6. Inanimate mechanical forces

Injury from inanimate mechanical forces involve being struck by, cut, or otherwise injured by an object. This includes being caught, crushed, jammed, or pinched between objects. It can include injuries from sports equipment, jammed fingers, and injuries from sharp objects such as knives, scissors, or glass.

This chapter looks at tamariki hospitalisation for injury from in animate mechanical force.

In the years 2014 to 2018, there were 8 tamariki deaths from inanimate mechanical forces for tamariki aged 0 to 14 years. Due to small numbers, there is no further analysis on fatalities from inanimate mechanical forces presented in this chapter.

In brief

From 2017 to 2021, 5,852 tamariki were hospitalised for injury from inanimate mechanical forces. The most common cause was a 'cut/pierce injury' (30%, n=1,780) followed by 'striking against or being struck by objects' (26%, n=1,546) and from being 'caught, crushed, jammed, or pinched between objects' (25%, n=1,455).

Over the same period, 42% (n=2,436) of hospitalisations for injury from inanimate mechanical forces were in tamariki aged 0 to 4 years, who also had the highest rate of hospitalisation of any of the age groups (160.4 per 100,000).
Looking at the three main age groups:

For tamariki aged 0 to 4 years the most common causes of hospitalisation for injury from inanimate mechanical forces was of being 'caught and jammed between objects' (58.6 per 100,000). The majority of these were in tamariki aged 1 to 4 (90.8%, n=2,213).

For tamariki in the age groups 5 to 9 years and 10 to 14 years, the most common cause of hospitalisation for injury from inanimate mechanical forces was 'cut/pierce' injury (39.9 and 45.8 per 100,000 respectively).

Pacific children had the highest rates of hospitalisation for inanimate mechanical force injury out of all ethnic groups. The highest rate of hospitalisation for Pacific children was in the age group 0 to 4 years (216.3 per 100,000, n=317). Asian children had the lowest rate of hospitalisation for inanimate mechanical force injury in all of the age groups.

Tamariki living in the most relatively deprived areas of Aotearoa (NZDep quintile 5) had the level of hospitalisation for inanimate mechanical force injury (n=1,776, rate of 143.6 per 100,000), while tamariki living in the least relatively deprived areas (NZDep quintile 1) had the lowest level (n=877, rate of 97.9 per 100,000).

Male tamariki accounted for a greater proportion of hospitalisations for injury related to inanimate mechanical forces (60.5%), compared with 39.5% for female tamariki.

Trend over time

In the years 2017 to 2021, 5,852 tamariki were hospitalised for injury from inanimate mechanical forces.

Tamariki hospitalisation rates for injury related to inanimate mechanical forces have decreased over time (from 163.2 per 100,000 in 2012 to 110.5 per 100,000 in 2021).

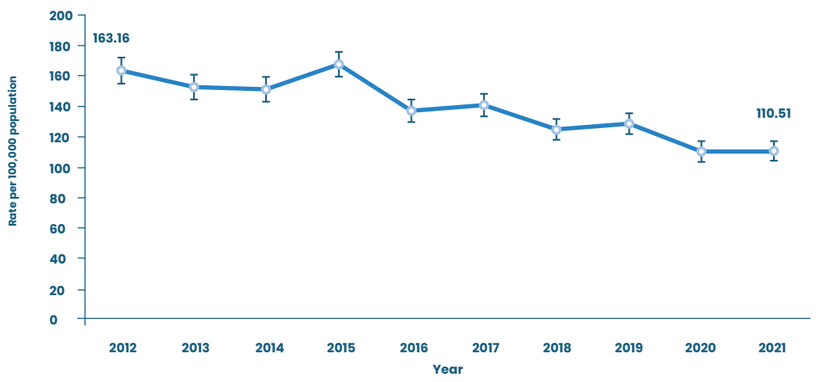
The most common causes of tamariki hospitalisation for injury from inanimate mechanical forces for tamariki were:

- 'Cut/pierce injury' (30%, n=1,780)
- 'Striking against or being struck by objects' (26%, n=1,546)
- Being 'caught, crushed, jammed or pinched between objects' (25%, n=1,455).

Figure 45 shows the rates of tamariki hospitalisation for injury from inanimate mechanical forces for tamariki, over time, for the years 2012 to 2021.

