Fatal Collisions 2008-2012

Vehicle Factors

4th April 2016

Údarás Um Shábháilteacht Ar Bhóithre
Road Safety Authority

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Executive Summary

Background to Report

Over the time period 2008 to 2012, 983 fatal collisions occurred on Irish roads claiming the lives of 1,077 people. This report examines 867 of the fatal collisions which occurred during this time period specifically focusing on the vehicle and associated vehicle factors which may have contributed to the collision.

The road collision database in Ireland is created using a form called a C(T)68 forwarded to the Road Safety Authority (RSA) from An Garda Síochána. The information provided in this form is based on preliminary information collected at the scene of a collision and does not constitute the findings of the final investigation. The RSA issues reports regularly using the data contained in this database as the best available representation of fatal and injury collisions.

However, this vehicle factors report is based on an analysis of the completed Garda investigation file where the full circumstances of the collisions are available. Access was granted by An Garda Síochána to the completed Investigation File produced for each collision. The file contains two main reports:

1. An Garda Síochána Investigation Report
2. Forensic Collision Investigation Report (FCI)

The RSA collected the data in the Garda National Traffic Bureau. This report provides an analysis of the data by collision, by vehicle and by contributory factor. Therefore, the figures and totals will change depending on the category.

Vehicle Factors Noted in All Collisions

Data for all vehicle factors (which may or may not have contributed in full or part to the overall outcome of the collision) were extracted from the FCI report. These factors include the condition of tyres, brakes, lights, steering

etc. These factors in some instances are highlighted as contributory factors to the collision due to the effect they may have had on the control of the vehicle. [1]

Of **the 867 fatal collisions** analysed, vehicle factors were noted in **121 (14%)** collisions which may or may not have contributed in full or part to the crash. While a vehicle factor may have been present it may not have rendered the vehicle defective or un-roadworthy. However, the factor may have been significant enough to have contributed to the collision. Of all vehicle factors noted in all 867 collision (Table 1), the largest single factor was tyres (8.7%).

Table 1. All Vehicle Factors, All Collisions

	N	%
Tyres	**75**	**8.7**
Brakes	**18**	**2.1**
Steering	4	0.5
Suspension	3	0.3
Lights	2	0.2
Windows - Vision Obscured	2	0.2
Mirrors	1	0.1
Stolen/U.T. Vehicle	1	0.1
Other	15	1.7
NR	33	3.8
None	713	82.2
TOTAL	867	100.0

**** NR is not recorded as no PSV report in file or not conducted due to hit and run, vehicle condition etc***

[1] In some circumstances a driver may not have lost control of the vehicle on a corner or in wet conditions, for example, if the condition of the tyres or steering was good. However, if the tyres are balding or defective this renders control of the vehicle much more difficult.

In the 121 collisions where a vehicle factor was noted as *possibly* contributing to the collision, tyre condition accounted for almost two thirds (60.6%) of all factors identified.

Vehicle Factors as a Contributory Factor all Motorised Vehicle Collisions

Of the 867 collisions analysed, 858 involved at least one motorised vehicle. In this section lone pedal cycles and non-motorised vehicles were excluded. In total, 101 collisions were identified as having a vehicle factor which contributed to the collision. These factors contributed in full or part to the outcome.

Tyres were an identified contributory factor in **8% of the 858** collisions involving a motorised vehicle (Table 2):

Table 2. Contributory Vehicle Factor Motorised Vehicle Collisions

	N	%
Tyres	**66**	**7.7**
Brakes	**14**	**1.6**
Steering	3	0.3
Suspension	3	0.3
Stolen/U.T. Vehicle	1	0.1
Windows - Vision Obscured	1	0.1
Other	13	1.5
None	757	88.2
TOTAL	858	100.0

The condition of tyres accounted for **almost two thirds (64.1%)** of the 101 collisions where a vehicle factor was cited as contributory to the collision.

Defective tyres were very prevalent as a factor in **single vehicle crashes (74.1%)** when compared with 2 or more vehicle crashes (57.6%).

The majority of defective tyres were on cars, however, four motorcycle collisions had tyre quality as a contributory factor. Table 3 indicates the top two vehicle factors cited by vehicle type.

Table 3. Top Two Vehicle Factors by Vehicle Type

	Tyres		Brakes	
	N	%	N	%
Car	56	84.8	8	57.1
HGV	0	0.0	2	14.3
Motorcycle	4	6.1	3	21.4
Van	5	7.6	0	0.0
All Other Vehicles	1	1.5	1	7.1
TOTAL	66	100.0	14	100.0

Tyre Condition as a Contributory Factor to Motorised Vehicle Collision

One vehicle in each of the 66 collisions cited the condition of the tyres as a contributory factor. Over half (51.5%) of the tyres on the 66 vehicles with defective tyres were excessively/dangerously worn and 10.6% were underinflated, some dangerously low. However, an additional 6% were a combination of excessively worn, underinflated, wrong size or fitted in the wrong direction (Table 4).

Table 4. Condition of Tyres Contributory to Collision

	N	%
Excessive/Dangerously Worn	34	51.5
Underinflated	7	10.6
Worn	5	7.6
Different Size Tyres	3	4.5
Overinflated	3	4.5
Below Min Tread Depth	2	3.0
Tyres Cracked/Perished	2	3.0
Excessive/Dangerously Worn And Wrong Size	1	1.5
Excessive Worn And Underinflated	1	1.5
Fitted Wrong Direction And Worn	1	1.5
Fitted Wrong Direction And Excessively Worn	1	1.5
Temporary Tyre	1	1.5
NR	5	7.6
TOTAL	66	100.0

NR = Tyre condition noted but no specific description available

In the majority of the 66 collisions involving defective tyres, it was a combination of tyres and behavioural factors such as the presence of alcohol, drugs, speed, distraction, fatigue factors that led to the final outcome of the collision.

However, 3 of the collisions involved no other reported behaviour. In these 3 collisions only the condition of the tyres was cited. For each of these cases, 1) the vehicle experienced a tyre blow-out, 2) the tyre was overinflated on a wet surface and lost control and 3) the tyre was underinflated and collapsed on cornering. The largest age group driving with defective, worn, over or underinflated tyres were 17 to 24 year olds (47%).

The county where the largest proportion of culpable drivers which had defective tyres on their vehicles was Donegal (18.2%). Followed by Cork, Kerry and Wexford (9.1% each).

21 of the 66 vehicles lost control on a bend (15 on a right bend; 6 on a left bend).The road surface was dry at the time of 41 (62%) of the 66 collisions involving defective, worn, under/overinflated tyres. The majority (62.1%) of the 66 collisions occurred on a regional road.

