting rhythm and bystander witnessed. Excludes children, EAS witnessed and no resuscitation attempt.
B New Zealand, St John Western Australia, and Queensland report on survival to 30-days, all other services report survival to hospital discharge.
C Queensland Ambulance Service reports on all ages.
D Ireland National Ambulance Service reports on patients ≥17 years old.
E King County EMS exclude cardiac arrests with penetrating or blunt trauma mechanisms.

Improve survival in your community

Community help can double survival

When community defibrillation occurred prior to EAS arrival, both event survival (orange) and 30-day survival (blue) were increased.

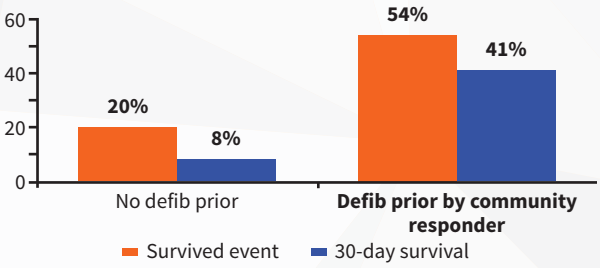


Figure 2: Influence of community defibrillation on outcomes (all events, adult, resuscitation attempted)[A].

When a GoodSAM responder was present, both event survival and 30-day survival were increased compared to events with no GoodSAM responder present.

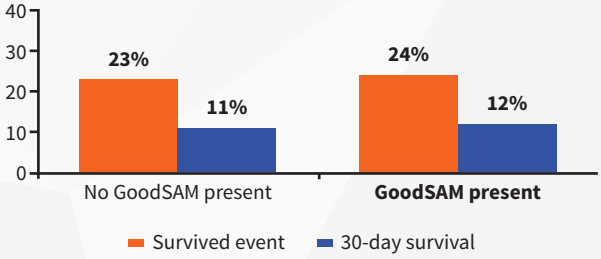


Figure 3: Influence of GoodSAM responder presence on outcomes (all events, adult, resuscitation attempted)[A].

CPR awareness sessions

Knowing CPR means you could save the life of a friend, a colleague, a member of your whānau or someone on the street.

Ngā Tohu Whakaora e Toru – 3 Steps for Life

The mission of 3 Steps for Life is to empower members of the community to step forward when help is needed, and increase out-of-hospital cardiac arrest survival rates. Delivered by volunteer Community Educators, this programme consists of public awareness sessions around basic CPR and AED training. It gives participants the skills and confidence to take action in responding to someone in cardiac arrest by:

1 Calling 111 **2 Starting CPR** **3 Using an AED**

You can find out details about this course and how to attend by visiting **stjohn.org.nz/3stepsforlife** or email **3stepsforlife@stjohn.org.nz**

Lloyd Morrison Foundation Heartbeat Programme

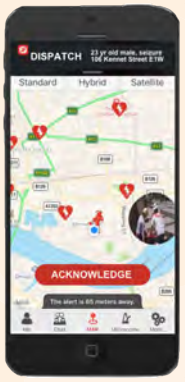
If you are in the Greater Wellington and Wairarapa area, Wellington Free Ambulance provides the Lloyd Morrison Foundation Heartbeat programme interactive training session free of charge. During the session you will learn everything you need to know about CPR and using an AED.

LLOYD MORRISON FOUNDATION
HEARTBEAT
COMMUNITY CPR TRAINING

You can find out details about this course and how to attend by visiting **wfa.org.nz/heartbeat** or email **heartbeat@wfa.org.nz**

A **All events, adult, resuscitation attempted:** includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

Become a GoodSAM responder



If you are confident in CPR and in using an AED, you can be a GoodSAM responder. When there is a cardiac arrest, the GoodSAM app alerts GoodSAM responders nearby that CPR is needed while an ambulance is on the way. Sign up to the GoodSAM app and improve someone's chance of surviving cardiac arrest.

Get all the info at **stjohn.org.nz/goodsam**

Volunteer as a CPR educator (3 Steps for Life instructor)

Make a difference in your community by volunteering with Hato Hone St John! We're looking for people to run 3 Steps for Life awareness sessions for your local community groups, such as sports clubs, retirement villages, marae communities and more. Full training will be provided!

To register your interest as a volunteer facilitator, please reach out to **3stepsforlife@stjohn.org.nz**

New external defibrillation strategy

Aotearoa New Zealand emergency medical services implement new external defibrillation strategy

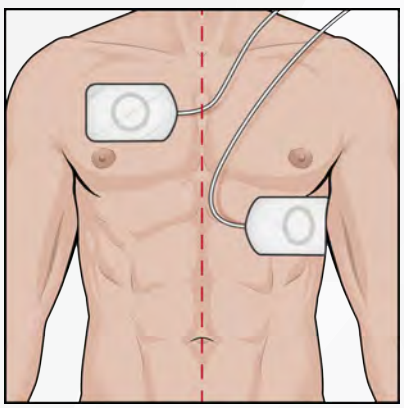
From 2024, Aotearoa New Zealand will be the first country outside of Canada to routinely implement double sequential external defibrillation (DSED) in the pre-hospital setting for patients experiencing abnormal heart rhythms such as refractory ventricular fibrillation or ventricular tachycardia (VF/VT) during cardiac arrests. We anticipate this innovative strategy will benefit the 20% of cardiac arrest cases where a shockable rhythm remains unresponsive despite three or more individual defibrillation attempts.

Defibrillation is a medical procedure designed to improve the chances of successfully restoring a normal heart rhythm in emergency situations. Standard defibrillation uses one defibrillator to administer shocks to two pads placed on the body – one anteriorly (front of the body) and the other laterally (side of the body). The DSED method delivers swift sequential shocks through the synchronized use of two defibrillators to two additional pads affixed in distinct vectors – one anterior-lateral (front middle of the body) and the other in an anterior-posterior position (on the back). During the DSED procedure, a single operator initiates the defibrillators in a sequential manner by moving one hand from the first defibrillator to the second.

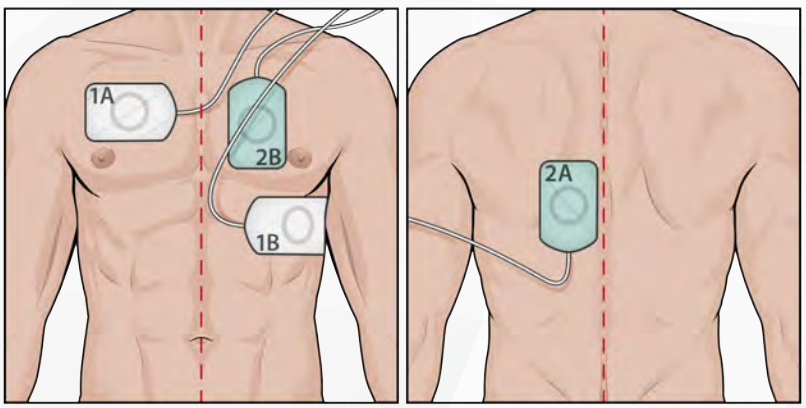
The adoption of this novel protocol is supported by recent findings from a Canadian clinical trial, which demonstrated increased survival rates when using DSED compared to standard resuscitation[7]. Given these compelling findings, as of late 2023, the Clinical Procedures and Guidelines (CPGs) now require the adoption of DSED if VF/VT persists after three shocks, contingent upon the availability of a second manual defibrillator. Additionally, the International Consensus on Cardiopulmonary Resuscitation (ILCOR) updated its recommendations in 2023 to endorse the incorporation of DSED as a viable consideration for patients dealing with refractory VF[8].

