Safer Pathways Through Childhood 2022–2027

Seatbelt and child restraint use in children 0–12 years

Road crash child passenger deaths Queensland 2004–2023

October 2024

Key findings

- Seatbelts and child restraints are highly effective measures to reduce injury and death in motor vehicle crashes.
- A total of 123 children aged 0–12 years died as passengers in motor vehicle crashes in Queensland in the 20 years from 2004 to 2023.
- The rate of child road crash passenger deaths decreased 3.7 per cent per year, and restraint use increased over the period. This suggests that strengthened seatbelt and child restraint laws, along with other road safety measures, have improved road safety outcomes for children travelling in motor vehicles.
- One in four children who died were not using any type of restraint, including an adult seatbelt, during travel. Nearly 60 per cent of the children who were unrestrained were Aboriginal and Torres Strait Islander children.
- Since strengthened child restraint legislation in 2010, one-third of children who died in motor vehicle crashes in Queensland were not secured in compliant child restraints.
- Approximately 75 per cent of fatally injured children (who were restrained during travel), were not restrained in accordance with best practice for their age. The data suggests there may be premature shifts in seat type, location and orientation before the child outgrows their existing restraint. Better adherence to best practice guidelines would increase safety for young passengers.
- Best practice guidance recommends that children under 13 should sit in the rear seat. While most younger children (under 7 years) who were fatally injured in crashes were rear seat passengers, one in four older children (7–12 years) were front seat passengers.
- Australian laws relating to child restraint use and position of travel of children in the vehicle do not reflect evidence-based safest practice and lag notably behind other high resource countries internationally. The upcoming review of child restraint legislation represents a timely opportunity to strengthen child restraint legislation to narrow the gap between legislation and best practice and improve passenger safety for infants and children.

Queensland Family & Child Commission

Queensland Government

Seatbelt and child restraint use in children 0–12 years

Overview

Transport incidents are the leading external cause of death in children and young people under 18 years of age. Transport has also seen the strongest reduction in any of the major categories of child death over the last 19 years.[1] Changes to graduated licensing and strengthened seatbelt and child restraint laws, along with improvements in vehicle design, have contributed to improved safety on the roads over the period.

Seatbelts and child restraints have been shown to be an effective intervention that can reduce the incidence of serious injury and death among child passengers in motor vehicle crashes by as much as 70 per cent.[2,3] Children are less likely to be severely injured in a motor vehicle crash if they are restrained in an age appropriate child restraint and if the restraint is installed and fitted correctly.[4]

This report is a descriptive analysis of the use of seatbelts and child restraints for children aged 0–12 who died while passengers in motor vehicle crashes in Queensland between 2004–2023. It examines demographics, the type of seatbelt or child restraint used and the position of the child in the vehicle. The report also examines the gap between both compliance with Queensland Road Rules and best practice in seatbelt and child restraint use, as well as highlighting the need for informed crash investigations by suitably trained officers to document restraint type and seating position to ensure accurate and complete data is available for future research.

Children with either a temporary or permanent disability require specialist, multidisciplinary, case-by-case assessment, and there are existing legislative exemptions available for such children. Assessment of whether a child had a medical condition or disability that may have necessitated the use of a different type of restraint was beyond the scope of this report.

Background

Seatbelt and child restraint laws

Seatbelt rules were introduced in Queensland in 1972, making it compulsory for drivers and passengers to wear seatbelts if fitted in the vehicle.

Child restraint laws were introduced in 1979. The laws initially required children under the age of 8 years to be secured in an approved child restraint device. For children aged 1 year and older, a seatbelt could be used as an alternative if an approved child restraint device was not available.

Queensland's requirements for child restraint use are currently provided in the Queensland Road Rules, which are consistent with national model law in the Australian Road Rules. The Australian Road Rules were first adopted into Queensland legislation in 1999. Each state and territory adopt the Australian Road Rules in its own legislation. With minor exceptions, the Australian Road Rules are uniform across jurisdictions.

Commencing in 2010, significant changes were made to the model law and Queensland Road Rules to specify the type of restraint suitable for specific age groups and required rear seating for all children under 7 years of age. The current requirements include:

- Infants from birth up to 6 months old must be placed in an approved rear-facing child restraint.
- Children aged 6 months to 4 years must be secured in either an approved rear-facing or forward-facing child restraint with an in-built harness.
- Children aged 4 to 7 years must use an approved forward-facing child restraint with an in-built harness or an approved booster seat.
- Children aged under 7 years must occupy the rear seat unless this is fully occupied with other children aged under 7 years.
- Children aged 7 and older may use an adult seatbelt. They may also remain in an approved child restraint that is forward-facing (either a child restraint with inbuilt harness or a booster seat).

The Queensland Road Rules provide that if a child cannot be safety restrained in the restraint type for their age due to their height or weight, then the approved lower-level child restraint may be used. If a child is considered too small to move to a restraint recommended for their age, then they should be kept in a lower-level child restraint for as long as it is considered necessary.

All child restraint systems manufactured and sold in Australia need to conform to the applicable Australian Standard (AS/NZS 1754). Periodic revisions in the standards have occurred with various improvements including in tether fittings, harness, age/sizing and test requirements. Notable changes in 2010 were the introduction of a booster seat and removal of booster cushions from the Standard, and the requirement for shoulder height markers on all child restraints. An updated version of the standard is expected to be published late 2024. The updated standard has provisions for:

- Improved head positioning to limit chin on chest positional asphyxia in infants.
- Improved shoulder strap positions for small infants.

- Mandatory anti-submarine clips on booster seats (designed to prevent children from sliding under the lap section of the seatbelt).
- Adjustable positions for the crotch strap to accommodate smaller infants and to prevent forward positioning and curvature of the spine.

Best practice

The National Guidelines for the Safe Restraint of Children Travelling in Motor Vehicles[5] (developed by Neuroscience Research Australia and Kidsafe Australia) provide best practice recommendations for the safe transport of children in motor vehicles, which overlap with and, in most cases, exceed legal requirements adopted by states and territories. In general, best practice guidelines are based on the size (height, which includes seated height and limb length) rather than the age of the child.

Rear-facing child restraints

Infants and toddlers should ride in a rear-facing child restraint until their shoulders are above the maximum height marker on the restraint. At a minimum, it is recommended that children remain in a rear-facing child restraint until they are at least 12 months old, however longer is preferred. This position better supports the head, neck, and spine and reduces the risk of head and neck injury in the event of a front-on crash.

Forward-facing child restraints

Once a child outgrows their rear-facing child restraint, they should transition to a forward-facing child restraint with in-built harness. While this typically happens between ages 2 and 4, it will depend on the child's size and the model of child restraint. Some convertible models can be also switched from rear-facing to forward-facing as the child grows. A forward-facing child restraint should be used until the child's shoulders go past the maximum height markers.

Booster seats

Children who outgrow their forward-facing child restraint should move to a booster seat. The booster seat lifts the child up to allow the adult seatbelt to be positioned where it is safest, across the bony areas of the shoulder and pelvis, rather than the neck or abdomen. Children should remain in their booster until their shoulders go past the maximum height marker on the booster seat. This does not typically occur until ages 11 or 12.