Issues with tyres, brakes, lights and steering were the main factors which resulted in a rating of defective or dangerously defective vehicles.

Death and Injury Figures Caused in full or Part by Collision Involving Vehicle with Defective Tyres, Brakes and Other Vehicle Factors

111 people lost their lives and 30 were seriously injured in collisions where vehicle defects were a contributory factor. This may not have been the sole cause of the collision, but this fact in combination with other pre-crash behaviours such as alcohol, speed etc. resulted in these deaths.

Tyres:

Some 71 people were killed and 19 were seriously injured in a collision where a vehicle had defective tyres as a contributory factor (Table 5).

Table 5. Injury Caused by Vehicle with Defective Tyres

	Fatal	Serious	Minor
Driver*	39	12	18
Passenger	28	7	32
Pedestrian	3	-	-
Cyclist	1	-	-
TOTAL	71	19	50

***4 of the drivers were motorcyclists**

Three of the 71 people died in a collision where the sole contributing factor was the condition of tyres.

18 people were killed and 6 were seriously injured in a collision where a vehicle had defective brakes. Again, this may not have been the sole contributing factor to the collision but may have had an impact on the outcome.

A further 22 people were killed and 5 seriously injured in a collision where a vehicle had other defects such as cut suspension, lights not efficient, or wipers not working. These may not have been the sole cause of the collision but would have had an impact on the overall outcome by impairing the control of the vehicle and vision of the driver.

Section 1.

Introduction

Section 1.1 Background to Report

Over the time period 2008 to 2012, 983 fatal collisions occurred on Irish roads claiming the lives of 1, 077 people. The current report is an examination of the circumstances and factors contributing to these collisions. By better understanding how and why these collisions have occurred, the RSA can focus their interventions on the main contributing factors to fatal collisions in Ireland and reduce the number of people being killed on the roads.

A remit of the RSA is to report on road collisions occurring on Irish roads; as part of this work data is collated and analysed using the road collision database. This database is created using a form called a C(T)68 forwarded to the RSA from An Garda Síochána. The information provided in this form is based on preliminary information collected at the scene of a collision and thus does not constitute the findings of the final investigation. The RSA issues reports regularly using the data contained in this database as the best available representation of fatal and injury collisions.

This vehicle factors report is based on an analysis of the completed investigation file where the full circumstances of the collisions are available.

Access was granted by An Garda Síochána to the completed Investigation File produced for each collision. The file contains two main reports:

1. An Garda Síochána Investigation Report
2. Forensic Collision Investigation Report (FCI)

The RSA collected data in the Garda National Traffic Bureau. Of the 983 fatal collisions which occurred in the time period under investigation, approximately 12% (116) were unavailable for analysis for reasons which included a continuing or ongoing investigation and the file held by An Garda Síochána Ombudsman Commission (GSOC). The final number of collisions analysed was 867.

An Garda Síochána Investigation Report:

This report is completed by the main investigating officer who attended the collision and provides a detailed breakdown of the collision scene, vehicles involved, details of each driver, passengers, testing for alcohol, the number and type of casualty and all relevant circumstances to the collision. Included in this report are all witness statements provided to An Garda Síochána around the factors observed prior to and post collision by those involved in the collision and those who may have witnessed the collision. Autopsy reports, results of alcohol tests, the Forensic Collision Investigation Report and the decision by the Coroner are also included. This file allows the investigating officer to determine the circumstances prior to the collision, the party whose actions were primarily responsible for causing the collision and the direction or request to the Director of Public Prosecutions for a prosecution of those involved.

Forensic Collision Investigation Report (FCI):

All fatal collisions are investigated by the regional Forensic Collision Investigation unit of An Garda Síochána. As part of this investigation a complete service check is performed on all vehicles involved to determine what or if any specific vehicle factors were present (e.g. faulty tyres, brakes, lights) which may have contributed either in full or part to the crash (PSV report). The PSV report is completed by Public Service Vehicle Inspector (a member of An Garda Síochána). This information is used in conjunction with a detailed forensic examination of the scene taking into account weather, lighting and road conditions or layout and the assessment of speed where possible. The result is an FCI Report containing information on each of the vehicles involved and a detailed description of how the crash occurred. This enables the decision to be made as to whether a specific party or vehicle is either culpable or part culpable for the collision.

Section 1.2 Number of Fatal Collisions and People Killed Under Review

This report will examine 867 of the fatal collisions which occurred from 2008 to 2012 (Table 1.1). These include:

Table 1.1 No of Collision Files Examined

	N
1 Vehicle	333
2 + Vehicle	319
Cyclist	37
Pedestrian	178
TOTAL	867

858 of the 867 collisions involved at least one driver. Of the other nine, seven were cyclist only and two 'pony and trap' only collisions. Details of 1,177 drivers (1,081 four wheeled motor vehicle and 96 motorcycle drivers) were available for analysis.

The number of people killed or injured for which details were available for analysis are as follows in Table 1.2:

Table 1.2 Killed and Injured Figures in Collisions Analysed

	Killed	Serious Injury	Minor Injury
Driver Motor Vehicle	450	69	154
Driver Motorcycle	84	2	6
Passenger	196	94	143
Pedestrian	180	-	-
Cyclist	37	-	-
TOTAL	947	165	303

Section 1.3 Person Deemed Culpable for the Collision

For each collision where possible or appropriate, the Investigation report produced by An Garda Síochána determines the party whose actions were primarily responsible for causing the collision. This results from a detailed analysis of all factors such as witness statements on the behaviours and actions of the driver, pedestrian or cyclist, and alcohol toxicology results. It also includes conclusions drawn from the FCI report on precisely how the collision occurred and which vehicle was being driven by the person deemed to be responsible or part responsible for causing the collision. In some instances no responsibility by the driver, cyclist or pedestrian is determined due to the specific circumstances of the collision. This may be the case in hit and run collisions or those with unforeseen circumstances, such as an animal or unexpected object on the road. However, for the most part one party is deemed by their actions to have caused the fatal collision.

It is important that the details of those parties whose actions or behaviour caused the collision be highlighted as these are the behaviours that will need to be addressed through road safety interventions to modify such behaviour. Throughout the report there will be a section detailing the profile and actions

of those who were deemed to be responsible or part responsible for the collision. For the remainder of the report they will be referred to as the culpable party. Of the 1,177 drivers of motorised vehicles where details are available, 705 were deemed to be culpable or part culpable for the collision. Three drivers were deemed not culpable due to unforeseen circumstances such as the presence of unexpected animals or objects on the road. A further three collisions were hit and run so no culpability could be determined.

Please note:

This report provides an analysis of the data by collision, by vehicle and by contributory factor. Therefore the figures and totals will change depending on the category under discussion.