NZ ambulance personnel have undergone mandatory education and training in DSED, and the implementation will be closely monitored for benefits and harms. Implementing this novel defibrillation method presents a transformative opportunity for patient care in Aotearoa New Zealand.

Standard defibrillation



Double sequential external defibrillation



Incidence and demographics
Taupori pāpātanga me Taupori āhuatanga

Key figures for adults (≥ 15yrs) and children

Adults[A]
(all events, adult, attended between 1 July 2022 – 30 June 2023)

98% of OHCA events occurred in adults

141.7 per 100,000 person-years was the incidence rate

44% was the proportion of OHCA events where a resuscitation attempt occurred

Females
35% of OHCA events occurred in females

70 years was the median age for females

90.3 per 100,000 person-years was the incidence for adult females

Males
65% of OHCA events occurred in males

67 years was the median age for males

181.9 per 100,000 person-years was the incidence for adult males

Children[B]
(all events, children, attended between 1 July 2019 – 30 June 2023)

2% of OHCA events occurred in children

13.2 per 100,000 person-years was the incidence rate

69% was the proportion of OHCA events where a resuscitation attempt occurred

Girls
42% of OHCA events occurred in girls

9 months was the median age for girls

Boys
58% of OHCA events occurred in boys

5 months was the median age for boys

A **All events, adult, attended:** includes adults (≥ 15 years old), all-cause, resuscitation attempted and no resuscitation attempted. Excludes children, EAS personnel witnessed events.

B **All events, children, attended:** includes children (< 15 years old), all-cause, resuscitation attempted and no resuscitation attempted. Excludes adults, EAS personnel witnessed events. Due to low numbers of paediatric events, this data includes events from 1 July 2019 through 30 June 2023.