Seatbelt use

Once a child has outgrown their booster seat, they may be ready to move into an adult lap sash seatbelt. The lap belt should lie snugly across the pelvis, not the stomach, and the sash portion of the belt should lie snugly across the shoulder and chest, not crossing the neck or face. The 'five-step test' should be used to determine whether a child can obtain a good seatbelt fit in an adult seatbelt without a booster seat in every vehicle in which they travel. To obtain a good seatbelt fit will depend on the length of the child's torso (seated height) as well as thigh length relative to the seat death in each vehicle in which they travel.

Installation and usage

Child restraints should be installed according to both the restraint and vehicle manufacturer's instruction manual. This includes securing the device tightly using the adult seatbelt Isofix compatible connectors. In addition, where the device has a tether strap, it must be fastened to the vehicle's restraint anchor points. This limits rotation of the device during a crash. The child is then restrained within the device or on the seat using the in-built harness or adult lap sash belt, ensuring these are snug and well positioned on the child for each ride. Adjustments must be made to accommodate growth.

Rear seat is safest

The rear seat of the vehicle is the safest location and is recommended for children aged under 13 years.

Child passenger crash-related deaths 2004–2023, trends over time

In the 20 years from 2004 to 2023, 123 children aged 0–12 died as passengers in road crashes in Queensland. This represents a rate of 0.8 deaths per 100,000. Of these deaths, 75 were aged 0–6 years while 48 were aged 7–12 years.

Figure 1 shows the number of deaths of children aged 0–12 who died as passengers in road crashes in Queensland from 2004 to 2023. While there was considerable variability in year-to-year numbers, the rate of deaths has been decreasing, as indicated by the trend line which decreased 3.7 per cent per year. While this is consistent with the rate of decline in all transport incidents involving children since 2004, notably it exceeded the estimated linear decrease of 2.5 per cent per year in the all-age Queensland road fatality rate over the same period.[6]

Between the two 10-year blocks of 2004–2013 and 2014–2023, the rate of child passenger deaths in motor vehicles decreased 56 per cent from 1.1 to 0.5 per 100,000 children aged 0–12 years. The large decrease

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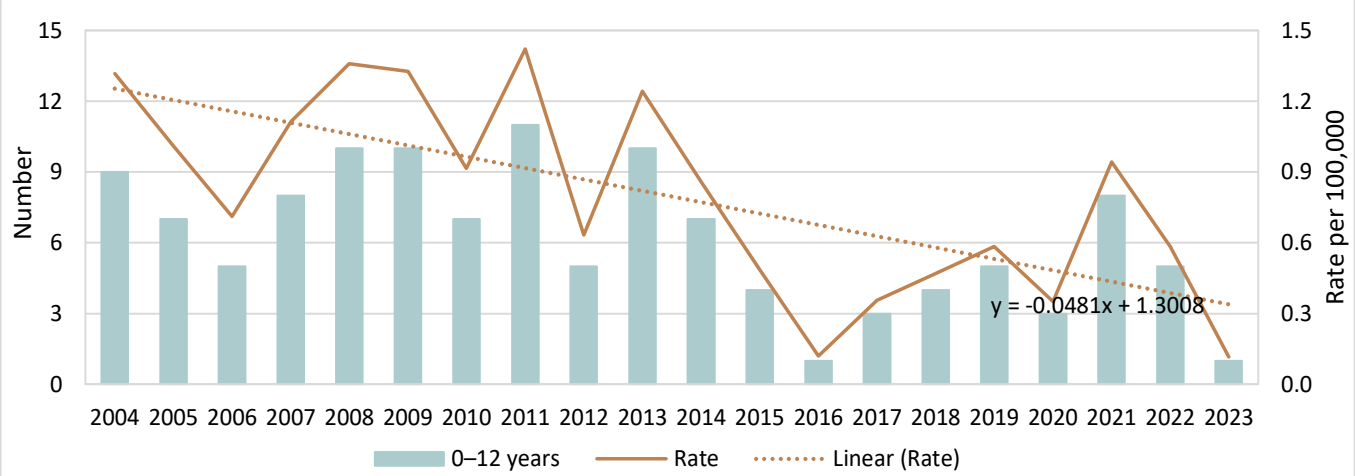
provides encouraging evidence that the strengthened requirements in seatbelt and child restraint laws over the period, along with improved vehicle design, road safety education initiatives, and other road safety measures, have contributed to improved safety for children in motor vehicles.

Figure 1: Number and rate of passenger deaths of children aged 0–12 years in Queensland by year, 2004–2023



Demographics

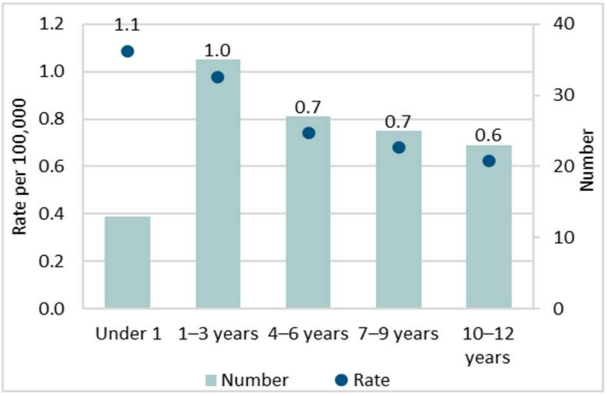
Sex

No differences were found in rates of child passenger deaths by sex, with 0.8 deaths per 100,000 children aged 0–12 years for both males and females.

Age

Figure 2 compares the rates of child passenger deaths by age group. Infants aged under 1 year had the highest rate of death, with 1.1 deaths per 100,000 infants. This represents a rate nearly double that of children aged 10–12 years. Rates of death decreased with increasing age. The lowest rate occurred among older children aged 10–12 years, with 0.6 deaths per 100,000 in this age group. While differences in the rates were not statistically significant, this may be because the sample size was not sufficient to detect statistically significant differences between the five age groups.

Figure 2: Number and rate of child passenger deaths by age group, 2004–2023



Remoteness and accessibility

The child mortality rate for all injury related causes of death is higher in areas of greatest remoteness, with a rate in remote and very remote areas around 2.5 times that of major cities.[1] Mortality rates for child passenger deaths by remoteness of area of residence are shown in Figure 3. Rates were significantly higher for children living in regional and remote areas compared to major cities, with rates outside major cities more than three times higher than in major cities.

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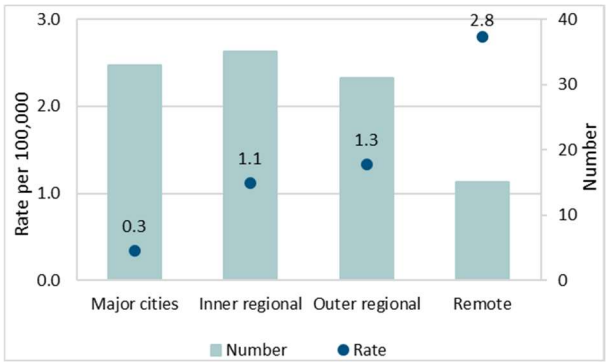
Figure 3: Number and rate of child passenger deaths by remoteness, 2004–2023



Motor vehicle crash fatalities increase with rurality Australia-wide, with 65% of all road fatalities in Australia occurring in regional and remote areas.[7] There are several transport, economic and social challenges unique to regional and remote areas that impact on road safety. These include low population density, vast road networks, significant socio-economic issues, and a lack of alternative transport options.[8] Trips in regional areas are likely to involve longer distances on roads with higher speed limits and poorer infrastructure. In the event of a crash there may be both limited telecommunications and longer response times to deal with critical injuries than in highly accessible areas. Together these factors play an important role in increased risk of death in road crashes in regional and remote areas.

