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Northern Ireland
Statistics and Research Agency
Gníomhaireacht Thuaisceart Éireann
um Staitisticí agus Taighde

Clinically seriously injured (MAIS 3+) road casualties in Northern Ireland, 1999-2024

Analysis, Statistics and Research Branch

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In this Report:

Key points

- In 2024 there were 50 MAIS3+ casualties – this is a decrease of 28% over the year and a decrease of 79% from the peak of 235 in 2002.

- While the numbers of MAIS3+ casualties are lower than PSNI reported seriously injured, the overall trends are similar: both series have shown a historical decrease followed by signs of levelling off, but with PSNI Serious injuries increasing in more recent years.

- Males accounted for seven-tenths (70%) of MAIS3+ casualties in Northern Ireland in the five years from 2020-2024. This is greater than the proportions for male casualties reported in overall hospital admissions (68%) and PSNI serious injuries (62%).

- One quarter (25%) of MAIS3+ casualties from 2020-2024 were aged 70 and over. This differs markedly from the age profile of overall hospital admissions for road traffic collisions and PSNI serious injuries, where 14% and 11%, respectively, were in this age band.

- Overall, 11% of hospital admissions for road traffic collisions in the five years 2020-2024 have injuries classified as MAIS3+; however, the proportions differ slightly by road user type, ranging from 8% of pedal cyclists having MAIS3+ injuries to 12% of pedestrians and 14% of other road users. 11% of car user and motorcyclist hospital admissions have injuries classified as MAIS3+.

- Comparing the number of hospital admissions to police reported serious injuries we see that a significant proportion (22% over the 26 years 1999-2024) of SI casualties are not known to the police; however, this historic underreporting has changed in recent years. In every year since 2020 the number of PSNI Serious Injures have exceeded hospital admissions. In the most recent five-year period (2020-2024) PSNI Serious Injuries exceeded Hospital admissions by 40%.

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MAIS 3+ Analysis

Clinically seriously injured road casualties in NI, 2020-2024

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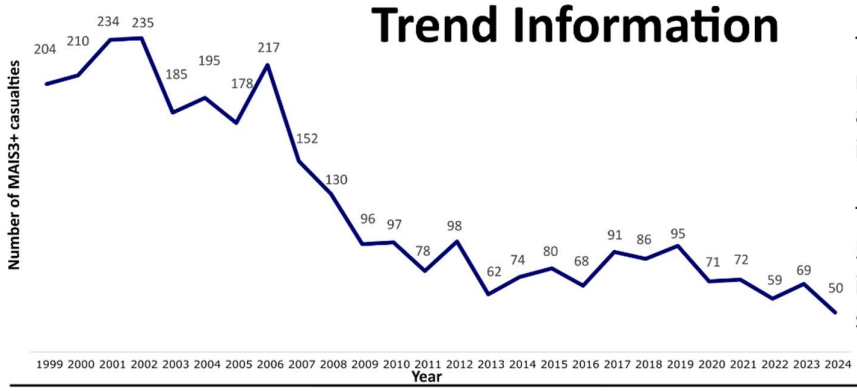
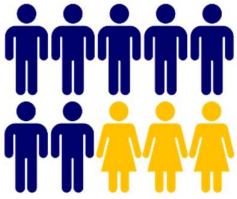
Trend Information



There were 50 MAIS 3+ road traffic casualties admitted to hospital in 2024.

The 2024 figure of 50 MAIS 3+ casualties is the lowest in the series.

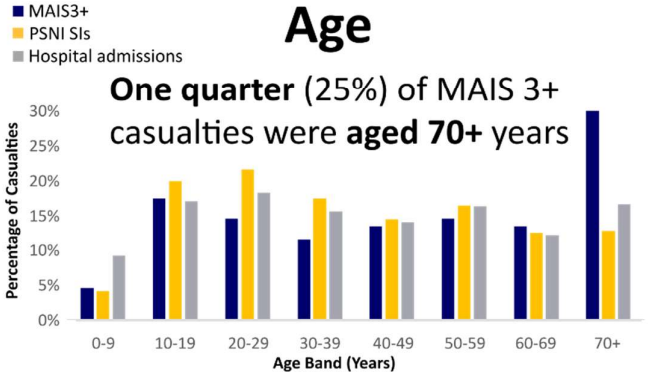
Sex



In 2020-2024 **seven tenths** (70%) of MAIS 3+ casualties were **male**

This compares with 68% of hospital admissions and 62% of PSNI reported serious injuries.

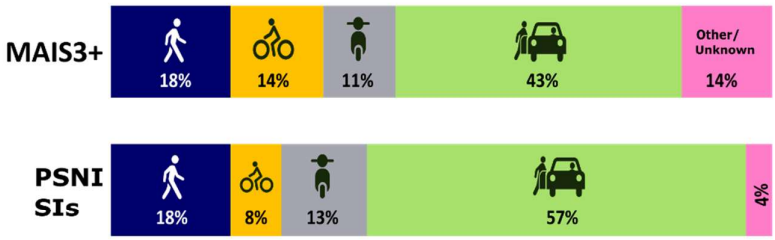
Age



One quarter (25%) of MAIS 3+ casualties were **aged 70+** years

This compares with 14% of hospital admissions and 11% of PSNI reported serious injuries during the same period (2020-2024).

Road User Type



Vulnerable road users made up a greater proportion of MAIS 3+ casualties than they did of PSNI reported SIs in 2020-2024.

In 2020-2024, **11%** of **hospital admissions** for road traffic collisions were seriously injured based on the **MAIS 3+** definition.

In 2020-2024, **MAIS 3+** casualties accounted for 8% of **PSNI** reported **serious injuries**.