Geographical distribution of OHCA

2022/23

OHCA Locations

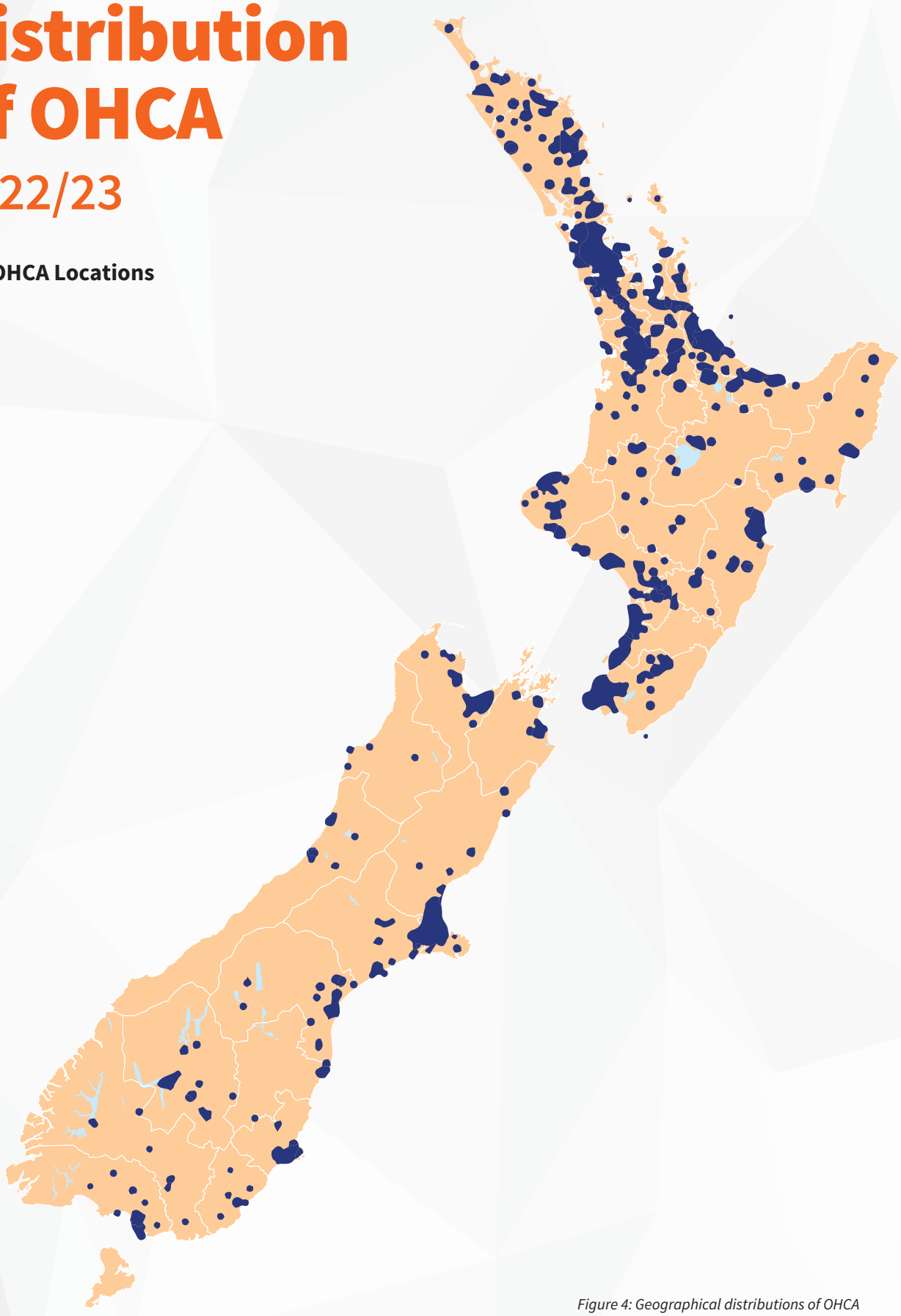


Figure 4: Geographical distributions of OHCA

Age distribution of OHCA according to sex for adults

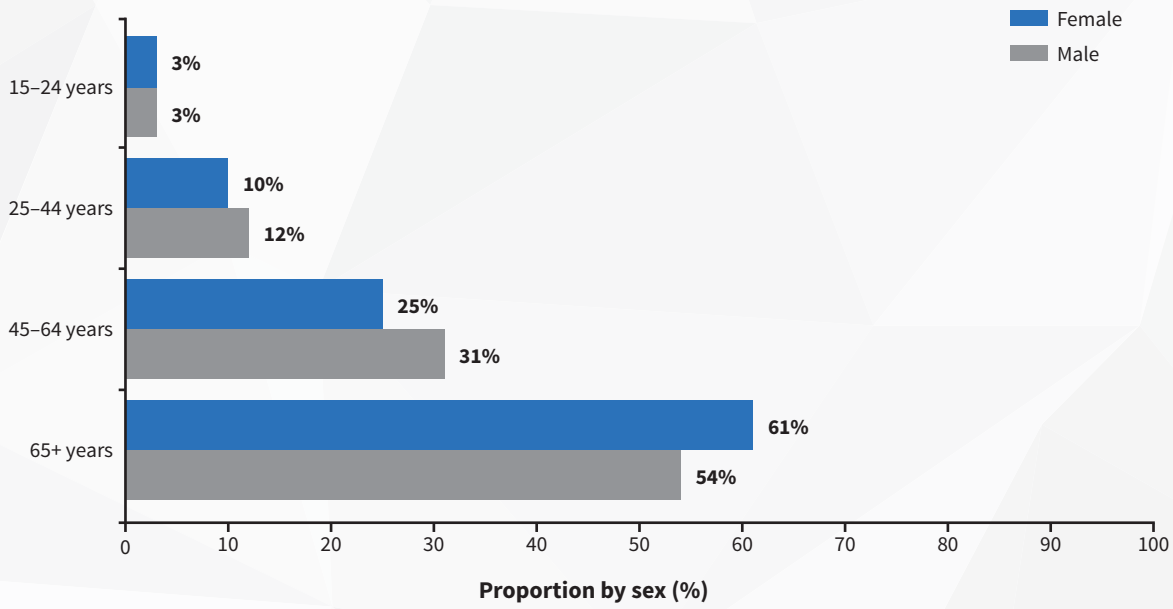


Figure 5: Age distribution of OHCA (all events, attended)[A].

Age-specific incidence of OHCA for adults

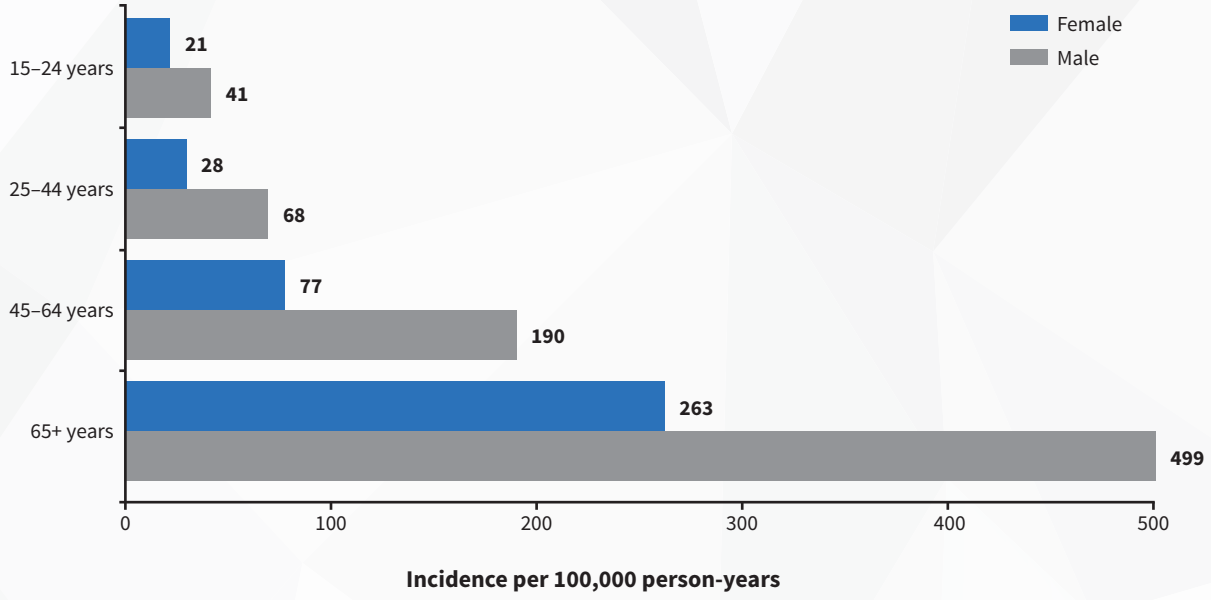


Figure 6: Age-specific rate of OHCA (all events, attended)[A,B].

Men suffer OHCA at an earlier age than women, and women live longer than men. That is why men have a higher incidence of OHCA at every stage of adult life (Figures 5 and 6).

A **All events, attended:** includes adults, all-cause, resuscitation attempted and no resuscitation attempted. Excludes EAS personnel witnessed events and children.

B Age-specific incidence rates are based on Primary Health Organisation (PHO) Enrolment Demographics as at June 2023.

Ethnicity

The majority of OHCA events attended by EAS were for patients of European ethnicity, which reflects the NZ population demographics (Figures 7 and 8). When ethnicity-specific rates were evaluated, Māori and Pacific Peoples had a disproportionately higher incidence and Asians a lower incidence of OHCA compared with the total population incidence. Ethnicity-specific rates were calculated based on the Manatū Hauora Ministry of Health prioritised ethnicity categories[9]. Middle Eastern/Latin American/ African, and Other Ethnicities combined made up an additional 1% of cardiac arrests attended (data not shown). Data was unknown or missing for the remaining 4% of records.

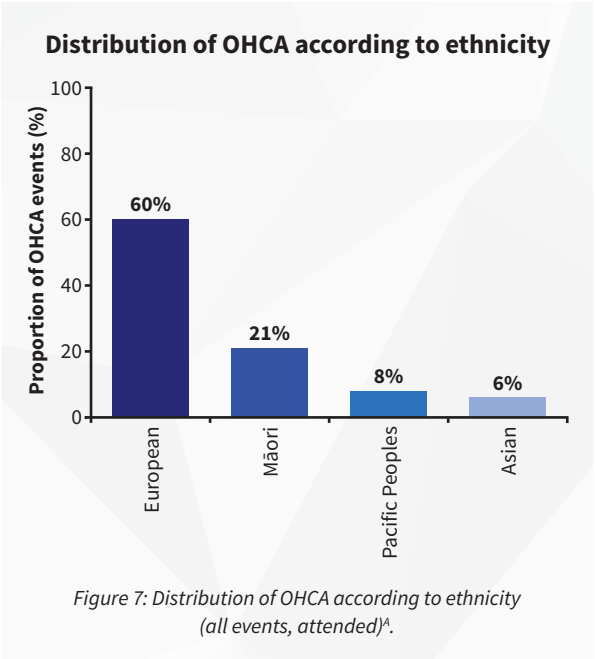


Figure 7: Distribution of OHCA according to ethnicity (all events, attended)[A].