Section 2.

All Vehicles Involved: Type and Age

An overview of all of the vehicles involved in the collision allows a snapshot into the age and condition of vehicles on the road. The type and registration number of each vehicle involved in the collision are recorded by An Garda Síochána. Where possible, using the registration number, an approximate age can be extracted for the vehicle. However, as the exact date of registration was not available, the age is an approximation. For example, there could be a difference of almost a year between a car registered in January and a car registered near the end of the same year.

Section 2.1 Age of Motorised Vehicles Involved for Period 2008-2012

All vehicles Involved:

The age of 1,103 of the 1,206 motorised vehicles involved in the 867 collisions was extracted from the registration details (pedal cyclists and pony and traps excluded). There were 103 vehicles where an age could not be extracted and is a combination of UK registered plates, not recorded, older plates with no year (tractors and motorcycles), trains and 3 hit and runs where no vehicle was identified. Of these, the average age was 8.1 years (Table 2.1) ranging from less than a year to 30 years (a tractor).

Table 2.1 Age of All Vehicles Involved

N	**1103**
Mean	8.1
Median	8
Mode	10
Range	30
Minimum	< 1
Maximum	30

Table 2.2 sets out the age band and frequency of vehicles involved. The largest number of vehicles involved in the 867 collisions were between 5 and 9 years old. The second largest group were between 10 and 14 years old. Older vehicles, while they may still be deemed roadworthy, in general will have less of the safety features designed to help reduce the severity of a collision.

Table 2.2 Age Band of All Vehicles Involved.

	N	%
<1	27	2.4
1-4	255	23.1
5-9	398	36.1
10-14	330	29.9
15-19	79	7.2
20-24	13	1.2
>30	1	0.1
TOTAL	1103	100.0

Culpable Party Vehicle:

Age was extracted for 640 of the 705 Motorised vehicles where the driver was deemed culpable for the collision. Over two thirds (70.4%) of the vehicles driven by the culpable party were aged between 5 and 14 years old. There were slightly more 10-14 year old vehicles than those aged between 5 and 9 years.

Table 2.3 Age of Vehicle Driven by Culpable Party

Age Band	N	%
<1	13	2.0
1-4	114	17.8
5-9	221	34.5
10-14	230	35.9
15-19	51	8.0
20-24	10	1.6
>30	1	0.2
TOTAL	640	100.0

Section 2.2 Type of Vehicle Involved

All Vehicles Involved:

Two thirds of the vehicles (66.7%) involved were private cars (Table 2.4). The second largest category were HGVs (8.3%). Some 43 (3.5%) were public service vehicles e.g. buses, mini buses and taxis. The 'other' category is classified in Table 2.5.

Table 2.4 Type of All vehicles Involved

	N	%
Private Car	831	66.7
HGV	103	8.3
Motorcycle	96	7.7
Van	94	7.6
Pedal Cycle	37	3.0
PSV Bus	21	1.7
Taxi Car	16	1.3
PSV Mini Bus	6	0.5
Other	41	3.3
TOTAL	1245	100.0

Two of the vehicles had false number plates, one was rented, and of the five buses one was a school bus.

Of the ‘other’ type of vehicle involved, the most frequent were tractors and tractors towing trailers 16 (39%). These vehicles were also among the oldest age category of vehicles.

Table 2.5 'Other' Vehicle Involved

	N
Tractor And Trailer	10
Tractor	6
Jeep Towing Trailer	4
Ambulance	3
Campervan	2
Pony And Trap	2
Train	2
Van And Trailer	2
Luas	1
Pick Up Truck	1
Taxi Minibus	1
Vintage Tractor	1
Combine Harvester	1
Patrol Car	1
Pick Up And Trailer	1
Pick Up With Horse Box	1
Teleporter	1
Van Towing Cherry Picker	1
TOTAL	41

Type of Vehicle by Culpable Party:

Table 2.6 sets out the type of vehicle being driven or cycled by the culpable party. The sequence of the top three vehicles has changed and HGV's moved from second to fourth place. This indicates that while HGVs are well represented in the 867 fatal collisions, the drivers of HGVs are less likely to have caused the collision by comparison to drivers of private motor cars, motorcycles and vans.

Table 2.6 Vehicle Type by Culpable Party

	N	%
Private Car	527	72.1
Motorcycle	79	10.8
Van	51	7.0
HGV	27	3.7
Pedal Bicycle	24	3.3
PSV Bus	4	0.5
PSV Mini Bus	1	0.1
Other	18	2.5
TOTAL	731	100.0

The ‘other’ category:

	N
• Tractor	6
• Pony and trap	2
• Tractor and trailer	2
• Ambulance	1
• Campervan	1
• Jeep towing trailer	1
• Jeep with trailer	1
• Pick-up truck	1
• Taxi minibus	1
• Van towing Cherry Picker	1
• Vintage tractor	1
• Total	18

Section 3.

Conclusions of PSV Inspectors Report of Motorised Vehicle

For the remainder of this report only motorised vehicles are discussed (pedal cycles and pony and trap are excluded). Just two of the pedal cycles with a PSV report had a vehicle factor noted. One with a defective tyre which was a manufacturing fault and a second with no brakes or lights.

PSV reports were analysed for 1,124 of the 1,206 motorised vehicles involved. No reports were available for 82 vehicles. Three were unidentified vehicles involved in hit and run collisions; in two cases reports were not possible due to the condition of the car (badly burned). PSV reports were unavailable for a further 21 as they were the third vehicle present at the scene and may not have been deemed a significant component of the crash. Of the remaining 56, Table 3.1 sets out the type of vehicles for which reports were not available.

Table 3.1 Type of Vehicle with No PSV Report

	N
Private Car	32
Motorcycle	7
Van	4
HGV	8
PSV Mini Bus	1
Other *	4
TOTAL	56

**** Other include 2 tractors, 1 train, 1 pick-up with horse box.***

Section 3.1 PSV Reports All Motorised Vehicles

Overall, 67(6%) ranged from being defective to poor/fair condition. Specifically, 19 (1.7%) vehicles were rated as dangerously defective (Table 3.2).

Issues with tyres, brakes, lights and steering were the main factors which resulted in a rating of defective or dangerously defective vehicle. An additional 40 (3.6%) vehicles were classified as serviceable, mechanically serviceable or no mechanical defects apart from tyres. For these 40 vehicles the condition of their tyres was indicated as a possible contributory factor in the collision. Therefore, while these vehicles were rated as *mechanically* serviceable the condition of the tyres were defective due to excessive wear, or over/under inflation. Section 5 further examines tyres as a contributory factor. Table 1 in Appendix 1 contains the exact terminology used by the individual PSV inspector and is extracted from each of the FCI reports.

