Safer pathways through childhood 2022–2027

A framework to guide the Queensland Family and Child Commission's child death prevention activities

Swimming pool immersions of young children in Queensland, 2011–2021

Queensland Family & Child Commission

Queensland Government

Swimming pool immersions, 2011–2021

Overview

Swimming is a key feature of Queenslander's lifestyles, with many families living in homes with backyard swimming pools. However, swimming pools pose a significant safety risk to young children, with drowning the leading external cause of death for children under five years of age in Queensland.

Children of this age are increasingly mobile and curious, but their rapidly expanding skillsets are not always matched by an ability to understand and respond to risk.[1,2] To prevent drownings of young children it is critical to combine physical barriers to restrict their access to water and robust supervision by a capable supervisor.*

The Queensland Family and Child Commission (QFCC) has a key role in improving the safety and wellbeing of Queensland's children and their families. The QFCC has a legislated responsibility to maintain a register of all child deaths occurring in Queensland, to report on trends and patterns, and to conduct research aimed at preventing future deaths.

In 2022, the QFCC launched the Safer pathways through childhood framework, providing a roadmap for our child death prevention activities over the next 5 years. One of our first action items was to find ways to improve the safety of young children around swimming pools. This was prompted by our previous research which had found an increase in the rate of pool drownings from 2014.[3]

This report considers fatal and non-fatal immersion incidents of children aged 0–4 years in Queensland that have occurred in pools covered by Queensland's swimming pool safety legislation (regulated pools). It uses information from the Queensland Pool Register, the Queensland Child Death Register and immersion notifications to identify regional patterns and findings about the two key methods of drowning prevention—pool fencing and supervision.

Key findings

- Queensland has almost 400,000 registered swimming pools required to comply with the pool safety standard introduced in 2010 (regulated pools).
- Forty children aged 0–4 years lost their lives in regulated pools between 2011 and 2021 and a further 853 received medical attention after a non-fatal immersion incident.
- While the number of total immersion incidents has increased over time, the rate of immersions per 1,000 pools has remained steady. This suggests increases in the number of total immersions is **largely in line with the swimming pools registered each year**.
- There are clear regional patterns in immersions across the state, with Central Queensland having the highest total immersion rate per 1,000 pools.
- Despite the strong standards, fencing was found to be non-compliant in 90 per cent of fatal immersions, with a concerning trend identified in which pool gates were deliberately propped open.
- The supervision of young children was considered inadequate for the circumstances in 65 percent of fatal immersions.
- There is a clear need to increase public awareness of the importance of maintaining pool fencing and of appropriate supervision for young children.

* For further information on drowning prevention strategies, visit www.royallifesaving.com.au

Background

Swimming pool safety laws in Queensland

Swimming pool fencing laws were first introduced in Queensland in 1991.[4] This change significantly reduced the number of children drowning in Queensland pools. However, these laws were complex, with different standards applying depending on the age of the pool.[4]

In late 2008, a review of Queensland's swimming pool safety laws was undertaken by the Swimming Pool Safety Review Committee. This review resulted in significant legislative reforms, introduced to the *Building Act 1975*.

The first stage of these reforms came into effect on 1 December 2009 and required all new pools built on or after this date to have fencing compliant with the Queensland Development Code, Mandatory Part 3.4 (MP3.4).[*5]

Stage 2 of the reforms, commencing 1 December 2010, extended Stage 1 reforms to cover existing pools, with owners given five years to comply with the new pool safety standard. The use of 3-sided fencing (that is, providing direct access from a building to the pool area) that was previously permitted for pools built before February 1991 was phased out.[5]

Swimming pools are now required to be registered on the Queensland Pool Safety Register. A mandatory final inspection is required after construction and the reforms provided for the licensing and regulation of pool safety inspectors. A pool safety certificate must be obtained (and provided to the buyer) before a property is sold.[†] A pool safety certificate is also required prior to leasing a property. It is an offence under the *Building Act 1975* for a pool owner to enter into a lease agreement without a current pool safety certificate.[‡]

The owner of a pool is responsible for ensuring it complies with the pool safety standard and that all barriers are maintained in good condition.[§] This includes while the property on which the pool is located is leased, with the QBCC recommending the fencing is assessed by owners at each property inspection.[6] Tenants must not wilfully interfere with the pool fence (including propping gates open or moving objects into the non-climbable zone)[**] and have general obligations to report repair or maintenance issues.[††]

Local governments must provide advice to pool owners whose safety certificate has expired at least once every four years to reinforce the importance of ensuring compliance with the pool safety standard.[‡‡] However, there is no obligation on property owners to have pool fences inspected for compliance unless the property is sold or leased.

The 2010 reforms reduced the ability for councils to make local laws about, and grant exemptions to, pool fencing requirements. In addition, they established a requirement for ambulance and hospital staff to report any presentations of a child under 5 years of age following immersion in a swimming pool. Councils are required to conduct an inspection of the pool fencing following receipt of an immersion notification.

Key terms

Swimming pool

An excavation or structure capable of being filled with water to a depth of 300mm or more; capable of being used for (and principally designed for) swimming or human aquatic activity.[§§] This includes spas and wading pools that meet this criteria.

Regulated pool

Pools covered by the swimming pool safety standard. That is, pools constructed on land associated with

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[*] QDC MP3.4 modifies the Australian Standard for swimming pool fencing, AS 1926:2007, parts 1 and 2.[5]
[†] The *Building Act 1975*, s. 246ATF provides that where a pool safety certificate is not provided, the seller must notify the buyer of this via the approved form. Where this occurs, the buyer is responsible for obtaining a pool safety certificate within 90 days of purchase (s. 246ATJ of the *Building Act 1975*).
[‡] *Building Act 1975*, s. 246ATG applies to non-shared pools. For shared pools, if a pool safety certificate is not current prior to a lease being signed, the owner must provide a *Notice of no pool safety certificate* to the tenant, the Queensland Building and Construction Commission and the body corporate. The body corporate then has 90 days to obtain a pool safety certificate (*Building Act 1975*, ss. 246ATI, 246ATK).
[§] *Building Act 1975*, s. 232.
[**] *Building Act 1975*, s. 245U.
[††] *Residential Tenancies and Rooming Accommodation Act 2008*, s. 217.
[‡‡] *Building Act 1975*, s. 246ATC.
[§§] *Building Act 1975*, Schedule 2.

residential premises, whether designed for permanent or temporary residence.*

This includes private swimming pools in residential backyards; shared pools in housing estates, townhouse and apartment complexes, residential care facilities, hotels, motels and resorts and caravan parks; spas; and wading pools capable of being filled to a depth of more than 300mm.† The standard applies to both indoor and outdoor pools.