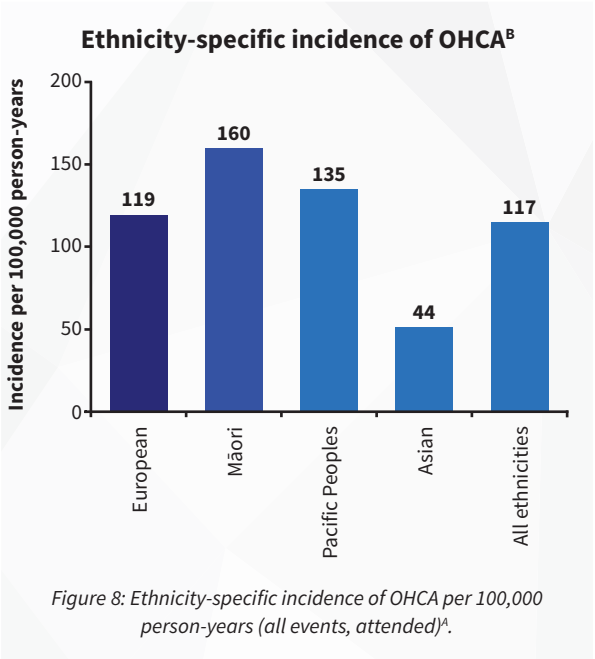


Figure 8: Ethnicity-specific incidence of OHCA per 100,000 person-years (all events, attended)[A].

A **All events, attended:** includes adults and children, all-cause, resuscitation attempted and no resuscitation attempted. Excludes EAS personnel witnessed events.

B Ethnicity-specific incidence rates are based on Primary Health Organisation (PHO) Enrolment Demographics June 2023. Te Whatu Ora Health New Zealand estmates that 85% of Māori and 98% of Pacific Peoples are enrolled with a PHO. Therefore the ethnicity-specific incidence reported for Māori is likely to overestimate the true incidence.

Deprivation-specific rates[A,B]

The NZDep2018 is a measure of socioeconomic deprivation calculated using census data. Some of the factors included in this measurement of deprivation are: no access to the internet, receiving a means tested benefit, household income below a certain threshold, being 18–64 years old and unemployed, being 18–64 years old with no qualifications, not living in own home, a single parent family, household bedrooms less than occupancy threshold and no access to a car. The NZDep2018 quintiles range from Q1–5, where the 20% least deprived areas are scored as Q1, and the 20% most deprived are scored as Q5. The incidence of OHCA increases as deprivation increases (Figure 9).

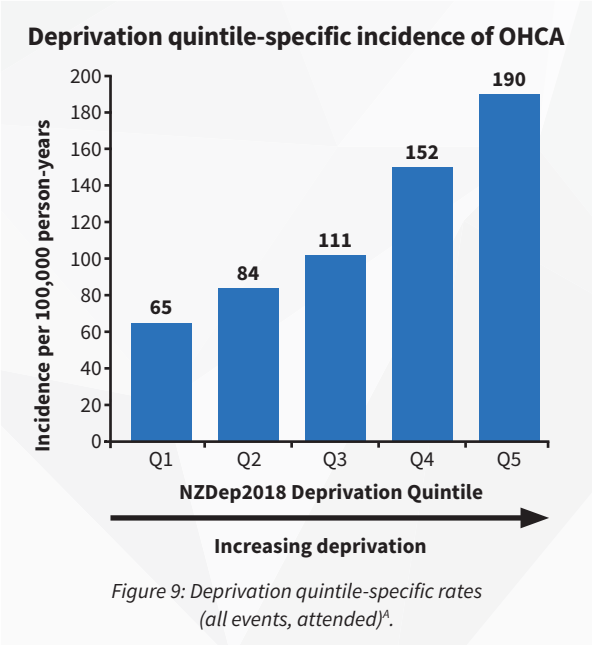


Figure 9: Deprivation quintile-specific rates (all events, attended)[A].

Incidence across urban and rural/remote areas[C]

A larger proportion of the New Zealand population is based within metropolitan centres and consequently a greater portion of OHCA events occurred within metropolitan localities (76%). However, the incidence rate for the urban population was lower (102 per 100,000 person-years) than the rural/remote population (137 per 100,000 person-years).

Precipitating events for adults

EAS personnel presume an OHCA to be of cardiac cause unless it is known or likely to have been caused by trauma, drowning, poisoning or any other non-cardiac cause. The most common aetiology of OHCA in adults where resuscitation was attempted was that of a presumed cardiac cause (Figure 10).

Precipitating causes for children

The occurrence of OHCA in children is significantly less than in adults. The leading cause of OHCA in children was respiratory arrest followed by Sudden Unexpected Death in Infancy (SUDI) (Figure 11).

OHCA location

The most common place for an OHCA to occur is in a person's home. The second most common place for an OHCA to occur is in a public area, which includes the workplace, the street, a shopping centre or similar (Figure 12).

A **All events, attended:** includes adults and children, all-cause, resuscitation attempted and no resuscitation attempted. Excludes EAS personnel witnessed events.

B **Deprivation calculation:** The NZDep2018 is a measure of socioeconomic deprivation assigned to a geographic area called a meshblock. The NZDep2018 quintile assigned to an event was derived from the incident location at the time of the event. Rates are based on Primary Health Organisation (PHO) Enrolment Demographics June 2023[1].

C **Rural versus Urban (the location of the OHCA):** These terms are derived from the Geographical Classification for Health as described in this publication: Whitehead J, Davie G, de Graaf B, Crengle S, Fearnley D, Smith M, Lawrenson R, Nixon G. Defining rural in Aotearoa New Zealand: a novel geographic classification for health purposes. N Z Med J. 2022 Aug 5;135(1559):24-40.

Precipitating causes for adults

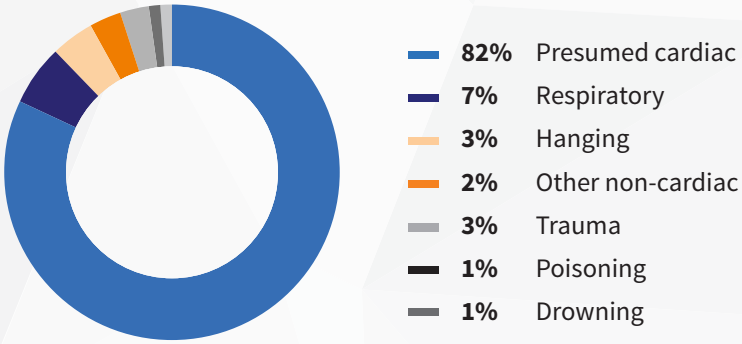


Figure 10: Precipitating causes for adults (all events, adult, resuscitation attempted)[A].