Socio-economic disadvantage

Figure 4 illustrates the higher rates of child passenger deaths for children living in the areas of greatest disadvantage compared to those living in areas of least disadvantage. The death rates in the most disadvantaged areas (quintiles 1 and 2) were three times higher than rates in areas of least disadvantage (quintile 5).

These findings mirror disparities by socio-economic status in child mortality rates for injury related deaths, with rates of fatal injury in low and very low socio-economic areas around 2.5 times the rate of high and very high socio-economic areas.[1] Socio-economic disadvantage (including low income and low educational attainment) whilst impacting vehicle model age, use and maintenance, has also been shown to influence parental behaviour regarding the use and non-use of both seatbelts and child restraints.[9] This is likely in part due to issues of access and affordability as well as lower health and general literacy among disadvantaged cohorts.

Census data also demonstrate that there is a relatively higher concentration of disadvantage in regional and remote communities.[10] As shown in Figure 5, disadvantage within the passenger deaths generally increased with increasing remoteness, with 47 per cent of fatally injured children living in remote and very remote areas also residing in areas of socio-economic disadvantage. Therefore, issues that increase the risk of fatal crashes for children living in remote areas are likely to be compounded by issues associated with socio-economic disadvantage.

Figure 4: Number and rate of child passenger deaths by socio-economic index quintile, 2004–2023

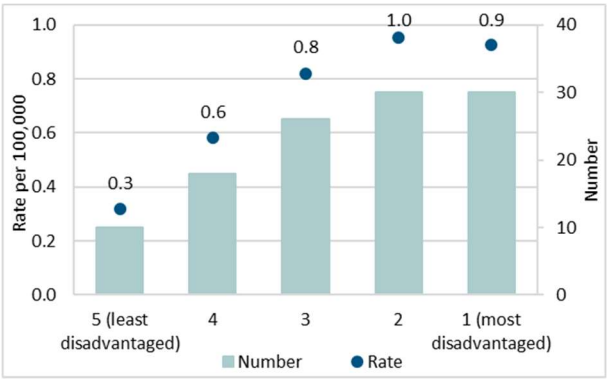
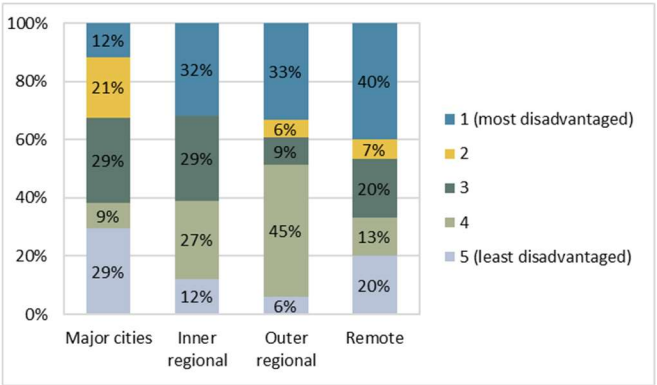


Figure 5: Child passenger deaths by remoteness and socio-economic index quintile, 2004–2023



Priority populations

Aboriginal and Torres Strait Islander children and children known to the child protection system are priority populations under the QFCC's ***Safer pathways through childhood*** framework because the intergenerational inequity many children and families from these groups experience leads to cumulative and heritable disparities in their health and wellbeing unless the inequity is addressed.

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Aboriginal and Torres Strait Islander children

Aboriginal and Torres Strait Islander children are over-represented in child deaths from all causes.[1] As illustrated in Figure 6, Aboriginal and Torres Strait Islander children are also over-represented in passenger crash-related deaths, with a mortality rate 3.8 times that of non-Indigenous children. Aboriginal and Torres Strait Islander children died as passengers in motor vehicles at a rate of 2.3 per 100,000 First Nations children compared to 0.6 per 100,000 non-Indigenous children over the study period. Research also shows that Aboriginal and Torres Strait Islander child passengers are also over-represented in serious crash-related injuries.[11]

As can be seen in Figures 7 and 8, larger proportions of Aboriginal and Torres Strait Islander children were from remote areas and areas of greatest socio-economic disadvantage, both factors shown to have higher mortality rates.

Figure 6: Number and rate of child passenger deaths by Indigenous status, 2004–2023

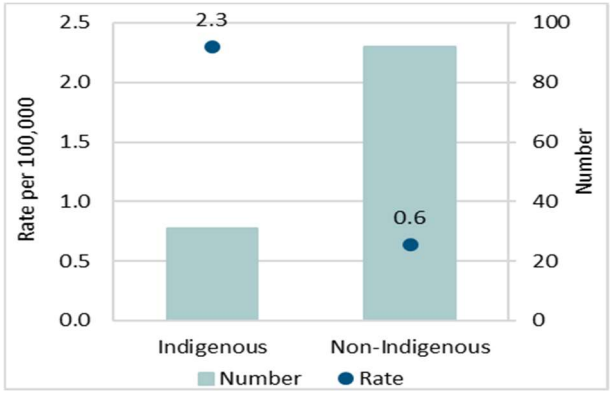


Figure 7: Child passenger deaths by Indigenous status and remoteness, 2004–2023

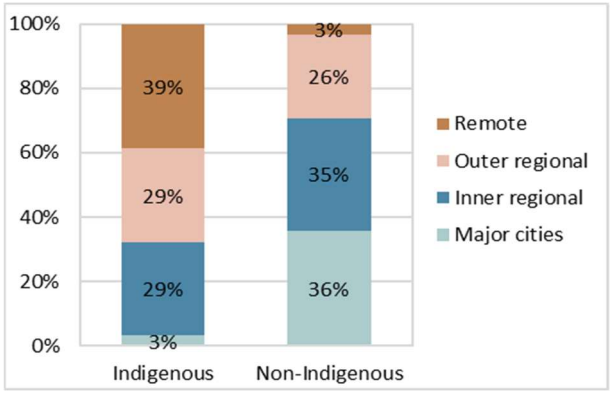
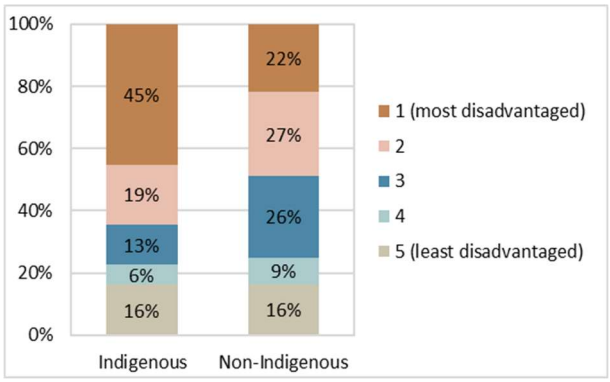


Figure 8: Child passenger deaths by Indigenous status and socio-economic index quintile, 2004–2023



Children known to child protection

Of the 123 child passenger deaths, almost 30 per cent (36 children) were known to the child protection system in the 12 months prior to their deaths.* None of the children were in care at the time of death. Thirty-nine per cent of children known to the child protection system were Aboriginal and Torres Strait Islander.

