



**GREATER
MANCHESTER**
FIRE AND RESCUE SERVICE

Road Casualties Analysis

Summary Report

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1. Introduction

During 2023, an independent review of Safe Drive Stay Alive was commissioned to help GMFRS understand whether the initiative was effective and targeted towards the correct audience. To support this review, some research was commissioned to understand the circumstances of road casualties within Greater Manchester over the period 2012 to 2021. This will help GMFRS understand whether road safety initiatives, such as Safe Drive Stay Alive, are targeted towards the most at-risk groups.

Greater Manchester Fire and Rescue Service commissioned Liverpool John Moores University to conduct this research. The analysis was completed by Dr Mark Taylor, who is based in the School Computer Science and Mathematics¹. This report presents a summary of Dr Taylor's findings. A full copy of the paper produced from this research can be found in Appendix A².

2. Methodology

The research method used for this study was exploratory data analysis of road traffic casualties utilising statistics from the Department for Transport³. The analysis of road casualty data was undertaken by examining the recorded circumstances of road casualties during 2012 to 2021 in Greater Manchester in England using frequency analysis, percentages, ratios and correlations.

The following research questions were posed:

- Who is most at risk of road casualty in terms of age and gender?
- Who is most at risk of road casualty in terms of road activity (e.g., pedestrian / driver / passenger)?

¹ Biography for Dr Mark Taylor: <https://www.ljmu.ac.uk/about-us/staff-profiles/faculty-of-engineering-and-technology/school-of-computer-science-and-mathematics/mark-taylor>

² The paper produced by Dr Taylor is pending publication in an appropriate peer review journal. This report will be updated with a link to the paper once it has been published.

³ Department for Transport statistics accessible at: <https://www.gov.uk/government/collections/road-accidents-and-safety-statistics>

- Where do road casualties occur in terms of road type and speed limit?

A summary of the findings for each of these research questions is presented in the following section.

3. Findings

The findings from Dr Taylor's analysis are summarised below. In this report, road casualties are reported as a cumulative figure of fatalities and injuries of all severities.

3.1. Who is most at risk of road casualty in terms of age and gender?

This part of the research aimed to understand patterns and trends related to age and gender of road casualties.

Overall, the number of road casualties across England decreased by 32% between 2012 and 2021. Within Greater Manchester, the numbers of road casualties decreased by 36% over the same period.

Across England, there was a 28% decrease in male road casualties and a 39% decrease in female casualties between 2012 and 2021. Within Greater Manchester, the reduction in male casualties over the same period was 34% and the reduction in female casualties was 39%.

There are 1.5 male road casualties to every one female casualty in England. Within Greater Manchester, this ratio is broadly similar, with 1.55 male casualties to every one female casualty. This means that males are more likely to become a casualty on the roads than females.

Across Greater Manchester, the reduction in road casualties was greatest in those aged under 18. There was a 43% reduction in road casualties in this age group. The smallest reduction was in those aged 35 – 64, which showed a 30% reduction.

Across England, the reduction in road casualties is broadly similar, with the largest reductions in road casualties being in younger age groups.

3.2. Who is most at risk of road casualty in terms of road activity?

This part of the research aimed to understand patterns and trends related to road casualties for drivers or riders, passengers, and pedestrians.

For drivers or riders, there was approximately a 27% reduction in the number of road casualties across England between 2012 and 2021. There was also a 27% reduction in driver or rider road casualties across Greater Manchester. There was a strong, positive correlation between age group and driver or rider road casualties, which shows that drivers or riders in older age groups were less likely to be road casualties when compared to younger age groups. When adjusted for population, the age group with the most driver or rider road casualties was the 18 – 25 age group, followed by the 26 – 49 age group.

For passengers, there was an overall reduction of approximately a 33% reduction in the number of road casualties across England between 2012 and 2022. Across Greater Manchester, this reduction was 48%. There was a strong, positive correlation between age group and passenger casualties, which shows that passengers in older age groups were less likely to be road casualties when compared to younger age groups. When adjusted for population, the age group with the most passenger road casualties was the 18 – 25 age group, followed by the 26 – 49 age group.

For pedestrians, there was an overall reduction of approximately 23% in the number of road casualties across England between 2012 and 2022. Across Greater Manchester, this reduction was 45%. There was a strong, positive correlation between age group and pedestrian road casualties, which shows that pedestrians in older age groups were less likely to be road casualties than younger age groups. When adjusted for population, the age group with the most pedestrian road casualties was the under 18 age group, followed by the 18 – 25 age group.

3.3. Where do road casualties occur in terms of road type and speed limit?

Between 2012 and 2021, there was a 25% reduction in rural road casualties and a 37% reduction in urban road casualties⁴. The ratio of urban to rural road casualties was 8.78 to 1, which is expected given approximately 90% of roads in Greater Manchester are classed as urban.

Analysis of road casualties with speed limit showed that 77% of road casualties occurred on a road where the speed limit was between 21 – 30 miles per hour. The lowest proportion of road casualties occurred on roads where the speed limit was between 51 – 70 miles per hour. This suggests that casualties are more likely to occur on roads through Greater Manchester's towns and cities rather than on motorways or dual carriageways.