Precipitating causes for children

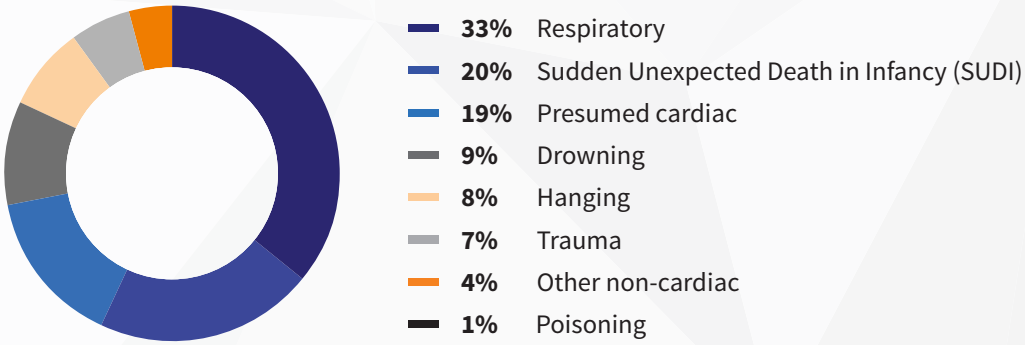


Figure 11: Precipitating causes for children (all events, child, resuscitation attempted)[B].

Location of OHCA

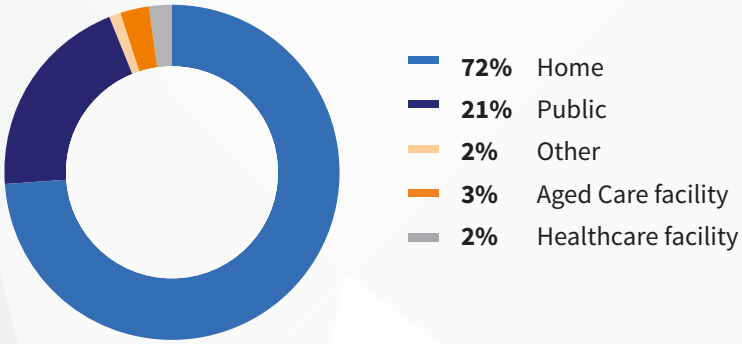
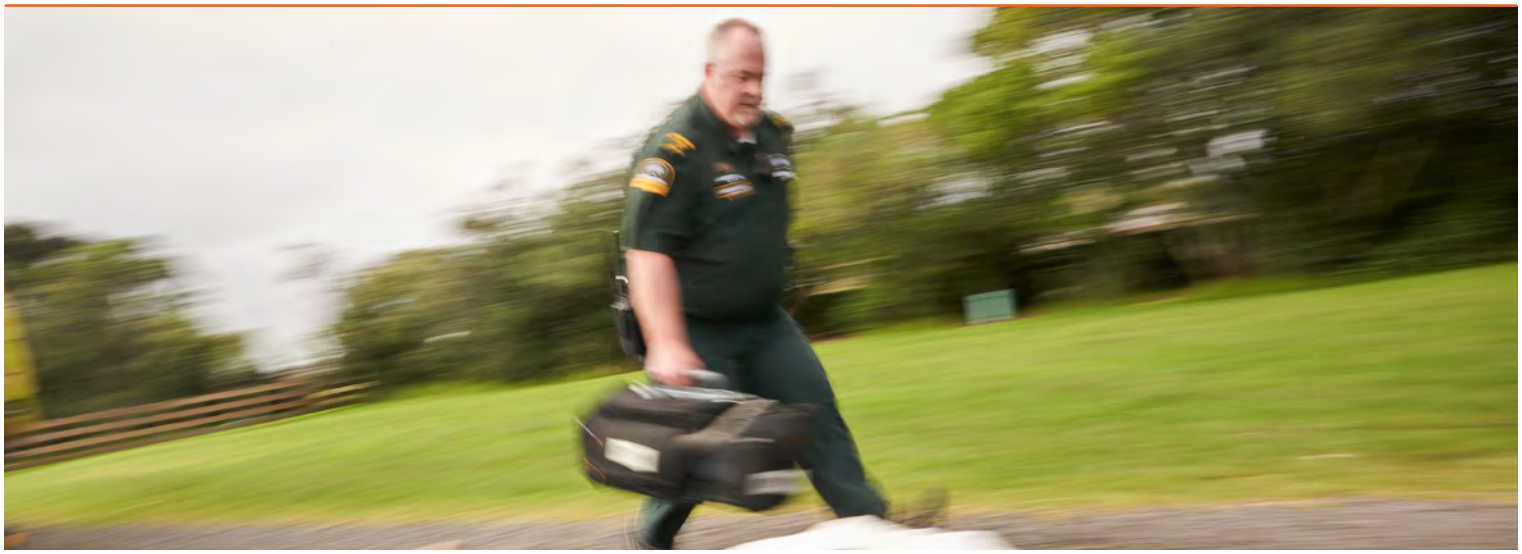


Figure 12: Location of OHCA for adults (all events, adult, resuscitation attempted)[A].

A **All events, adult, resuscitation attempted:** includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

B **All events, child, resuscitation attempted:** includes children (< 15 years old), all-cause, resuscitation attempted. Excludes adults and EAS personnel witnessed events. Includes data from 1 July 2019 to 30 June 2023 combined.



Outcomes
Whakataunga

Adult outcome from all-cause cardiac arrest

The results from the OHCA Registry show an event survival rate (ROSC sustained to hospital handover) of 23%.

The rate of survival to 30 days in adults where resuscitation was attempted was 11%. In the 2022/2023 reporting period, there were 69 OHCA survivors per million population. Figure 13 shows the rolling two year OCHA survival per million population.

Utstein Comparator Group

The international benchmarking of OHCA outcomes also compares survival rates for a specific group of patients. This subgroup is referred to as the Utstein Comparator Group and requires the following criteria to be met: adults (≥ 15 years old), all-cause, resuscitation attempted, shockable presenting rhythm, bystander witnessed and excluding EAS personnel witnessed events.

In the current reporting period, there were 654 cardiac arrests that met the Utstein criteria. This subgroup of patients represented approximately 27% of all events where resuscitation was attempted.

For this selected subgroup the rate of 30-day survival was 28%. This result is benchmarked against other services within the executive summary (Table 3).