In the most recent 5-year period, an estimated 8 per cent of Queensland children (aged 0–14) were known to the child protection system, indicating children involved with the child safety system are over-represented in motor vehicle crash deaths by more than a factor of three.

Children known to the child protection system are likely to have experienced intergenerational adversity—it is often these experiences that have brought them into contact with system. These children are generally at a higher risk of death from a range of external causes, including transport injuries.[1]

Seatbelts and child restraints

The following sections present data on various aspects of seatbelt and child restraint use in child passenger crash-related deaths. While throughout the 20-year period, Queensland Road Rules have required that all infants and children be restrained in either a seatbelt or child restraint, both legislation and best practice regarding the *type* of restraint by age group and the child's *seating position* within the vehicle have been substantially strengthened since 2010. As such, binary analysis of child restraint use (i.e. children restrained versus unrestrained) spans the entire period (2004–2023), whereas analysis of child restraint type and

* Prior to 2014 children were known to the child protection system in the 3 years prior to their deaths.

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assessment of the adequacy of a child's restraint according to both legislation and best practice is confined to the period 2010–2023.

Restraint use, 2004–2023

It is widely acknowledged that the use of any child restraint is preferrable to not using a restraint. Failure to wear a seatbelt or use a child restraint is a key factor in road crash deaths, with unrestrained drivers and passengers reported to be 8 times more likely to die in a motor vehicle crash than restrained occupants.[12] Despite this, it should be noted that some crashes presented in the following analysis may not have been survivable regardless of the restraint used due to the severity of the incident.

In over a quarter of the 123 passenger deaths (32 children or 26 per cent), the child was unrestrained in the vehicle (i.e. not fastened into a seatbelt or child restraint). Two-thirds of the child passengers were restrained (83 children or 67 per cent). The use of a restraint was not specified in 8 cases (7 per cent).

Analysis of child restraint use by age shows variable proportions unrestrained at the time of the crash (Figure 9). Children aged 1–6 had relatively poor restraint use, with close to one-third of children in this age group unrestrained (30 per cent). Infants under 1-year and children aged 7–12 were more likely to be restrained, with 23 per cent unrestrained over the 20-year period. Interestingly, the proportion of infants unrestrained does not appear sufficient to account for the higher mortality rates seen in infants under 1 year (see Figure 2), indicating that both suboptimal child restraint use along with developmental vulnerability also plays a contributory role in some of these deaths.

Figure 9: Restraint use in child passenger deaths by age group, 2004–2023

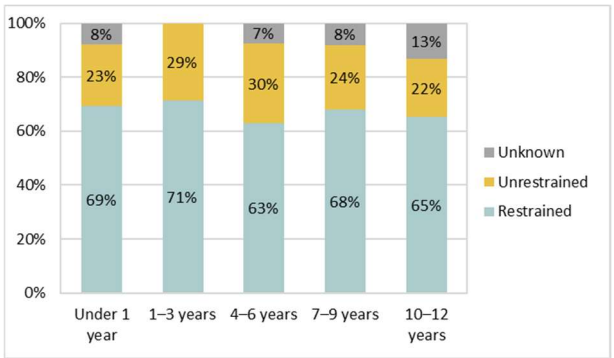
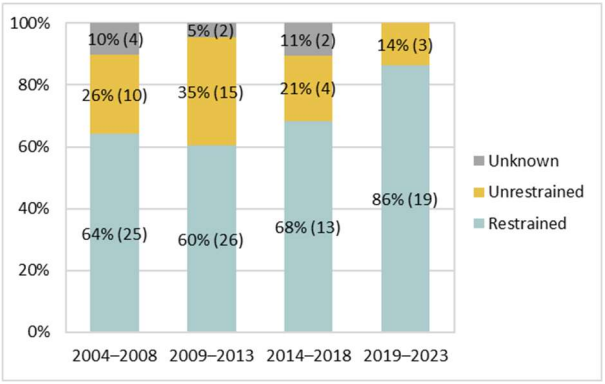


Figure 10 presents the restraint use data in five-year blocks across the 20-year period. Encouragingly, the proportions of children who were restrained in the vehicle increased in 2014–18 and 2019–23. The more marked increase in restraint use in 2019–23 may in part reflect improved data capture, with no missing data on restraint use in the more recent period.

The increased proportion of children who were restrained in more recent years is likely to be impacting the decreased numbers and rates of passenger deaths in the last 10 years (see Figure 1).

Figure 10: Restraint use in child passenger deaths by year, 2004–2023



Compliance with child restraint laws, 2010–2023

The laws in all Australian states and territories outline the *minimum* child restraint requirements for all children. This section presents analysis of compliance with the Queensland Road Rules, following the strengthened child restraint laws introduced in 2010, for the 74 child fatalities in 2010–2023.

As shown in Figure 11, in total only 58 per cent of children were found to be secured in child restraints that were compliant with the Queensland Road Rules. Of concern, one third of children were not legally restrained (26 per cent unrestrained, 7 per cent inadequately restrained). Child restraint status was unknown in 9 per cent of cases.

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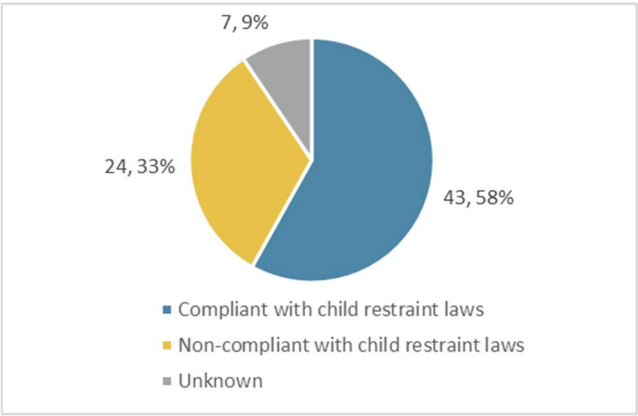
Definition: Compliant child restraint

Children were classified as in compliant child restraints (i.e. legally restrained) if they were secured in a restraint of a type that met the legal requirements for the child's age.

Children were classified as not compliant with child restraint laws if they were either unrestrained or in a restraint that was not approved for use in that age group (i.e. inadequately restrained) at the time of the crash.

Queensland Road Rules require that child restraints meet the Australian standard (AS/NZ 1754) and are properly installed, adjusted and fastened. It was not possible to assess these factors in child death data, resulting in a narrower definition of compliance.