Compliant fencing

Fencing compliant with the Queensland Development Code MP3.4. The key components of a compliant pool fence are:

- A minimum height of 1200mm from the ground, with no more than 100mm gap between the ground and the fence.
- Outward-opening gates that self-close and self-latch from all open positions.
- Latch releases 1500mm from the ground, 1400mm from the lowest fence rail or shielded.
- A 900mm 'non-climbable zone' around the entire barrier, in which there may be no objects (trees, furniture, barbeques, retaining walls etc) that could provide a foot or hand hold for a child to climb the fence.
- Display of a compliant guide to conducting cardio-pulmonary resuscitation.

The use of self-closing, self-latching doors as a barrier between a building and the pool area is no longer permitted (other than for indoor pools).[4]

Supervision

The QFCC uses a supervision classification model, based on the concept of adequate supervision (see Tables 1 and 2). Our classification is based on the Royal Life Saving Society's definition of 'active supervision'.[7,8] The criteria differ depending on whether the child was known to be in or around water at the time of the incident.

Table 1: Adequate supervision (child in or around water)

Criteria	Description
Capable supervisor	A person aged 16 years or older with appropriate physical and mental capacity to supervise a young child. Supervisor not adversely affected by alcohol or other substances.
Supervisor proximity	The supervisor is in contact with, or in arm's reach of, the child while in water. For children around (rather than in) water, the supervisor is in the immediate vicinity with clear line of sight.
Continuity of supervision	Continuous supervision without break or distraction.

Table 2: Adequate supervision (child not in or around water)

Criteria	Description
Capable supervisor	A person aged over 12 years with the appropriate physical, mental and developmental capacity to supervise a young child and not adversely affected by alcohol or other substances. Developmental capacity is dependent on a range of contextual factors.
Supervisor proximity	Supervisor is: • in physical contact with child • within arm's reach of child • in immediate proximity with or without clear line of sight, or • in surrounding proximity.
Continuity of supervision	Supervision is: • continuous, without break or distraction • continuous, with unplanned interruption of less than 10 minutes, or • planned intermittent supervision with break of less than 10 minutes.

* See the *Building Act 1975*, ss. 231A, 231B for the legal definition of a regulated pool and regulated land.
† Under the legislation, wading pools not capable of being filled to a depth of 300mm are known as *portable wading pools* and do not require fencing.

Results

Registered pools in Queensland

Queensland currently has almost 400,000 registered swimming pools. With a population of around 5 million, there is approximately one private swimming pool for every 13 people.*

South East Queensland (South)—comprising the local government areas of Gold Coast, Logan and Redlands—has the most registered pools, followed by Brisbane and South East Queensland (North) (Moreton Bay, Noosa, Sunshine Coast).†

This analysis uses the number of registered pools to calculate rates of fatal and non-fatal immersions. This allows us to account for the larger number of immersions that could be expected to occur in an area with a high number of pools. The number of registered pools in each region in 2016 is used for analysis in this paper and is shown in Table 3.‡

Table 3: Registered pools by Queensland region, 2016

Region	Number of registered pools (2016)
South East Queensland (South)	106,485
Brisbane	82,031
South East Queensland (North)	77,555
Far North Queensland	23,501
North Queensland	20,168
South East Queensland (West)	13,647
Central Queensland	13,412
Greater Whitsunday	11,038
Fraser Coast & Gympie	9,866
Bundaberg Burnett	6,245
Darling Downs South West	5,625
North West Queensland	2,092
Total	**371,665**

Fatal and non-fatal immersions, 2011–2021

Between 1 January 2011 and 31 December 2021, 40 children aged 0–4 years drowned in regulated swimming pools in Queensland. A further 853 children were treated by health professionals following a non-fatal immersion in a regulated swimming pool. This equates to a drowning rate of 0.1 per 1,000 registered pools in Queensland and a non-fatal immersion rate of 2.3 per 1,000 registered pools.

Non-fatal immersions can have serious consequences, including brain or organ damage and can impact long-term health outcomes and quality of life.[9] Research conducted by RLSSA has found that among children aged 0–4 years, for every fatal drowning there are 8 non-fatal drownings.[9] Recent research from New Zealand has found that for every fatal immersion in the 0–4 year age group there are 5 non-fatal immersions requiring hospitalisation.[10] The information analysed by the QFCC indicates a ratio of approximately 21 non-fatal immersions for every drowning.

This is well above the estimates provided by other research. However, this is likely the result of differences in methodology, with previous studies only considering non-fatal immersions requiring hospitalisation. Queensland's immersion notification system includes ambulance responses, whether or not hospitalisation was required.§

Demographics

Age

Previous research has found the mean age of children who drown in swimming pools is 2–2.3 years,[11] while recent research from New Zealand has found both fatal and non-fatal immersions (all water hazards) to be most common among children aged 1 year.[10]

Figure 1 compares the age profile of fatal and non-fatal immersion incidents in three-month blocks. It shows that while non-fatal immersions peak between 33 and 35 months of age (just prior to a child's third birthday), fatal immersions peak between 18 and 20 months.

* As at 2019, the Queensland Building and Construction Commission had records of 388,105 registered swimming pools, excluding those for which insufficient address details were available. As at 31 March 2022, the Queensland population was 5,296,098.[22]
† As at 2019, South East Queensland (South) had 110,793 registered pools; Brisbane had 85,207; and South East Queensland (North) had 81,964.
‡ The number of swimming pools registered by the end of 2016 was used to calculate rates, as this represents the mid-point of the 11-year period under review.
§ *Building Act 1975*, s. 245H; *Ambulance Service Act 1991*, s. 23.