4. Summary and recommendations

Over the period studied road casualties were steadily decreasing. The rate of reductions within Greater Manchester was greater when compared with England as a whole.

The analysis suggests that males were roughly 1.5 times more become road casualties than females. Overall, the rate of road casualties decreased with age, with younger road users being more at risk than older road users. Road injuries occurred most frequently on 30 mile per hour roads than on roads with other speed limits.

This suggests that younger age groups, especially young males, are a key demographic that GMFRS should target for road safety campaigns. Messaging related to pedestrian road safety should be targeted towards children and young people aged under 18, and risks related to driver and passenger safety should be targeted towards young people aged 18 – 25. This broadly aligns with how current road safety campaigns, such as Safe Drive Stay Alive, is targeted.

⁴ Urban roads are those within an area of population of 10,000 or more. Rural roads are those within an area of population less than 10,000.

As such, it is recommended that:

- Greater Manchester Fire and Rescue Service note the findings of this analysis.
- Use the findings of this analysis to inform future target audiences for road safety initiatives and / or use the findings of this analysis to provide assurance that the correct audiences are being targeted as part of future road safety initiatives.

Appendix A: Road Casualties Analysis

Report of Dr Mark Taylor

Abstract

This paper examines the circumstances of road casualties over the period 2012 to 2021 in Greater Manchester in North West England. In particular, the demographics of road casualties, the nature of the road activity involved, and the nature of the roads where the casualties occurred are examined. Over the period studied there was an overall decrease in road casualties, similar to that of Great Britain overall, and there were 1.55 times as many male as female road casualties. The largest decrease in road casualties by age group was amongst those aged less than 18. The majority of road casualties occurred on urban roads with a speed limit of 21 to 30 mph. There was a strong relationship between age group and the rate of road casualties for pedestrians, driver / riders, and passengers.

Key words: Road Casualty Analysis

1. Introduction

In Great Britain in 2021 there were an estimated 128,209 road casualties, which represented a decrease of 34.49% from 2012 to 2021 (NS, 2023). In Great Britain road casualties are reported by the relevant police force. In this article we examine road casualties in Greater Manchester in the North West of England. Greater Manchester covers an area of 1,276 km² and in the 2021 UK Census, had a population of 2,867,800 (ONS, 2023). Transport for Greater Manchester is the local government body that is responsible for delivering Greater Manchester's transport strategy and commitments set by the Greater Manchester Combined Authority (TfGM, 2023). The road network in Greater Manchester comprises over 10,000 km (6,000 miles) of roads, of which approximately 10% are classified as rural roads (GMHSIF, 2018). In the UK urban roads are defined as those within an urban area of 10,000 population or more and rural roads are those outside an urban area (RL, 2023). In Great Britain in 2019 33% of all road casualties occurred on rural roads, despite such roads only carrying 44% of all road traffic (RSS, 2019).

In England the central government sets the regulatory framework for roads, vehicles and road users, and the national road safety strategy. Central government funding and resources are provided to local government and other agencies to improve road safety, in terms of research into the nature, causes, and strategies to reduce road casualties. Local government is the main delivery agent of road safety, and has a statutory duty under section 39 of the 1988 Road Traffic Act to take actions to reduce and prevent road accidents (ROSPA, 2019). The UK Parliamentary Advisory Council for Transport Safety (PACTS, 2023) states that road safety is a shared responsibility between road users, road managers, and vehicle manufacturers for taking appropriate actions to ensure that road traffic collisions do not result in serious or fatal injuries. In 2019 the UK Government announced 74 actions to improve road safety including: improved road safety education for children, young people, and older people, especially learner drivers, and improved vehicle safety in conjunction with vehicle manufacturers. (RSS, 2019). During the period studied Greater Manchester Council had introduced a number of road safety initiatives including improved cycle and walking routes, and road safety training and courses specifically for drivers, motorcyclists, cyclists and pedestrians (TGM, 2023).

The research reported in this article concerns the patterns and distributions of the circumstances of road casualties. The originality of the research concerns the detailed analysis of the circumstances of road casualties in the English county of Greater Manchester over a ten year period 2012 to 2021 in terms of road casualty demographics, road activities and road types.

2. Literature review

2.1 Road casualties

Road traffic collisions result in the deaths of approximately 1.3 million people around the world annually and cause 20 and 50 million non-fatal injuries. More than half of all road traffic deaths and injuries involve vulnerable road users, such as pedestrians, cyclists and motorcyclists and their passengers (WHO, 2023). Christie (2018) commented that transport poses a significant public health risk. Road casualties are disproportionately experienced by some social groups more than others. Children, for example, are at a greater risk of pedestrian injury than any other age group (O'Toole and Christie, 2018). In the UK the main causes of serious road

injuries and deaths are speeding, drink / drug driving, not wearing a seat belt and using a mobile phone while driving (GMP, 2023). The road deaths per million population in England in 2021 was 23 which was lower than the other countries in the United Kingdom (Wales 27, Scotland, 26, Northern Ireland 26), and also lower than most other European countries (e.g., France 43, Italy 49, Germany 41) and considerably lower than the United States of America (129) (NS, 2023).