Table 3.2 Condition of All Motorised Vehicles Involved as per PSV Report

	N	%
Serviceable/Roadworthy Condition	1017	90.5
Serviceable/Mechanically Serviceable Apart From Tyres	40	3.6
Not Roadworthy	20	1.8
Dangerously Defective	19	1.7
Defective	15	1.3
Not Serviceable Condition	6	0.5
Poor Pre-Crash Condition	4	0.4
Poor / Fair Pre- Crash Condition	3	0.3
TOTAL	1124	100.0

Table 3.3, sets out the 67 vehicle types deemed defective or not road worthy. Of the 67 vehicles deemed dangerous or defective, 6 were driving for work or using a work vehicle (4 HGVs, 1 taxi and 1 jeep towing a trailer).

Table 3.3 Defective or Poor Roadworthy Condition Vehicles

	N	%
Private Car	52	77.6
Motorcycle	4	6.0
Other*	4	6.0
HGV	4	6.0
Van	1	1.5
TOTAL	67	100.0

**** of the 'other' deemed defective, one was a tractor pulling a trailer, 1 a jeep pulling a trailer, 1 van pulling a cherry picker and 1 teleporter was rated as not road worthy.***

Of the 59 defective vehicles where the age of the vehicle was recorded (Table 3.4), almost half (46%) were aged between 10 and 14 years old.

Table 3.4 Age of Defective or Poor Roadworthy Condition Vehicles

	N	%
1-4	4	6.8
5-9	13	22.0
10-14	27	45.8
15-19	13	22.0
20-24	2	3.4
TOTAL	59	100.0

Table 3.5 sets out the age and gender where available of all drivers who were driving vehicles deemed defective or not roadworthy. The majority were male aged between 17 and 34 years of age (62.3%).

Table 3.5 Age and Gender of All Drivers in Defective Vehicles

	10-16	17-24	25-34	35-39	50-64	TOTAL
	N	N	N	N	N	N
MALES	1	19	14	8	1	43
FEMALES	0	4	3	2	1	10
TOTAL	1	23	17	10	2	53

Section 3.2

PSV Report of Vehicle Driven by Culpable Party

PSV reports were analysed for 677 of the 705 motorised vehicles where the driver was deemed culpable. Some 47 (7%) ranged from being defective to poor/fair un-roadworthy condition (Table 3.6). Specifically, 15 (2.2%) were dangerously defective.

A further 33 (4.9%) were classified as serviceable, mechanically serviceable or no mechanical defects apart from tyres. These 33 vehicles had the condition of their tyres indicated as a possible contributory factor in the collision. Therefore, while these vehicles were rated as *mechanically* serviceable the condition of the tyres were defective due to excessive wear, or over/under inflation.

Interestingly, 47 (70.1%) of the 67 vehicles which were deemed to be defective or not serviceable/roadworthy were driven by the person deemed to be culpable for the collision. Table 1 in Appendix 1 sets out the exact terminology used by the individual PSV inspectors.

Table 3.6 Condition of Vehicle Driven by Culpable Party

	N	%
Serviceable/Roadworthy Condition	597	88.2
Serviceable/Mechanically Serviceable Apart From Tyres	33	4.9
Dangerously Defective	15	2.2
Not Roadworthy	12	1.8
Defective	8	1.2
Not Serviceable Condition	5	0.7
Poor Pre-Crash Condition	4	0.6
Poor /Fair Pre-Crash Condition	3	0.4
TOTAL	677	100.0

Table 3.7 sets out the type of vehicle rated as defective or in poor road worthy condition driven by the culpable party.

Table 3.7 Defective or Poor Roadworthy Condition Vehicles Driven By Culpable Party

	N	%
Private Car	40	85.1
Motorcycle	3	6.4
Van	2	4.3
HGV	1	2.1
Other*	1	2.1
TOTAL	47	100.0

**** The other vehicle was the jeep pulling a trailer.***

The majority (85.1%) were in private cars. However, 1 HGV driver was driving for work in a HGV rated as defective or not roadworthy and was deemed culpable for the collision.

Of the 47 vehicles deemed defective or in poor road worthy condition (Table 3.8) and where age of the vehicle was recorded, 30 (63.8%) were aged between 10 and 19 years with the single largest category being between 10 and 14 years old accounting for 19 (40.4%) of the vehicles.

Table 3.8 Age of Defective Vehicle Driven by Culpable Party

	N	%
1-4	3	6.4
5-9	7	14.9
10-14	19	40.4
15-19	11	23.4
20-24	1	2.1
TOTAL	47	100.0

Table 3.9 sets out the age and gender of the 47 drivers who were deemed culpable and who were driving vehicles deemed defective or not roadworthy. Two thirds (65.9%) were male and aged between 17 to 34 years.

Table 3.9 Age and Gender of Culpable Drivers using Defective Vehicles

	10-16	17-24	25-34	35-39	50-64	TOTAL
Males	1	18	13	6	1	39
Females	0	4	3	1	0	8
TOTAL	1	22	16	7	1	47

Section 4.

Vehicle Factors Recorded in PSV Report

Data for all vehicle factors which may have contributed to the overall outcome of the collision or in some instances caused the collision were extracted from the PSV report. These factors include the condition of tyres, brakes, lights, steering etc. and will be further set out in section 4.1. These factors in some instances are highlighted as contributory factors due to the effect they may have on the control of the vehicle. In some circumstances a driver may not have lost control for example, on a corner or in wet conditions if the condition of the tyres or steering was good. However, if the tyres are balding or defective this renders control of the vehicle much more difficult.

This section examines the data by collision, by vehicle and by contributory factor. Therefore figures and totals will differ depending on the category under discussion.

Section 4.1 Vehicle Factors Noted in All Collisions

Of the 867 fatal collisions analysed, vehicle factors were noted in 121 (14%) collisions which may or may not have contributed in full or part to the crash. While a vehicle factor may have been present it may not have rendered the vehicle defective or un-roadworthy. However, the factor may have been significant enough to have contributed to the collision. Of all vehicle factors noted in all 867 collisions, the largest single factor were tyres (8.7%), see Table 4.1.

Table 4.1 Vehicle Factors Identified in All Fatal Collisions

	N	%
Tyres	75	8.7
Brakes	18	2.1
Steering	4	0.5
Suspension	3	0.3
Lights	2	0.2
Windows - Vision Obscured	2	0.2
Mirrors	1	0.1
Stolen/U.T. Vehicle	1	0.1
Other	15	1.7
NR	33	3.8
None	713	82.3
TOTAL	867	100.0

**** NR is not recorded as no PSV report in file or not conducted due to hit and run, vehicle condition etc***

Issues with tyres, brakes, lights and steering were the main factors which resulted in a rating of defective or dangerously defective vehicle. In particular, the condition of the tyres on 36 vehicles rendered the car 'defective' in the PSV report. However, a further 40 vehicles were rated as serviceable / mechanically serviceable apart from the tyre condition.

