Road Traffic Management Corporation

South African Fatal Crashes in Context

December 2021

'Safe roads in South Africa'

The Road Traffic Management Corporation (RTMC) is an Agency of the Department of Transport (DoT) and a Member of the United Nations Road Safety Collaboration

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1. ACRONYMS AND ABBREVIATIONS

ABBREVIATION / ACRONYM	INTERPRETATION
AARTO	Administrative Adjudication of Road Traffic Offences
AARTO SI	AARTO Speed Infringements
FatCrashes	Fatal Crashes
GDOCS	Gauteng Department of Community Safety Traffic Police
GG	Government Garage
GVM	Gross Vehicle Mass
HAZ_SUBST_VEH	Hazardous Substance Vehicles
JMPD	Johannesburg Metropolitan Police Department
LDV D/C	Light Delivery Vehicle Double/Cab
MD Stock	Manufacturer or Dealer
MIB Stock	Manufacturer, Importer or Builder
MV	Motor Vehicle
NaTIS	National Traffic Information System
NCDMS	National Crash Data Management System
NRSS	National Road Safety Strategy (2016-2030)
NRTA	National Road Traffic Act
NTP	National Traffic Police
O/U	Over/Under
RTI	Road Traffic Information
RTI&T	Road Traffic Information & Technology
RTMC	Road Traffic Management Corporation
SA	South Africa
SANDF	South African National Defence Force
SAPS	South African Police Service
SI	Speed Infringement
SORSR	State of Road Safety Report
TMPD	Tshwane Metro Police Department
TVP	Total Self-propelled Vehicle Population
UNDA	United Nations Decade of Action
VehPop	Total Self-propelled Vehicle Population
WHO	World Health Organisation

2. ACKNOWLEDGEMENTS

All stakeholders who assisted with the finalisation of this projects are acknowledged with special mention to the RTMCs Business Intelligence Unit, for not only providing relevant data for this project, but for their positive contributions for the author to understand the data towards best possible analysis and output.

3. INTRODUCTION

The aim of this report is to provide input to road safety programmes regarding the 'type of vehicle' which is involved in fatal crashes. In addition, through the analysis of speed infringements of the type of vehicle that is involved in fatal crashes, possible over-underrepresentation of vehicle type in fatal crashes and or involved speed infringements are analysed and discussed.

Amongst others, safe vehicles, and safe speeds as well as safe road use are critical elements of the Safe System approach to which this report might provide relevant analysis output.

A safe system approach recognises that[1]:

- the safety and preservation of human life as the highest value of consideration and that deaths and injuries are not an inevitable outcome of road transport;
- humans are fallible and capable of making errors that are not mitigated by education, training or enforcement;
- humans are fragile and have limits to the crash forces they can sustain, before serious or fatal injuries are inevitable; and
- those who design and maintain the roads, manufacture vehicles, and administer safety programmes share responsibility for safety with road users so that when a death or an injury occurs, remedies are sought throughout the system.

This report further provides baseline analysis for further research as well as recommendations for further research and analysis that would provide scientific input towards reducing death and injury because of road crashes.

[1] WHO, Global Plan of Action for the 2021 – 2030 Decade of Action For Road Safety, Draft 16 April 2021 - https://cdn.who.int › global-plan-of-action_en_web (27Dec2021)

3.1. Background

In line with the National Road Safety Strategy (NRSS) 2016-2030, research into situational conditions of crashes (time of day, weather, other vehicles present/involved) need to be conducted which should feed into road safety guidelines. Situational conditions such as time of day, weather etc., are analysed on an annual basis and published in the RTMC State of Road Safety Report (SORSR) as well as in ad-hoc analysis to provide input into specific road safety programmes such as pedestrian programmes and hazardous road segment analysis. The implementation of the National Road Safety Strategy (NRSS) 2016-2030 remains a priority in South Africa (SA) with the adoption of a Safe System approach being key to a safe road system increasingly free of death and serious injury.

Key challenges are inherently challenging to change in South Africa and amongst these, are the rise of inherent road safety risks such as information settlements next to major freeways, poor town planning which does not prioritise non-motorised transport and limited action towards safer vehicles in South Africa.

Statistics on the number of vehicles involved in fatal crashes and the type of vehicles involved in fatal crashes are included as a parameter analysed in the SORSR however, more in-depth analysis of the type of vehicle involved in fatal crashes vs the proportion of respective vehicle population is needed to identify over or under representation of such type or class of vehicles. More in depth analysis which, include inter alia the age category and colour of vehicles involved in fatal crashes vs same for the respective vehicle population is also included in the analysis.

In addition to the above, more in depth analysis of the vehicle classifications such as colour of vehicles involved in fatal crashes vs the colour of total vehicle population is also analysed to determine if there are any over/under representation of colour of vehicles vs the vehicle population etc.

Some research suggests that vehicle colour plays a significant role in crash risk such as Teck-Hua Ho et al., 2017[2] who studied three years of data from a company that owns the taxis in Singapore and found that yellow taxis had an accident rate 9 percent lower than blue taxis.

[2] Teck-Hua Ho, Juin Kuan Chong, and Xiaoyu Xia, 2017; Yellow taxis have fewer accidents than blue taxis because yellow is more visible than blue, National University of Singapore (Singapore)

This, they suggest, aligns with historical records from Chicago's Yellow Cab company, which was the first to deploy yellow painted taxis due to their perceived better visibility. Similarly, Newstead and D'Elia, 2010[3] identified a clear statistically significant relationship between vehicle colour and crash risk in that compared to white vehicles, several colours were associated with a higher crash risk such as black, blue, grey, green, red, and silver.

The over or under representation of vehicle type vs the respective vehicle population could provide, an indication of where possible intervention might be needed relating to the actual type or class of vehicles in SA.

3.2. Research Scope

To establish any over/under representation on the following NaTIS defined vehicle parameters for vehicles involved in fatal crashes vs for the total registered vehicle population in South Africa:

- vehicle CATEGORY,
- vehicle MAKE,
- vehicle MODEL,
- vehicle DESCRIPTION,
- vehicle COLOUR,
- vehicle AGE,
- vehicle registered to PERSON TYPE or ORGANISATION,
- vehicle OWNERSHIP, and
- combinations of the above vehicle parameters.

To identify over-/under representation of the above vehicle parameters involved in fatal crashes vs the speed infringements for the same vehicle parameters.

To recommend further research/analysis identified during this study.

[3] Stuart Newstead, Angelo D'Elia, 2010, Does vehicle colour influence crash risk?, Monash University Accident Research Centre (Australia)

3.3. Analysis Methodology

The NaTIS defined vehicle parameters for vehicles viz. vehicle category, description, make, model, vehicle colour, ownership, age as well as combinations thereof, extracted from the RTMC NaTIS are used as variable ranked for vehicles involved in fatal crashes.

The analysis period for vehicles involved in fatal crashes is between 1 October 2017 to 30 June 2021, a period of 3.8 years, 114 months, or 1,369 days.

Comparative analysis is conducted on the over/under representation of the top count of vehicles parameter type involved in fatal crashes with:

- Total number of NaTIS registered self-propelled vehicles[4], and
- AARTO speed infringements for the same vehicle classification

3.4. Link to NRSS 2016-2030 Interventions

This study is linked to the following NRSS interventions:

- 1A(ii) Continue to support improvement measures to address the problem areas within road safety.
- 1D(iv) Strengthen programme to share data across the private and public sector.
- 1D(iii) Commission research into situational conditions of crashes (time of day, weather, other vehicles present/involved), which should feed into road safety guidelines.
- 1D(v) Identify availability and potential integration of other crash data sources.
- 4C(vi) Identify and address high-risk road users for focused interventions.

[4] Self-propelled vehicle means a motor vehicle having and an engine or an electric motor as an integral part thereof or attached thereto and which is designed or adapted to be propelled by means of such, engine or motor, or both such engine or motor.

4. DATA USED IN ANALYSIS

The following three data sets were used during the analysis of this study:

- NaTIS total self-propelled vehicle population on 31 October 2021.
- AARTO Speed Infringements from 1 January 2019 to 30 June 2021.
- RTMC Fatal Crash Data from the NCDMS from 1 October 2017 to 30 June 2021.

A total of 48,330 vehicles were involved in fatal crashes over the analysis period in 37,583 fatal crashes with 66.9% of the vehicle registrations that could be traced to their respective NaTIS classification; the analysis is based on the vehicles registrations that could be linked to NaTIS.

The rationale for the use of the specific time frames for the data sets is discussed under the respective headings below.

- RTMC Fatal Crash Data from the NCDMS from 1 October 2017 to 30 June 2021

4.1. RTMC Fatal Crash Data

4.1.1. Fatal Crash Data Used:

Fatal crash data recorded on the RTMC National Crash Data Management System (NCDMS) system from 1 October 2017 to 30 June 2021 was used in the analysis; a period of 1 369 days, 46 months, or 3.8 years.

During this period, a total of 48 330 vehicles were involved in 37 583 fatal crashes with 45 232 fatalities recorded with a severity (deaths per crash) of 1.203.

4.1.2. RTMC Fatal Crash Data Limitations:

Only 66.9% or 32 333 of the 48 330 total vehicles involved in the fatal crashes over the analysis period could be linked to NaTIS vehicles via the reported and recorded vehicle license numbers plate. The reasons for 33.1 % of the data that could not be link to a specific type of vehicle on the NaTIS are inter alia:

- No vehicle license number plates available for hit & run type crashes

- Foreign vehicles not included
- Erroneous reporting/recording of vehicle license number plates

4.2. NaTIS Vehicle Population Data

4.2.1. NaTIS Vehicle Population Data Used:

For the purposes of this study, the NaTIS self-propelled vehicle population on 31 October 2021 (live, non-backed-up data) was used for this study.

The extraction of historic data from the NaTIS on the micro level needed for this study would have been a tedious exercise and with no significant difference in vehicle class proportions since end 2018, for the purposes of this study, the 31 October 2021 NaTIS live self-propelled vehicle population is acceptable.

Table 1 below illustrates the insignificant difference in vehicle class data compared for on 31 December 2018, 2019, 2020 and on 31 October 2021.

Table 2 below indicates the absolute number of the total self-propelled vehicles on same dates for which the proportions in Table 2.1a are depicted; the NaTIS total self-propelled vehicles on 31 October 2021 which was used for this study was 11 478 531.