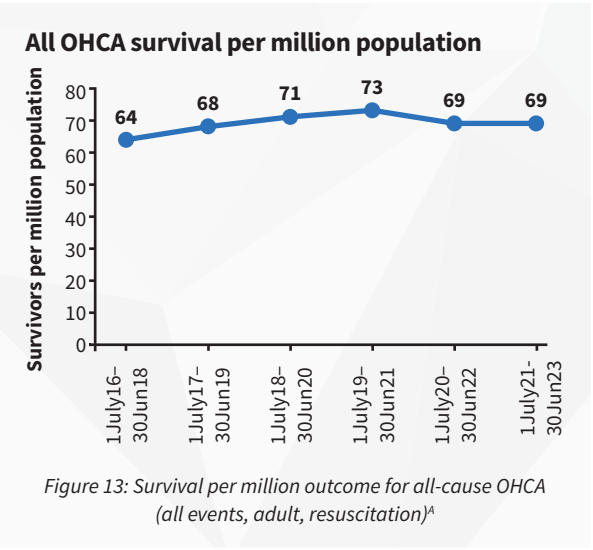


Figure 13: Survival per million outcome for all-cause OHCA (all events, adult, resuscitation)[A]

Outcomes for all-cause OHCA in adults[A] 2022/23

23% ROSC

11% 30-day survival

Outcomes for OHCA in the Utstein Comparator Group[B] 2022/23

44% ROSC

28% 30-day survival

A **All events, adult, resuscitation attempted:** includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

B **Utstein Comparator Group:** includes adults (≥ 15 years old), all-cause, resuscitation attempted, shockable presenting rhythm and bystander witnessed. Excludes children, EAS witnessed and no resuscitation attempt.

Scene outcome for OHCA in adults

One of the contributing factors to patient survival is good quality chest compressions during CPR. Performing CPR during the transport of a patient following an OHCA may compromise the quality of the CPR being delivered. Therefore, in the majority of OHCA events, it is appropriate to continue resuscitation at the scene until either ROSC occurs or resuscitation is ceased. This is reflected in the scene outcomes observed in adult patients where resuscitation was attempted (Figure 14).

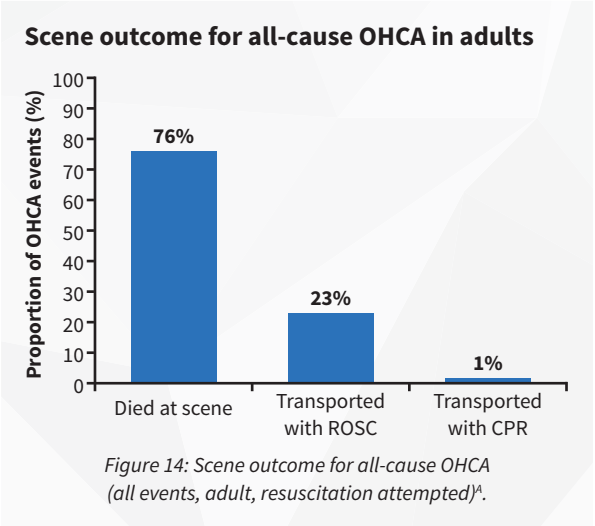


Figure 14: Scene outcome for all-cause OHCA (all events, adult, resuscitation attempted)[A].

Adult outcomes according to presenting rhythm

Patients who present with a shockable rhythm such as ventricular fibrillation (VF) or ventricular tachycardia (VT) have a greater chance of survival than patients who present with a non-shockable rhythm such as pulseless electrical activity (PEA) or asystole (Figure 15).

EAS personnel witnessed outcomes

If a patient presents with a shockable rhythm and the arrest is witnessed by EAS personnel, the immediate intervention of defibrillation can lead to the best outcomes. Of the adult patients who had a shockable presenting rhythm where the arrest was witnessed by EAS personnel, the rate of event survival was 78% and survival to 30 days was 64% (data not shown).

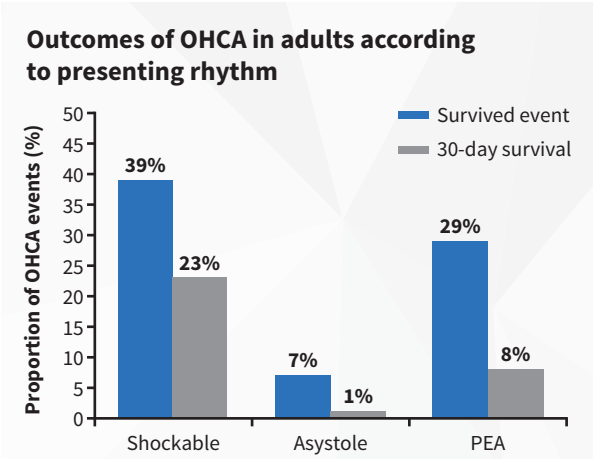


Figure 15: Outcomes for OHCA according to presenting rhythm (all events, adult, resuscitation attempted)[A].

Outcomes according to age

New Zealand has an aging population. It is important to review whether outcomes vary with age. People aged 80 years and over at the time of their cardiac arrest had the lowest percentage survival compared to younger people (Figure 16).

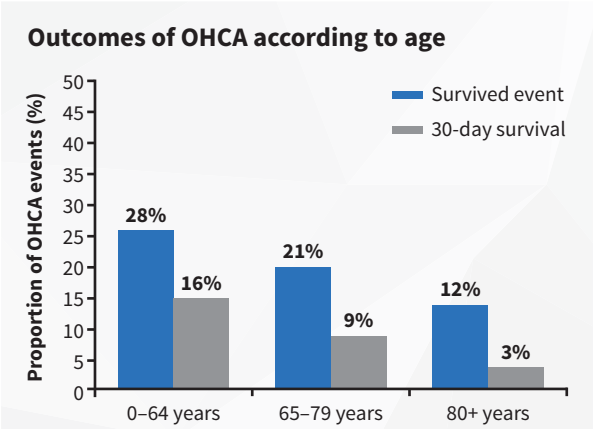


Figure 16: Influence of age on outcomes (all events, adults and children, resuscitation attempted)[B].

A **All events, adult, resuscitation attempted:** includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

B **All events, adults and children, resuscitation attempted:** includes adults and children, all-cause, resuscitation attempted. Excludes EAS personnel witnessed events.

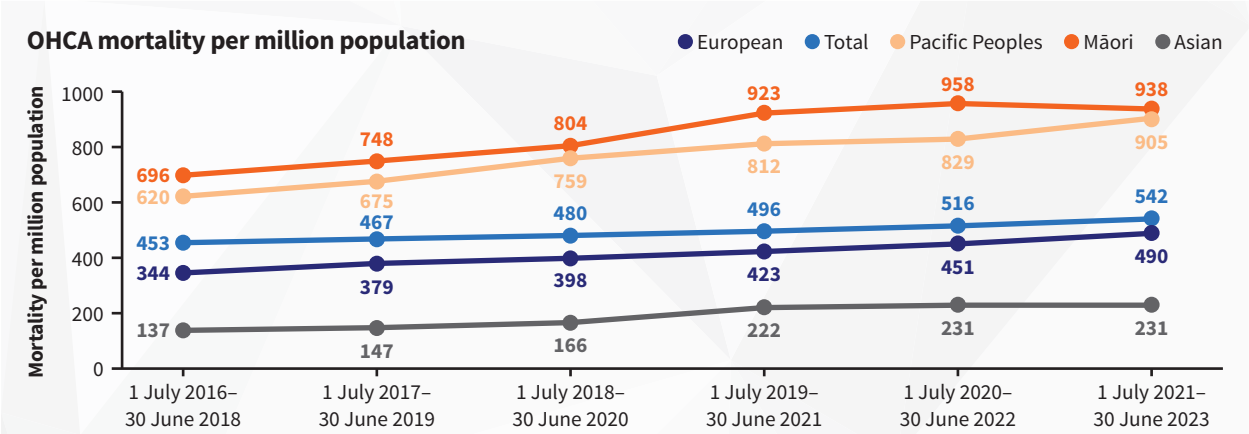


Figure 17: Mortality per million for all-cause OHCA by ethnicity (all events, adult, resuscitation attempted)[A]

Adult outcomes according to ethnicity

Figure 16 shows the rolling two year OHCA mortality per million population. OHCA mortality per million is higher in Māori and Pacific Peoples (Figure 16). In the period 1 July 2019 to 30 June 2023, Māori and Pacific Peoples had a lower 30-day survival than Europeans (Figure 18).