Two of the cyclists were using bicycles rated as defective due to 1) no brakes and no front or back lights and 2) defective tyre (manufacturing fault).

Section 4.2 Vehicle Factors All Motorised Collisions

This section examines only collisions involving at least one motorised vehicle Therefore, the total number of collisions examined here changes from 867 to 858. As a result the 121 collisions with a vehicle factor reduces to a total of 119 collisions with 125 vehicle factors noted. In the 119 collisions where a vehicle factor was noted as possibly contributing to the collision, one or more factors, such as altered suspension and bald tyres or steering, were highlighted in six collisions. Tyres accounted for almost two thirds (60.6%) of all factors identified (Table 4.2%).

Table 4.2 Vehicle Factors Identified for all Vehicles

	N	%
Tyres	76*	60.6
Brakes	17	14.2
Other	15	11.8
Lights	6	4.7
Steering	4	3.1
Suspension	3	2.4
Windows - Vision Obscured	2	1.6
Mirrors	1	0.8
Stolen/U.T. Vehicle	1	0.8
TOTAL	125	100.0

**** UT is unauthorised taking of vehicle.* one collision involved both vehicles with defective tyres***

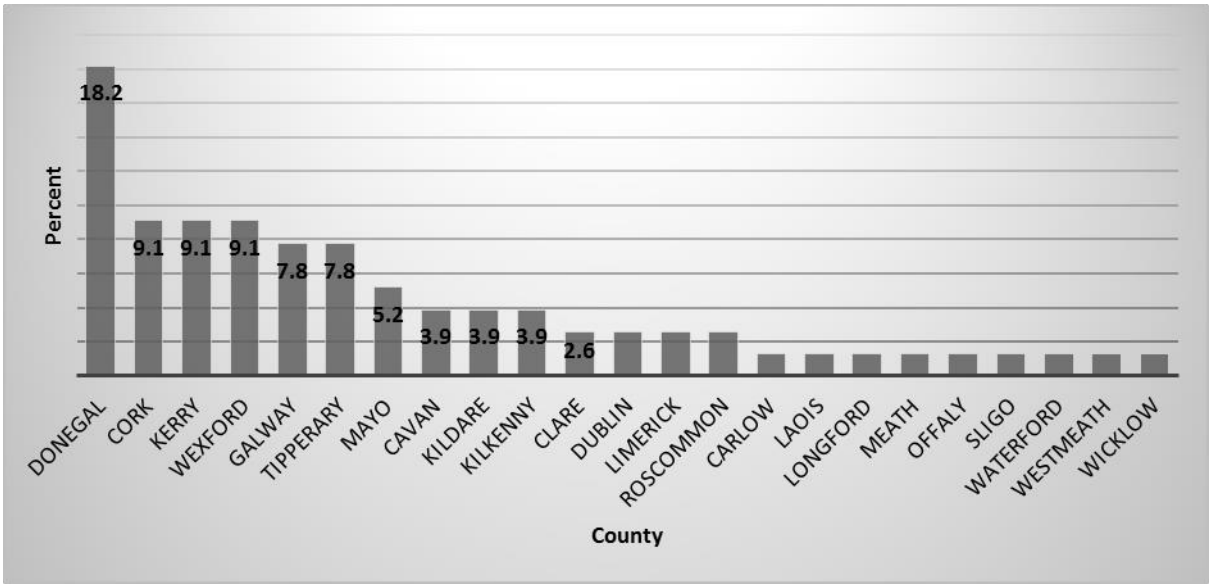
Table 4.3 sets out the vehicle type by the top two vehicle factors noted. Tyres and brakes were the most common factors set out in the PSV reports. However, it is interesting to note that the main factor highlighted for HGVs were brakes (3 of the 4 factors).

Table 4.3 Vehicle Type by Top Two Vehicle Factors Identified in All Motorised Vehicles

	TYRES		BRAKES	
	N	%	N	%
Private Car	62	81.6	9	52.9
HGV	1	1.3	3	17.6
Motorcycle	4	5.3	3	17.6
Van	6	7.9	0	0.0
All Other Vehicles	3	3.9	2	11.8
TOTAL	76	100.0	17	100.0

The county of collision where most vehicles had defective or poor quality tyres was Donegal (18.2%). Figure 1 displays the location of the collision where the vehicle had defective tyres.

Figure 1. Location of All vehicles with Defective Tyres



Section 5

Vehicle Factors as a Contributory Factor in all Motorised Vehicle Collisions

Section 5.1 Contributory Vehicle Factors

Of the 867 collisions analysed, 858 involved at least one motorised vehicle. In total 101 collisions were identified through the available PSV reports as having at least one vehicle factor which contributed to the collision. These factors contributed in full or part to the outcome. All 101 vehicles were driven by the party deemed culpable for the crash. Tyres were a known contributory factor **in 8%** of the 858 collisions involving a motorised vehicle (Table 5.1).

Table 5.1 Contributory Factors Identified in Vehicle Driven by Culpable Party

	N	%
Tyres	**66**	**7.7**
Brakes	**14**	**1.6**
Steering	3	0.3
Suspension	3	0.3
Stolen/U.T. Vehicle	1	0.1
Windows - Vision Obscured	1	0.1
Other	13	1.5
None	757	88.2
TOTAL	858	100.0

Table 5.2 sets out the 101 vehicle factors identified in the PSV report as contributory factors to the collision. The condition of tyres accounted for almost two thirds (65.3%) of the vehicle factors cited as contributory to the collision.

Table 5.2 Contributory Vehicle Factors Identified in Vehicle Driven by Culpable Party

	N	%
Tyres	**66**	**65.3**
Brakes	**14**	**13.9**
Steering	3	3.0
Suspension	3	3.0
Stolen/U.T. Vehicle	1	1.0
Windows - Vision Obscured	1	1.0
Other	13	12.9
TOTAL	101	100.0

The top two contributory factors in the vehicle driven by the culpable party are set out in Table 5.3.The majority (84.4%) of defective tyres were found on private cars.

Table 5.3 Top Two Contributory Vehicle Factors by Vehicle Driven by Culpable Party

	TYRES		BRAKES	
	N	%	N	%
Private Car	56	84.8	8	57.1
HGV	0	0.0	2	14.3
Motorcycle	4	6.1	3	21.4
Van	5	7.6	0	0.0
All Other Vehicles	1	1.5	1	7.1
TOTAL	66	100.0	14	100.0

Section 5.2 Contributory Vehicle Factors by Type of Collision Involved

As can be seen in Table 5.4 defective tyres were very prevalent as a factor in single vehicle crashes when compared with 2 or more vehicle crashes (74.1%).