Table 1 NaTIS Vehicle Population Class Proportions

Vehicle Class	31 Dec 2018	31 Dec 2019	31 Dec 2020	31 Oct 2021	Average	% points Diff - 31Oct21 & Average
Motor cars and station wagons	65,2%	65,3%	65,4%	65,3%	65,3%	-0,00712%
Minibuses	2,9%	3,0%	3,0%	3,0%	3,0%	-0,01152%
Buses, bus trains, midibuses	0,6%	0,6%	0,6%	0,6%	0,6%	0,01221%
Motorcycles, quadricycles, tricycles	3,1%	3,0%	3,0%	3,0%	3,0%	0,03018%
LDV's, panel vans, other light load vehicles GVM <= 3500kg	22,7%	22,7%	22,8%	22,8%	22,8%	-0,04949%
Trucks (Heavy load vehicles GVM > 3500kg)	3,4%	3,3%	3,3%	3,3%	3,3%	0,00352%
Other self-propelled vehicles	2,1%	2,0%	2,0%	2,0%	2,1%	0,02223%
Total self-propelled vehicles	100%	100%	100%	100%	100%	0,00000%

Table 2 NaTIS Vehicle Population Class Absolute Numbers

Vehicle Class	31-Dec-18	31-Dec-19	31-Dec-20	31-Oct-21	Average
Motor cars and station wagons	7 340 787	7 498 988	7 498 955	7 652 080	7 497 703
Minibuses	330 023	342 735	341 853	349 314	340 981
Buses, bus trains, midibuses	64 653	65 230	64 889	64 789	64 890
Motorcycles, quadricycles, tricycles	346 624	343 397	339 053	347 710	344 196
LDV's, panel vans, other light load vehicles GVM <= 3500kg	2 557 873	2 609 767	2 616 359	2 673 784	2 614 446
Trucks (Heavy load vehicles GVM > 3500kg)	377 090	380 710	377 788	388 383	380 993
Other self-propelled vehicles	235 248	234 891	233 613	237 537	235 322
Total self-propelled vehicles	11 252 298	11 475 718	11 472 510	11 713 597	11 478 531
Difference:		+223 420	+220 212	+237 879	+170 378
% Difference:		+1,99%	+1,96%	+2,07%	+1,50%

4.2.2. NaTIS Vehicle Population Data Limitations:

A total number of 233 480, or 2.02% of the total vehicle Category records were indicated as 'Unknown' and consequently not included in the study.

4.3. AARTO Speed Infringement Data

4.3.1. AARTO Speed Infringement Data Used:

The AARTO speed infringement data set used in the analysis is for all speed infringements from 1 January 2019 to 30 June 2021; a period of 912 days, 30 months, or 2.5 years. The four issuing authorities of the Speed infringements are:

- Johannesburg Metropolitan Police Department (JMPD)
- Tshwane Metro Police Department (TMPD)
- Department of Community Safety (GDOCS) Traffic Police
- RTMC National Traffic Police (NTP)

The JMPD issued by far the most speed infringements with 92.8% during the data period; the number and percentage of speed infringements per issuing authority and per motor vehicle category used in the data set is shown respectively in Table 3 and Table 4 below.

Table 3 Number of Speed Infringements Issued per Issuing Authority

ISSUING AUTHORITY	# OF SPEED INFRINGEMENTS	% OF TOTAL
JMPD	11 266 273	92,8%
TMPD	711 771	5,9%
GDOCS	142 191	1,2%
NTP	20 074	0,2%
Total:	9 648 887	79,5%

Table 4 Number of Speed Infringements Issued per More Vehicle Category

MV CATEGORY	# OF SPEED INFRINGEMENTS	% OF TOTAL
Light passenger motor vehicle (less than 12 persons)	9 648 883	79,5%
Light load vehicle (GVM 3500Kg or less)	1 932 948	15,9%
Heavy passenger motor vehicle (12 or more persons)	431 726	3,6%
Heavy load Vehicle (GVM>3500Kg equip to draw)	63 478	0,5%
Motorcycle / Motortricycle / Quadracycle	26 607	0,2%
Heavy load Vehicle GVM>3500Kg	22 680	0,2%
Special Vehicle	13 987	0,1%
Total:	12 140 309	100,0%

4.3.2. AARTO Speed Infringement Data Limitations:

The reason for not using AARTO speed infringement data for the selected fatal crash data set i.e., from 1 October 2017 to 30 June 2021, is due to the limitation the analysis software that was used (Microsoft Excel) which limits the amount of data that can be analysed pragmatically. The proportions of the speed infringements per issuing authority and per speed limit class for the period from 1 October 2017 to 31 December 2018 is similar thus, the exclusion of the said data in the analysis should not affect the outcome of the analysis significantly.

5. ANALYSIS

As indicated in Section 3.2 above, analysis was conducted to establish over-underrepresentation on the following NaTIS defined vehicle parameters for vehicles involved in fatal crashes vs for the total registered vehicle population and vs AARTO speed infringements:

- vehicle CATEGORY,
- vehicle MAKE,
- vehicle MODEL,
- vehicle DESCRIPTION,
- vehicle COLOUR,
- vehicle AGE,
- vehicle registered to PERSON TYPE or ORGANISATION,
- combinations of the above vehicle parameters.

Output for each of the analysed items are presented in subsections containing a table which provide a list (maximum 20) of the relevant vehicle parameter, sorted by most vehicles involved in fatal crashes as well as the number of and percentage of each for respective registered total self-propelled vehicles and AARTO speed infringements linked to the same vehicle parameter.

The data is then illustrated on a graph for each, and the over-/underrepresentation is also illustrated on a graph for each after with a discussion/interpretation for each subsection.

5.1. Vehicle Category

According to the NaTIS motor vehicle Category, the most fatal crashes i.e., 53.8% of all fatal crashes during the study period involved Light passenger MV (less than 12 persons) followed by Light load vehicles (GVM 3500Kg or less) with a recorded 25.1% fatal crashes, indicated in Table 5 and illustrated in Figure 1 below. In total, these top two categories of vehicles were involved in almost 78.9% of fatal crashes.

These two vehicle categories also accounted by far for the most AARTO speed infringements (SIs) with 95.5% of all SIs issued from 1 January 2019 to 30 June 2021 and 90.8% of the total NaTIS self-propelled vehicle population (TVP) respectively.

Table 5 Data per Vehicle CATEGORY

Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle CATEGORY							
	Total:	11 546 383		12 140 309		32 333	
	% Of Total:	98,0%		99,9%		99,9%	
	Subtotal:	11 312 903		12 126 322		12 126 322	
#	Vehicle CATEGORY	VehPop	% OF Total	Fatal Crashes	% OF Total	AARTO SI	% OF Total
1	Light passenger MV (less than 12 persons)	7 641 466	67,5%	17 232	53,8%	9 648 883	79,6%
2	Light load vehicle (GVM 3500Kg or less)	2 636 255	23,3%	8 021	25,1%	1 932 948	15,9%
3	Heavy passenger MV (12 or more persons)	314 542	2,8%	3 089	9,6%	431 726	3,6%
4	Heavy load vehicle (GVM>3500Kg equip to draw)	287 645	2,5%	2 532	7,9%	63 478	0,5%
5	Motorcycle / Motortricycle / Quadrucycle	338 974	3,0%	657	2,1%	26 607	0,2%
6	Heavy load vehicle (GVM>3500Kg, not to draw)	94 021	0,8%	482	1,5%	22 680	0,2%