Swimming pool immersions, 2011–2021

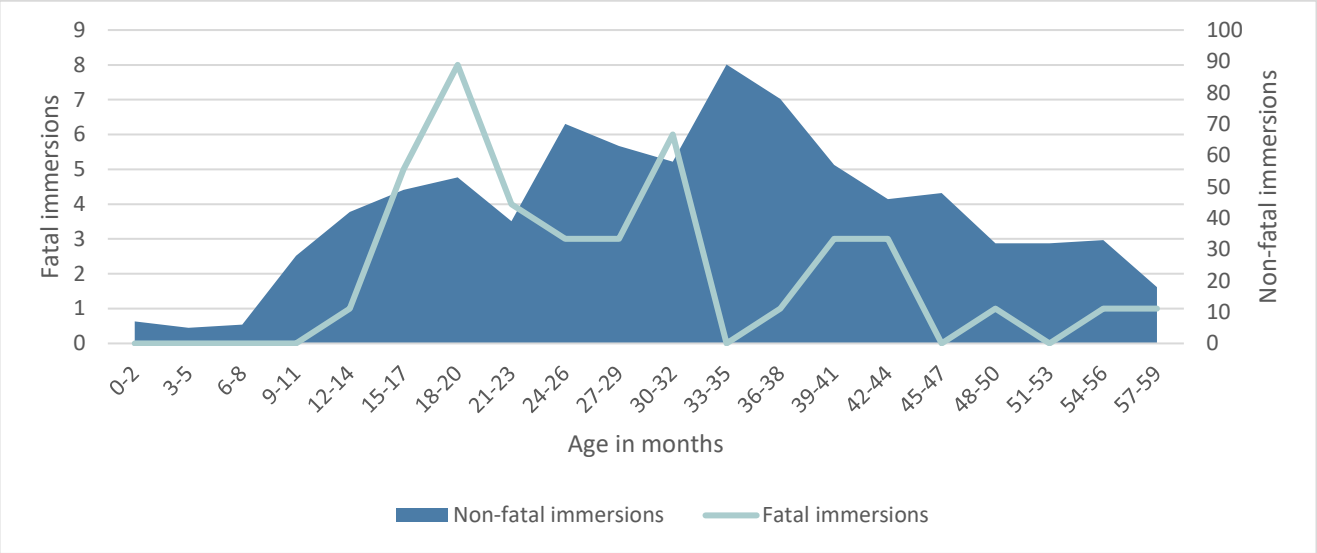

Figure 1: Fatal and non-fatal pool immersions, children 0–4 years, by age in months, 2011–2021

Sex

Male children are at greater risk of injury and death from external causes throughout childhood. Research has identified a variety of intrinsic and extrinsic factors that may influence greater risk-taking behaviour in boys.[3] Previous research has found males, including children aged 0–4 years, are more likely to be involved in both fatal and non-fatal drowning incidents.[10,12,13] While male children comprised 50.5 per cent of those involved in non-fatal immersions between 2011 and 2021 in Queensland, they represented 65 per cent of children who drowned.*

Season

Unsurprisingly, spring and summer are the seasons in which children are most active around pools, with most immersions (fatal and non-fatal combined) occurring in these seasons (50.7 per cent in summer, 30 per cent in spring). There was little difference in the seasonal patterns evident for fatal immersions compared with non-fatal immersions.

Regional patterns

South East Queensland (South) had the highest number of both drowning and immersion incidents over the total period. However, this region is a large, highly-populated area with the highest number of pools, so this is not unexpected.

The number of drownings occurring in each Queensland region is too small to enable the accurate calculation of rates for most areas. Combining drownings with non-fatal immersions, however, allows rates to be calculated and provides a more comprehensive understanding of the risks swimming pools pose across the state. The numbers of fatal and non-fatal immersions, along with a combined rate per 1,000 pools per Queensland region, are provided in Table 4.

* Note: Among non-fatal immersions, the sex of the child was not recorded in 9.1 per cent of cases.

Swimming pool immersions, 2011–2021

Table 4: Fatal and non-fatal pool immersions, children 0–4 years, by Queensland region, 2011–21

Queensland Region	Drownings (n)	Non-fatal immersion (n)	Total (n)	Rate per 1,000 pools
Central Queensland	2	54	56	4.2
North West Queensland	2	6	8	3.8
Far North Queensland	3	74	77	3.3
Fraser Coast & Gympie	2	30	32	3.2
North Queensland	2	58	60	3.0
South East Queensland (West)	2	36	38	2.8
South East Queensland (South)	13	276	289	2.7
Bundaberg Burnett	0	17	17	2.7
Greater Whitsunday	1	29	30	2.7
South East Queensland (North)	7	167	174	2.2
Darling Downs South West	3	9	12	2.1
Brisbane	3	97	100	1.2
Total	**40**	**853**	**893**	**2.4**

This analysis shows that Central Queensland has the highest rate of total immersion incidents, at 4.2 per 1,000 registered swimming pools. This is followed by North West Queensland at 3.8 per 1,000 pools.

Of note, the five Queensland regions with the highest rate of pool immersions covered Local Government Areas that were all in regional and remote areas of the state.

Trends over time

Between 2 and 6 children aged 0–4 years have drowned in regulated pools in Queensland each year since 2011. These small numbers do not enable any clear patterns or trends to be identified. However, when combined with the number of non-fatal immersions, there is a clear upward trend in the number of total incidents occurring each year.

However, to assess trends over time, it is preferable to analyse the rate at which immersion incidents occur, rather than raw numbers. Figure 2 shows the number of fatal and non-fatal immersion incidents each year and the three-year rolling average rate of both combined.

This shows that the average rate of total immersions has changed very little over time, remaining steady at around 0.2 per 1,000 registered pools.