Table 5.4 Contributory Vehicle Factors by the Type of Collision

	1 VEHICLE	2 + VEHICLE	CYCLIST	PEDESTRIAN	TOTAL
	N	N	N	N	N
Tyres	43	19	1	3	66
Brakes	7	6	o	1	14
Other	6	4	0	3	13
Steering	1	1	1	0	3
Suspension	0	3	0	0	3
Stolen/U.T. Vehicle	1	0	0	0	1
Windows(Vision Obscured)	0	1	0	0	1
Lights	0	0	0	0	0
TOTAL	58	34	2	7	101

The condition of tyres may not have been the sole cause of the collision but may have contributed in full or part to the outcome. Additional behavioural factors such as alcohol, speed, drugs, fatigue etc. may have been present.

Section 6

Tyre Condition

Section 6.1 Tyre Condition on All Motorised Vehicles Assessed

Overall, 76 motorised vehicles had the condition of their tyres noted in the final report. However, only 66 vehicles were rated as having tyre condition as a contributory factor to the collision. It was the opinion expressed by the PSV investigator that while there was an issue with the condition of tyres on 10 of the 76 vehicles, the condition may not have been sufficient to be deemed a contributory factor to the collision. The tyres on these 10 vehicles were either under inflated or below the recommended tread depth. While the driver of these vehicles may not have had enough time to react to the collision, the condition of the tyres could have impacted the stopping distance. However, there was insufficient evidence to corroborate this.

Specifically, three of these collisions involved a pedestrian who was deemed culpable for the collision by their actions. However, these three vehicles had excessively worn tyres. One collision involved both drivers in vehicles with defective tyres. In six collisions other factors were deemed to have been the cause of the collision but the six vehicles who were hit had issues with their tyre quality.

Table 6.1 sets out the condition of the tyres on the 76 vehicles identified. **Over half (53.9%) were rated as being excessively or dangerously worn.** In these instances wires would have been exposed and the rubber may have been deformed. **An additional 6.6% were classified as worn. A further 7 (9.2%) were due to underinflating of tyres, some dangerously low**. One of the 76 vehicles was travelling on a temporary tyre. Of the 76 vehicles identified many had an issue with more than one of the tyres on the vehicle (in some cases all four were defective).

Table 6.1 Condition of All Tyres Recorded on Motorised Vehicles

	N	%
Excessive/Dangerously Worn	**41**	**53.9**
Underinflated	**7**	**9.2**
Worn	**5**	**6.6**
Different Size Tyres	3	3.9
Overinflated	3	3.9
Below Min Tread Depth	3	3.9
Tyres Cracked/Perished	3	3.9
Excessive/Dangerously Worn And Wrong Size	1	1.3
Excessive Worn And Underinflated	1	1.3
Fitted Wrong Direction And Worn	2	2.6
Fitted Wrong Direction And Excessively Worn	1	1.3
Temporary Tyre	1	1.3
NR	5	6.6
TOTAL	76	100.0

NR = Tyre condition noted but specific description not available

Section 6.2 Tyre Condition as a Contributory Factor to Collision

Over half (51.5%) of the tyres on the 66 vehicles with defective tyres were excessively/dangerously worn and 10.6% were underinflated some dangerously low. However, an additional 6% were a combination of excessively worn, underinflated, wrong size or fitted in the wrong direction (Table 6.2).

Table 6.2 Tyre Condition as Contributory Factor to Collision

	N	%
Excessive/Dangerously Worn	**34**	**51.5**
Underinflated	**7**	**10.6**
Worn	**5**	**7.6**
Different Size Tyres	3	4.5
Overinflated	3	4.5
Below Min Tread Depth	2	3.0
Tyres Cracked/Perished	2	3.0
Excessive/Dangerously Worn And Wrong Size	1	1.5
Excessive Worn And Underinflated	1	1.5
Fitted Wrong Direction And Worn	1	1.5
Fitted Wrong Direction And Excessively Worn	1	1.5
Temporary Tyre	1	1.5
NR	5	7.6
TOTAL	66	100.0

NR = Tyre condition noted but no specific description available

The following list provides an example of the issues around the tyres fitted on all vehicles including those 66 vehicles driven by the culpable party. Table 3 in the appendix provides a description of the condition of all 76 vehicles tyres.

- Underinflated or dangerously low pressure
- Overinflated
- Wires exposed and deformed shape
- Excessive wear from hand-braking

- Different size tyres fitted
- Temporary tyre smaller than others
- Tyres fitted the wrong way (2 or more)
- Bald
- Excessive wear on insides
- Perished rubber
- Rubber disintegrating with age
- Front tyres in poor condition affecting performance in wet conditions (e.g. aquaplaning
- 3 out of 4 tyres defective
- All tyres defective

It is important to understand that the collision may have involved a combination of vehicle and other behavioural factors such as alcohol, drugs, speed, distraction, fatigue etc. In the majority of these cases a combination of these factors led to the final outcome of the collision. Only three of the collisions involved no other reported behaviour. In these three collisions only the condition of the tyres was cited. Specifically for each case, 1) the vehicle experienced a blow-out, 2) the tyre was overinflated on a wet surface and lost control and 3) the tyre was underinflated and collapsed on cornering.

Some 13 vehicles in the 867 collisions analysed aquaplaned and 4 of these vehicles were known to have had excessively worn or underinflated tyres.

Tables 6.3 sets out the injury to the driver, passengers, and pedestrians and cyclist caused by the culpable party who was driving a vehicle with defective, worn or over/underinflated tyres.

Table 6.3 Injury Figures by Collision Involving a Vehicle with Defective Tyres

	Fatal	Serious	Minor
Driver	39	12	18
Passenger	28	7	32
Pedestrian	3	-	-
Cyclist	1	-	-
TOTAL	71	19	50

71 people lost their lives and 19 were seriously injured in a collision where a vehicle had defective tyres. This may not have been the sole cause of the collision, but this fact in combination with their other pre-crash behaviours such as alcohol, speed etc. resulted in these deaths. Three of the 71 people died in a collision where the sole contributory factor was the condition of tyres.

Sixty one (92.4%) of the 66 culpable drivers, driving a vehicle with defective tyres were travelling forward. A further 3 (4.5%) were attempting to overtake. The other two vehicles were either exiting or entering or attempting to turn right at inappropriate speed.