2.2 Road casualty costs

Road traffic injuries can have a major impact on victims' physical and psychological well-being and functioning (Weijermars et al, 2016). The value of preventing all reported and unreported road collisions in Great Britain in 2021 was estimated to be £30 billion. The cost of fatal road casualty in Great Britain in 2021 was £2,114,526, the cost of a serious road casualty was £237,614, and the cost of a slight casualty was £18,318 (UKGOV, 2023). In the UK, the NHS injury costs recovery (ICR) scheme recovers the cost of NHS treatment where personal injury compensation is paid following a road casualty. The UK Compensation Recovery Unit (CRU, 2023) recovers funds mainly from insurance companies and then pays them to the NHS hospital or ambulance trust that provided treatment for the individual injured in a road traffic collision (NHSCRU, 2021). In 2020/21 in Great Britain the NHS received £193,744,905 from the Compensation Recovery Unit.

2.3 Road casualty prevention

Effective and comprehensive road safety strategies can reduce the number of people killed or injured in road traffic collisions, despite increasing levels of traffic (ROSPA, 2023). In the UK the Parliamentary Advisory Council for Transport Safety (PACTS, 2023) advocates investing in effective, targeted action in the transport system to protect against death and serious injury, and aligning public health, occupational health and safety, environmental and social justice objectives for road safety. In practical terms this concerns safer vehicles, safer roads and roadsides, and safer speeds, and education on safer road use. In England, methods of road casualty prevention include the introduction of 20 mph speed limits in residential areas (Jepson et al, 2022; Li and Graham, 2016), the introduction of road speed bumps (Daddah et al, 2022), the introduction of cycle lanes (Blank-Gomel, 2017), and road safety classes (GMRSP, 2023). A study by Klanjčić et (2022) involving 24

cities in 5 European countries concluded that cities with the highest rates of walking and cycling paths are the safest for the most vulnerable road users. A higher presence of low-speed limit roads appeared to only significantly reduce the number of injuries of car occupants.

Overall, although research has been undertaken into specific aspects of road casualties, there has been limited research into the patterns and distributions of road casualty circumstances. The originality of the research presented in this article is the detailed analysis of the circumstances of road casualties in an English county over a ten-year period in terms of casualty demographics, road usage, and type of road.

3. Research method

The research method adopted was exploratory data analysis of road casualty data for Greater Manchester in England between 2012 and 2021 from the UK Department for Transport. The analysis of road casualty data was undertaken by examining the recorded circumstances of road casualties during 2012 to 2021 in Greater Manchester in England using frequency analysis, percentages, ratios and correlations. The research involved analysing overall patterns of road casualties, and analysis of the distribution of road casualties by demographics, the nature of the road activity involved, and the nature of the roads where the road casualties occurred.

The research questions posed by the research were:

- Who is most at risk of road casualty in terms of age and gender?
- Who is most at risk of road casualty in terms of road activity (pedestrian / driver / passenger)?
- Where do road casualties occur in terms of road type and speed limit?

These are important research questions since road casualties have both a social and economic cost. The cost of a fatal road casualty in 2021 in Great Britain was over £2m, the cost of a serious road casualty was almost £0.25m, and the cost of a slight casualty was over £18,000 (UKGOV, 2023). The purpose of the research was to examine the distribution of road casualties in order to inform road safety initiatives.

The data was collected from the UK Department of Transport for the relevant period for the Greater Manchester area which comprises of the ten local authorities of Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan. The data analysis was undertaken using frequency analysis using frequency charts, percentage increases and decreases over the study period and ratios of casualties by different categories. The data analysis was performed using the MS Excel spreadsheet software.

4. Road casualty analysis results

The pattern of road casualties in England over the period studied 2012 to 2021 is shown in Figure 1.

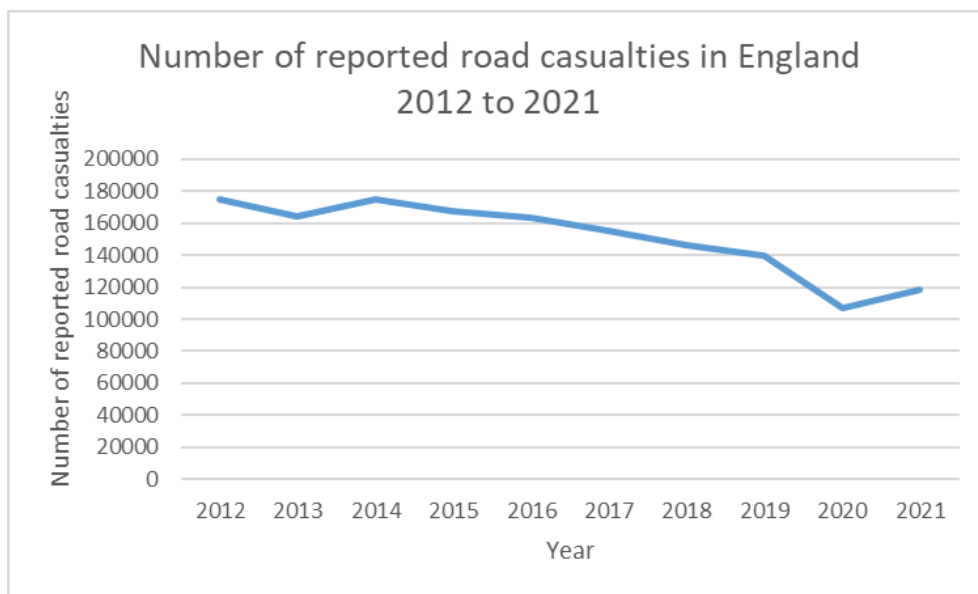


Figure 1. Number of reported road casualties (including deaths) in England 2012 to 2021