Swimming pool immersions, 2011–2021

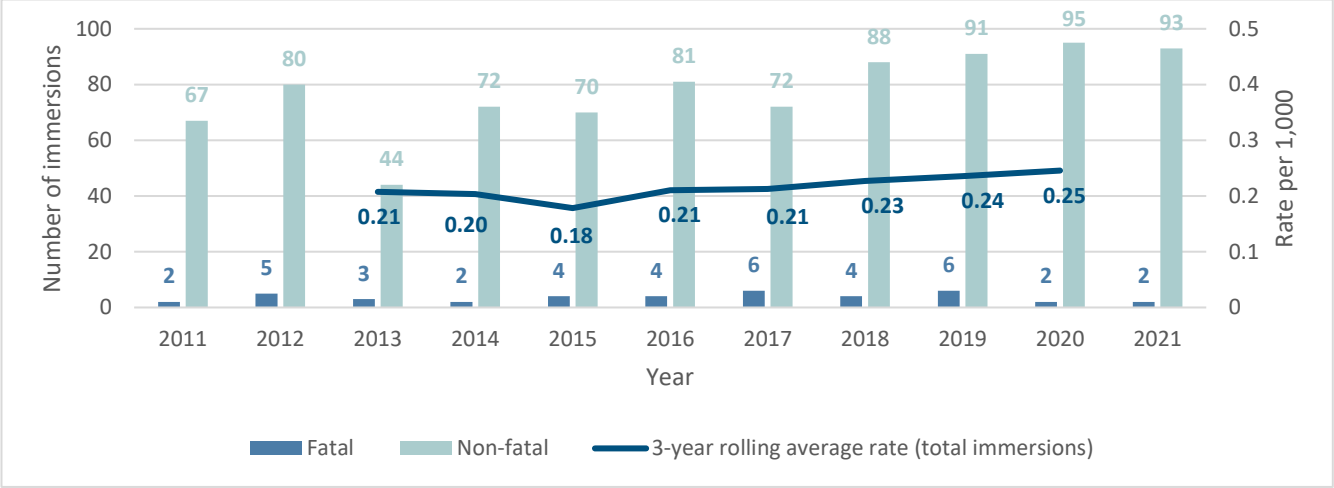

Figure 2: Number and rate of fatal and non-fatal pool immersions, children 0–4 years, 2011–2021

Data about both fatal and non-fatal immersions is only available since the second stage of swimming pool safety laws were rolled out from 2010. The QFCC is therefore unable to determine whether the steady immersion rate shown in Figure 2 represents a decrease on the rate of immersions prior to the introduction of these reforms.

However, data about fatal immersions is available back to 2004. Analysis of this data (see Figure 3 below) shows that the average number of young children drowning in private swimming pools did decrease following the introduction of reforms in 2010 and remained lower for several years before demonstrating an upward trend from 2017 to 2019. The average number of fatal immersions declined again in 2020 and 2021. However, it is not yet possible to determine if this represents an ongoing trend.

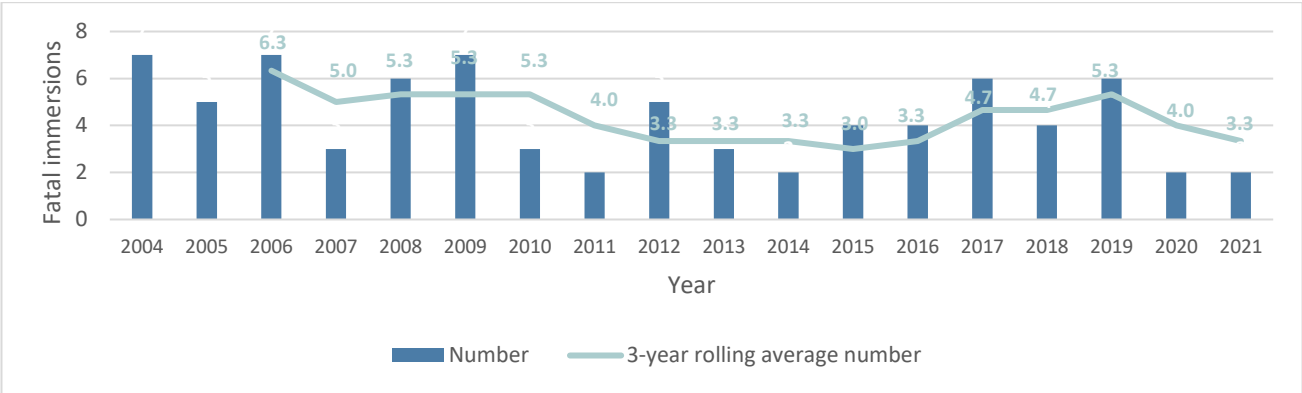

Figure 3: Number and average number of fatal pool immersions, children 0–4 years, 2004–2021

Overall, this information indicates that, at least initially, the pool fencing reforms likely helped to reduce the number of fatal and non-fatal immersions. While the number of non-fatal immersions has risen over time, this appears to be largely in line with the number of swimming pools registered each year, as indicated by the relatively consistent rate shown in Figure 2.

Swimming pool immersions, 2011–2021

Environmental characteristics

Pool location

Almost 70 per cent of total immersions were known to have occurred in pools associated with a single residence (i.e. backyard pools). Less than a quarter of total immersions occurred in shared pools common to multiple residences (such as townhouse complexes or resorts).[*] Of note, all but one of the fatal immersions occurred in a non-shared pool.

Of the 206 total immersions that occurred in shared pools, most occurred in hotels, motels or resorts (61.7 per cent), rather than in townhouse or apartment complexes.

Place of usual residence

Just over half of all immersion incidents occurred in a pool located at the child's usual place of residence (54.8 per cent).[†] For fatal incidents specifically, 62.5 per cent of incidents occurred at the child's home. Fatal incidents occurring elsewhere most commonly occurred at the home of a family member.[‡]

Remoteness and socio-economic status of location

From the information available, the QFCC was able to ascertain, at a high level, the geographic remoteness and the socio-economic status of the Local Government Areas in which fatal and non-fatal immersions have occurred.[§]

As at 2016, 89.8 per cent of Queensland's pools were located in regional areas and only 6.8 per cent in major cities. This finding reflects that some of the major coastal centres with high number of pools (such as the Gold and Sunshine Coasts) are considered regional areas under the Australian Statistical Geography Standard. Only 3.3 per cent of the state's pools are in remote or very remote areas.

In line with these proportions, 86.9 per cent of fatal and non-fatal immersions occurred in regional areas, 7.6 per cent in metropolitan areas and 5.5 per cent in remote areas.

However, remote areas had the highest combined rate of fatal and non-fatal immersions per pool. Total immersions occurred at a rate of 4.0 per 1,000 pools in remote areas, compared with 2.7 per 1,000 in major cities and 2.3 per 1,000 in regional areas.

As would be expected, wealthier areas had more pools—almost 85 per cent of pools in Queensland are in high to very high socio-economic areas. Around 10.2 per cent are in moderate socio-economic areas and only 5.5 per cent in low to very low socio-economic areas.

Despite the much lower number of pools in low socio-economic areas, these areas had a slightly higher rate of total immersions at 2.8 per 1,000 pools, equal to the rate in moderate areas. This compares with 2.3 per 1,000 pools for high socio-economic areas.

External causes of child death tend to be socially patterned, occurring at a disproportionate rate among disadvantaged families. For example, between 2004 and 2019 in Queensland, external cause deaths of children living in very low socio-economic areas occurred at 2.1 times the rate of those in very high socio-economic areas.[3] As such, the findings of this analysis contrast with the expected pattern. These findings are, however, in line with the concentration of pools in high to very high socio-economic areas of the state—with greater exposure to these water hazards comes an increased risk of fatal or non-fatal immersion.