Figure 11: Compliance with child restraint laws in child passenger crash-related deaths, 2010–2023



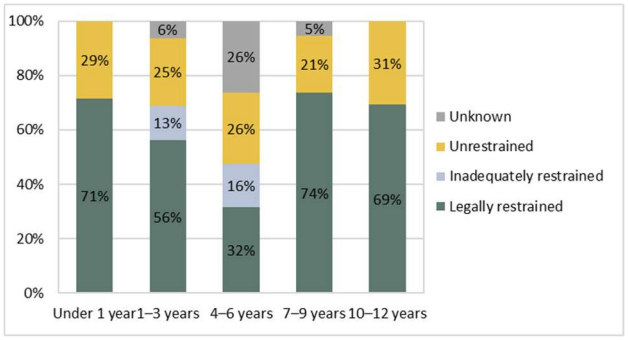
Compliant child restraint use, demographics

Age

Figure 12 shows that for infants under 1 year, 71 per cent were in child restraints that were compliant with Queensland Road Rules, but there was still a substantial proportion who were not legally restrained (29 per cent unrestrained). Restraint compliance became poorer across the next two age groups, with only 56 per cent of children aged 1–3 years and 32 per cent of 4–6 year-olds not legally restrained. In a comparatively large proportion of cases (26 per cent), the child restraint status was unknown for children aged 4–6 years. A proportion of these children were likely to have been in compliant child restraints. Compliance with child restraint laws was highest among children aged 7–9 years, with 74 per cent of children legally restrained.

Over 30 per cent of children aged 10–12 years were not legally restrained, with 69 per cent of children in this age group secured in compliant child restraints.

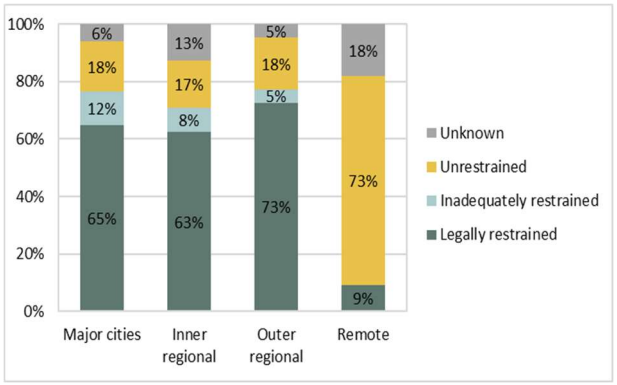
Figure 12: Compliance with child restraint laws by age group, 2010–2023



Remoteness and accessibility

Figure 13 shows child restraint compliance in remote and very remote areas. Less than 10 per cent of children living in remote areas were legally restrained, with 73 per cent not using any form of child restraint (including an adult seatbelt). All but one of these children were Aboriginal and Torres Strait Islander children. This is particularly concerning. Although choice of affordable child restraints is known to be more limited in remote areas, issues related to access and affordability are not sufficient to explain these findings.

Figure 13: Compliance with child restraint laws by remoteness, 2010–2023



Socio-economic disadvantage

In contrast to previous research reporting that child restraint use is generally lower in socio-economically disadvantaged groups, fatally injured children living in high and very high socio-economic areas (quintiles 4 and 5) were less likely to be legally restrained than those living in disadvantaged areas (quintiles 1 and 2), although it is acknowledged that for nearly a quarter of children living in high socio-economic areas restraint status was unknown. While disaggregated numbers are

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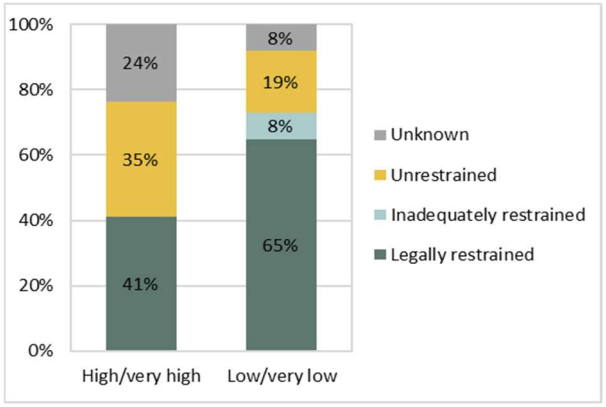
small, 67 percent of the unrestrained children living children in high socio-economic areas were also living in remote or very remote areas. These were largely communities dominated by mining and petroleum and gas resources, which elevates the areas socio-economic classification. Most of these children were also Aboriginal and Torres Strait Islander.

Figure 14: Compliance with child restraint laws by socio-economic area, 2010–2023

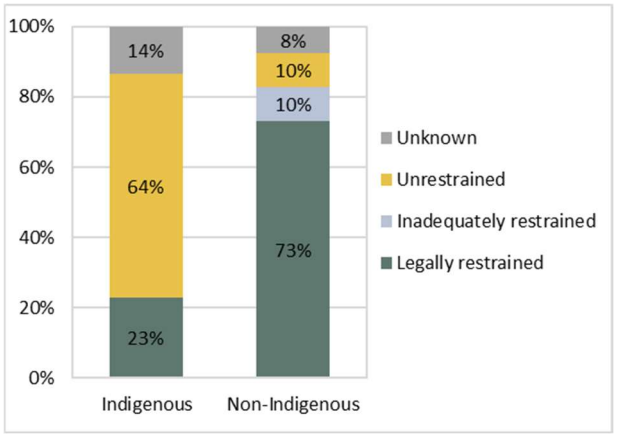


Compliance with child restraint laws among priority populations

Aboriginal and Torres Strait Islander children

Figure 15 shows that child restraint use was very low among Aboriginal and Torres Strait Islander children, with less than one-quarter of First Nations children in child restraints that were compliant with Queensland Road Rules. Nearly two-thirds of First Nations children were unrestrained. For non-Indigenous children, 73 per cent were secured in compliant child restraints, with 20 per not legally restrained.

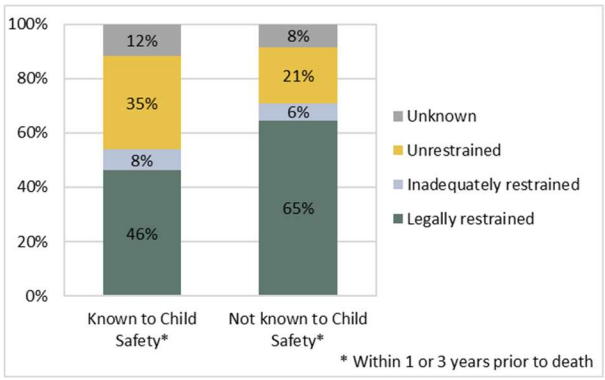
Figure 15: Compliance with child restraint laws by Indigenous status, 2010–2023



Children known to child protection

Less than half the fatally injured children known to the child protection system were in child restraints that were compliant with the Queensland Road Rules (46 per cent), with 43 per cent not legally restrained (Figure 16). In comparison, 65 per cent of children who were not known to the child protection system were legally restrained, with 27 per cent not in compliant child restraints. Over half (55 per cent) the children known to child safety who were not legally restrained were Aboriginal and Torres Strait Islander children. None of these children were using any form of restraint (including an adult seatbelt).