Note: Special Vehicle & Unknown (2.02%) not comparable to crash hence, omitted

Figure 1 Data per Vehicle CATEGORY

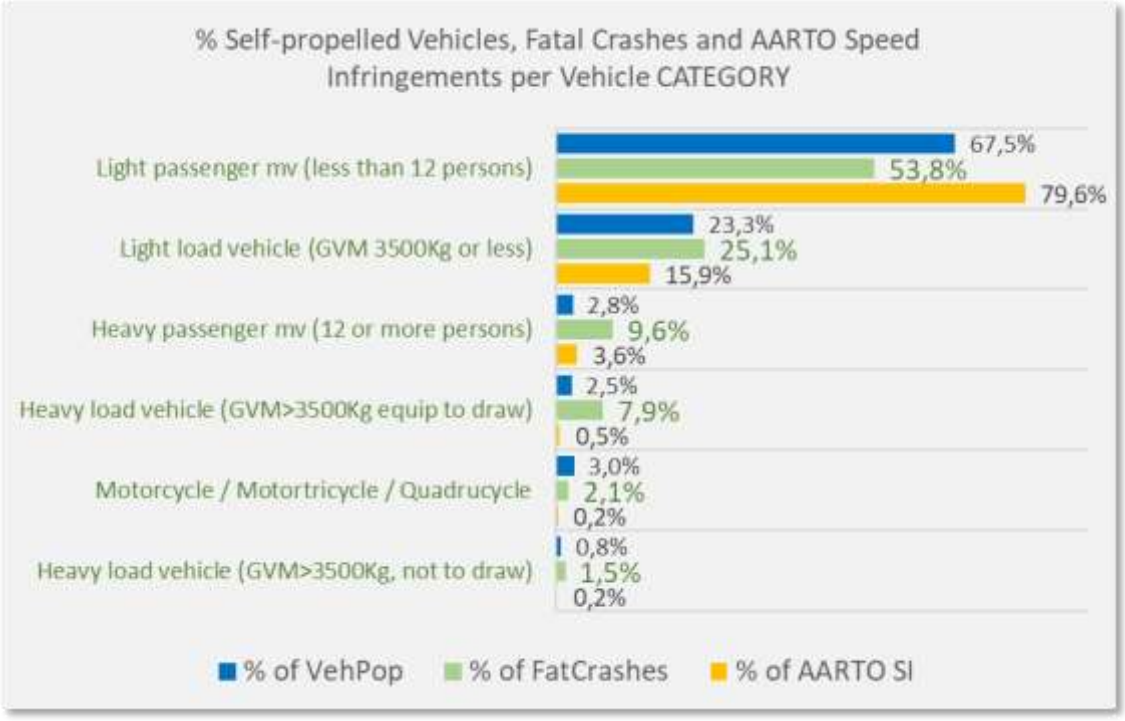


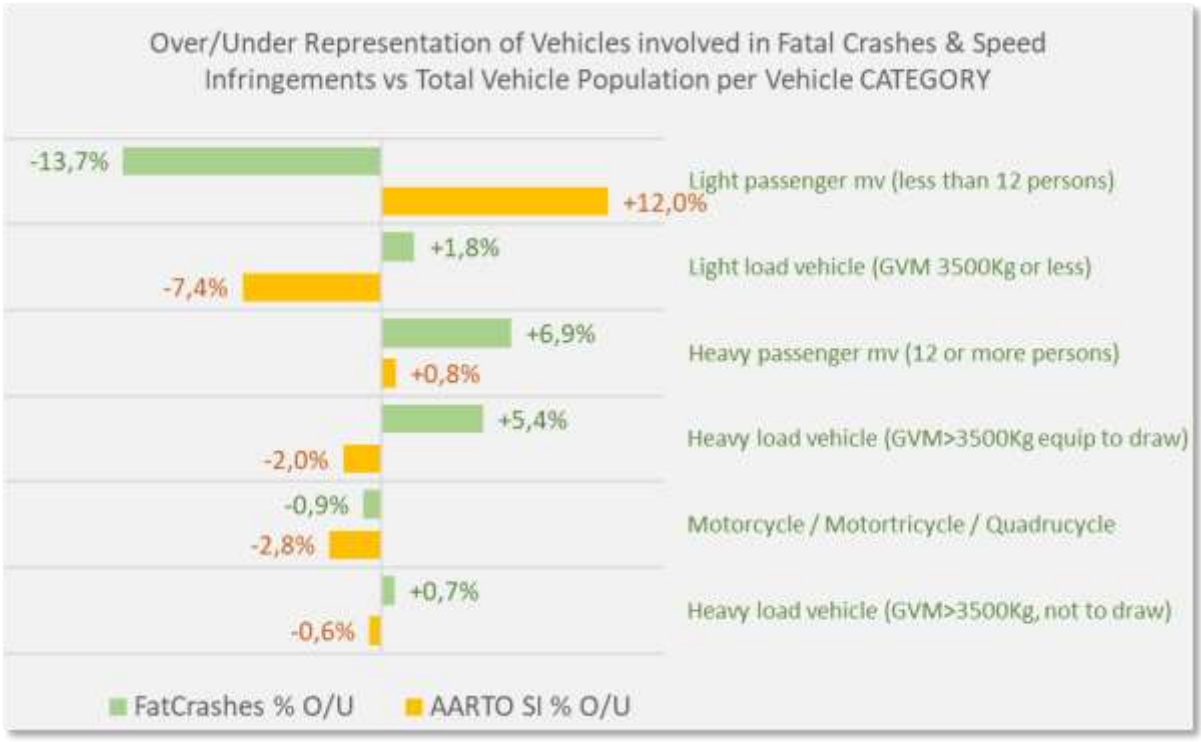
Figure 2 below depicts a visual illustration of the over/under representation for each of the subcategories for SIs vs TVP respectively.

SIs are overrepresented by 12.0% for light passenger vehicles and fatal crashes are underrepresented by 13.7% vs TVP. Light load vehicles on the other hand are underrepresented for SIs with 7.4% and slightly overrepresented for fatal crashes vs TVP. Other over- or underrepresentation of note are 6.9% and 5.4 % overrepresentation for both heavy passenger vehicles and heavy load vehicles (equipped to draw) respectively for fatal crashes. Considering that heavy passenger vehicles (mostly public transport type vehicles) and heavy load vehicles travel more million vehicle kilometres vs other classes and would thus be exposed to more on road conflict situations and/or to driver fatigue, one could expect more fatal crashes for this type of classes.

The rationale for the over-/underrepresentation needs to be further analysed per province/metro to provide better intelligence.

More concentrated traffic law enforcement, or speed over distance enforcement could address overrepresentation in SIs indicated in Figure 2 below.

Figure 2 Over/Under: Vehicle CATEGORY



5.2. Vehicle Make

More than 1 400 NaTIS motor vehicle makes were identified in the analysis. Analysis of the top 20 vehicle makes involved in fatal crashes which constitutes approximately 1.5% of all vehicle makes are discussed in this Section. The most vehicle makes involved in fatal crashes i.e., 30.8% of all fatal crashes during the study period involved Toyota, followed by Volkswagen with a recorded 15.9%, indicated in Table 6 and illustrated in Figure 3 below. In total, these two vehicle makes were involved in 46.7% of fatal crashes.

These two vehicle makes also accounted by far for the most SIs with 36.0% of all SIs issued from 1 January 2019 to 30 June 2021 and constituted 39.1% of the TVP.

Table 6 Data per Vehicle MAKE

% Over/Under: -propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle MAKE							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	86,6%		89,8%		90,5%	
	Subtotal:	9 993 866		29 033		10 965 823	
#	Vehicle CATEGORY	VehPop	% OF Total	Fatal Crashes	% OF Total	AARTO SI	% OF Total
1	TOYOTA	2 376 635	23,8%	8 950	30,8%	2 160 618	19,7%
2	VOLKSWAGEN	1 527 200	15,3%	4 604	15,9%	1 782 873	16,3%
3	FORD	961 230	9,6%	2 250	7,7%	1 031 119	9,4%
4	NISSAN	825 165	8,3%	2 215	7,6%	723 578	6,6%
5	HYUNDAI	629 205	6,3%	1 230	4,2%	800 735	7,3%
6	MERCEDES-BENZ	557 945	5,6%	1 428	4,9%	918 184	8,4%
7	BMW	460 411	4,6%	1 028	3,5%	967 550	8,8%
8	ISUZU	378 431	3,8%	1 480	5,1%	162 560	1,5%
9	OPEL	370 322	3,7%	887	3,1%	192 552	1,8%
10	MAZDA	317 544	3,2%	750	2,6%	268 228	2,4%
11	CHEVROLET	302 609	3,0%	733	2,5%	290 665	2,7%
12	RENAULT	265 903	2,7%	493	1,7%	327 935	3,0%
13	KIA	258 869	2,6%	503	1,7%	407 979	3,7%
14	HONDA	257 542	2,6%	408	1,4%	239 866	2,2%
15	AUDI	217 249	2,2%	483	1,7%	507 361	4,6%
16	MITSUBISHI	115 293	1,2%	254	0,9%	66 766	0,6%
17	VOLVO	82 912	0,8%	462	1,6%	100 619	0,9%
18	HINO	41 143	0,4%	260	0,9%	9 113	0,1%
19	MAN	30 284	0,3%	330	1,1%	3 635	0,0%
20	SCANIA	17 974	0,2%	285	1,0%	3 887	0,0%

Figure 3 Data per Vehicle MAKE

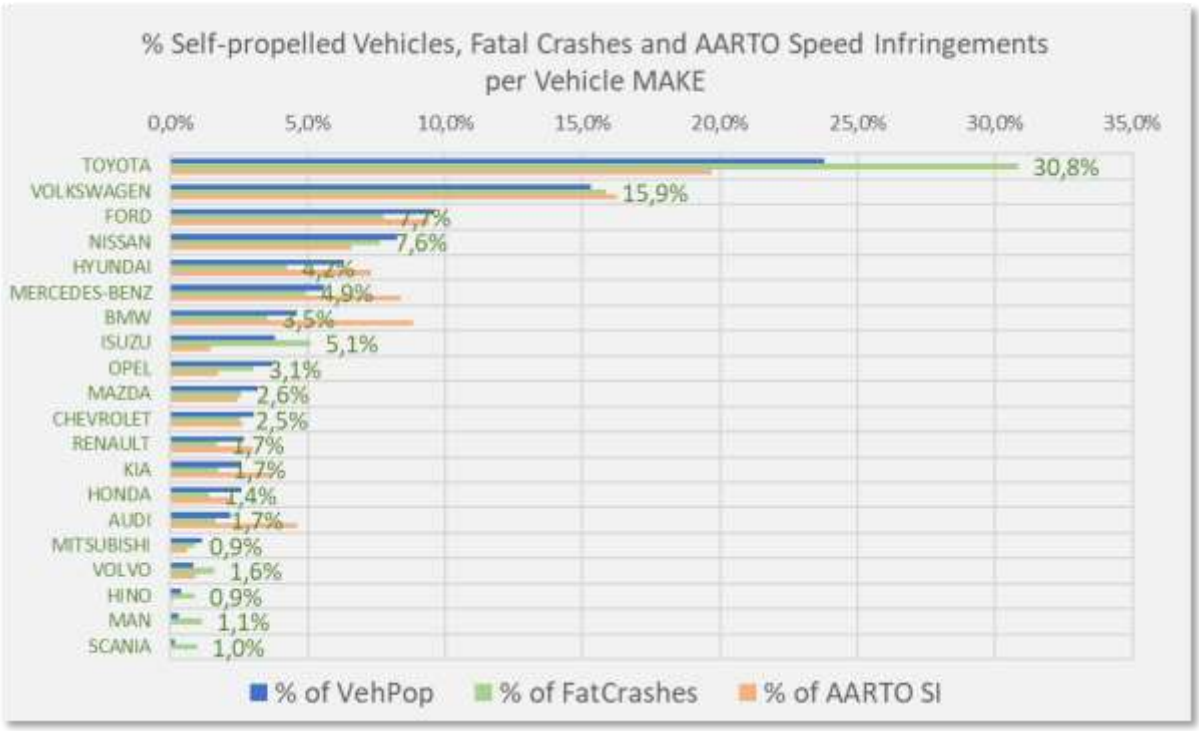


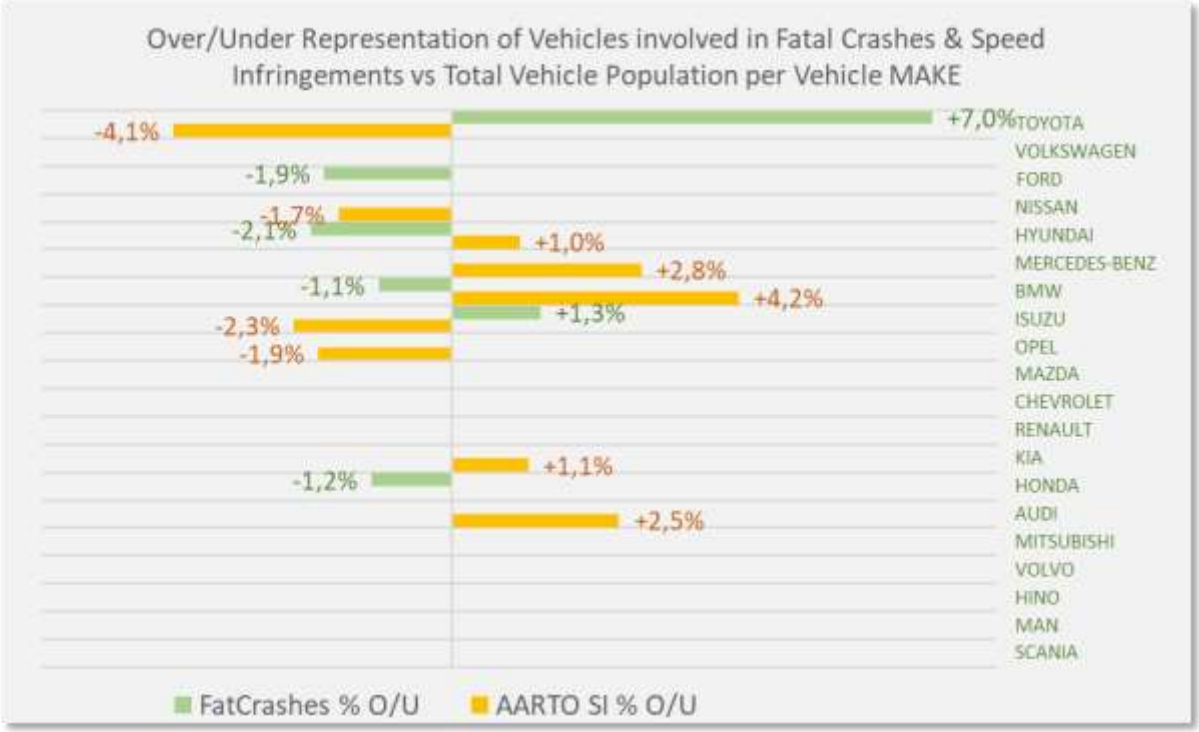
Figure 4 below depicts a visual illustration of the over/under representation for each of the subcategories for SIs and fatal crashes vs TVP respectively.