Additional data on tamariki hospitalisation for injury from inanimate mechanical forces, broken down by year, are provided in Appendix 2. [138]

Figure 45: Rates of tamariki hospitalisation for injury from inanimate mechanical forces, over time, 2012–2021



138. Table 51, Appendix 2.

Age Group

In the years 2017 to 2021, 42% (n=2,439) of all tamariki hospitalisations from inanimate mechanical forces were for those aged 0 to 4 years, and this group had the highest rate of these hospitalisations out of all the age groups (160.4 per 100,000). The majority of hospitalisations in the 0 to 4 age group were in tamariki aged 1 to 4 years (90.8%, n=2,215), compared with 9.2% (n=224) of hospitalisations in tamariki under 1 year of age.

The hospitalisation rates for injury from inanimate mechanical forces injury for tamariki aged 5 to 9 years and 10 to 4 years were similar to each other (109.5 per 100,000 and 100.2 per 100,000 respectively).

When looking at the causes of tamariki injury from inanimate mechanical forces in tamariki by age, the highest rate of hospitalisation of those aged 0 to 4 years was for injury I the categories 'caught and jammed between objects' (58.6 per 100,000), followed by 'striking against or being struck by objects' (36.4 per 100,000) and injury from a 'cut/pierce' injury (25.6 per 100,000).

For tamariki in the age groups 5 to 9 years and 10-14 years, the rates of hospitalisation for injury from inanimate mechanical forces had a different pattern from those of the youngest age group. For both of these older age groups, the most common cause of hospitalisation was from a 'cut/pierce' injury (39.9 and 45.8 per 100,000 respectively), followed by 'striking against or being struck by objects' (27.8 and 33.4 per 100,000 respectively) and from 'caught and jammed between objects' (25.4 and 8.9 per 100,000, respectively).

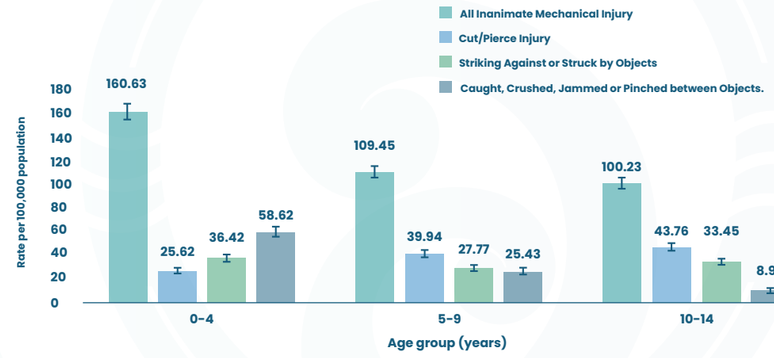
Table 19 shows tamariki hospitalisations for injury from inanimate mechanical forces, presented by age-group, for the years 2017 to 2021.

Figure 46 shows the rates of tamariki hospitalisation for injury from inanimate mechanical forces for tamariki, presented by age-group and the top three causes, for the years 2017 to 2021.

Table 19: Tamariki hospitalisations for injury from inanimate mechanical forces, by age-group, 2017–2021

Age Group (Years)	No. of Hospitalisations	%	Rate/100,000	95% CIs	
0 -4	2,439	41.7	160.63	154.13	166.94
5 - 9	1,825	31.2	109.45	104.49	114.59
10 - 14	1,588	27.1	100.23	95.24	105.15
Total	**5,852**	**100**	**122.68**	**119.56**	**125.87**

Figure 46: Rates of tamariki hospitalisation for injury from inanimate mechanical forces, by age-group and top three causes, 2017-–2021



Ethnicity

In the years 2017 to 2021, Pacific children had the highest rates of hospitalisation for injury from inanimate mechanical forces out of all ethnic groups and across every age group. The highest rate of hospitalisation for Pacific children was in the 0 to 4 years age group (216.3 per 100,000, n=317).

Asian children had the lowest rates of hospitalisation for injury from inanimate mechanical forces, across each age group.

Differences between ethnic groups in rates of hospitalisation for injury from inanimate mechanical forces were most pronounced in the age group 0 to 4 years. Looking at the age group 0 to 4 years:

For tamariki aged less than 1 year old, MELAA children had the highest rate of hospitalisation for injury from inanimate mechanical forces (128.2 per 100,000), although this should be interpreted with caution due to low numbers (n=8). European/other children had the second-highest rate of hospitalisation (99.2 per 100,000, n=117), followed by tamariki Māori (76.6 per 100,000, n=65).

For children in the age group 1 to 4 years, Pacific children had the highest rate of hospitalisations for injury from inanimate mechanical forces (254.7 per 100,000, n=298) followed by tamariki Māori (213.3 per 100,000, n=716).