Introduction: Clinically seriously injured (MAIS3+) road casualties in Northern Ireland, 1999-2024

The Abbreviated Injury Scale (AIS) is a clinical measure used to classify and describe the severity of injuries; it represents the threat to life associated with the injury. A score of 1 indicates a minor injury, while 6 refers to an unsurvivable injury. A casualty that sustains an injury with a score of 3 or higher on the AIS is classified as clinically seriously injured (MAIS 3+).

AIS Code	Injury	Example
1	Minor	Superficial laceration
2	Moderate	Fractured sternum
3	Serious	Open fracture of humerus
4	Severe	Perforated trachea
5	Critical	Ruptured liver
6	Unsurvivable	Total severance of the aorta
9	Not Known	

This is the tenth report in the series and presents the 2024 update. The MAIS 3+ data in this report are produced using casualty admissions to hospitals in Northern Ireland between 1999 and 2024 with a clinically defined serious injury following a road traffic collision. See methodology on page 14 for further detail.

Hospital Admissions Data Issues: 2022 and 2023-2024

There was an issue with the initial extraction of data for 2022 and as a result this publication will provide revised figures for 2022. Also, data for 2023 includes data extracted from encompass (a new electronic patient record system) for the South Eastern Health and Social Care Trust (HSCT) from 9 November 2023. Data for 2024 includes data extracted from encompass (a new electronic patient record system) for South Eastern Health and Social Care Trust (HSCT), Belfast HSCT and Northern HSCT. This subset of the data is classed as "Official Statistics in Development" whilst undergoing evaluation. As a result, users should exercise some caution with this data.

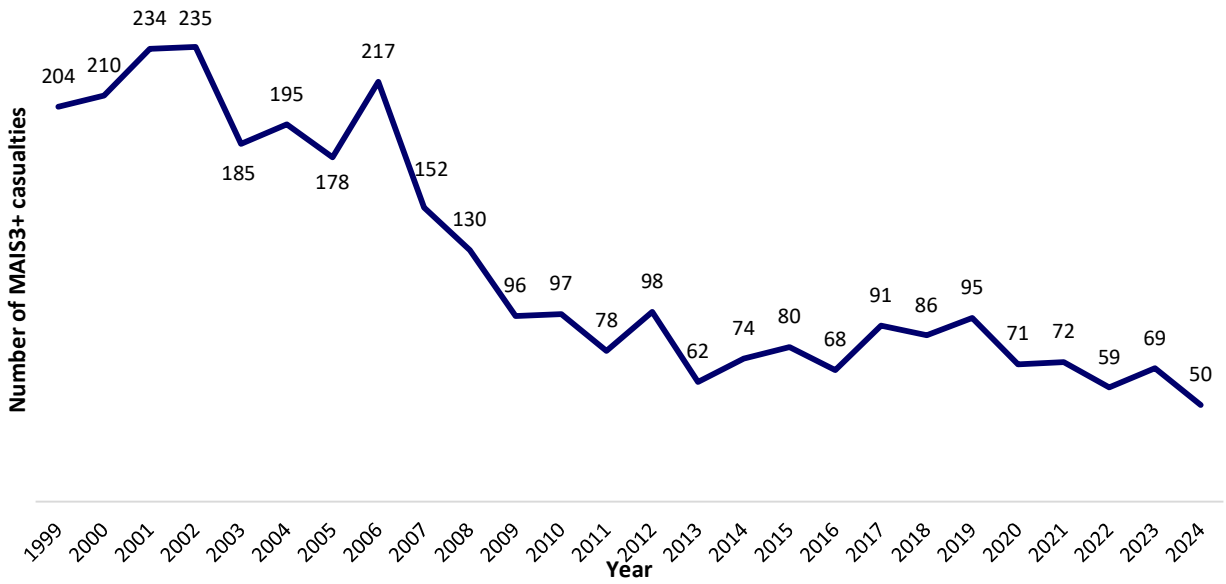
What is the need for MAIS3+?

The current reporting of serious injuries is derived from PSNI data. It is based on the judgement of the reporting police officer, following defined guidelines, rather than on medical expertise. The main limitation is the extent to which PSNI data represents the true level of collisions that occur; research carried out[1] suggests that a considerable proportion of non-fatal casualties in Great Britain (and by extension in Northern Ireland) are not known to the police. The PSNI data are directly comparable with Great Britain and the Republic of Ireland but are not generally considered comparable with other international jurisdictions due to significant differences in the grading of severity of injury which can be applied. Reporting serious injury casualties using MAIS 3+ will therefore provide a more accurate, clinical definition of serious injury, while simultaneously correcting for the historic underreporting of police data and international definitional differences. It is the definition of road traffic serious injury currently recommended by the European Union but, it should be stressed again, is at a much higher severity threshold than the existing PSNI definition.