Figure 1 shows the number of reported road casualties in England by year from 2012 to 2021 (including deaths). The percentage decrease in the number of reported road casualties over the period was 31.99%.



Figure 2. Number of reported road casualties (including deaths) in Greater Manchester 2012 to 2021

Figure 2 shows the number of reported road casualties in Greater Manchester by year from 2012 to 2021 (including deaths). The percentage decrease in the number of reported road casualties over the period was 35.66% compared to a 31.99% decrease over the same period for England as a whole.

4.1 Road casualty demographics

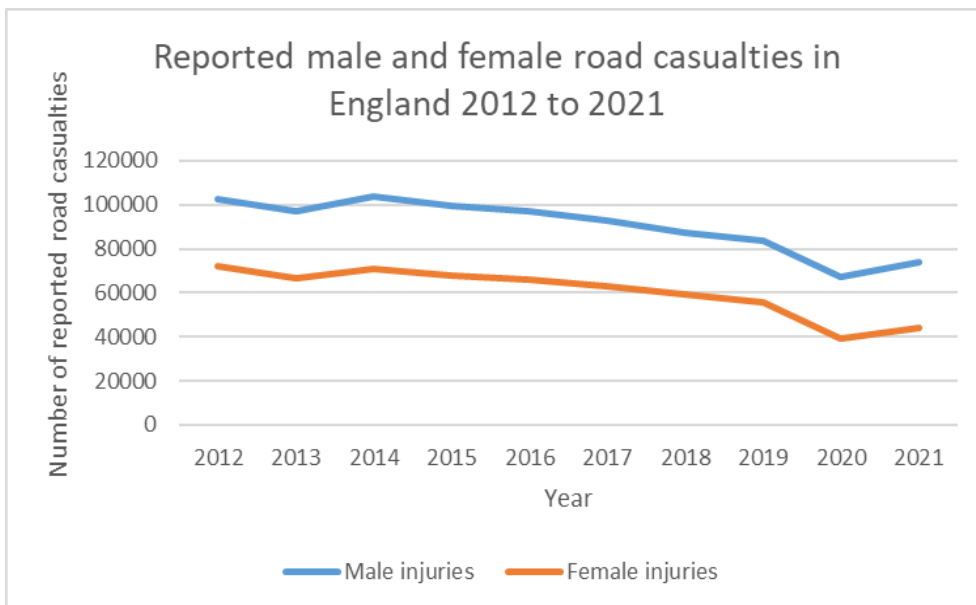


Figure 3. Reported male and female road casualties (including deaths) in England by year from 2012 to 2021.

Figure 3 shows the reported male and female road casualties in England by year from 2012 to 2021. There was a 28.12% decrease in male casualties, and a 38.89% decrease in female casualties over the period studied. Overall, the ratio of male to female road casualties was 1.5 to 1 over the period studied. Overall, over the period studied, there were 904,387 male road casualties with a rate of male road casualties per 100,000 of 3267, and there were 604,851 female road casualties with a rate of female road casualties per 100,000 of 2095.

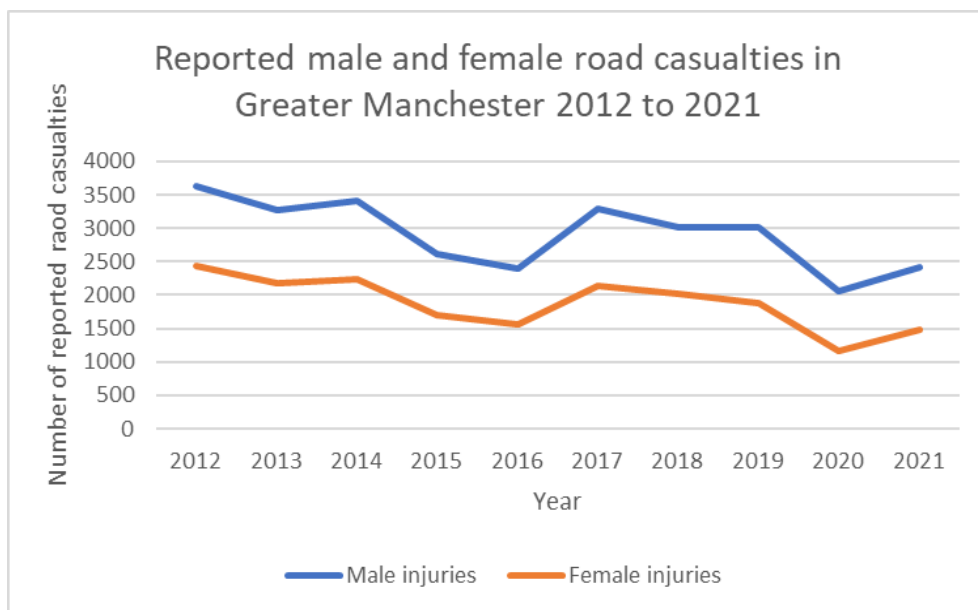


Figure 4. Reported male and female road casualties (including deaths) in Greater Manchester by year from 2012 to 2021.