SIs for Toyota are overrepresented by 7.0% and fatal crashes are underrepresented by 4.1% vs TVP. SIs for Volkswagen are slightly underrepresented by 1.9% for fatal crashes vs TVP. The only other over- or underrepresentation of more than 3% is for BMW.

The rationale for the over/under representation needs to be further analysed per province/metro to provide better intelligence to road safety practitioners.

More concentrated traffic law enforcement, or speed over distance enforcement could address overrepresentation in SIs.

Figure 4 Over/Under: Vehicle MAKE



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

5.3. Vehicle Make & Model

Analysis of the top 20 vehicle models involved in fatal crashes are discussed in this Section with the top 20 models involved in almost half of all fatal crashes. The most vehicle models involved in fatal crashes i.e., with 16.7% of all fatal crashes during the study period involved are Volkswagen Polo, followed closely by Toyota Hilux and Toyota Quantum models with a recorded 14.2% and 12.2% respectively, indicated in Table 7 and illustrated in Figure 5 below. In total, these three vehicle models were involved in 43.2% of fatal crashes.

These three models also accounted by far for the most SIs with 35.0% of all SIs issued during the SI period and constituted 33.0% of the TVP.

Even though not acceptable, considering that Toyota Quantum and Toyota Hiace vehicles are on road on a semi-full-time basis and travel more million vehicle kilometres vs other vehicle models and would thus be exposed to more on road conflict situations and/or to driver fatigue, one could expect more fatal crashes for this type of classes.

The high SIs for especially public transport type vehicles such as for Toyota Quantum and Toyota Hiace models is however unacceptable and needs to be addressed.

Table 7 Data per Vehicle MAKE & MODEL

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle MAKE & MODEL							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	40,4%		49,3%		41,9%	
	Subtotal:	4 668 098		15 952		5 071 360	
#	Vehicle MAKE & MODEL	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	VOLKSWAGEN | POLO	795 613	17,0%	2 668	16,7%	1 091 912	21,5%
2	TOYOTA | HILUX	592 021	12,7%	2 272	14,2%	372 843	7,4%
3	TOYOTA | QUANTUM	152 742	3,3%	1 954	12,2%	310 706	6,1%
4	TOYOTA | COROLLA	522 757	11,2%	1 435	9,0%	522 583	10,3%
5	ISUZU | KB SERIES	265 655	5,7%	1 048	6,6%	124 701	2,5%
6	VOLKSWAGEN | GOLF	316 573	6,8%	1 032	6,5%	267 277	5,3%
7	FORD | RANGER	302 176	6,5%	848	5,3%	377 737	7,4%
8	BMW | 3 SERIES	202 695	4,3%	524	3,3%	381 412	7,5%
9	TOYOTA | HIACE	70 847	1,5%	464	2,9%	91 906	1,8%
10	NISSAN | NP200	164 378	3,5%	425	2,7%	228 958	4,5%
11	TOYOTA | AVANZA	63 798	1,4%	396	2,5%	44 767	0,9%
12	TOYOTA | ETIOS	112 159	2,4%	367	2,3%	179 113	3,5%

#	Vehicle MAKE & MODEL	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
13	NISSAN | HARDBODY	111 468	2,4%	366	2,3%	37 644	0,7%
14	OPEL | CORSA	243 973	5,2%	361	2,3%	130 227	2,6%
15	MERCEDES-BENZ | W2 SERIES	187 503	4,0%	319	2,0%	298 578	5,9%
16	TOYOTA | YARIS	140 717	3,0%	311	1,9%	148 647	2,9%
17	TOYOTA | FORTUNER	134 872	2,9%	307	1,9%	174 206	3,4%
18	TOYOTA | CONQUEST	89 979	1,9%	301	1,9%	22 782	0,4%
19	NISSAN | NP300	68 933	1,5%	280	1,8%	69 300	1,4%
20	FORD | FIESTA	129 239	2,8%	274	1,7%	196 061	3,9%

Figure 5 Data per Vehicle MAKE & MODEL

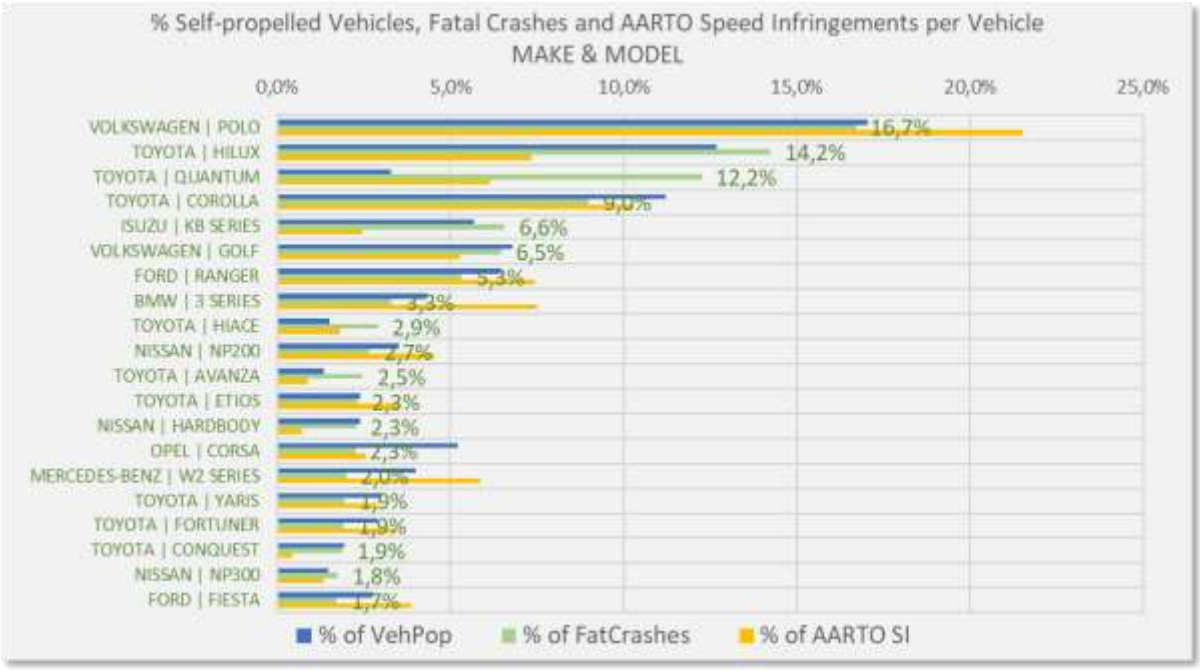


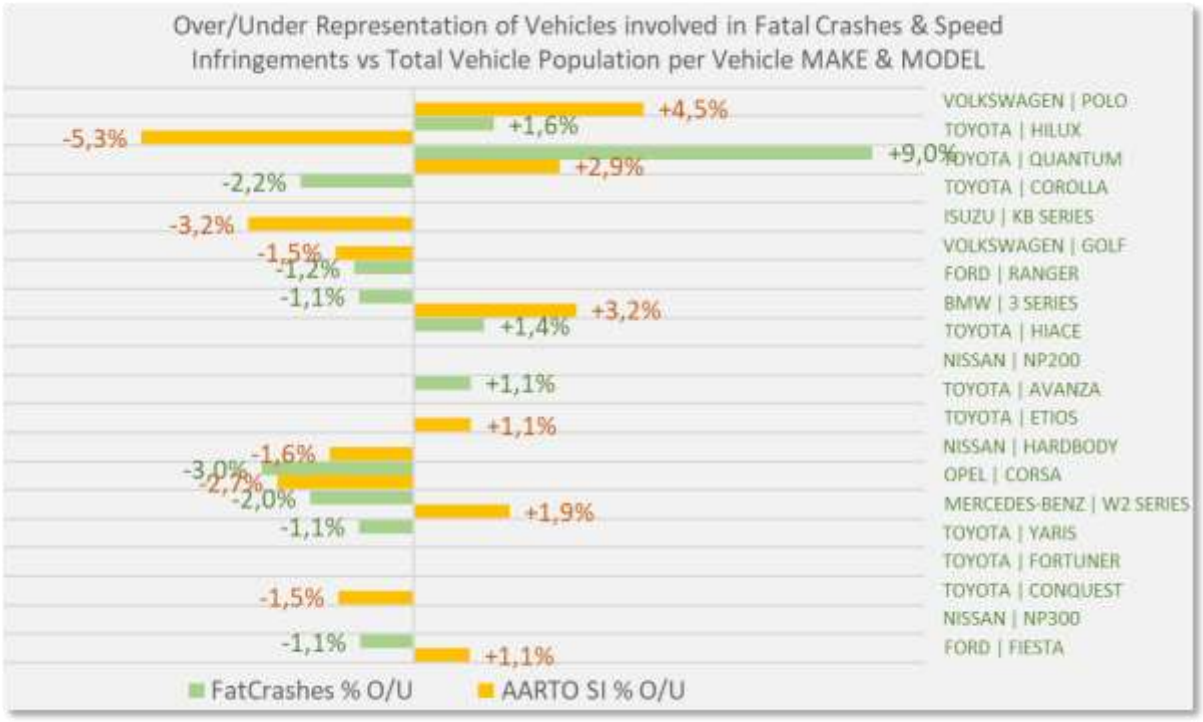
Figure 6 below depicts a visual illustration of the over/under representation for each of the vehicle makes and models for fatal crashes and SIs vs TVP respectively.