[1] https://www.gov.uk/government/publications/other-sources-of-information-on-road-casualties/other-sources-of-information-on-road-casualties

MAIS 3+ in Northern Ireland

Chart 1: MAIS 3+ road casualties in Northern Ireland, 1999-2024

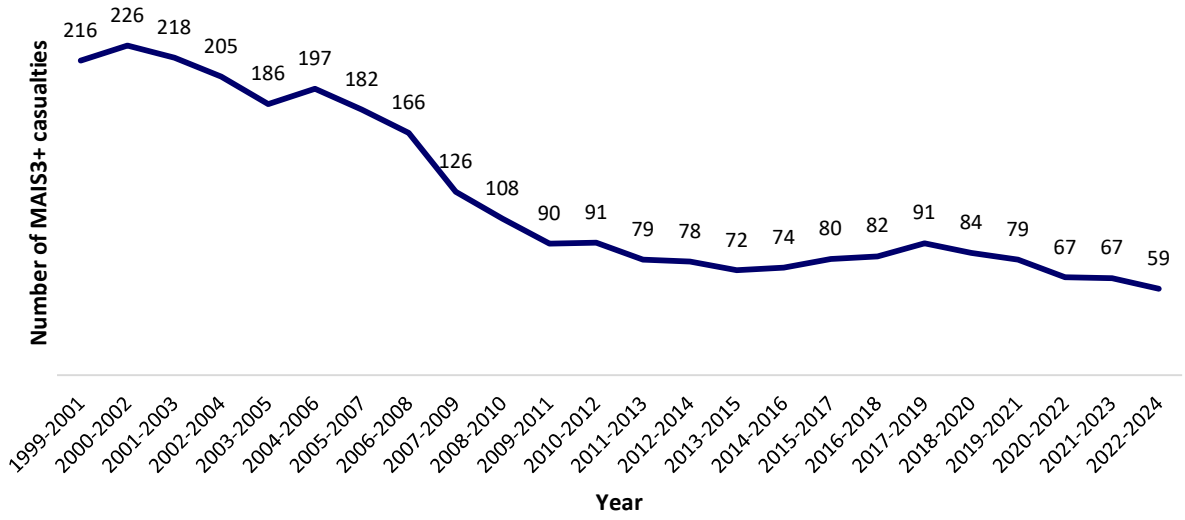


NB: A single patient may have more than one admission of care arising from a single collision; however, the number of such cases is expected to be very small.

Chart 1 above shows the number of clinically seriously injured (MAIS 3+) road casualties in Northern Ireland from 1999 to 2024. The series peaked in 2002 with 235 serious injury (SI) casualties, after which numbers began to fall (with a temporary rise in 2006). Looking at the most recent years, there is evidence that the historic downward trend is levelling off; there was a peak of 98 clinical SIs in 2012, followed by a decrease of over one-third (37%) to 62 in 2013. This year's figure is the series low with 50 clinical SIs, followed by 59 in 2022.

There has been considerable variability year-on-year across the period, although this is to be expected given the relatively small number of admissions in Northern Ireland that meet the higher MAIS 3+ severity threshold. For this reason, the smoothed trend is presented below.

Chart 2: MAIS 3+ road casualties in Northern Ireland, 1999-2024 (3-Year Rolling Average)



The rolling average in Chart 2 shows more clearly the downward trend and levelling off. In the time period examined, the SIs reached their highest level in the period 2000-2002 (average SIs = 226), after which the numbers started to fall. The temporary rise in 2006 is, however, still evident. The smoothed trend, which showed large reductions earlier in the series, began to show a slower rate of reduction from 2010 onwards, with a gradual increase from 2013-2015 to a slight peak in 2017-2019. However, since then the figures have gradually decreased again. The latest 3 years, 2022-2024 had an average number of 59 SIs, which is the lowest in the series, a reduction of nearly three-quarters (74%) on the series peak.

MAIS 3+ compared with police-reported data

Table 1: Admissions to hospital for road traffic collisions and PSNI reported Serious Injuries in Northern Ireland, 1999-2024

Year of admission	Number of admissions*	MAIS3+	MAIS3+/ Admissions	PSNI Serious Injuries	MAIS3+ /PSNI SIs	PSNI SIs/ Admissions
1999	2,429	204	8%	1,509	14%	62%
2000	2,409	210	9%	1,786	12%	74%
2001	2,405	234	10%	1,682	14%	70%
2002	2,290	235	10%	1,526	15%	67%
2003	1,865	185	10%	1,288	14%	69%
2004	1,833	195	11%	1,183	16%	65%
2005	1,695	178	11%	1,073	17%	63%
2006	1,751	217	12%	1,211	18%	69%
2007	1,687	152	9%	1,097	14%	65%
2008	1,440	130	9%	990	13%	69%
2009	1,355	96	7%	1,035	9%	76%
2010	1,130	97	9%	892	11%	79%
2011	978	78	8%	825	9%	84%
2012	1,030	98	10%	795	12%	77%
2013	1,026	62	6%	720	9%	70%
2014	989	74	7%	710	10%	72%
2015	986	80	8%	711	11%	72%
2016	924	68	7%	828	8%	90%
2017	908	91	10%	778	12%	86%
2018	872	86	10%	730	12%	84%
2019	870	95	11%	774	12%	89%
2020	584	71	12%	596	12%	102%
2021	624	72	12%	809	9%	130%
2022	610	59	10%	910	6%	149%
2023	574	69	12%	880	8%	153%
2024	568	50	9%	939	5%	165%
1999-2024	**33,832**	**3,186**	**9%**	**26,277**	**12%**	**78%**
2020-2024	**2,960**	**321**	**11%**	**4,134**	**8%**	**140%**

* A single patient may have more than one admission of care arising from a single collision; however, the number of such cases is expected to be very small.

Of the 33,832 hospital admissions in Northern Ireland for road traffic collisions between 1999 and 2024, only 3,186 (9%) were classified as seriously injured based on the MAIS 3+ definition. In the most recent five years, 2020-2024, it was 11%. It should be noted that the MAIS score was unknown in 10% of cases (2020-2024), so the true number of admissions with a MAIS 3+ may be significantly higher. See table 1 above.

The number of MAIS 3+ casualties in Northern Ireland is much lower than the number of seriously injured casualties reported by PSNI; over the 26-year period 1999-2024 the numbers of MAIS 3+ casualties accounted for 12% of PSNI serious injuries (see table 1). In 2020-2024, this decreases to 8%. This reflects the higher severity threshold for a serious injury on the MAIS scale offset, to a certain extent, by the PSNI under-reporting issue.