Adult outcomes according to deprivation

The incidence of OHCA increases with increasing socioeconomic deprivation. Compared to the least deprived quintile (Q1), those in the most deprived quintile (Q5) had lower 30-day survival (Figure 19).

Adult outcomes according to rurality

Incidents that occurred in rural locations also had lower event and 30-day survivals than those that occurred in urban settings (Figure 20).

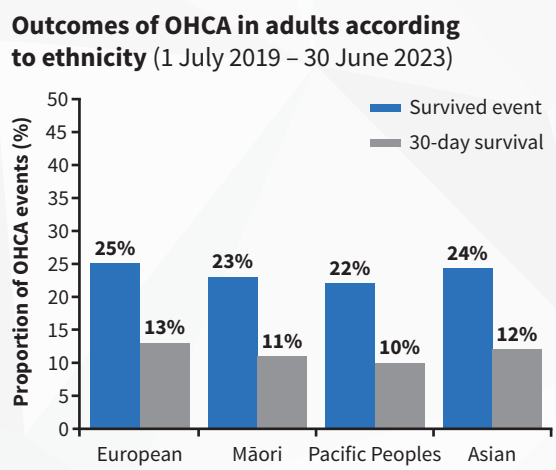


Figure 18: Influence of ethnicity on outcomes (all events, adult, resuscitation attempted)[A].

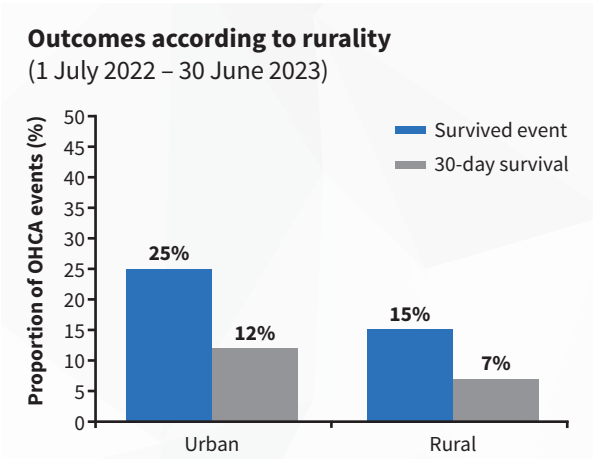


Figure 20: Influence of rurality on outcomes (all events, adult, resuscitation attempted)[A].

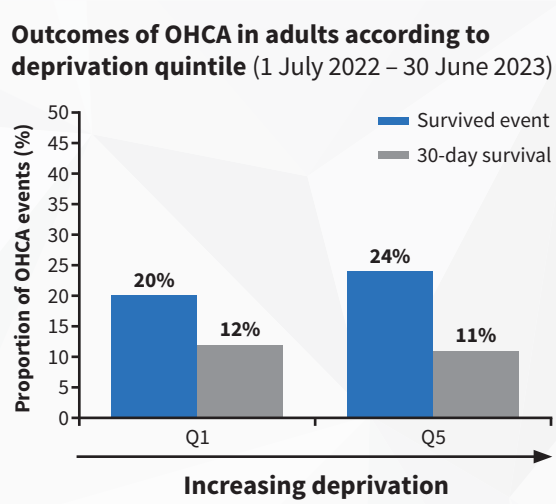


Figure 19: Influence of deprivation on outcomes (all events, adult, resuscitation attempted)[A,B].

A **All events, adult, resuscitation attempted:** includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

B **Deprivation calculation:** The NZDep2018 provides a measure of social deprivation for every locality in New Zealand, based on census and other social data. Thus, the outcomes of every OHCA can be looked at in terms of social deprivation, according to the location where they occur. Social deprivation is categorised into five groupings known as quintiles[10].

The community response is fundamental to improving outcomes from OHCA

Adult outcomes according to GoodSAM responder presence

GoodSAM (Good Smartphone Activated Medics) is a cell phone application that alerts community responders to nearby cardiac arrests (**www.goodsamapp.org**). Anyone who is trained in CPR and how to use an AED is able to register as a GoodSAM responder (**youtu.be/EPwY3yGj8IY**). Currently there are 12,887 people registered as GoodSAM responders in New Zealand.

In the current period, a GoodSAM responder was present at 2 in 10 confirmed cardiac arrests. When a GoodSAM responder was pre sent both event survival and 30-day survival were increased compared to events where there was no GoodSAM responder (Figure 3, page 7).

Adult outcomes according to defibrillation by Fire and Emergency New Zealand

During this reporting period Fire and Emergency New Zealand personnel were present at 94% of adult OHCA events where resuscitation was attempted by EAS. When Fire and Emergency New Zealand or First Response Group defibrillation occurred prior to EAS arrival, both event survival and 30-day survival were increased (Figure 21).

Adult outcomes according to community defibrillation

When community defibrillation occurred prior to EAS arrival both event survival and 30-day survival were increased. Community members were fundamental in the early defibrillation of 136 adult patients in cardiac arrest, 41% of these people survived to 30 days compared with only 8% of people that did not receive defibrillation prior to EAS arrival (Figure 2, page 7).

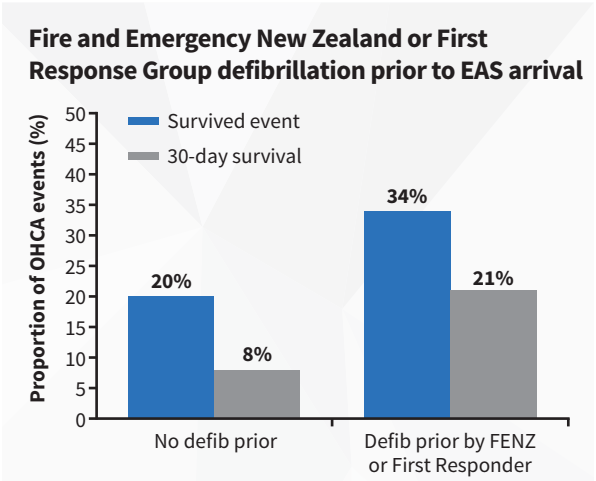


Figure 21: Influence of Fire and Emergency New Zealand or First Response Group defibrillation on outcomes (all events, adult, resuscitation attempted)[A].