Toyota Quantum vehicles are overrepresented by 9.0% on SIs and by 2.9% for all fatal crashes vs TVP, which is reason for serious concern. The number of Volkswagen Polo vehicles involved in fatal crashes are within 1.0% of the TVP but are overrepresented by 4.5% for SIs vs TVP. Other over- or underrepresentation of note are 3.2% and 1.9% overrepresentation for both BMW 3 Series and Mercedes-Benz W2 Series vehicles respectively for SIs.

The rationale for the over/under representation needs to be further analysed per province/metro to provide better intelligence.

More concentrated traffic law enforcement, or speed over distance enforcement could address overrepresentation in SIs indicated in Figure 6 below.

Figure 6 Over/Under: Vehicle MAKE & MODEL



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

5.4. Vehicle Description

For the purpose of this report, the NaTIS Description was clustered into the following more pragmatic descriptions as per Table 8 below.

Table 8 Vehicle type included in Vehicle DESCRIPTION

DESCRIPTION	
1. PRIVATE TYPE	6. MOTORCYCLE
Beach buggy	Motor quadricycle
Caravan	Motor tricycle
Combi / Micro bus / Minibus (not carry persons for reward)	Motorcycle (no sidecar)
Coupe (closed top)	Motorcycle (with sidecar)
Coupe (open top)	Scooter
Hatch back	7 HAZ_SUBST_VEH; Where MV Usage =
Jeep	Chemicals
Sedan (closed top)	Hazardous substances
Sedan (open top)	Petroleum
Station wagon	8 EQUIPMENT TYPE
Station wagon / Combi (not carry persons for reward)	Backacter
2. LDV TYPE	Compactor body
LDV's, panel vans, other light load vehicles GVM <= 3500kg	Compressor
3. PUBLIC TRANSPORT	Crane
Bendi bus / Bus-train	Drill / Borer / Drain Cleaner
Bus (double deck)	Grader
Bus (single deck)	Loader-Pump-Lifter
Combi / Micro bus / Minibus	Mixer
Minibus (10 to 15 persons)	Mobile equipment
Sedan (closed top - (carry persons for reward))	Roadmaking
Station wagon (carry persons for reward)	Roller/Mobile Facility
Station wagon / Combi (carry persons for reward)	Tanker
4. HEAVY VEHICLE	Tipper
LDV's, panel vans, other light load vehicles GVM <= 3500kg	Tractor
Trucks (Heavy load vehicles GVM > 3500kg)	9. EMS TYPE
5 LDV D/C TYPE	Ambulance
LDV's, panel vans, other light load vehicles GVM <= 3500kg (with 4 doors)	Breakdown
10. Hearse	Fire engine
Hearse	Rescue vehicle

Analysis of the 10 clustered vehicle descriptions involved in fatal crashes are discussed in this Section. Private type vehicles account for more than half of all fatal crashes and if considered that most Light Delivery Vehicle Double/Cab (LDV D/C Type) vehicles would most probably be used for private purposes, then Private Type vehicles would account for an estimated 58.6% of all vehicle types involved in fatal crashes, indicated in Table 9 and illustrated in Figure 7 below. The reason for analysing the LDV D/C type vehicles is to determine the SIs for such.

LDV type vehicles are involved in 18.6% of all fatal crashes with an unacceptable high proportion (10.5%) of public transport type vehicles involved in fatal crashes. The 1.7% of Hazardous Substance Vehicles and 0.6 % or (195) EMS type vehicles are most concerning.

A separate analysis of vehicle registration numbers recorded for fatal crashes alarmingly showed that 95 marked SAPS vehicles (Vehicle license plate starts and ends with B) were involved in fatal crashes. Further research on the latter is highly recommended.

Table 9 Data per Vehicle DESCRIPTION

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle DESCRIPTION							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	86,6%		100,0%		100,1%	
	Subtotal:	9 993 866		32 333		12 130 488	
#	Vehicle DESCRIPTION	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	PRIVATE TYPE	6 818 300	68,2%	16 906	52,3%	9 649 189	79,5%
2	LDV TYPE	1 699 642	17,0%	6 006	18,6%	1 133 097	9,3%
3	PUBLIC TRANSPORT	275 127	2,8%	3 384	10,5%	431 887	3,6%
4	HEAVY VEHICLE	269 504	2,7%	2 231	6,9%	60 377	0,5%
5	LDV D/C TYPE	744 310	7,4%	2 033	6,3%	799 081	6,6%
6	MOTORCYCLE	105 555	1,1%	659	2,0%	26 609	0,2%
7	HAZ_SUBST_VEH	38 317	0,4%	558	1,7%	12 994	0,1%
8	EQUIPMENT TYPE	22 359	0,2%	357	1,1%	3 490	0,0%
9	EMS TYPE	19 548	0,2%	195	0,6%	13 128	0,1%
10	HEARSE	1 204	0,0%	4	0,0%	636	0,0%

Figure 7 Data per Vehicle DESCRIPTION

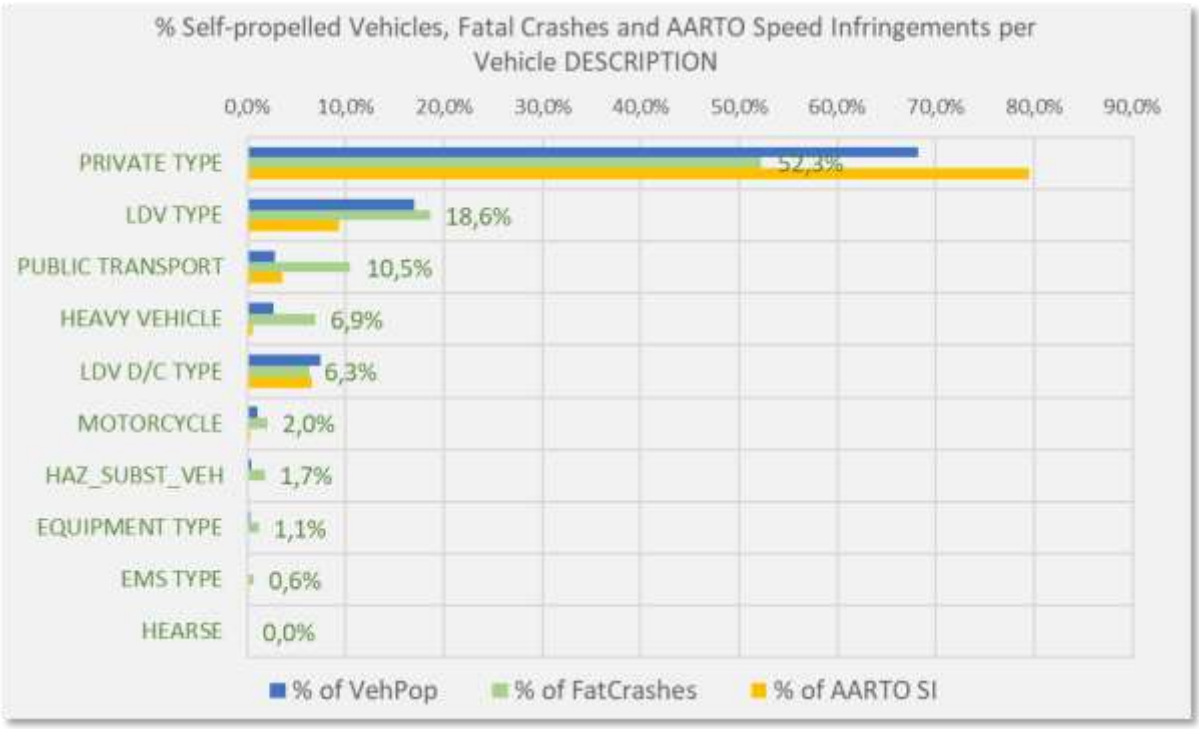
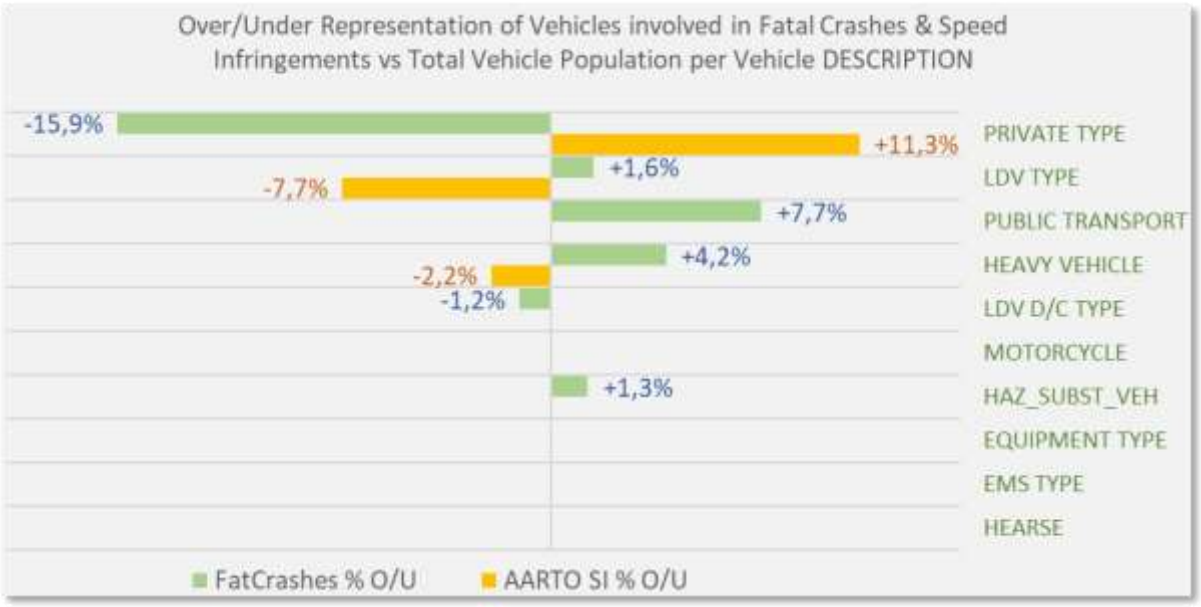


Figure 8 below depicts a visual illustration of the over/under representation for each of the clustered vehicle descriptions for fatal crashes and SIs vs TVP respectively.