In general, PSNI defines a serious injury[2] as one for which a person is detained in hospital as an 'in-patient' or if they have one or more injuries from a predefined list. Since 1999, the total amount of PSNI SIs was 26,277, and by contrast, admissions to hospital for road traffic collisions in the same period was 33,832. This highlights the fact (mentioned previously) that there is a significant proportion (around a fifth) of SI casualties not known to the police. This under-reporting issue has been noted across many jurisdictions including Great Britain and the Republic of Ireland. The most recent year has shown the highest level of reporting, for the fifth year in a row, there were more PSNI SIs than hospital admissions, with PSNI SIs being 65% higher than hospital admissions.

Chart 3: MAIS 3+ casualties following a road traffic collision and PSNI reported Serious Injuries, Northern Ireland 1999-2024

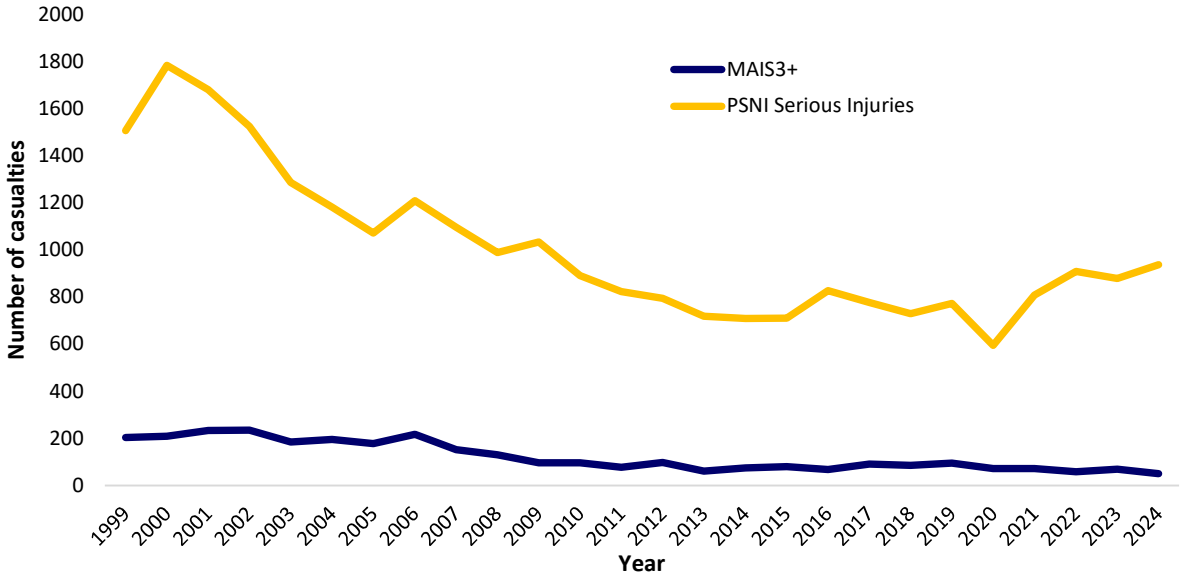
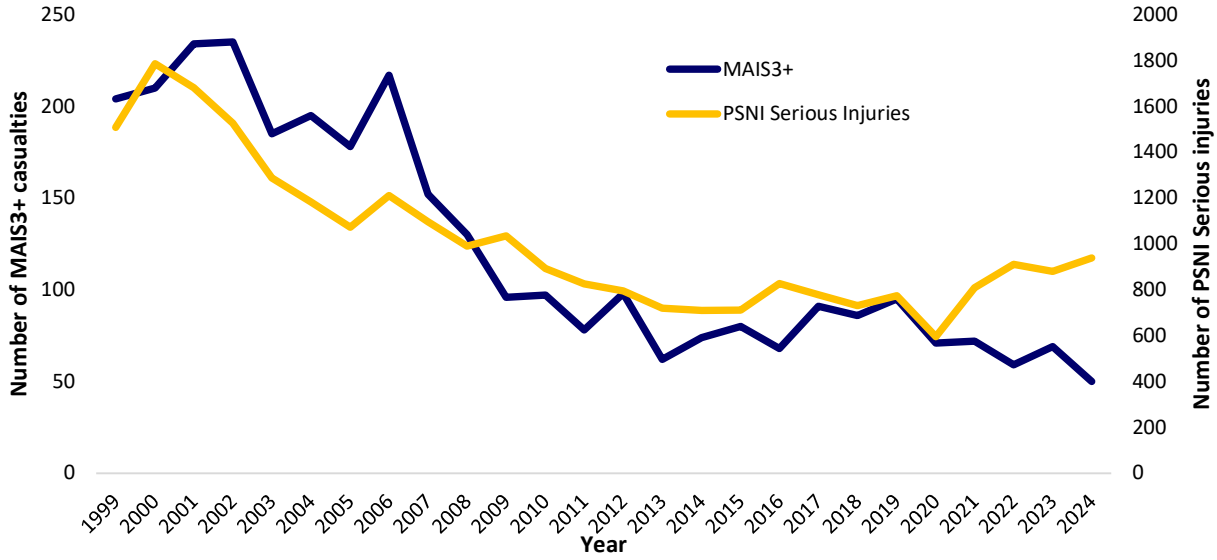


Chart 4: MAIS 3+ casualties following a road traffic collision and PSNI reported Serious Injuries, Northern Ireland 1999-2024 (Alternate Version – MAIS 3+ Casualties displayed on second axis)



[2] Full PSNI definition of serious injury: an injury for which a person is detained in hospital as an 'in-patient', or any of the following injuries whether or not the person is detained in hospital: fractures, concussion, internal injuries, crushing's, burns, severe cuts and lacerations or severe general shock requiring medical treatment.