Fatal immersions, 2011–2021

The above analysis of total immersion incidents—both fatal and non-fatal—provides a broad understanding of where and when these events occur, and who is most affected. *How* these incidents occur, and what can be done to prevent them, is best identified by detailed analysis of fatal drownings, for which greater detail is available.

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[*] The type of pool (shared or non-shared) was unable to be determined in 8 per cent of cases.

[†] In 337 of the total immersions, the incident occurred at a regulated pool located elsewhere (38 per cent). In 67 cases of non-fatal immersions, address data was insufficient to identify whether the incident address was also the child's usual place of residence. Proportions therefore do not add to 100 per cent.

[‡] Insufficient information is available about non-fatal immersions to identify the relationship between the property owner and the subject child.

[§] These findings are indicative only, as it was not possible to ascertain the exact remoteness and socio-economic status of the address of each pool in Queensland as well as those in which fatal and non-fatal immersions have occurred, due to the volume of records. As a proxy measure, the remoteness and socio-economic status of LGAs as at the 2016 census has been used.[23,24]

Swimming pool immersions, 2011–2021

Demographics

Aboriginal and Torres Strait Islander children

Research has found that First Nations children are over-represented in drowning statistics across Australia, with those aged 0–4 years drowning at almost twice the rate of non-Indigenous children.[14]

Among the swimming pool drowning fatalities in this age group in Queensland between 2011 and 2021, the majority were of non-Indigenous children (87.5 per cent). Due to the small number of First Nations children within this dataset, it is not possible to calculate rates.

Family-level adversity

For external cause deaths such as drowning, the QFCC records any available evidence about adverse life experiences the child or their family may be facing. This includes things like alcohol or substance use, mental health issues, offending or detention history, domestic and family violence or homelessness.

Forty per cent of the young children who drowned in swimming pools between 2011 and 2021 had evidence of at least one kind of family-level adversity present in their lives. As this paper relates to children aged 0–4 years, these factors largely pertain to family and household members and may not have been a contributing factor to the death incident.

As shown in Figure 4, many of the children who died in immersion incidents were from families experiencing multiple types of adversity. The cumulative impact of these experiences has been linked with chronic stress and long-term negative outcomes.[15] The most common types of adversities noted were domestic and family violence, offending or detention history, alcohol and substance use and alleged abuse.

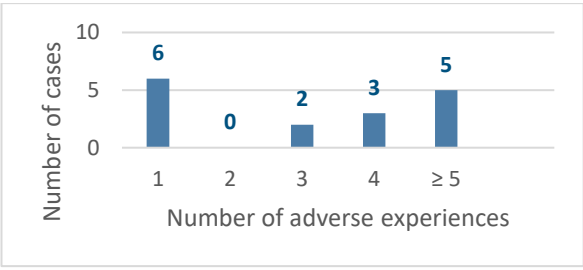

Figure 4: Number of adverse experiences present, fatal pool immersions, children 0–4 years, 2011–21

Known to Child Safety

Children known to the child protection system are likely to have experienced adversity—it is often the nature of these experiences that has brought them into contact with the system to begin with. These children are generally at increased risk of death from a range of external causes, including drowning. In the 16-year period between 2004 and 2019, the QFCC identified that children (0–17 years) known to the child protection system drowned at 4.5 times the rate of all Queensland children.[3]

Of the 40 drowning incidents under consideration here, almost half (19 children or 47.5 per cent) were of children known to the Queensland child protection system.[*] However, 7 of these 19 children only came to the attention of the system as a result of the incident leading to their death.[†]

Type of structure

Thirty-four of the 40 fatal immersion incidents occurred in in-ground pools. Four of the fatal immersion incidents occurring since 2011 have occurred in wading pools that met the definition of a regulated pool and were therefore subject to fencing requirements. One death occurred in an above-ground pools and in a further case the type of pool was not known.

Pool fencing

While all the pools in which children have drowned in Queensland between 2011 and 2021 were required to comply with the state's swimming pool safety laws, five of the structures involved did not have any pool fencing present. Four of these were wading pools that met the definition of a swimming pool under the *Building Act 1975*.

Means of gaining access

There are a variety of means by which children have gained access to the pool area in the cases of fatal immersion that have occurred during the period under review. These include:

- fencing defects, including 3-sided pool fencing in which a doorway provided direct access from the house
- open pool gates, whether deliberately propped open or open as a result of a faulty locking mechanism, and

[*] That is, known to the Department of Children, Youth Justice and Multicultural Affairs within the 12 months prior to their death.
[†] For example, a child who is resuscitated on scene but later dies in hospital may be the subject of a report to Child Safety by hospital staff, who are obliged to report harm or risk of harm to children.

- children climbing pool fences or using objects to gain access to the locking mechanism of the pool gate.

In some instances it remains unclear how the child gained access to the pool area.

Non-compliant fencing

Ninety per cent of fatal immersions were identified as having non-compliant fencing at the time of the incident (36 out of 40 cases). In 4 cases this was due to the absence of required fencing and in 32 cases defects in the fencing were noted.

Of the defects identified in these cases, the most common were gates that were not self-latching, objects within the non-climbable zone and gates not self-closing, as shown in Table 5.

Table 5: Fencing defects identified

Fencing defect	Frequency
Door or window providing direct access to pool from building	4
Gaps in fencing larger than specified limit	6
Gates not self-closing	15
Gates not self-latching	20
Objects within the non-climbable zone	16
Fence not required height	5
Fence not constructed of child-resistant material	2
Other defect not elsewhere classified	15

Of the cases with non-compliant fencing, multiple defects were identified in over 78 per cent of cases.

Pool safety certificates remain current for one year for shared pools and two years for non-shared pools. Interestingly, in 11 of the 32 events in which fencing was defective, there was a current pool safety certificate in place. This indicates that the property had been sold or leased to the current tenants within the previous 1–2 years and that, at the time of inspection, the pool fencing was compliant with the standards.

The most common defects identified in cases where a current certificate was in place were:

- gates not self-latching (8 instances)
- gates not self-closing (6 instances), and
- objects within the non-climbable zone (6 instances).