Private type vehicles are overrepresented by 11.3% on SIs and underrepresented by 15.9% for all fatal crashes, adding LDV D/C type vehicles to private type vehicles would not influence any significant change. The high percentage (7.7%) of overrepresentation of public transport type vehicles and 4.2% for Heavy vehicles on SIs reason for serious concern.

More concentrated traffic law enforcement, or speed over distance enforcement could address overrepresentation in SIs indicated in Figure 6 below, especially for public transport type and heavy vehicles.

Figure 8 Over/Under: Vehicle DESCRIPTION



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

5.5. Vehicle Colour

Vehicle colour versus crash risk is an active debate locally and internationally. Some research suggests that vehicle colour plays a significant role in crash risk such as Newstead and D'Elia, 2010[3] who identified a clear statistically significant relationship between vehicle colour and crash risk in that compared to white vehicles, several colours were associated with a higher crash risk such as black, blue, grey, green, red, and silver.

Analysis of the top 20 vehicle colours on the Natis System indicate that the two vehicle colours which represents the largest proportion of the TVP are 49.2% White, with an additional 14.4% for Silver vehicles, indicated in Table 10 and illustrated in Figure 9 below.

White vehicles are involved in 56.2% of all fatal crashes; however, consideration should be given that most mini/minibus taxis, LDV type and fleet vehicles would be white due to economical and road safety reasons.

Table 10 Data per Vehicle COLOUR

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle COLOUR							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	86,2%		100,0%		99,0%	
	Subtotal:	9 948 458		32 326		11 992 588	
#	Vehicle COLOUR	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	White	4 894 089	49,2%	18 153	56,2%	5 567 795	46,4%
2	Silver	1 727 211	17,4%	4 661	14,4%	2 402 597	20,0%
3	Blue	922 439	9,3%	2 605	8,1%	934 938	7,8%
4	Red	622 406	6,3%	1 890	5,8%	744 419	6,2%
5	Grey	576 891	5,8%	1 419	4,4%	1 042 392	8,7%
6	Black	331 734	3,3%	1 061	3,3%	535 083	4,5%
7	Green	216 522	2,2%	631	2,0%	113 845	0,9%
8	Gold	176 635	1,8%	473	1,5%	162 452	1,4%
9	Maroon	81 998	0,8%	294	0,9%	57 093	0,5%
10	Beige	100 925	1,0%	284	0,9%	104 190	0,9%
11	Yellow	60 009	0,6%	204	0,6%	32 585	0,3%
12	Cream	58 015	0,6%	171	0,5%	14 773	0,1%
13	Orange	46 955	0,5%	165	0,5%	82 178	0,7%
14	Brown	59 390	0,6%	150	0,5%	87 300	0,7%
15	Bronze	43 821	0,4%	103	0,3%	82 625	0,7%
16	Purple	11 398	0,1%	24	0,1%	9 476	0,1%
17	Other	11 149	0,1%	23	0,1%	15 581	0,1%
18	Pink	3 115	0,0%	6	0,0%	3 148	0,0%
19	White/Cream/Beige	2 184	0,0%	5	0,0%	67	0,0%
20	Blue/Green/Purple	1 572	0,0%	4	0,0%	51	0,0%

Figure 9 Data per Vehicle COLOUR

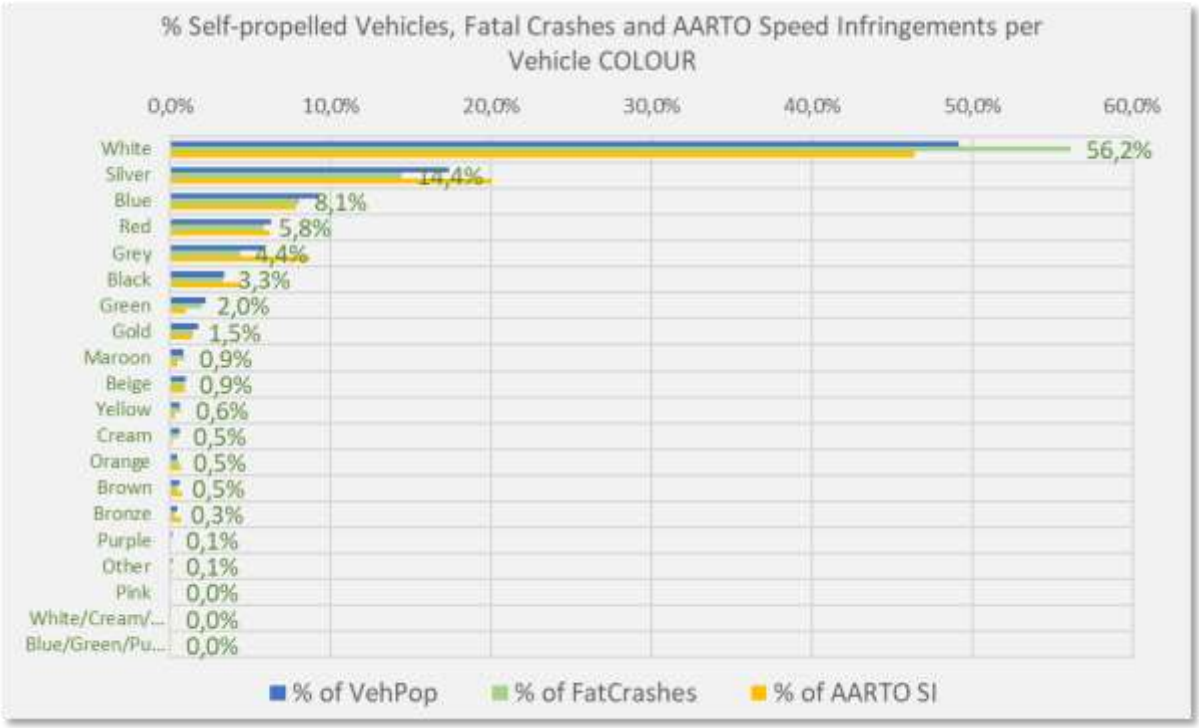


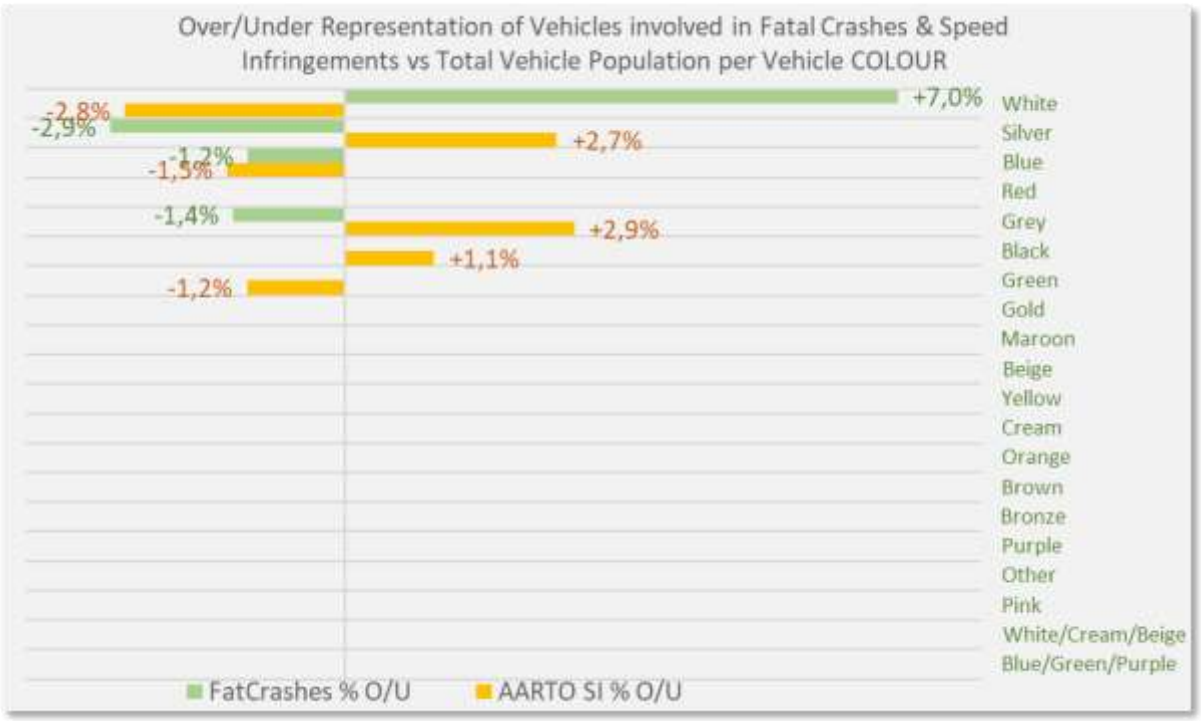
Figure 10 below depicts a visual illustration of the over/under representation for each of the vehicle colour categories for SIs and fatal crashes vs TVP respectively.

It would appear that contrary to common belief, the results of crash risk factor vs vehicle colour by Newstead and D'Elia, 2010[3], do not apply to SA statistics as the number of white vehicles involved in fatal crashes are overrepresented by 7% vs TVP.

However, as stated above, consideration should be given that most mini/minibus taxis, LDV type and fleet vehicles are most probably white which will skew the results as these vehicles travel more million vehicle kilometres at higher risk than the norm.

It would then appear that vehicle colour follows mostly the same trend as the colour represented by the relevant proportion of vehicle colour of the TVP, further research is proposed to test this hypothesis.

Figure 10 Over/Under: Vehicle COLOUR



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

5.6. Vehicle Age

Analysis of the age of vehicles involved in fatal crashes, as depicted in Table 11 below and illustrated in Figure 11 below, found that most vehicles involved in fatal crashes are 1 to 20 years old with vehicles aged between 5 and 10 years involved in 28.9% of all fatal crashes. Thus, vehicles aged between 5 and 20 years are involved in 61.4% of fatal crashes vs a very similar 57.1% of the TVP. It should be noted that, as with other analysis parameters thus far, this proportion follows the same trend as the representative TVP.

Vehicles aged 2 to 5 years are involved in 22.2% of all fatal crashes with newer vehicles up to 2 years old involved in 18.7% of fatal crashes.