Conclusion

Mutunga

The data presented in this report represent the 2022/23 results from the Aotearoa New Zealand National OHCA registry. Year on year, these reports provide an update on how the EAS is performing in the crucial management of OHCA.

Appendices

The Aotearoa New Zealand National Out-of-Hospital Cardiac Arrest Registry

Eligibility

The registry captures data on all OHCA events attended by EAS. A cardiac arrest is defined as a patient who is unconscious and pulseless with either agonal breathing or no breathing.

Inclusion and exclusion criteria are described in Table A1 and Table A2.

Data capture

The data is collated in the registry using a reporting template based on international definitions outlined in the Utstein style of reporting and the variables developed by the Australasian Resuscitation Outcomes Consortium (Aus-ROC).

In the data collection process there are three separate points where data is acquired:

- Computer Aided Dispatch (CAD) and supporting systems
- On scene by the EAS personnel in attendance
- Mortality data from the New Zealand National Health Index (NHI) records.

Computer aided dispatch

Patient and event details are collected by the Ambulance Communications Centre when a 111 call is received and an ambulance is dispatched, with data being entered into the CAD system. Data specifically related to cardiac arrest is obtained from the CAD system and transferred into the OHCA Registry.

On scene collection

Ambulance officers on scene attending a patient in cardiac arrest are required to record specific data. This is recorded on an electronic Patient Report Form (ePRF) and submitted electronically to a secure server.

NHI patient outcome data

The patient's NHI is collected by EAS personnel on scene or at hospital handover. If the NHI was not available at the time of the event then the NHI is determined by cross-reference of the patient's date of birth and name to the NHI database.

Table A1: Inclusion criteria (all of the following).

1	Patients of all ages who suffer a documented cardiac arrest
2	Occurs in New Zealand where the ambulance service or one of its participating co-responders is the primary treatment provider
3	› Patients of all ages who on arrival of the EAS are unconscious and pulseless with either agonal breathing or no breathing **or** › Patients of all ages who become unconscious and pulseless with either agonal breathing or no breathing in the presence of EAS personnel **or** › Patients who have a pulse on arrival of EAS personnel following successful bystander defibrillation

Table A2: Exclusion criteria (any of the following).

1	Patients who suffer a cardiac arrest in a hospital facility where the EAS may be in attendance but are not the primary treatment providers
2	Patients who suffer a cardiac arrest during an inter-hospital transfer where the EAS may be providing transport but are not the primary treatment providers
3	Bystander suspected cardiac arrest where the patient is not in cardiac arrest on arrival of the EAS personnel, and where defibrillation did not occur prior to ambulance arrival or no other evidence verifying a cardiac arrest state is present

If a patient dies, the date of death is updated by the Manatū Hauora Ministry of Health identity data management team after matching NHI identity with the official death registrations on a monthly basis.

Data quality

The registry is subject to quality improvement processes which involve continual auditing of existing data and updating of the registry entries as appropriate.

Registry reports are generated on a monthly and quarterly basis and these are analysed for variances in the numbers of cases and patient outcomes. These results are compared with international data from EAS that are similar to New Zealand.

Missing data

This current OHCA report is based on full electronic data capture of EMS records. By contrast, in the 2018/19 period Hato Hone St John used paper data capture for a hiatus of 6 months (Dec 2018 to July 2019) due to industrial disruption. This likely affected the quality of data and makes comparisons between 2018/19 and the current period less exact.

Ethical review

The OHCA Registry has been approved by the New Zealand Health and Disability Ethics Committee (Aotearoa New Zealand, Paramedic Care Collection (ANZPaCC), 13415).

The registry is also subject to EAS internal research governance processes that include a locality review and locality authorisation as per the Standard Operating Procedures for Health and Disability Ethics Committees.

The OHCA Registry is held on a secure server which requires active directory permissions. At no stage is data that could identify individual patients or individual hospitals released from this registry.

COVID-19

The 2021/22 reporting period encompassed both the longest COVID-19-related lockdown and the highest COVID-19 infection rates New Zealand has recorded to date.

Between August and December 2021, Auckland experienced a 107-day lockdown. Although daily infection rates were relatively low during this period, disruption to healthcare access was significant.

In the first half of 2022, New Zealand experienced its highest peak of COVID-19 infections. Daily infections were under 200 until early February 2022 when they increased rapidly to a peak of over 24,000. From mid-March 2022, cases declined and remained under 10,000 per day for all of May and June 2022 (**https://www.rnz.co.nz/news/in-depth/450874/covid-19-data-visualisations-nz-in-numbers**).

Abbreviations

AED	Automated external defibrillator
CAD	Computer aided dispatch
CPR	Cardiopulmonary resuscitation
EAS	Emergency ambulance service
EMS	Emergency medical services
GoodSAM	Good Smartphone Activated Medics
OHCA	Out-of-hospital cardiac arrest
PEA	Pulseless electrical activity
PHO	Primary Health Organisation
ROSC	Return of spontaneous circulation
SUDI	Sudden unexpected death in infancy
VF	Ventricular fibrillation
VT	Ventricular tachycardia

Glossary of terms

Adjusted rates	Rates are standardised to a control population.
Adult	Patients aged 15 years or older.
Asystole	The absence of any cardiac electrical activity.
Children	Patients aged less than 15 years.
Community responder	A member of the community who is not part of the EAS service who provides assistance at an OHCA event. For example, a member of the public, or an off duty ambulance officer or an off duty doctor or nurse.
EAS attended	This is the population of all patients following cardiac arrest where EAS personnel attended regardless of whether emergency treatment was provided.
EAS personnel	Emergency ambulance crews dispatched to a medical emergency.
Presumed cardiac aetiology	An OHCA is presumed to be of cardiac aetiology, unless it is known or likely to have been caused by trauma, drowning, poisoning or any other non-cardiac cause.
Resuscitation attempted	Any resuscitation attempt by responding EAS personnel, or the delivery of a shock at any time (including before ambulance arrival).
Return of spontaneous circulation	The patient shows clear signs of life in the absence of chest compressions for more than 30 seconds. Signs of life include any of the following: normal breathing, palpable pulse, increasing end tidal CO_2 or active movement.
Rural and remote service area	Assigned according to the Geographic Classification for Health.[11] **Rural includes:** R1, R2 and R3.
Shockable rhythm	Ventricular fibrillation, ventricular tachycardia or unknown shockable (AED).
Specific rates	Rates for specific segments/groups of the population (e.g. sex, age, ethnicity).
Survival to 30-days	The patient is alive at 30-days post-OHCA event.
Survived event	The patient has sustained ROSC to handover at hospital.
Urban area	Assigned according to the Geographic Classification for Health.[9] **Urban includes:** U1 and U2.
Witnessed event	A witnessed cardiac arrest is one that is seen or heard by another person.

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