Figure 4 shows the reported male and female road casualties in Greater Manchester by year from 2012 to 2021. There was a 33.52% decrease in male casualties, and a 39.30% decrease in female casualties over the period studied. Overall, the ratio of male to female road casualties was 1.55 to 1 over the period studied. Overall, over the period studied, there were 29,094 male road casualties with a rate of male road casualties per 100,000 of 2059, and there were 18,794 female road casualties with a rate of female road casualties per 100,000 of 1291 based upon 2021 population estimates from the Office for National Statistics (Nomis, 2023).

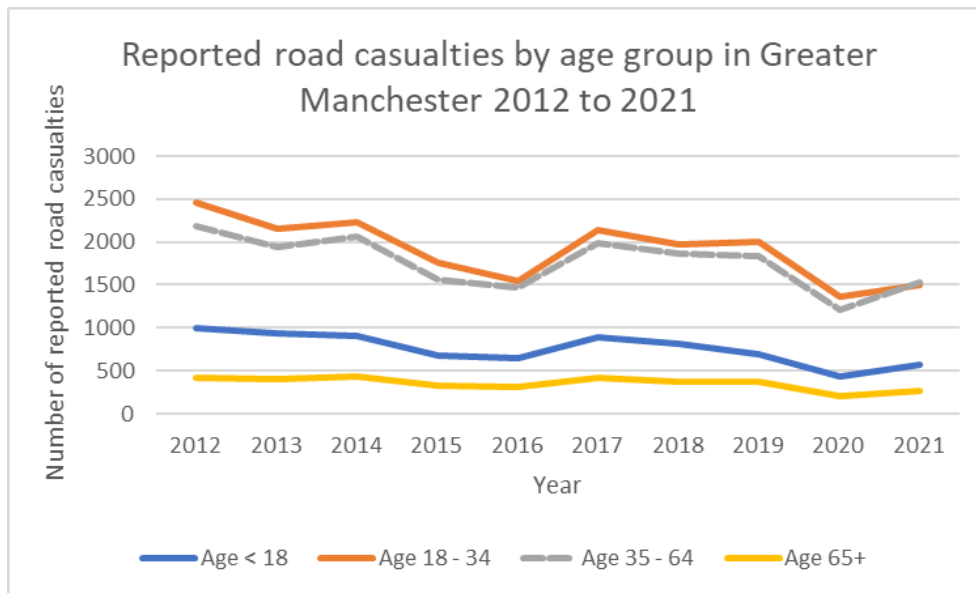


Figure 4. Reported road casualties (including deaths) by age group in Greater Manchester by year between 2012 and 2021.

Figure 4 shows the reported road casualties by age group in Greater Manchester by year between 2012 and 2021. Over the period studied, those aged less than 18 had the largest percentage decrease in road casualties (42.50% decrease), followed by those aged 18-34 (38.92% decrease), then those aged 65+ (37.20% decrease), then those aged 35 to 64 (29.51% decrease).

4.2 Road casualty road activities

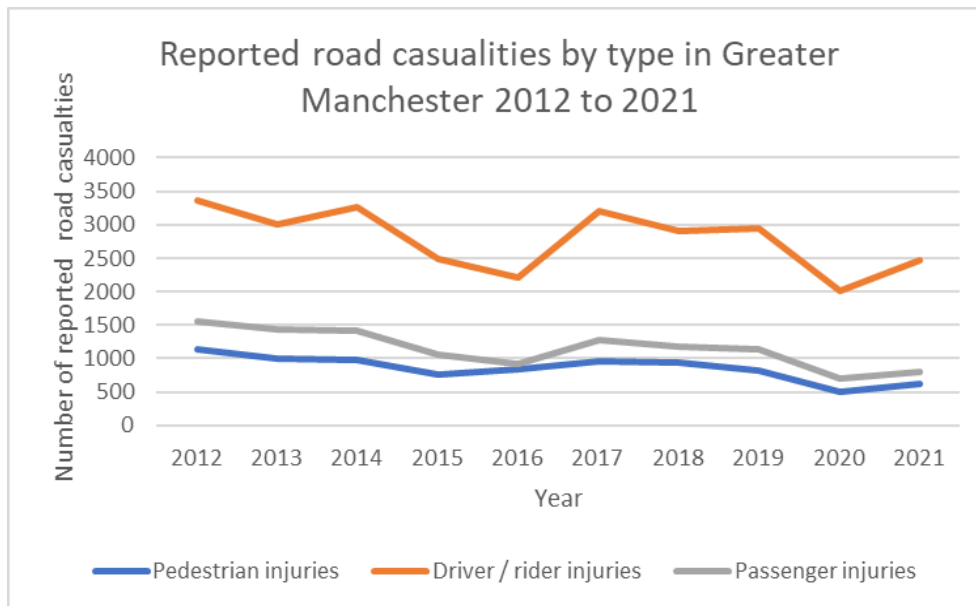


Figure 5. Reported road casualties (including deaths) by type in Greater Manchester by year between 2012 and 2021.