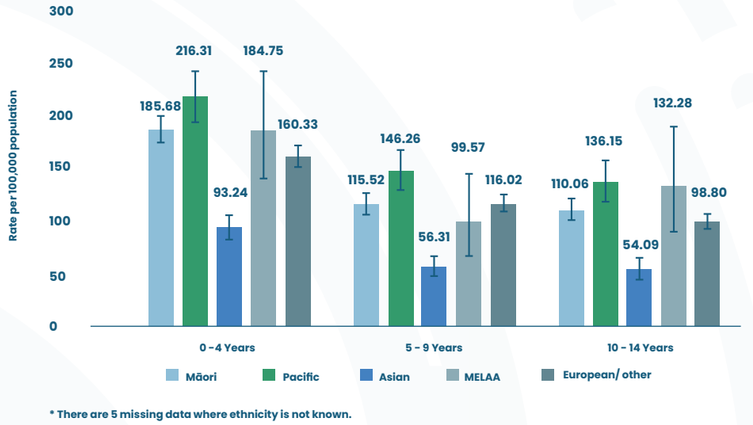
Figure 47 shows the rates of tamariki hospitalisation for injury from inanimate mechanical forces, presented by age group and prioritised ethnicity for the years 2017 to 2021. [139]

Figure 48 shows the rates of hospitalisation for injury from inanimate mechanical forces for tamariki aged 0 to 4 years, by prioritised ethnicity, for the years 2017 to 2021.

Additional data on tamariki hospitalisations for injury from inanimate mechanical forces, by prioritised ethnicity and age, are provided in Appendix 2. [140]

139. Please note that the MELAA analysis should be interpreted with caution due to low numbers.
140. Table 52, Appendix 2.

Figure 47: Rates of tamariki hospitalisation for injury from inanimate mechanical forces, by age group and prioritised ethnicity, 2017–2021,*

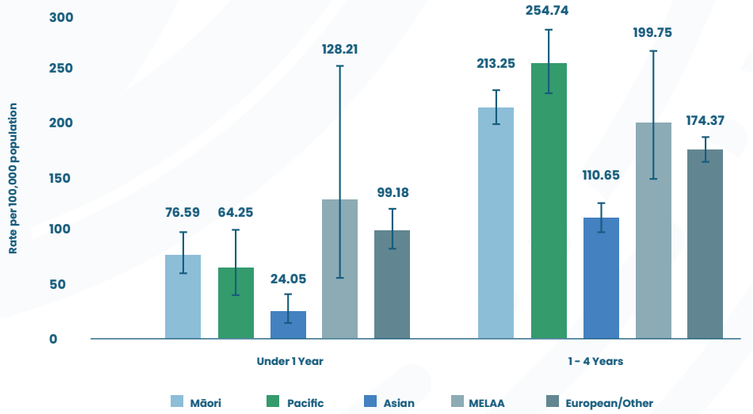


* There are 5 missing data where ethnicity is not known.

Points to note from Figure 47:

- The differences in rates of hospitalisation were larger between younger age groups than in older age groups. For example, in the 5 to 9 years age group, tamariki Māori and European/other children had very similar rates of hospitalisation (115.5 per 100,000 for Māori and 116.0 for European/other) but in the 0 to 4 years age group, the rates of hospitalisation for tamariki Māori were significantly higher than those for European/other children (185.7 per 100,000 for tamariki Māori compared with 160.3 per 100,000 for European/ other children).

*Figure 48: Rates of hospitalisation for injury from inanimate mechanical forces for tamariki aged 0–4 years, by prioritised ethnicity, 2017-2021**



* There are 3 missing data where ethnicity was not known.