These defects can occur over time if the pool fence is not maintained. However, in a small number of cases, defects were present that may have been in existence at the time the inspection was conducted. These included doors and windows providing direct access from the home to the pool area, gaps in fencing larger than the specified limits, fencing not being of the required height or not being constructed of child-resistant material. In at least one case, the Coroner noted that the defects were present at the time the compliance certificate was issued and that disciplinary action had been taken against the certifier.

Open gates

Pool safety guidelines state that it is the responsibility of pool owners or occupiers to ensure that gates providing access to the pool area are kept closed. Under the *Building Act 1975*, failure to ensure a pool gate is securely closed at all times when not in use is an offence carrying a maximum penalty of over $23,000.*

In 20 of the 35 cases (57.1 per cent) in which pool fencing was present, there was evidence to indicate that the pool fencing had been left open or propped open at the time of the incident. This includes 2 cases where the fence was otherwise compliant with legislative requirements.

In 11 of the 20 cases, the pool gate had been deliberately propped open to enable the occupants of the home to easily access the pool area. In 6 incidents the gate was unintentionally open due to it being in a state of disrepair (i.e. it did not self-close or self-latch). In a further three incidents the gate appeared to have caught on an object preventing it from closing properly.

There were a notable number of cases in which household pets (namely dogs) played a role in facilitating a child's access to the pool area. In 3 cases, the child's parents or carers identified that the pool gate had been deliberately propped open to allow their

* *Building Act 1975*, s. 245T; *Penalties and Sentences (Penalty Unit Value) Amendment Regulation 2022.*

dogs access to the pool area (for example, to cool off in hot weather).

Climbing

There were a small number of instances (3) in which children appeared to have climbed the pool barrier or used a nearby object to gain enough height to operate the locking mechanism. In two of these cases, more than one child drowned in the incident.

Fencing maintenance in rental properties

Pool owners are responsible for maintaining pool fencing to ensure its compliance with the pool safety standard, including while the property is leased.

Nineteen of the properties involved in the 40 fatal immersions occurring between 2011 and 2021 were known to be rented by the occupants.* In most cases, for both owned and rented properties (11 and 10 cases respectively) the family had been in residence for more than 12 months.

Fifteen of the 19 rented properties in which drownings occurred were identified to have fencing that was not compliant with Queensland's pool safety standard. Of concern, in some of the cases analysed, tenants reported fencing defects to the property manager and evidence indicates repairs had not been completed to a satisfactory standard.

Supervision

Adequacy of supervision

In 26 of the 40 fatal pool immersions of young children occurring between 2011 and 2021, supervision was considered inadequate (65 per cent).

In 12 cases, supervision was considered to be adequate, largely on the basis that the child was not known to be in or around water at the time of the incident. In a further 2 cases the information provided to the QFCC was insufficient to enable an assessment of the adequacy of supervision.

The factors associated with inadequate supervision are provided in Table 6.

Table 6: Factors for inadequate supervision

Supervision factor	n
Supervisor affected by alcohol or substances	2
Young age of supervisor	4
Supervisor not within immediate proximity (without obstruction) while in or around water	13
Supervision not continuous while in or around water	15
Break in supervision too long (child not in or around water)	9

Note: Some cases featured more than one factor contributing to inadequate supervision. Figures therefore do not sum to the total number of cases (n = 26).

Supervising in company

There were 12 cases among the 40 fatal immersions that occurred while people other than usual household occupants were present (for example, a family gathering or visitors to the home). These circumstances may create competing priorities for supervisors who may be attempting to supervise additional children or juggle socialising with visitors. The following circumstances were included in this definition:

- police reports indicate that a party or gathering was taking place at the time of the incident
- a group of children, beyond the child's sibling group, were in attendance
- multiple adults that do not normally reside at the premises were present, or
- the ratio of adults to children was such that the provision of adequate supervision was challenging.

In 6 of the 12 cases, the child was known to be in or around water at the time of the incident. These findings reinforce the importance of ensuring that a nominated capable supervisor is within arm's reach and is providing continuous supervision during social events around pools.

* Seventeen properties were known to be owned by the occupants and in a further 4 cases it is unknown whether the property was being rented or owned by the occupants.

Discussion

This analysis has identified the distribution of regulated swimming pools across the state, which are concentrated around the high-population centres of Brisbane, Logan, and the Gold and Sunshine Coasts. However, areas such as Central Queensland, North West Queensland and Far North Queensland have the highest rate of immersions (fatal and non-fatal combined) per 1,000 pools.

Factors that may underpin an increased risk of immersion in regional and remote areas of the state are worthy of further investigation. Particularly for remote areas, where pools are less common, carers may be less familiar with the components of best-practice water safety. Compliance with legislation may be challenging due to geographic isolation and the availability of fencing contractors and safety inspectors.

This analysis also identified that, contrary to the pattern typically seen for external-cause child deaths, immersion rates were not markedly higher in low socio-economic areas. The higher-than-expected rate in high socio-economic areas is likely the result of greater exposure to these types of water hazards, with the majority of pools being constructed in high socio-economic areas of the state.

While the number of pool immersions has increased over time, there was very little change in the state-wide rate of total immersions per 1,000 pools, indicating that this increase is commensurate with the number of pools being constructed. Most immersions occur in backyard pools, with just over half occurring at the child's usual place of residence.

A detailed analysis of the 40 fatal immersions occurring in Queensland between 2011 and 2021 found that fencing was non-compliant in 90 per cent of cases. The most commonly noted defects related to gates not self-closing or self-latching and objects being placed within the non-climbable zone. These are issues likely to change over time, as fencing deteriorates, landscapes change and home occupants move outdoor furnishings. This indicates that maintenance of pool fencing over time is an issue.

As pool safety inspections are generally only required when a property is sold or leased, many years may pass between inspections in properties with long-term occupants. However, defects were noted even in properties with a current pool safety certificate. It may be that the fencing for these properties had been modified or fallen into disrepair subsequent to buying or leasing the property. It is also possible that the inspection conducted at the time of sale or lease did not identify the defects. Some of the defects noted, such as the fencing not being of the required height, are likely to have been ongoing issues.