Figure 16: Compliance with child restraint laws by child protection status, 2010–2023



Type of child restraint, comparison to best practice

The available evidence shows that there is more that can be done above and beyond the requirements set within the Queensland Road Rules, to minimise injury and death in child passengers, by encouraging best practice child restraint use.[5] This section analyses type of child restraint used for the 52 of the 74 deaths in the period 2010–2023 where the child was known to be restrained.

Determining the optimum age or size at which all children should transition to the next mode or category of child restraint (e.g. rear-facing, front-facing, booster seat) is challenging due to the wide variety in models of restraint in each category, and there is currently no optimal age- or size-range at which each category of child restraint is most effective.[5] It is also not possible within the available death data to fully understand the appropriateness of restraint selection and fit. To enable an estimated comparison to best practice in this section, the recommended minimum and/or average age at which children move to the next restraint category has been used. This is reflected in the modified age groupings used in this section. As there is considerable variation in both the recommended and average ages reported for each restraint category, the ages reported in the Queensland Department of Transport and Main Roads' recently developed series of

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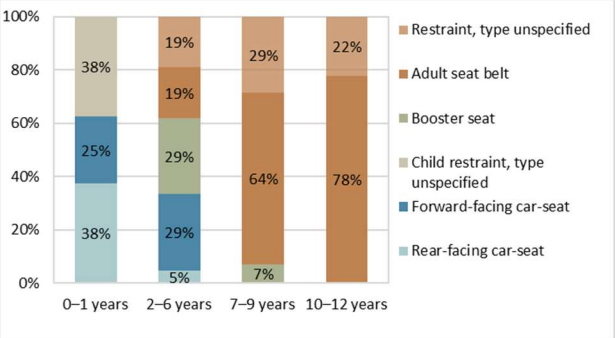
child restraints video guides[13] and the National Guidelines for the Safe Restraint of Children Travelling in Motor Vehicles[5] have used.

Figure 17 shows the types of child restraints used among fatally injured restrained children in the different age groups. Early transition to forward-facing child restraints was seen in the youngest age group, with premature transition to booster seats and adult seatbelts evident in older age groups, resulting in a substantial proportion of children not being restrained in accordance with best practice.

Figure 17: Type of restraint used by age group, 2010–2023



Comparison to best practice

Under 2 years

Studies indicate that rear-facing child restraints offer an 88–96% reduction in the risk of fatal and serious injuries to properly restrained infants compared to no restraint.[5] Trauma registry and crash test data also support the increased safety of rear-facing child restraints in younger age groups. Rear-facing restraints support the young child's head and neck significantly better in frontal crashes (which occur most commonly) than forward-facing restraints, reducing mortality and injury severity. This is important in this age group as infants and toddlers have relatively large heads and weak necks which put them at particularly high risk of serious injuries or death, if the head and neck are not supported.

Currently data are not available on the optimal age or size until which rear-facing child restraints are most effective, however, to maximise safety, best practice guidelines recommend that babies and toddlers remain in their rear facing restraint for as long as possible (ideally until 2 years of age, or when their shoulders go past the maximum height marker).[13]

Overall, only 38 per cent of infants and toddlers under 2 years were in a rear-facing restraint, in line with best practice guidelines.

Looking at restraint type usage for the deaths of children aged under 2 years, both restrained infants aged under 6 months were in rear-facing seats as required by law and recommended by best practice guidelines. Early movement to forward-facing child restraints was seen in the infants aged between 6 months and 1 year, with none of these infants in rear-facing child restraints, as recommended. Restraint type for children aged between 12 to 23 months was incomplete for most, hampering understanding of child restraint practices in fatal crashes in this age group. It is likely that most of these children were in forward-facing child restraints given recent Australian research finding that approximately two-thirds of children are in a forward-facing child restraint by 18 months of age.[14]

These data indicate a deviation from best practice, likely contributed to by child restraint legislation, which only requires that children are restrained in rear-facing child restraints until 6 months of age. It is possible that movement to a forward-facing child restraint in infants older than 6 months, while permissible by law, may contribute to the higher rates of death for the youngest age groups.

2–6 years

While best practice guidelines recommend that children from birth should use rear-facing child restraints for as long as they fit within them, children often outgrow rear-facing seats around 2 years of age.[5] Forward-facing child restraints with an inbuilt harness should then be used until the child's shoulders are above the upper shoulder height marker. For most Australian children this occurs around 7–8 years. As such, while children are legally permitted to use booster seats from 4 years, following best practice recommendations most children aged 2–6 years should be in forward-facing child restraints with in-built harness.

Overall, only 34 per cent of children aged 2–6 years were in rear- or forward-facing child restraints, in accordance with best practice recommendations. A further 29 per cent of children in this age group were in booster seats, and a concerning 19 per cent were inadequately restrained in adult seatbelts.

7–9 years

By law, children aged 7 and older may be restrained using an adult seatbelt, however best practice guidelines recommend using a booster seat until an adult seatbelt fits correctly, meeting all parts of the 5-step test. Most children are not tall and big enough to fit an adult seat and seatbelt correctly until 11 or 12 years.[13]

As was seen in the youngest age groups, there is also a notable gap between legislation and best practice here.

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Only 7 per cent of children in this age group were in booster seats, with 64 per cent using adult seatbelts, indicating many children may be transitioned to adult seatbelts prematurely and unsafely.

10–12 years

The data shows 78 per cent using adult seatbelts. No children in this age group were in a booster seat. As many children are unable to obtain an adequate adult seatbelt fit until age 11 or 12,[13] for a some of these children, particularly in the 10-year age group, best practice restraint may have involved the use of a booster seat.

Overall, approximately three-quarters[†] of fatally injured children (who were restrained during travel), were not restrained in line with best practice for their age. This highlights the importance of safety education and indicates that there may be a need to strengthen child restraint rules to better align legislation and best practice, to improve children's safety on Queensland roads.

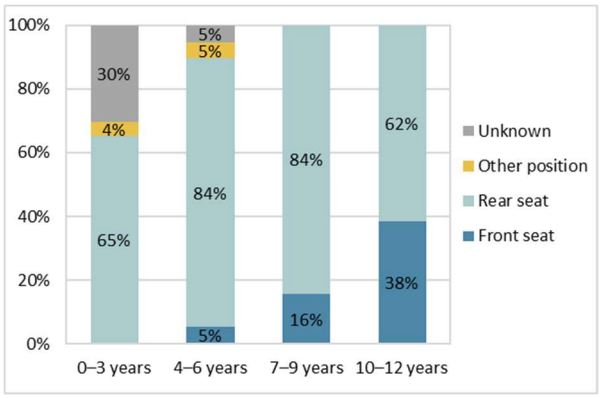
Seating position

Under the Queensland Road Rules, from 2010, all children aged under 7 years must be in a rear seat (where there is more than one row of seats) unless this is fully occupied with other children aged under 7 years, in which case children aged 4–6 years can legally sit in the front seat in an untethered booster seat. A child under 4 years must never sit in the front seat in a vehicle with more than one row of seats. Best practice for child safety in vehicles is for children to be restrained in the rear seats until they are at least 13 years of age, unless the rear seat is occupied by younger children.