Table 11 Data per Vehicle AGE

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle AGE							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	86,6%		100,0%		100,0%	
	Subtotal:	9 993 866		32 333		12 117 527	
#	Vehicle AGE	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	<2 years	657 730	6,6%	435	1,3%	489 721	4,0%
2	2-5 years	1 864 885	18,7%	7 177	22,2%	4 259 272	35,1%
3	5-10 years	2 459 910	24,6%	9 346	28,9%	4 307 205	35,5%
4	10-20 years	3 245 592	32,5%	10 520	32,5%	2 682 900	22,1%
5	20-30 years	1 256 360	12,6%	3 660	11,3%	324 299	2,7%
6	30-40yrs	414 761	4,2%	1 063	3,3%	48 851	0,4%
7	Classic	87 048	0,9%	118	0,4%	4 818	0,0%
8	Vintage	7 580	0,1%	14	0,0%	461	0,0%

Figure 11 Data per Vehicle AGE

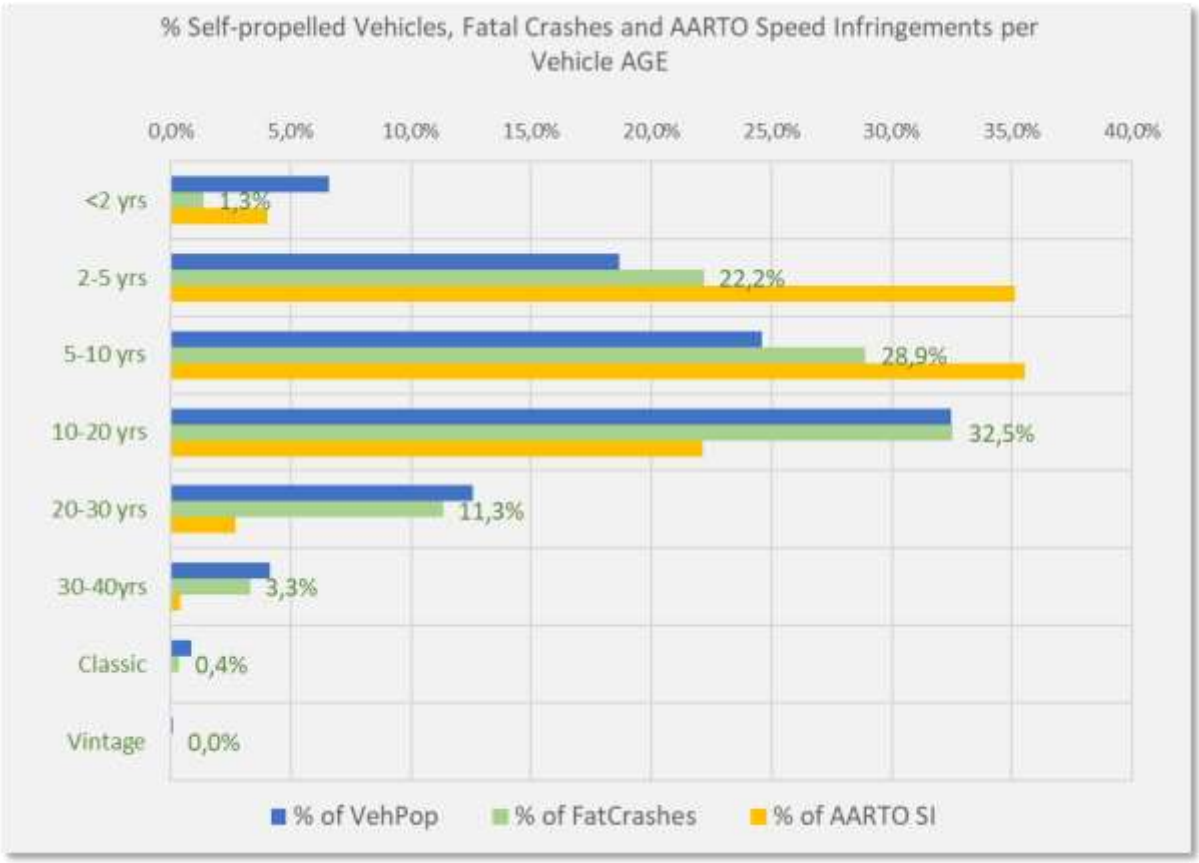


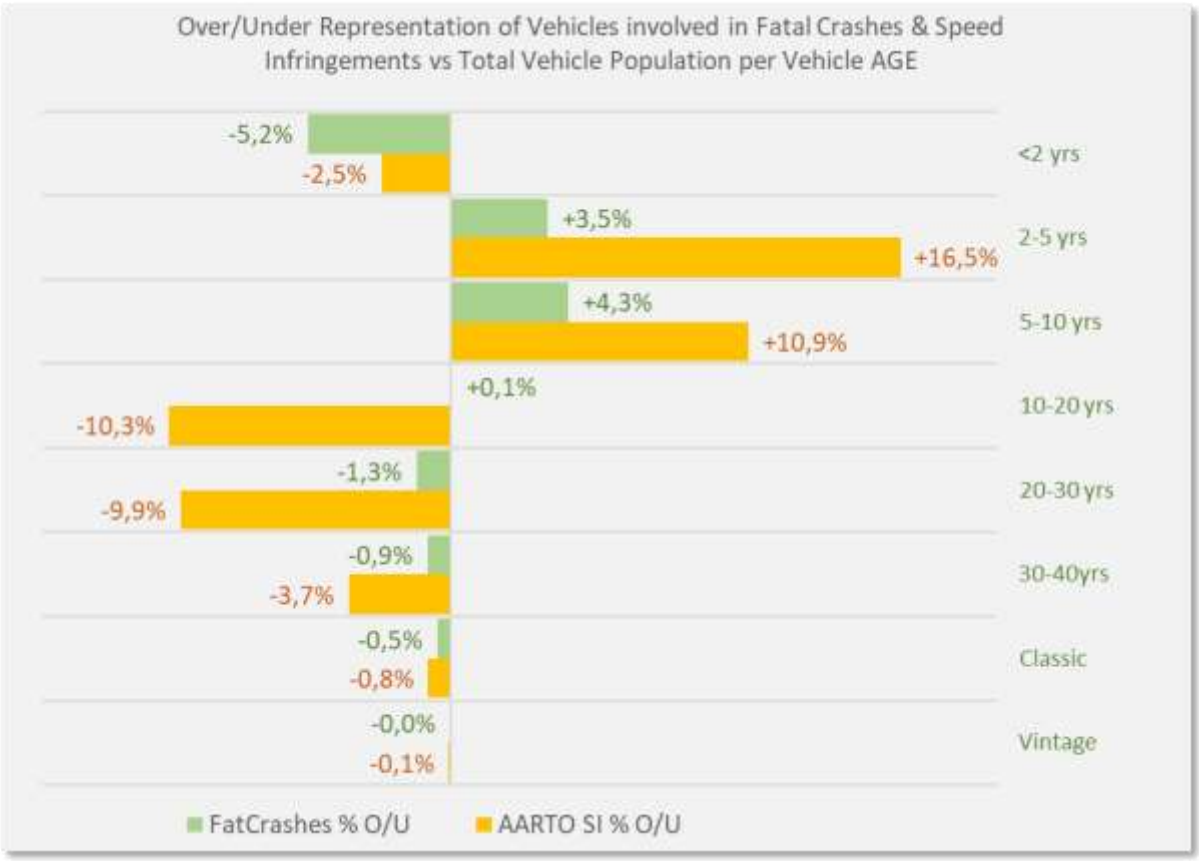
Figure 12 below depicts a visual illustration of the over/under representation of vehicle age involved in fatal crashes and SIs vs TVP respectively.

Vehicles up to two years old are underrepresented by 5.2% in fatal crashes vs TVP which, is most probably due to better vehicle safety features on newer model vehicles. However, concerning is the overrepresentation of vehicles aged between 2 and 10 years which are overrepresented by 7.8% in fatal crashes vs TVP.

Of note is that vehicles aged between 10 to 30 years old are underrepresented by 20.2% in SIs vs TVP however, vehicles ages 2 to 10 years old are overrepresented by 27.4% vs TVP.

More concentrated traffic law enforcement, or speed over distance enforcement could address overrepresentation in SIs indicated in Figure 6 below, especially for public transport type and heavy vehicles.

Figure 12 Over/Under: Vehicle AGE



5.7. Vehicle Person Type or Organisation

According to the person type or organisation in whose name a vehicle is registered, the most fatal crashes i.e., 57.4% and 21.2% of all vehicles analysed involved in fatal crashes were registered in private male and female persons respectively. Private company and closed corporation registered vehicles makes up the rest of the bulk of the vehicles which were involved in fatal crashes with various other smaller organisation's vehicles involved in lesser percentages of fatal crashes as depicted in Table 12 and illustrated in Figure 13 below.

The privately registered vehicles, to male and female persons also accounted for the most AARTO speed infringements (SIs) with 81.2% of all SIs and proportionally represents 84.2% of the TVP respectively.

Table 12 Data per Vehicle PERSON TYPE or ORGANISATION

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle PERSON TYPE							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	86,6%		100,0%		99,8%	
	Subtotal:	9 993 866		32 333		12 094 847	
#	Vehicle PERSON TYPE or ORGANISATION	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	Male	5 513 365	55,2%	18 552	57,4%	6 100 549	50,4%
2	Female	2 900 192	29,0%	6 847	21,2%	3 722 592	30,8%
3	Private company	610 528	6,1%	2 678	8,3%	1 039 689	8,6%
4	Close corporation	485 167	4,9%	2 388	7,4%	706 996	5,8%
5	Public company	157 120	1,6%	703	2,2%	224 430	1,9%
6	Mun/Prov/Govt Authority	151 815	1,5%	445	1,4%	139 794	1,2%
7	Trusts	50 280	0,5%	187	0,6%	35 050	0,3%
8	One-man business	36 398	0,4%	186	0,6%	18 170	0,2%
9	Other	25 771	0,3%	124	0,4%	25 280	0,2%
10	Foreign company	906	0,0%	52	0,2%	31 452	0,3%
11	Partnership	14 182	0,1%	51	0,2%	5 817	0,0%
12	Incorporated private company	10 540	0,1%	34	0,1%	16 777	0,1%
13	Church/Congregation/Welfare	10 291	0,1%	29	0,1%	8 512	0,1%
14	Educational organisation	11 183	0,1%	19	0,1%	4 686	0,0%
15	Statutory body	7 082	0,1%	14	0,0%	4 083	0,0%
16	Company not for gain	4 108	0,0%	11	0,0%	4 883	0,0%
17	Unlimited company	3 561	0,0%	10	0,0%	5 094	0,0%
18	Guarantee company	191	0,0%	1	0,0%	383	0,0%
19	Recreational organisation	1 177	0,0%	1	0,0%	605	0,0%
20	Unknown	9	0,0%	1	0,0%	5	0,0%