Of even greater concern is the number of instances identified in which pool owners had deliberately propped open pool gates. The high number of non-compliant fences among rental properties is also of concern. Tenants are reliant on property managers and owners attending promptly to fencing maintenance and conducting quality repairs when required, but must also take responsibility for proper use of the pool fencing and reporting issues as they arise. In general, the information available online about the responsibilities of lessors is focused on requirements relating to pool safety certificates,[16,17] although the Queensland Building and Construction Commission does provide some guidance for managing pool safety during a tenancy for property managers.[6,18]

The number of cases in which supervision was inadequate, particularly when children were known to be in or around water, is also concerning. The Royal Life Saving Society Australia (RLSSA) considers that when supervising a child under 5 years in or around water, supervisors should be 'within arms' reach and interacting with your child'.[7] The RLSSA specifies that active supervision means 'focusing all of your attention on your children all of the time when they are in, on or around water'.[8] It 'is not an occasional glance while you nap, read or undertake household chores, and it is not looking outside at your kids playing while you are inside'.[7] None of the children who were known to be in or around water at the time of the incident were being actively supervised.

Conclusion

This paper has reviewed trends and patterns in both fatal and non-fatal immersion incidents of young children aged 0–4 years, occurring in Queensland since the implementation of its swimming pool safety reforms from 2010. It has focused on assessing two of the key components of drowning prevention—swimming pool fencing and supervision.

While Queensland's swimming pool safety laws have created a robust, single standard for pool fencing throughout the state, fencing only remains effective when adequately maintained and properly used. Further, water safety for young children should not rely on physical barriers alone. Young children require close supervision, particularly when they are known to be in

or around water. The findings of this paper indicate that pool owners may have become complacent about swimming pool safety since the reforms were rolled out from 2010. There is a clear need to raise awareness among pool owners, parents and carers about the importance of both pool fencing and supervision in preventing both fatal and non-fatal pool immersions. There is also a need for further review of factors that may be contributing to higher rates of immersions in specific regional and remote areas.

The QFCC will continue to work with relevant agencies to identify and progress options to achieve this.

References

1. Kidsafe Tasmania. *Home Safety Community Action Kit: A guide for health professionals*. https://www.kidsafetas.com.au/home_safety_community_action_kit/ (2014).

2. World Health Organization & UNICEF. *World Report on Child Injury Prevention*. https://www.who.int/violence_injury_prevention/child/injury/world_report/en/ (2008).

3. Queensland Family and Child Commission. *Counting Lives, Changing Patterns: Findings from the Queensland Child Death Register 2004-2019*. https://www.qfcc.qld.gov.au/sites/default/files/2021-05/QFCC 16 Year Review -Web Version.pdf (2020).

4. Department of Housing and Public Works. *Guidelines for pool owners and property agents*. https://www.hpw.qld.gov.au/__data/assets/pdf_file/0008/4112/guidelinesforpoolownersandpropertyagents.pdf (2016).

5. Dixon, N. *Swimming Pool Safety Laws*. https://documents.parliament.qld.gov.au/explore/ResearchPublications/ResearchBriefs/2010/RBR201023.pdf (2010).

6. Queensland Building and Construction Commission. Pool safety in rental properties. *Residential Tenancies Authority* https://www.rta.qld.gov.au/webinars/pool-safety-in-rental-properties (2020).

7. Royal Life Saving Society Australia. *Fact Sheet 1: Supervise*. https://rlssq.com.au/about-us/factsheets/.

8. Royal Life Saving Society Australia. Keep watch actions. *Royal Life Saving Society Australia* https://www.royallifesaving.com.au/about/campaigns-and-programs/keep-watch/keep-watch-actions.

9. Royal Life Saving Society Australia. Non-fatal drowning. *Royal Life Saving Australia* https://www.royallifesaving.com.au/research-and-policy/drowning-research/non-fatal-drowning.

10. Peden, A. E. & Richardson, K. Quantifying fatal and non-fatal drowning in children under five in Aotearoa, New Zealand. *Aust N Z J Public Health* **46**, 46–51 (2022).

11. Franklin, R. C. & Peden, A. E. Improving pool fencing legislation in Queensland, Australia: Attitudes and impact on child drowning fatalities. *Int J Environ Res Public Health* **14**, (2017).

12. Royal Life Saving Society Australia. *National Drowning Report 2022*. https://www.royallifesaving.com.au/research-and-policy/drowning-research/national-drowning-reports (2022).

13. Mahony, A. & Pidgeon, S. *Non-Fatal Drowning in Australia*. https://www.royallifesaving.com.au/research-and-policy/drowning-research/non-fatal-drowning (2021).

14. Pidgeon, S. & Nimmo, L. *Drowning deaths among Aboriginal and Torres Strait Islander peoples*. https://www.royallifesaving.com.au/__data/assets/pdf_file/0007/38842/RLS_AboriginalReport2020_FINAL_LR.pdf (2020).

15. Grey, H. R., Ford, K., Bellis, M. A., Lowey, H. & Wood, S. Associations between childhood deaths and adverse childhood experiences: An audit of data from a child death overview panel. *Child Abuse Negl* **90**, 22–31 (2019).

16. Queensland Building and Construction Commission. Buy, sell or lease a property with a pool. *Swimming Pools* https://www.qbcc.qld.gov.au/your-property/swimming-pools/buy-sell-lease-property-pool (2021).

17. Residential Tenancies Authority. Pool laws and maintenance. *During a tenancy: Maintenance and repairs* https://www.rta.qld.gov.au/during-a-tenancy/maintenance-and-repairs/pool-laws-and-maintenance.

18. Queensland Building and Construction Commission. *Pool Safety Checklist for Property Managers*. https://www.qbcc.qld.gov.au/resources/guide/pool-safety-checklist-property-managers-fact-sheet (2021).

19. Australian Building Codes Board. *Understanding the NCC: Building classifications*.

https://www.abcb.gov.au/sites/default/files/resources/2022/UTNCC-Building-classifications.PDF (2022).

20. Department of Housing and Public Works. *Local government swimming pool safety guideline*. https://www.qbcc.qld.gov.au/your-property/swimming-pools/local-councils-role-pool-safety (2016).

21. Department of State Development Infrastructure Local Government and Planning. Queensland regions. *State Development, Infrastructure, Local Government and Planning* https://www.statedevelopment.qld.gov.au/regions/queensland (2022).

22. Queensland Government Statistician's Office. Queensland population counter. *Population estimates* https://www.qgso.qld.gov.au/statistics/theme/population/population-estimates/state-territories/qld-population-counter (2022).

23. Australian Bureau of Statistics. *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016 (Cat. No. 2033.0.55.001)*. https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/2033.0.55.001Main+Features12016?OpenDocument (2018).