Of the 74 child passenger crash-related fatalities between 2010 and 2024, 74 per cent (55 children) were seated in the rear while 12 per cent (9 children) were seated in the front row.[‡] Seat position was unknown for 11 per cent (8 children) and a further 3 per cent (2 children) were unrestrained in other parts of the vehicle's interior (e.g. passenger footwell, centre console).

Figure 18 displays the seat positions for children who died in motor vehicle crashes across different age groups. The data shows a decline in rear seat usage with increasing age, with 84 per cent of children 7–9 years and 62 per cent of fatally injured children 10–12 years being rear passengers.

Figure 19: Seat position of child passenger crash-related deaths, 2010–2023



Comparison to legislation and best practice

In relation to seat position, the data shows 65 per cent compliance with Queensland Road Rules for children aged 0–3 years, although in one case (4 per cent) the child was unrestrained and not in a seat and for 30 per cent the seat position was unknown. There was high but not full compliance for children aged 4–6 years (84 per cent) and, again, one child was not in a seat position and for a second the position information was unknown.

The increase in the proportion of deaths where the child was a front seat passenger (16 per cent for 7–9 years and 38 per cent for 10–12 years) indicates a deviation from best practice, as children under 13 years should sit in the rear seat unless the rear seat is occupied by younger children.

Missing data

The report has relied on the information available within police reports of death to a coroner, autopsies and coronial findings. To best inform research and understanding about the safest restraint type and position it is desirable for information available in these sources to be as complete as possible. Incomplete data may occur where, for example, injured persons have been transported to hospital prior to the arrival of the police, or vehicles have been heavily damaged. Incident locations a long distance from population centres may also hamper thorough crash investigations.

However, a bigger issue is that ascertaining whether the restraint used at time of crash was age, size and ability

[†] Children aged 10–12 years were excluded in the calculation of percentage.

[‡] For vehicles with more than two rows of seats such as minivans and buses, any seat row behind the front row was defined as 'rear' in the analysis.

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appropriate and whether it was installed, fitted, and secured appropriately, requires detailed knowledge and expertise in forensic investigation and child restraint engineering. For example, a child restraint may fail due to static or dynamic factors; because the tether strap is anchored to a luggage rather than a child restraint point (static), or the seatbelt sash was not across a child's shoulder at time of impact (dynamic). Some of these issues can be determined from forensic crash site inspections, and others required understanding of biomechanics and forensic injury patterns.

Accurate, informed and complete death data is essential for developing and evaluating policies related to child passenger safety. Missing data can lead to gaps in understanding which types of restraints, for example, are most effective for different age groups, potentially hindering the development and implementation of best practice guidelines. Detailed and expert investigation of serious crash even regardless of fatality would also contribute to the evidence base for best practice recommendations.

The following figures show the trends over time in missing data on restraint use (Figure 19) and seat position (Figure 20). There has been a noticeable improvement in the collection of restraint and position data in the last 5 years. The percentage of missing restraint data decreased from 31 per cent in 2004–2008 to 5 per cent in 2019–2023. Position data had poorer completeness but also improved in the last 5 years, with 5 per cent missing and 14 per cent partially missing in 2019–2023.

The QFCC encourages forensic crash investigation reports to provide as much detail as possible about whether and how a child was restrained in fatal motor vehicle crashes, including detailed information on the type of child restraint used and the seating position of the child. Such information is not only valuable in informing coronial investigations, but also ensures that the Queensland Child Death Register records comprehensive information to inform research, policy and practice initiatives to improve road safety for children and young people.

Figure 19: Missing restraint data by year, 2004–2023

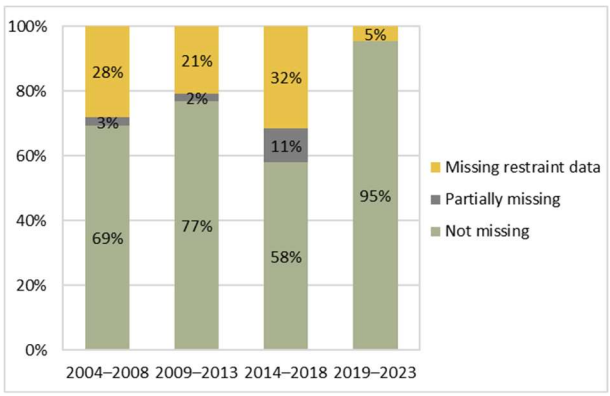
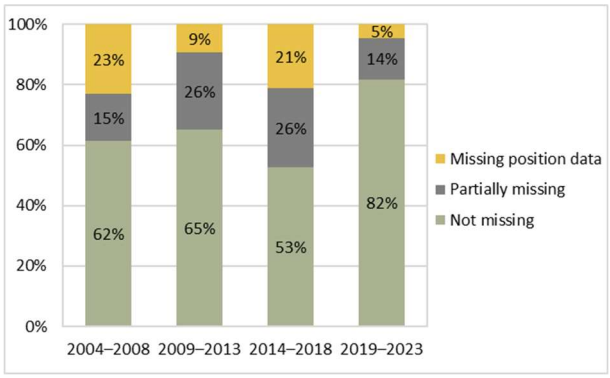


Figure 20: Missing seat position data by year, 2004–2023



Discussion

This analysis has identified a steady decrease in the number and rate of child passenger fatalities in motor vehicle crashes and a corresponding increase in restraint use over time. This indicates that strengthened seatbelt and child restraint laws, in tandem with other road safety measures, have improved road safety outcomes for child passengers in motor vehicles. Despite these encouraging trends, certain cohorts of children were over-represented in passenger crash fatalities, including infants and toddlers (0–3 years), Aboriginal and Torres Strait Islander children, children known to the child protection system and children living in socio-economically disadvantaged and remote areas of the state. The factors underpinning the increased risk of death in these groups are worthy of further exploration.

There were other troubling findings. One in four children who were fatally injured in motor vehicle crashes were not using any form of restraint, including an adult seatbelt, at the time of the crash. Abundant research has shown that correctly using an appropriate child restraint is the single most effective way to reduce injuries and fatalities in crashes. Yet, since the introduction of strengthened child restraint legislation in 2010, one-third of fatally injured children were not

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secured in child restraints that were compliant with the Queensland Road Rules during travel. Our data also shows that a higher proportion of Queensland children were unrestrained or in a restraint that was inappropriate for age (according to legislation) than in a previous analysis of child passenger deaths in New South Wales.[15] There also appeared to be a tendency to transition children into the next restraint type and into both adult seatbelts and the front seat of the vehicle earlier than appropriate (based on age), significantly reducing the protection afforded in the event of a crash.

Aboriginal and Torres Strait Islander children and children known to the child protection system were significantly over-represented in children who were not legally restrained during travel, doubtless contributing to the higher rates of death among these groups. Worryingly, large proportions of Aboriginal and Torres Strait Islander children were not using any type of restraint, including an adult seatbelt. This indicates that the lack of compliance may be driven by other factors, in addition to issues related to child restraint affordability and access.