Figure 5 shows the reported road casualties by type over the period studied. There was a 47.90% decrease in passenger road casualties, a 44.81% decrease in pedestrian road casualties, and a 26.94% decrease in driver / rider road casualties over the period studied.

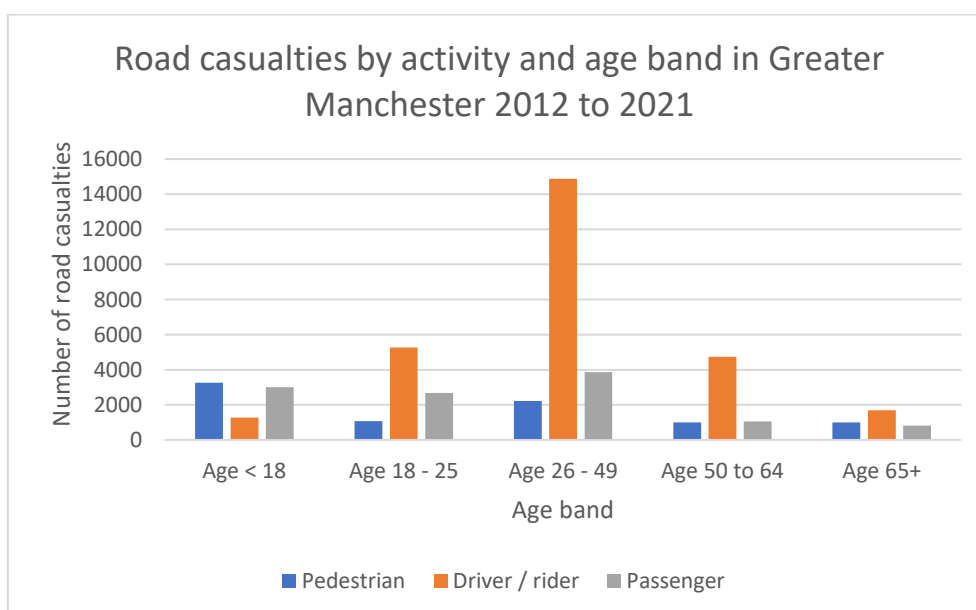


Figure 6. Road casualties (including deaths) by activity and age band in Greater Manchester 2012 to 2021.

Figure 6 shows how the relative numbers of road casualties of the different types varied by age band, with those aged less than 18 more likely to be injured as a pedestrian, and driver / rider road casualties being much more likely than the other types of road casualty for those aged 26 to 49.

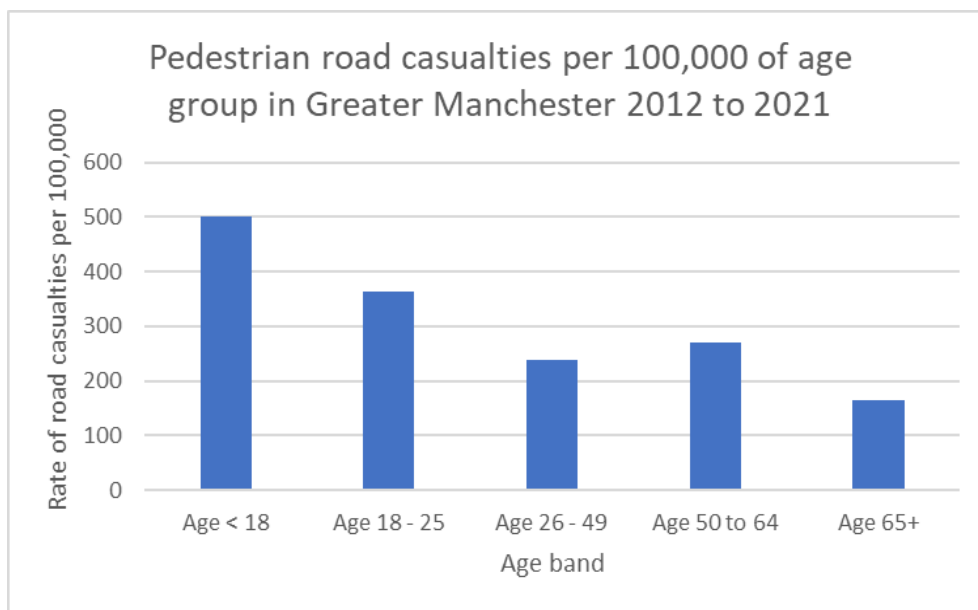


Figure 7. Pedestrian road casualties (including deaths) per 100,000 of age group in Greater Manchester 2012 to 2021

Figure 7 shows the pedestrian road casualties per 100,000 of age group in Greater Manchester between 2012 and 2021. Overall, the rate of pedestrian road casualties decreased with age group. The Pearson Product Moment Correlation Coefficient between age group and the rate of pedestrian road casualties per 100,000 of age band was 0.93 with a significance level of 0.02.