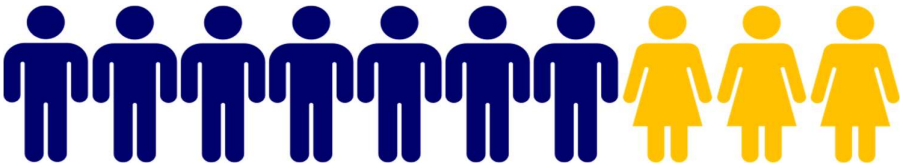
Charts 3 and 4 show the PSNI SIs and MAIS 3+ casualty numbers; in chart 4, the overall trends can be better compared. Notwithstanding the difference in the levels of SIs reported by each definition, it is noteworthy that both series have shown an historic decrease followed by signs of levelling off, but with PSNI Serious Injuries increasing in recent years. The large peak seen in MAIS 3+ casualties in 2006 was echoed in the PSNI data; however, the greater variability associated with the much smaller numbers of MAIS 3+ casualties mean its peak is more pronounced.

Since 2020, the number of MAIS3+ casualties has declined to a series low of 50 seen in 2024, while the number of PSNI Serious Injuries have increased since the series low of 596 seen in 2020. The PSNI Serious Injuries figure of 939 in 2024 is an increase of 58% from the 2020 series low.

Analysis of MAIS 3+ casualties

The following analysis looks at MAIS 3+ casualties in the last 5-year period (2020 – 2024).

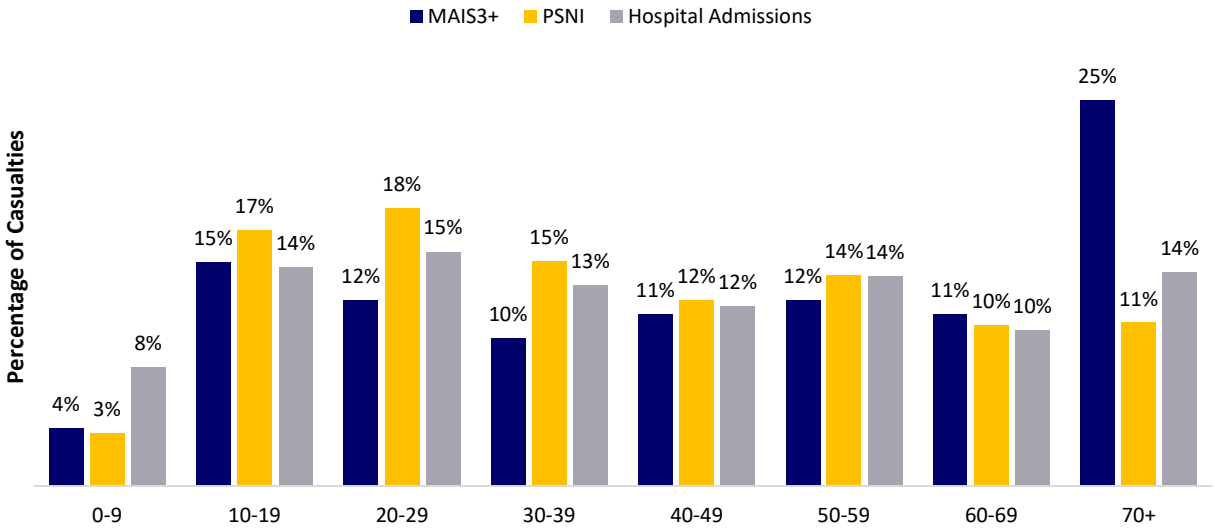
Sex



Males accounted for seven-tenths (70%) of the total MAIS 3+ casualties in Northern Ireland in the five years from 2020 to 2024. This is greater than the proportions of male casualties reported in overall hospital admissions (68%) and PSNI serious injuries (62%).