While research on the use of child restraints in First Nations children is limited, national reports from crash data suggests child restraint usage rates are low.[16,17] Previous Australian research with remote Aboriginal communities has found that the highest priority for most people was to get where they need to by whatever means available, with seatbelts and child restraints a low priority.[18] Awareness of the legislation and consequences, recognition of the safety value of child restraints, perception of risk on short trips, use of multiple and overcrowded and unroadworthy vehicles, restraint availability and affordability, and access to accredited installation to ensure correct usage and fit have also been shown to be critical issues affecting First Nations as well as disadvantaged and geographically isolated populations. Further road safety research to better understand barriers to seatbelt and child restraint use among First Nations families in Queensland is needed.

Mainstream, community wide education campaigns have also been found to be minimally effective in cohorts in which seatbelt use is low and barriers to child restraint use coexist.[19] Evaluations of culturally responsive, targeted community-based interventions involving both education and child restraint distribution and installation have shown promising results in other Australian jurisdictions,[16] suggesting there may be a benefit to investing in similar programs in Queensland's First Nations communities. Interventions that focus on child restraint education, distribution and installation, which are tailored and responsive to local and cultural contexts should be prioritised, with the community-controlled sector's capacity to provide services in this area strengthened.

While education on the correct fitting and use of child safety restraints and initiatives to increase access equity are important actions to improve road safety for Queensland children, setting and enforcing strong laws closely aligned with best practice guidelines are of equal importance. Current Australian laws relating to child restraint use and position of travel of children in the vehicle do not reflect evidence-based safest practice. Both the model law and Queensland Road Rules, particularly regarding restraint of infants and the age at which children are permitted to transition to an adult seatbelt, lag notably behind other high resource countries internationally. For example, Queensland Road Rules permit infants to be moved from rear- to front-facing child restraints at six months of age, which is the youngest of almost any developed nation in the world. By comparison, New Zealand requires that children remain rear facing until 2 years of age, the United Kingdom, Canada and most of Europe until at least 15 months, and most South American countries until 12 months.

Legal enforcement has been identified as an effective way to improve child restraint use. Recent research examining child restraint practices in Australia has shown that while most caregivers comply with child restraint legislation, there is very low awareness and poor compliance with best practice, where recommendations differ from legislation.[14] The National Transport Commission (NTC) reviews the model Australian Road Rules biannually, with a commitment by the NTC to review child restraint legislation in 2024. This represents a timely opportunity to advocate for strengthened child restraint legislation to narrow the gap between legislation and best practice and improve Australia's standing in comparison with other highly developed countries.

Appendix 1: Methods

Data sources

The Queensland Chid Death Register was the primary source of information for this analysis. The QFCC has a statutory obligation under Part 3, Sections 25–29 of the *Family and Child Commission Act 2014* to maintain a register of all deaths of children and young people under the age of 18 years in Queensland. The Child Death Register is based on notifications from the Registry of Births, Deaths and Marriages as well as details of the circumstances and factors associated with all reportable deaths under Section 8 of the *Coroners Act 2003*. Information in the register is classified according to cause of death, demographic information and other relevant factors. Cause of death information is coded according to the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* (ICD-10).

Data quality in the Child Death Register is impacted by the quality and completeness of the data in the source documents and datasets that comprise the register. However, the QFCC have established rigorous quality assurance and data cleaning processes and in general, data quality and completeness are of a high standard.

Inclusions and exclusions

The scope of the analysis includes children aged 0–12 years who died as passengers in motor vehicle crashes in the period 1 January 2004 to 31 December 2023. Excluded from the analysis was a small number of deaths where the child was either riding outside of the vehicle (such as in the tray of a utility) or was driving the vehicle (3 deaths in total). Pedestrian deaths, deaths on motorcycles and other forms of transport were also excluded.

The analysis includes deaths which occurred within Queensland, regardless of their usual residence, even if the incident occurred in a different jurisdiction. Nine children were injured in New South Wales but transported to a Queensland hospital where they subsequently died.

Crashes on private property were included in the analysis. Only one fatal incident occurred on private property, with all the other incidents occurring on public roadways.

Data analysis

Child death rates are calculated per 100,000 children in Queensland using estimated resident population (ERP) data. The Queensland Government Statistician's Office provided ERPs by age, sex, and Indigenous status for 2004 to 2022. ERPs by geographic location and socio-economic status were only available up to 2021 at the time of reporting.

Indigenous status

The Child Death Register records Aboriginal and Torres Strait Islander status as noted in the derived birth registration and death registration data, in coronial data and in other official records. There are instances of inconsistent reporting of Aboriginal and Torres Strait Islander status across official records. The QFCC uses a guideline to determine which status will be recorded within the Register.

Geographic location

The Accessibility/Remoteness Index of Australia Plus (ARIA+) is used to code geographical remoteness for the child's place of usual residence. ARIA+ is a measure of remoteness that ranks locations based on their distance by road to a centre that provides services.[20] e child's usual place of residence (street address and post code) was used to assess geographical location. For the purposes of analysis, remote in this report includes areas classed as remote and very remote areas under ARIA+.

Socio-economic status

The socio-economic status of the area in which a child was living at the time of death was classified using the Socio-Economic Indexes for Areas (SEIFA)–Index of Relative Socioeconomic Advantage and Disadvantage. Areas are grouped into quintiles from 1 (most disadvantaged) to 5 (least disadvantaged).[10]

Supplementary data

While speed has been documented to be a major contributing factor to serious injuries and road fatalities, analysis of speed was outside the scope of his review, with vehicle speed at the time of the crash not reliably ascertained in child death data.

The following supplementary data on area speed limit has been provided, which may be of interest to researchers and other stake holders. Table 1 shows that the majority of fatal crashes involving child passengers occurred in areas with high speed limits (90–110km). However, as seen in Figure 21, there was little difference in restraint practices between lower versus higher speed limited areas.

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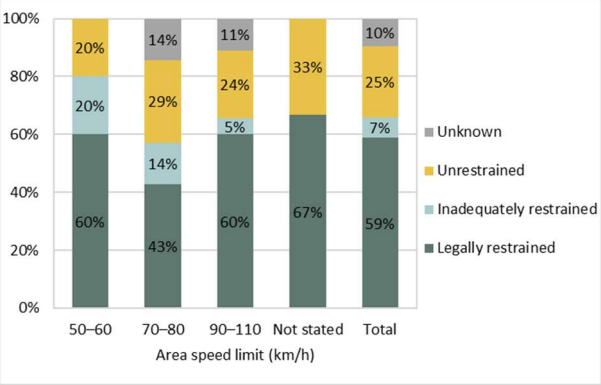
Table 1: Area speed limit in child passenger crash-related deaths, 2004–2023

Area speed limit (km/hr)	Number	Per cent
50–60	11	9
70–80	12	10
90–110	79	65
Not sated	20	16
Grand total	**122**	**100**

Figure 21: Area speed limit by compliance in child passenger crash-related deaths, 2010–2023



Data for prevention activities

More information about the Queensland Family and Child Commission's (QFCC) child death prevention activities and research framework is available at https://www.qfcc.qld.gov.au/safer-pathways-through-childhood

We work with researchers and government agencies to raise community awareness and develop prevention programs and policies by identifying risk factors, trends and emerging safety hazards.

The QFCC can provide detailed Queensland child death data to researchers and organisations at no cost. Email child_death_prevention@qfcc.qld.gov.au

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