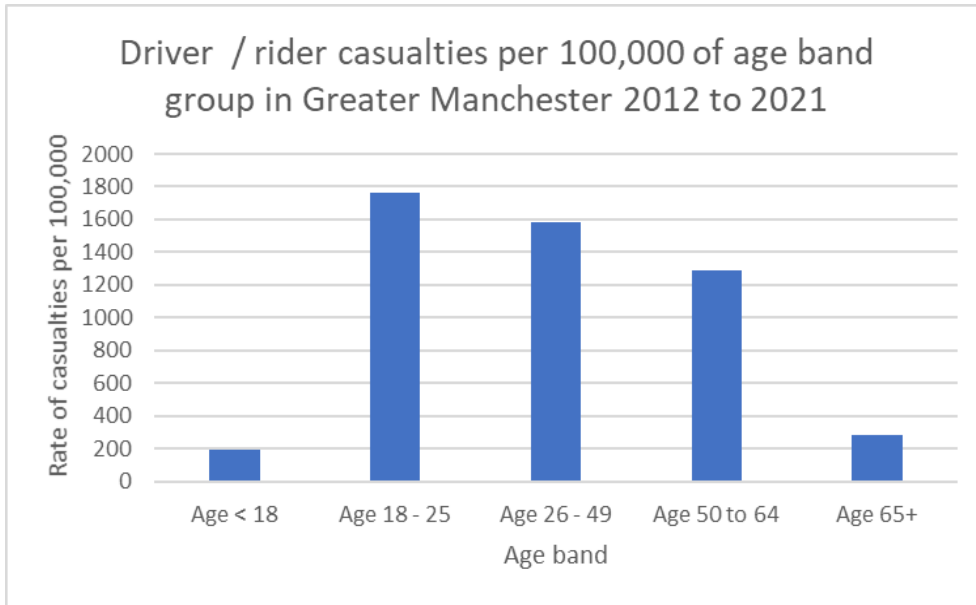


Figure 8. Driver / rider road casualties (including deaths) per 100,000 of age group in Greater Manchester 2012 to 2021

Figure 8 shows the rate of driver / rider casualties per 100,000 of age group in Greater Manchester between 2012 and 2021. Overall, apart from those aged less than 18, the rate of driver / rider road casualties decreased with age group. The Pearson Product Moment Correlation Coefficient between age group and the rate of driver / rider road casualties per 100,000 of age band for those aged over 18 was 0.93 with a significance level of 0.074

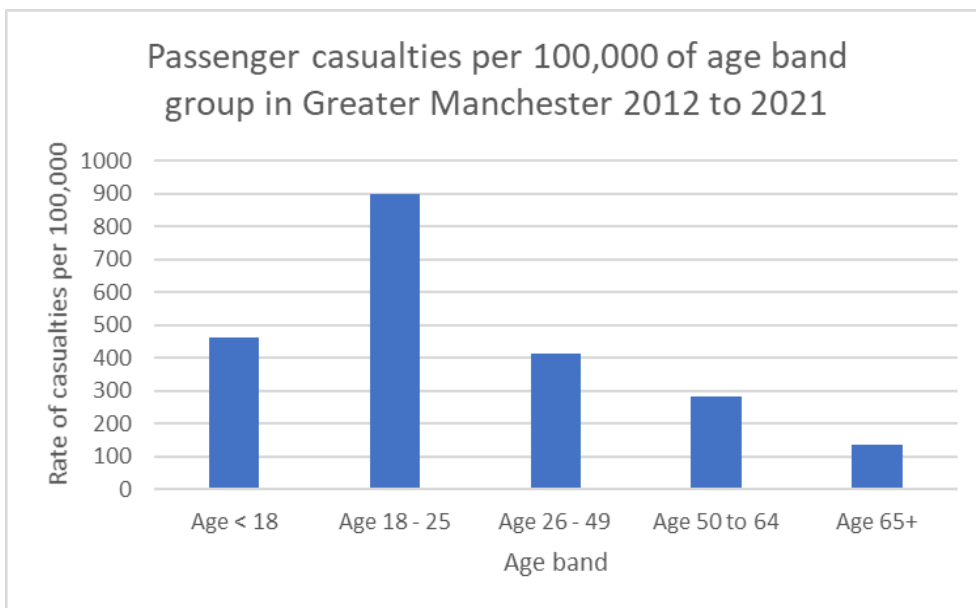


Figure 9. Passenger road casualties (including deaths) per 100,000 of age group in Greater Manchester 2012 to 2021

Figure 9 shows the rate of passenger casualties per 100,000 of age group in Greater Manchester between 2012 and 2021. Overall, apart from those aged less than 18, the rate of passenger road casualties decreased with age group. The Pearson Product Moment Correlation Coefficient between age group and the rate of passenger road casualties per 100,000 of age band for those aged over 18 was 0.94 with a significance level of 0.056.