Age

Chart 5: Proportion of Casualties by age[3], Northern Ireland 2020-2024

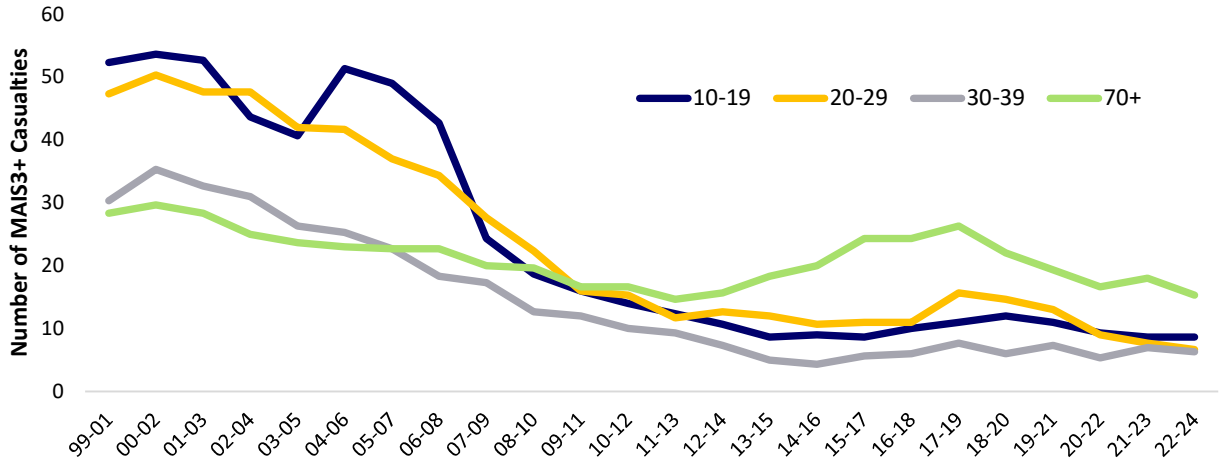


A quarter (25%) of MAIS 3+ casualties from 2020-2024 were aged 70 and over. This differs markedly from the age profile of overall hospital admissions for road traffic collisions and PSNI serious injuries, where 14% and 11%, respectively, were in this age band. The high proportion of MAIS 3+ casualties which were aged 70 and over is perhaps not surprising given people in this age band are likely to be more vulnerable than those who are younger, and you may expect an older person would suffer more serious injuries if in a collision.

When looking at the full trend of available data (1999-2024 for hospital admissions; 2002-2024 for PSNI SIs), the proportions for all casualties are lower, with 17% of MAIS3+ casualties falling within the 70+ category, compared with 9% for hospital admissions and 9% for PSNI SIs. The greater differences observed more recently is largely a result of decreases in the number of MAIS3+ casualties aged 10-39 – see Chart 6 below.

[3] For MAIS3+ casualties and hospital admissions, this refers to the age at the start of the admission; for PSNI serious injuries it is the age at time of collision.

Chart 6: MAIS 3+ casualties by age at start of admission, Northern Ireland 1999-2024 (Selected age bands)



At the start of the reporting period, the numbers of MAIS 3+ casualties aged 10-29 were much greater than of those aged 70+, while those aged 30-39 were just slightly above. All four groups have seen a decline over the time series; however, the number of older person casualties did not fall to the same extent as numbers in other age groups, and in 2013-2015 started to increase to an average of 26 recorded in 2017-2019, before falling to 15 in 2022-2024. The result is that numbers of casualties aged 70+ are now greater than those in the younger three groups. It can be seen that the large spike in casualty numbers mentioned previously, which appeared in 2006, was caused by the 'Aged 10-19' group. Additionally, the increase in MAIS3+ casualties from 2016-2018 to 2017-2019 are largely explained by increases in MAIS 3+ casualties in the 'Aged 20 to 29' group (numbers in this category have risen by an average of 5 - from 11 to 16).

Looking at both age and sex, males aged 70+ accounted for the greatest proportion of overall MAIS 3+ casualties in 2020-2024 (14%); with males aged 10-19 (12%) and females aged 70+ (12%) joint second.
Looking at the PSNI data – there we see young male casualties are the most frequently reported (12% aged 20-29), with far fewer in 70+ age category. In both trends, we see that the proportion of male casualties far exceeds females for the younger age groups; indeed, the proportion of male casualties is higher for every age-band. See charts 7 and 8 below.

Chart 7: MAIS 3+ by age and sex, 2020-2024

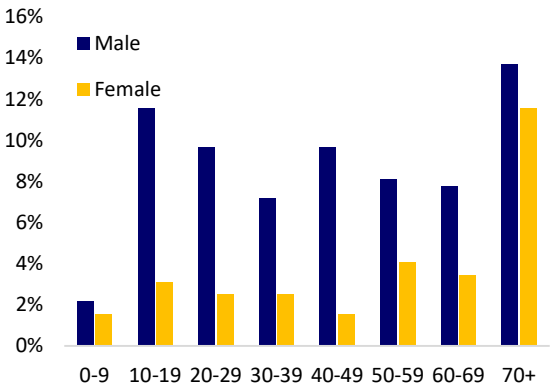
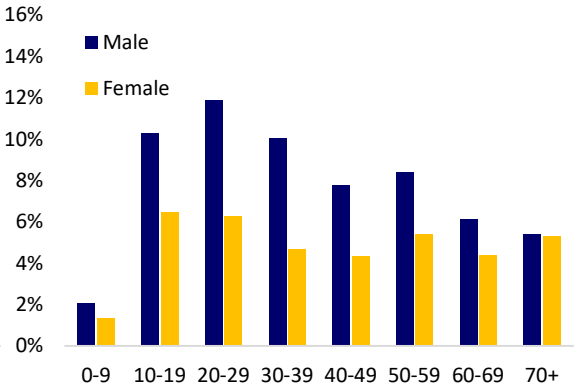


Chart 8: PSNI SIs by age and sex, 2020-2024



Road user type

Chart 9: MAIS 3+ casualties compared with PSNI reported seriously injured casualties, by road user type, Northern Ireland 2020-2024