Table 6.4 sets out the driver action associated with the 66 vehicles with defective, worn or under/over inflated tyres. Three quarters (75.8%) of those drivers lost control of their car and an additional seven crossed to the wrong side of the road.

Table 6.4 Action of Culpable Driver with Defective Tyres on Vehicle

	N	%
Lost Control	50	75.8
Went To Wrong Side Of Road	7	10.6
Exceeded Safe Speed	3	4.5
Failed To Stop Or Yield	2	3.0
Improper Overtaking	2	3.0
Failed To Observe	1	1.5
Other	1	1.5
TOTAL	66	100.0

Of the 66 vehicles, 21(31.8%) were known to have lost control on a bend (15 on a right bend; 6 on a left bend). The road surface was dry at the time of 41 (62%) of the 66 collisions involving defective, worn, under/overinflated tyres.

The majority (62.1%) of the 66 collisions occurred on a regional road (Table 6.5).

Table 6.5 Collision Involving Vehicle with Defective Tyres by Road Type

	N	%
Local	3	4.5
Motorway	2	3.0
National	20	30.3
Regional	41	62.1
TOTAL	66	100.0

Table 6.6 sets out the age group of drivers driving vehicles with defective, worn, over or underinflated tyres, the largest of which was 17 to 24 year olds (47%). Only 12 (18.1%) of the 66 culpable drivers and who had defective tyres were female.

Table 6.6 Age Band of Culpable Driver with Defective Tyres on Vehicle

	N	%
10-16	1	1.5
17-24	31	47.0
25-34	24	36.4
35-49	8	12.1
50-64	2	3.0
65+	0	0.0
TOTAL	66	100.0

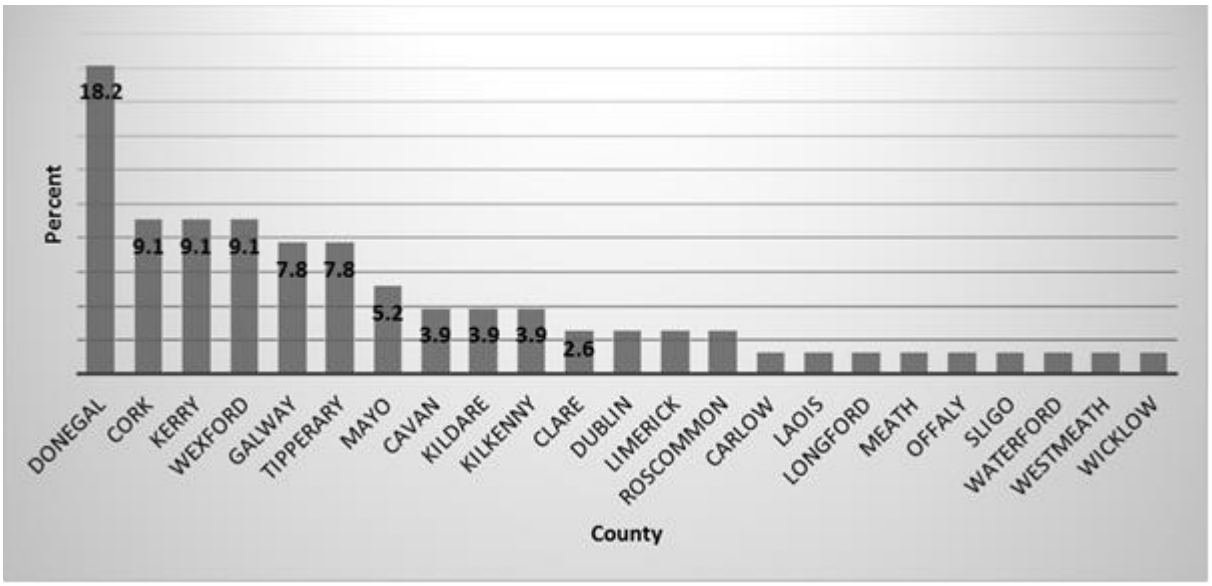
Table 6.7 sets out the age of the vehicle driven by the culpable party with defective tyres. The largest group was the 10-14 year old cars.

Table 6.7 Age band of Vehicle with Defective Tyres Driven by Culpable Party

	N	%
1-4	7	10.6
5-9	15	22.7
10-14	27	40.9
15-19	11	16.7
20-24	3	4.5
NR	3	4.5
TOTAL	66	100.0

The county where the largest proportion of culpable drivers had defective tyres on their vehicle was Donegal (18.2%). Excessive wear, and in one instance excessive wear as a direct result of 'hand braking', was the main description of the tyre condition for those vehicles in Donegal. Figure 2 displays the 66 vehicles with defective tyres driven by the culpable party by geographical location.

Figure 2. Geographical Location of Culpable Driver with Defective Tyres Fitted



Section 7

Other Contributory Vehicle Factors

There were 18 people killed and six seriously injured in a collision involving a vehicle with defective brakes. Again, this may not have been the sole contributing factor to the collision but may have had an impact on the outcome (Table 7.1).

Table 7.1 Injury Figures by Collision Involving a Vehicle with Defective Brakes

	Fatal	Serious	Minor
Driver	9	2	3
Passenger	8	4	1
Pedestrian	1	-	-
TOTAL	18	6	4

A further 22 people were killed and five seriously injured in a collision where a vehicle had other defects such as cut suspension, defective lights, or wipers not working. Again, these may not have been the sole cause of the collision but would have had an impact on the overall outcome by impairing the control of the vehicle and vision of the driver (Table 7.2).

Table 7.2 Injury Caused by Collision Involving a Vehicle with Other Defects

	Fatal	Serious	Minor
Driver	13	2	3
Passenger	4	3	2
Pedestrian	4	-	-
Cyclist	1	-	-
TOTAL	22	5	5

Appendix 1

Table 1. PSV Report Terminology All Vehicles 1

Serviceable Condition
Good Roadworthy Condition
Good Serviceable Condition
Good Pre-Crash Condition
Serviceable Condition Apart From Tyres
Not Roadworthy
Dangerously Defective
Mechanically Serviceable
Defective
Good Motorised Order
Roadworthy Condition
No Motorised Defects
Excellent Pre-Crash Condition
No Mechanical Defects, Tyres Worn
Not Serviceable Condition
Poor Pre-Crash Condition
Fair Serviceable Condition
Mechanically Serviceable Apart From Tyres
Minor Defects
No Mechanical Defects, Tyre Underinflated