24. Queensland Government Statistician's Office. *Remoteness Area by Local Government Area (ASGS 2016)*. (2016).

Appendix A: Methods

Data sources

The Queensland Child Death Register

Records relating to children aged 0–4 years who have drowned in swimming pools in Queensland between 2011 and 2021 were extracted from the QFCC's Queensland Child Death Register.

Immersion notifications

The QFCC also holds records of pool immersions since the introduction of these provisions in December 2010.[*] Although there are some limitations, these notifications provide a good indication of the number of non-fatal immersions occurring in pools each year.

Immersion notifications received between 1 January 2011 and 31 December 2021 were reviewed. A data cleansing process was undertaken to ensure the accuracy of the data to the greatest extent possible. The following records were excluded from this dataset:

- immersions of children 5 years of age or older
- duplicate records (including fatal immersions captured in data from the Child Death Register)
- immersions not occurring in regulated pools (public pools, baths, non-pool water hazards) or those with insufficient detail to determine the type of water hazard[†]
- records with insufficient incident address details.

The local government area in which the incident occurred (current as at time of incident) was cross-checked for accuracy. In a small number of cases where it was found to be incorrect or missing, geocoding services using current local government boundaries were used to populate this field.

To allow for greater comparability with the information held in the Child Death Register, the location address was examined to help identify the type of property and type of pool.[‡§]

The Queensland Pool Register

The register of regulated pools is currently maintained by the Queensland Building and Construction Commission (QBCC). The QBCC provided to the QFCC details of all pools registered in Queensland each year between 2010 and 2019. This allowed QFCC to identify the number of regulated pools in Queensland during the time period analysed for this paper and where these are located.

The following types of swimming must be registered on the Queensland Pool Register

- Pools situated on land on which one of the following buildings is constructed:
    - Houses and townhouses (Class 1)
    - Apartments, hotels and resorts (Class 2)
    - Boarding houses, hostels or residential care facilities (Class 3)
    - A residence within a non-residential building (Class 4)
- A caravan park
- A residential park.[**19]

Public pools are not considered regulated pools. In addition, pools associated with Class 3 buildings are exempt from provisions relating to regulated pools *if* an approved pool safety management plan is in place.

Due to technical issues arising from system upgrades and changes to local government boundaries, several records were excluded from this dataset due to insufficient location details. The excluded records represented only 0.3 per cent of the total registered pools in Queensland. A sample of these records indicated that excluding these records was unlikely to disproportionately affect any particular local government area.

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[*] A copy of notifications completed by health professionals are forwarded to the QFCC under s. 245I of the *Building Act 1975*.
[†] It is possible that a small number of immersions in other water hazards have been included in this dataset where insufficient details were provided to allow these to be identified and excluded.
[‡] In some instances, there was no evidence of a swimming pool at the location address using satellite imaging. Pools may have been decommissioned since the event occurred, or have involved a wading pool, certain types of which are also covered by Queensland's pool fencing laws.
[§] The *Building Act 1975* defines a swimming pool as an excavation or structure capable of being filled with water to a depth of 300mm or more; capable of being used for swimming, bathing, wading, paddling or other human aquatic activity; and principally designed for this use, despite its current use. It includes spas (portable and fixed) and wading pools. Wading pools are exempt if they are considered *portable wading pools*, defined as those capable of being filed with no more than 300mm of water; with a volume of less than 2000L and with no filtration system.
[**] *Building Act 1975*, s. 231A.

Swimming pool immersions, 2011–2021

Data analysis

To identify trends and patterns it is important to consider the *rate* at which fatal and non-fatal immersions occur, rather than simply the number of incidents. Typically, the QFCC uses the population of Queensland children to calculate mortality rates.

However, for this analysis, it is more meaningful to use the number of swimming pools in Queensland as the basis for calculating rates. This allows us to account for the larger number of immersions that could be expected to occur in an area with a high number of pools. Trends in immersions over time and across different areas of the state are presented as a rate per 1,000 registered swimming pools.

Local government areas and Queensland regions

Local governments play a critical role in enforcing Queensland's swimming pool safety laws. Local governments are responsible for conducting inspections of pool fencing (following an immersion incident or in response to a complaint), taking enforcement action, managing exemptions to pool safety standards and cancelling pool safety certificates when required.[20]

Due to the small number of deaths (and relatively small number of immersions) occurring within each local government area, it was not possible to analyse the data at this level.* Instead, data has been aggregated into larger regions, according to the local government groupings used by the Department of State Development, Local Government and Planning, as shown below.[21]

Note: Under this model, Brisbane City Council is split across the South East Queensland North and West divisions. For the purpose of the QFCC's analysis, Brisbane was considered as a separate region.

Far North Queensland

- Aurukun
- Cairns
- Cassowary Coast
- Cook
- Croydon
- Douglas
- Etheridge
- Hope Vale
- Kowanyama
- Lockhart River
- Mapoon
- Mareeba
- Napranum
- Northern Peninsula Area
- Pormpuraaw
- Tablelands
- Torres
- Torres Strait Island
- Weipa Town
- Wujal Wujal
- Yarrabah

North Queensland

- Burdekin
- Charters Towers
- Hinchinbrook
- Palm Island
- Townsville

North West Queensland

- Burke
- Carpentaria
- Cloncurry
- Doomadgee
- Flinders
- McKinlay
- Mornington
- Mount Isa
- Richmond

Greater Whitsunday

- Isaac
- Mackay
- Whitsunday

Central Queensland

- Banana
- Barcaldine
- Barcoo
- Blackall-Tambo
- Boulia
- Central Highlands
- Diamantina
- Gladstone
- Livingstone
- Longreach
- Rockhampton
- Woorabinda

* This could lead to the identification of individuals and makes it difficult to calculate and compare rates.

Swimming pool immersions, 2011–2021

- Winton

Bundaberg Burnett

- Bundaberg
- Cherbourg
- North Burnett
- South Burnett

Fraser Coast and Gympie

- Fraser Coast
- Gympie

Darling Downs South West

- Balonne
- Bulloo
- Goondiwindi
- Maranoa
- Murweh
- Paroo
- Quilpie
- Southern Downs'
- Toowoomba
- Western Downs

South East Queensland (North)

- Brisbane suburbs north of Brisbane River (analysed separately by QFCC)
- Moreton Bay
- Noosa
- Sunshine Coast

South East Queensland (West)

- Brisbane suburbs south of Brisbane River (analysed separately by QFCC)
- Ipswich
- Lockyer Valley
- Scenic Rim
- Somerset

South East Queensland (South)

- Gold Coast
- Logan
- Redlands