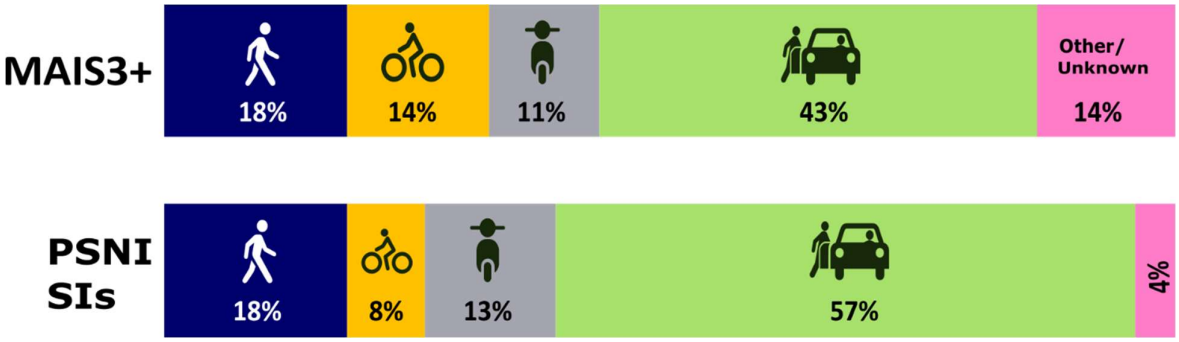


Chart 9 above shows a comparison of MAIS 3+ casualties with PSNI serious injury casualties, by road user type, over the period 2020-2024. As expected, the most frequently recorded road user type of the MAIS 3+ casualties was car users (43%). However, the equivalent proportion of PSNI Serious Injuries is 57%. Therefore, the numbers of casualties that were travelling by the more vulnerable modes (pedestrian, motorcycle and pedal cycle) made up a greater proportion of the MAIS 3+ total than they did of the PSNI SIs (43% compared with 39%, respectively). Like the over-representation of older people in the MAIS 3+ numbers, this again is not surprising: you might expect that a motorcyclist or cyclist, for example, would suffer injuries at the more severe end of the scale if in a collision than someone travelling by car. However, it should also be noted that research conducted in Great Britain has shown that there is significant under reporting of non-fatal pedal cyclist casualties in police data and it would not be unreasonable to assume this would also be the case in Northern Ireland, and which may also help to explain at least part of the difference.

Chart 10: Admissions to hospital for road traffic collisions by road user type and severity, Northern Ireland 2020-2024

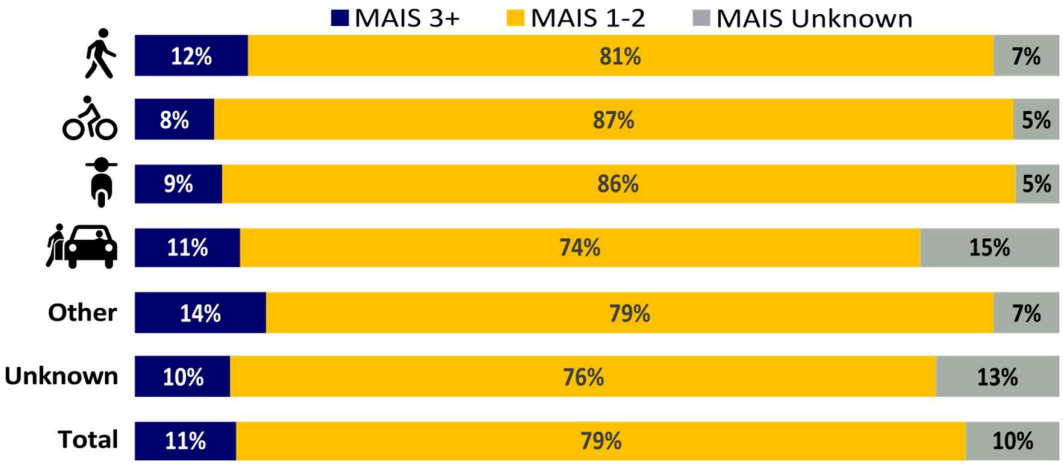


Chart 10 above shows the admissions to hospital in Northern Ireland for road traffic collisions, split by road user type and severity of injury. Of the admissions between 2020-2024, 11% were MAIS 3+, 79% had a MAIS score of 1 or 2 with the remaining 10% having unknown MAIS. This

differs slightly by road user type, with Other having the greatest proportion of admissions that were MAIS 3+ (14%) and pedal cyclists the fewest (8%). This analysis, however, is somewhat confounded by the high percentage of unknowns across the various road user categories; in particular car user admissions, where 15% were unclassified, over double the proportion of the more vulnerable road user groups. It is currently unclear why such a high proportion of car user admissions have been unable to be classified by the MAIS 3+ measure.

Chart 11: Number of MAIS 3+ casualties by road user type, Northern Ireland 2020-2024