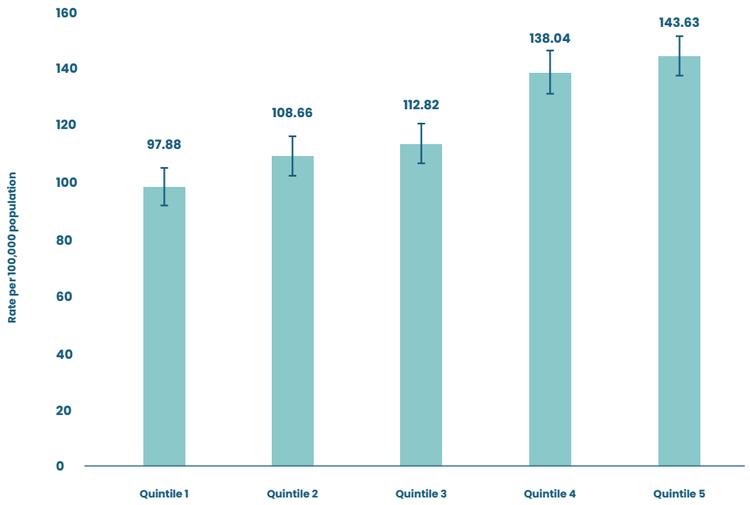
Socio-economic deprivation

In the years 2017 to 2021, tamariki living in the most relatively deprived areas of Aotearoa (NZDep quintile 5) had the highest number of hospitalisations for injury from inanimate mechanical forces (n=1,776), and a hospitalisation rate of 143.6 per 100,000.

Tamariki living in the least relatively deprived areas of Aotearoa (NZDep quintile 1) had the lowest number of hospitalisations for injury from inanimate mechanical forces (n=877) with a hospitalisation rate of 97.9 per 100,000.

Figure 49 shows the rates of tamariki hospitalisation for injury from inanimate mechanical forces, presented by NZDep quintile for the years 2017 to 2021.

*Figure 49: Rates of tamariki hospitalisation injury for injury from inanimate mechanical forces, by NZDep quintile, 2017–2021**



* There are 31 missing data in the NZDep quintile data. Total = 5,821.

Gender

In the years 2017 to 2021, male tamariki accounted for a greater proportion of hospitalisations for injury from inanimate mechanical forces (60.5%, n=3,543) than female tamariki (39.5%, n=2,309). The hospitalisation rate for males (144.6 per 100,000) was significantly higher than that for females (99.5 per 100,000).

Table 20 shows tamariki hospitalisations for injury from inanimate mechanical forces, presented by gender, for the years 2017 to 2021.

Table 20: Tamariki hospitalisations for injury from inanimate mechanical forces, by gender, 2017–2021

	Number	%	Rate/100,000	95% CIs	
Females	2,309	39.5	99.52	95.50	103.66
Males	3,543	31.60.52	144.62	139.90	149.46
Total	**5,852**	**100.00**	**122.68**	**119.56**	**125.87**

Policy implications

Inanimate mechanical force injury is a broad category, which presents challenges for policy-level intervention and focus for injury prevention specialists. This highlights the need for additional research to help explain the data and understand the best ways to intervene to reduce tamariki injury from inanimate mechanical forces.

Notwithstanding the need for more research, our main recommendation is that ongoing investment is needed in holistic home safety and healthy-home visits for whānau.

The Home Safety Programme currently offered by Ririki Haumaru | Safekids Aotearoa and its network of community providers, in partnership with ACC, provides the basis for such a programme, with its focus on working with whānau, both in the community and in their homes, to make changes that keep their tamariki safe from avoidable harm.

Taking a holistic approach also means making injury prevention a legitimate part of the mandate of numerous home visit providers who already have well-established family and whānau relationships. This could include:

- Healthy Homes Initiatives, which work with eligible whānau to carry out a comprehensive housing assessment and complete an individualised action plan to create a warmer, drier, healthier home
- Well Child Tamariki Ora, a series of health visits and support that are free to all whānau for tamariki from around the age of 6 weeks up to 5 years).
- Child Development Services, Whaikaha (Ministry for Disabled People)-funded community-based services to support disabled children and children who are not meeting development milestones
- The Family Start programme, a free home-visiting programme in parts of the country, focusing on improving children's growth, health, relationships, family circumstances, environment, and safety.

From the data we have presented in this chapter, addressing the risk of tamariki aged 1 to 4 years being 'caught, crushed, jammed or pinched between objects' (such as drawers) would have the biggest impact. This would have to be done in partnership with Pacific communities to ensure prevention measures were effective for Pacific children, who had the highest rates of tamariki hospitalisation for injury from inanimate mechanical forces out of all the ethnic groups. As we noted in our previous data book, there is good evidence for home safety programmes where injury prevention specialists are able to work with whānau on reducing risks to tamariki (e.g., by removing opportunities to climb onto furniture).[141]

Supporting whānau in rental accommodation is also an important part of addressing the injury risk from inanimate mechanical forces. Some evidence suggests that being in rental accommodation is a barrier to fitting safety equipment in the home to keep tamariki safe.[142] We also recommend the increased use of safety glass in windows and doors in rental properties.

141. Safekids Aotearoa, 2015.
142. Ingram et al., 2012.