Table 2. All Motorised Vehicles Tyre Details Extracted From PSV Report

	N
All Four Tyres Excessively Worn	1
All Tyres In A Very Dangerous Condition	1
Car Would Have Failed The NCT Due To Poor Tyre Condition	1
Dangerously Underinflated	1
Dangerously Worn And Underinflated Tyres	1
Dangerously Worn Tyres	1
Defective Tread Depth	1
Excessive Wear To Tyres	1
Excessive Wear From Hand Braking	1
Excessive Wear On Inside With Wires Exposed, Rear Left Rubber Perished	1
Excessively Worn And No Tread Left On Tyres	1
Excessively Worn Back Tyres With Wire Exposed And Defective Accelerator/Throttle	1
Excessively Worn Front Left Tyre	1
Excessively Worn Front Tyre With Wire Showing	1
Excessively Worn Rear Tyre	1
Excessively Worn Two Front Tyres And Defective Brakes	1
Excessively Worn Tyres	1
Excessively Worn Tyres Front And Back	1
Front Left Tyre Excessive Wear	1
Front Left Tyre Excessively Worn	1
Left Back Tyre Excessively Worn With Wire Exposed And Deformed Shape.	1
Left Front Tyre Excessively Worn And Two Rear Tyres Wrong Direction	1

Left Nearside Back Tyre Excessively Worn With Treads Exposed	1
Nearside Front Tyre Below Min Tread Depth	1
One Tyre Below Min Tread Depth	1
Offside Rear Tyre Under Inflated To Half Recommend	1
One Bald Tyre And Braking System Not Optimal	1
One Tyre Pressure Extremely Low	1
One Wrong Size Tyre, Brake Pads Not Fully Catching	1
Over Inflated And Not In Good Condition	1
Overinflated Tyres	1
Pressure Lower Than Recommended Front And Back	1
Rear Tyres Perished And Trailer Dangerously Defective	1
Right Rear Tyre Excessively Worn	1
Temporary Tyre Small Size	1
The Left Front Tyre Was Smaller Than Others	1
Three Of 4 Tyres On Vehicle Defective	1
Two Bald Tyres	1
Two Excessively Worn Tyres	1
Two Excessively Worn Tyres At Rear	1
Two Front Tyres Dangerously Defective, Three Different Sizes	1
Two Front Tyres Different Sizes One 13 The Other Size 1	1
Two Front Tyres Excessively Worn	1
Two Front Tyres In Poor Condition And This Would Affect Performance In Wet Conditions	1
Two Front Tyres Worn	1
Two Front Tyres Worn To Wire Exposure	1
Two Rear Tyres Bald	1

Two Very Defective Tyres On Back Of Vehicle	1
Two Worn And A Rear Fitted The Wrong Way Around	1
Tyre Collapsed Due To Under Inflation	1
Tyre Got A Blow-Out	1
Tyre Worn	1
Tyres Cracked And One Perished. Steering Rod Worn	1
Tyres Dangerously Defective With Wires Exposed And Defective Braking System	1
Tyres Over Inflated	1
Tyres Were Worn	1
Tyres Were Worn	1
Tyres Worn	1
Underinflated Tyre	1
Underinflated With Two New Tyres To Front	1
Very Badly Worn	1
Very Bald Front Tyres	1
Very Worn Two Back Tyres	1
All Tyres Excessively Worn	1
Excessively Worn Inside Rear Tyre	1
Excessively Worn Tyres With Tread Showing	1
Low Tread Front Left Tyre	1
One Excessively Worn Tyre	2
Three Tyres Excessive Wear	1
Two Back Tyres Excessively Worn	1
NR (No Specific Description)	5
TOTAL	76

Table 3. Tyre Details on Vehicle of Culpable Party

	N
All Four Tyres Excessively Worn	1
All Tyres Excessively Worn	1
All Tyres In A Very Dangerous Condition	1
Car Would Have Failed The NCT Due To Tyre Condition	1
Dangerously Underinflated	1
Dangerously Worn And Underinflated Tyres	1
Dangerously Worn Tyres	1
Defective Tread Depth	1
Excessive Wear From Hand Braking	1
Excessively Worn And No Tread Left On Tyres	1
Excessively Worn Back Tyres With Wire Exposed And Defective Accelerator/Throttle	1
Excessively Worn Front Left Tyre	1
Excessively Worn Front Tyre With Wire Showing	1
Excessively Worn Two Front Tyres And Defective Brakes	1
Excessively Worn Tyres	1
Excessively Worn Tyres Front And Back	1
Excessively Worn Tyres With Tread Showing	1
Front Left Tyre Excessively Worn	1
Left Back Excessively Worn With Wire Exposed And Deformed Shape.	1
Left Front Excessively Worn And Two Rear Tyres Wrong Direction	1
Left Nearside Back Tyre Excessively Worn With Treads Exposed	1
Nearside Front Tyre Below Min Tread Depth	1
One Tyre Below Min Tread Depth	1

Offside Rear Tyre Under Inflated To Half Recommended	1
One Bald Tyre And Braking System Not Optimal	1
One Excessively Worn Tyre	1
One Tyre Pressure Extremely Low	1
One Wrong Size Tyre, Brake Pads Not Fully Catching	1
Over Inflated And Not In Good Condition	1
Overinflated Tyres	1
Pressure Lower Than Recommended Front And Back	1
Rear Tyres Perished And Trailer Dangerously Defective	1
Right Rear Excessively Worn	1
Temporary Tyre Small Size	1
Left Front Tyre Was Smaller Than Others And May Have Contributed To Travelling Into The Gravel	1
Two Back Tyres Excessively Worn	1
Three Tyres Excessive Wear	1
Two Excessively Worn Tyres	1
Two Excessively Worn Tyres At Rear	1
Two Front Tyres Dangerously Defective, Three Different Sizes	1
Two Front Tyres Different Sizes One 13 The Other Size 1	1
Two Front Tyres Excessively Worn	1
Two Front Tyres In Poor Condition And This Would Affect Performance In Wet Conditions	1
Two Front Tyres Worn To Wire Exposure	1
Two Rear Tyres Bald	1
Two Very Defective Tyres On Back Of Vehicle	1
Two Worn And A Rear Fitted The Wrong Way Around	1

Tyre Collapsed Due To Under Inflation	1
Tyre Got A Blow-Out	1
Tyre Worn	1
Tyres Cracked And One Perished. Steering Rod Worn	1
Tyres Dangerously Defective With Wires And Defective Braking System	1
Tyres Over Inflated	1
Tyres Were Worn	1
Tyres Were Worn	1
Tyres Worn	1
Underinflated Tyre	1
Underinflated With Two New Tyres To Front	1
Very Badly Worn	1
Very Bald Front Tyres	1
Very Worn Two Back Tyres	1
NR (No Specific Description)	5
TOTAL	66

Working To Save Lives

Údarás Um Shábháilteacht Ar Bhóithre
Road Safety Authority

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