4.3 Road casualty road types and speed limits

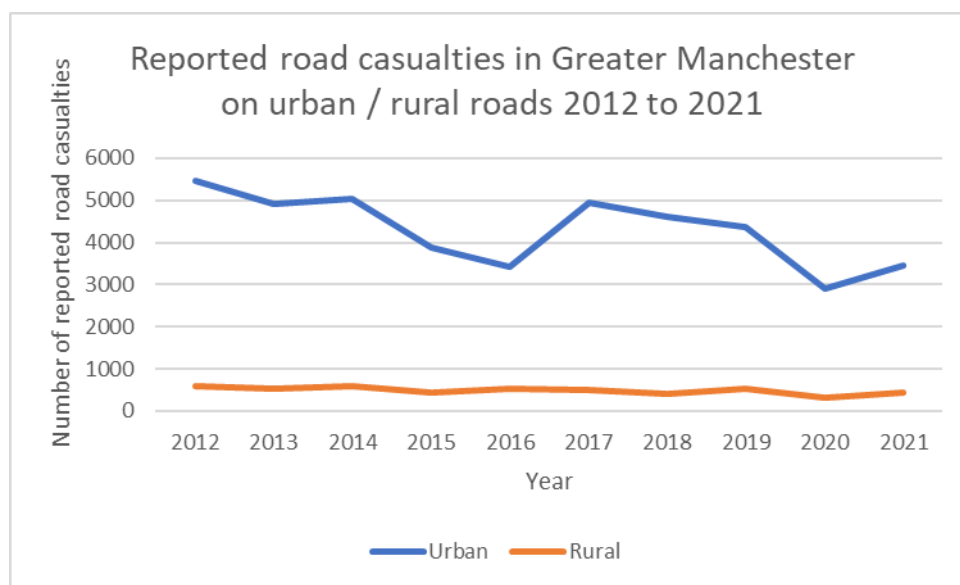


Figure 10. Urban and rural road casualties (including deaths) in Greater Manchester 2012 to 2021

Figure 10 shows the reported urban and rural road casualties in Greater Manchester by year from 2012 to 2021. There was a 36.82% decrease in urban road casualties, and a 25.34% decrease in rural casualties over the period studied. Overall, the ratio of urban to rural road casualties was 8.78 to 1 over the period studied. However, Greater Manchester is a mainly urban area, with roughly only 10% of roads being classified as rural roads, whereas in 2021, the majority of road length in Great Britain was rural, with 75% of A roads, 80% of B roads, and 57% of the combined C and U roads classified as rural (RLGB, 2022).



Figure 11. Road casualties by road speed limit (including deaths) in Greater Manchester 2012 to 2021

Figure 11 shows reported road casualties by road speed limit by year in Greater Manchester 2012 to 2021. Over the period studied the majority of road casualties (76.78%) occurred on roads with a speed limit of 21 to 30 mph. There was a 64.15% decrease in road casualties on roads with a speed limit between 31-50 mph, a 62.12% decrease in road casualties on 51-70 mph roads, a 44.63% decrease in road casualties on 1-20 mph roads, a 32.78% decrease in road casualties on 21-30 mph roads, and a 21.05% decrease in road casualties on motorways. Within the Greater Manchester area 30 mph roads form the majority of road lengths.

5. Limitations

The data used for the analysis was reported road casualties from the UK Department for Transport. The UK Department for Transport states that whilst very few road fatalities are not reported to the police it has long been known that a considerable proportion of non-fatal road casualties are not reported to the police (and thus are not

included in UK Department for Transport data records), as hospital, survey and compensation claims data all indicate a higher number of road casualties than police accident data would suggest (UKDFT, 2023). In the UK there is no obligation for individuals to report all personal injury road collisions to the police (NS, 2023).

6. Conclusions

Overall, over the study period 2012 to 2021 road safety in terms of the number of road casualties per year had improved in Greater Manchester across all age bands, genders, road user types, and types of road. There was a strong relationship between age group and the rate of road casualties per 100,000 for pedestrians, driver / riders, and passengers over the period studied, with the rate of such casualties decreasing with age for those aged over 18.

The originality of the research presented in this article is the detailed analysis of the circumstances of road casualties in Greater Manchester over a ten year period 2012 to 2021. Over the period studied road casualties were steadily decreasing, with the largest decrease by age group being amongst the elderly (those aged 65+). In terms of the pattern of road casualties by road user type, the largest decreases were amongst passengers, then pedestrians, then driver / riders. The ratio of road casualties on urban compared to rural roads was roughly 9 to 1 in Greater Manchester, which contrasts with the figures for Great Britain as a whole where 33% of all road casualties occurred on rural roads. However, Greater Manchester contains only roughly 10% of rural roads, whereas in Great Britain as a whole the majority of roads are rural.

In terms of the practical application of the research for road casualty prevention, it appeared that males were roughly 1.5 times more likely to be injured than females in road traffic collision incidents, and that overall, the rate of road casualties decreased with age, with younger road users being more at risk. Road injuries occurred more frequently on 30 mph roads than on roads with other speed limits. However, 30 mph roads form the majority of road lengths within the Greater Manchester area. It is hoped

that the results of this research may be useful to public sector agencies in the UK and elsewhere in terms of informing road safety initiatives.

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