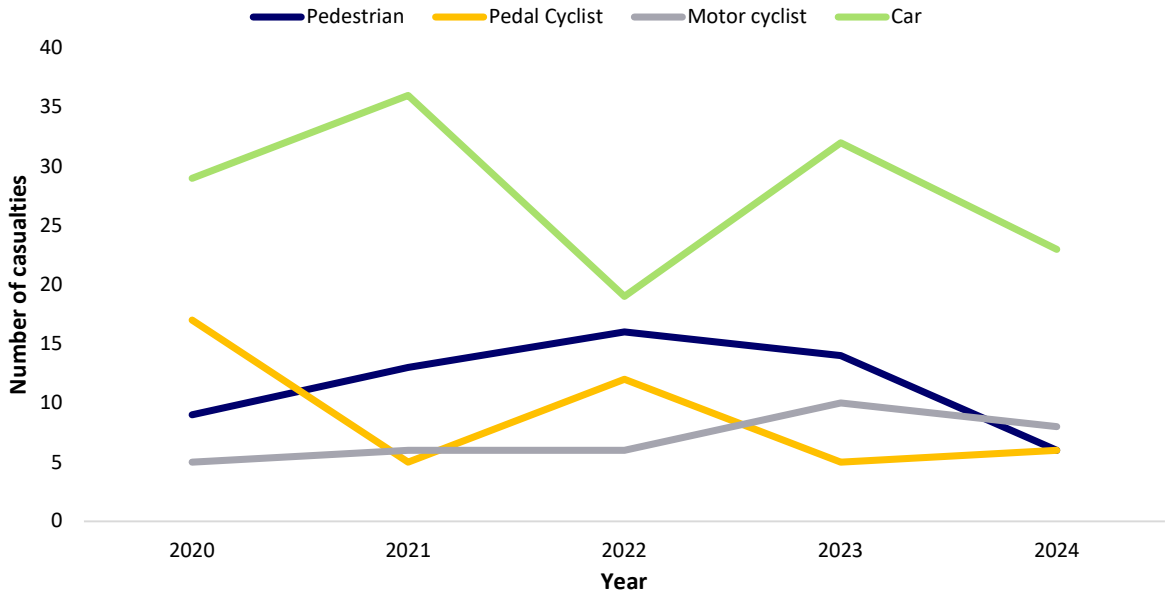
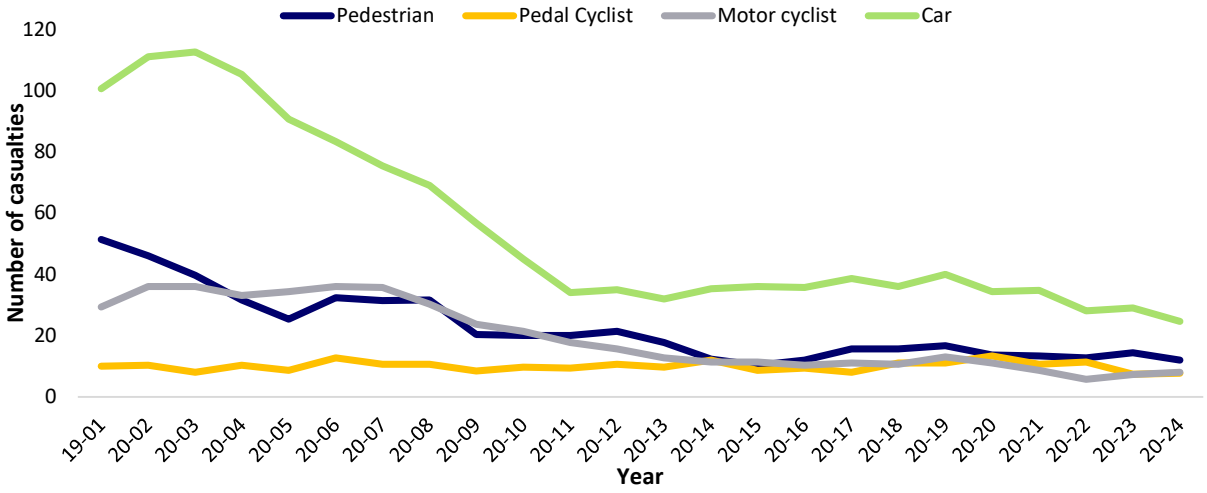


Chart 12: Number of MAIS 3+ casualties by road user type, Northern Ireland 1999-2024 (3-Year Rolling Average)



When looking at the number of MAIS 3+ casualties by road user type for the most recent five years, it's clear that each series experiences year-on-year volatility exacerbated by the small numbers in these sub-groups. For that reason, the rolling average chart (Chart 12) has been included to give a clearer indication of which direction the trends are moving. The smoothed trend would suggest there has been little change over the years to Pedal Cyclist MAIS 3+ casualties (the moving average tends to regress to a mean of 10 casualties); however, this must be seen in light of an increased level

of cycling over largely the same time period (average miles cycled per person per year in Northern Ireland doubled over the 15 year period 2002/04 to 2017/19, from 17 miles to 34 miles respectively)[4]. The three other main road user types have all experienced varying degrees of decline. Car User numbers have experienced the greatest decrease, from 113 casualties, on average in 2001-03, to 25 in 2022-24.

Methodology

The AIS

When a patient is admitted to hospital, clinical details of their conditions are coded to the International Classification of Diseases 10th revision (ICD-10)[5]. A standard look-up table has been developed by the European Commission to convert the ICD-10 diagnostic codes of road traffic related hospital admissions to the Abbreviated Injury Scale (AIS). This then provides for international comparisons of road traffic serious injuries on a consistent basis.

The AIS severity score is an ordinal scale of 1 to 6 (1 indicating a minor injury and 6 being unsurvivable) developed by the Association for the Advancement of Automotive Medicine (see table below). An admission to hospital may have a number of different injuries, with differing severities. The Maximum Abbreviated Injury Scale (MAIS) is therefore the AIS score of the most severe injury that a patient sustains; if a patient has one injury with an AIS score of 2 (moderate) and another with AIS of 4 (severe) then their MAIS score is 4. Patients with a MAIS of 3 or above (MAIS 3+) are considered to be clinically seriously injured.

Abbreviated Injury Scale

AIS-CODE	INJURY	EXAMPLE
1	Minor	Superficial laceration
2	Moderate	Fractured sternum
3	Serious	Open fracture of humerus
4	Severe	Perforated trachea
5	Critical	Ruptured liver with tissue loss
6	Unsurvivable	Total severance of aorta
9	Not known	

Producing the MAIS 3+ numbers used in this report

In addition to providing details of the injuries sustained, the ICD-11 codes also provide information on how a patient's injuries were caused. Hospital patients who have an external cause of injury relating to a road transport collision (codes V01 to V89, excluding V81) were extracted from the hospital admissions inpatient database over 1999 to 2024. Only casualties whose injuries related to collisions that occurred on a public highway (i.e. road traffic collisions) were included. Each admission was therefore assigned to a MAIS category as follows:

- MAIS 3+ if any of the patient's codes were AIS 3 or above
- MAIS<3 if all of the patient's codes were AIS1-2
- Unknown if all of the patient's codes were Unknown if none of the patient's codes were AIS 3 or above and at least one code was unknown

[4] Source: Travel Survey for Northern Ireland

[5] For more information on ICD-11 see International classification of diseases