Figure 13 Data per Vehicle PERSON TYPE or ORGANISATION

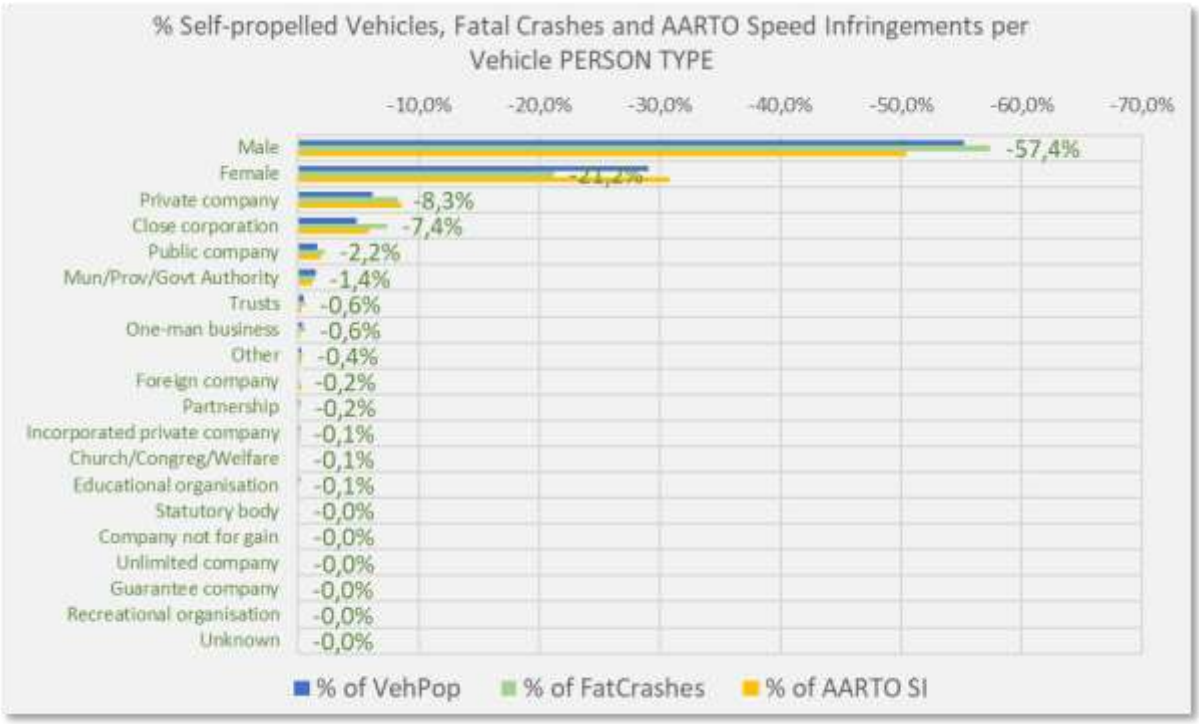
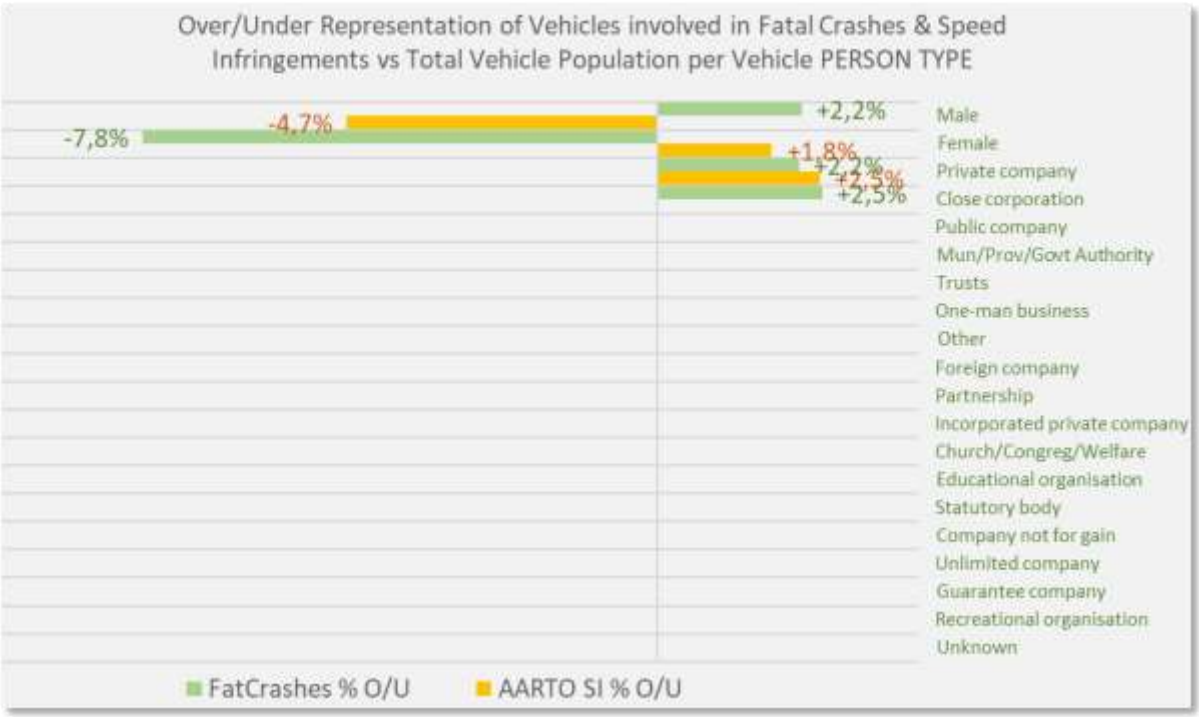


Figure 14 below depicts a visual illustration of the over/under representation of vehicles person type or organisation in whose name a vehicle is registered and involved in fatal crashes and SIs vs TVP respectively.

Vehicles registered to females are underrepresented by 7.8% in fatal crashes vs TVP but overrepresented by 1.8% in SIs vs TVP whereas vehicles registered to their male counterparts were inversely overrepresented in fatal crashes vs TVP by 2.2% and underrepresented by 4.7% in SIs vs TVP. The interpretation of the latter should be done cautiously as in SA, many vehicles registered by male persons who are the breadwinners but are 'owned' driven by family members which include females.

Vehicles registered to private company's and close corporations were overrepresented by approximately 2% in both SIs and fatal crashes vs TVP. Over- underrepresentation of vehicles registered by the rest of the other organisations are within 1%.

Figure 14 Over/Under: Vehicle PERSON TYPE



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

5.8. Vehicle Ownership

According to vehicle ownership, the most fatal crashes i.e., 83.2% of all vehicles involved in fatal crashes were registered in private persons with vehicles owned by businesses involved in 15.2% of fatal crashes, depicted in Table 13 and illustrated in Figure 15 below.

Privately owned vehicles also accounted for the most AARTO speed infringements (SIs) with 84.7% of all SIs and 88.0% of the TVP respectively.

Table 13 Data per Vehicle OWNERSHIP

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle OWNERSHIP							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	86,6%		100,0%		99,8%	
	Subtotal:	9 993 866		32 333		12 094 847	
#	Vehicle OWNERSHIP	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	Private	8 792 569	88,0%	26 916	83,2%	10 243 738	84,7%
2	Business	1 016 808	10,2%	4 914	15,2%	1 412 942	11,7%
3	MD Stock	173 908	1,7%	432	1,3%	426 011	3,5%
4	Unknown	2 449	0,0%	55	0,2%	29	0,0%
5	MIB Stock/Under construction	8 132	0,1%	16	0,0%	12 127	0,1%

Figure 15 Data per Vehicle OWNERSHIP

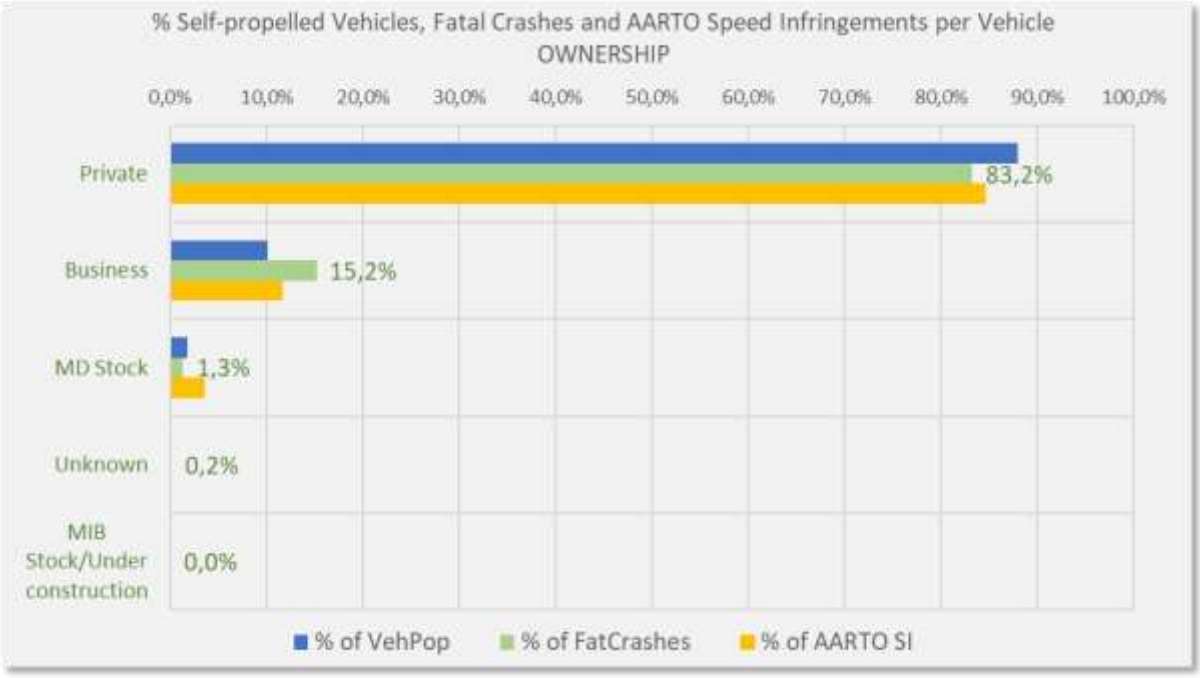
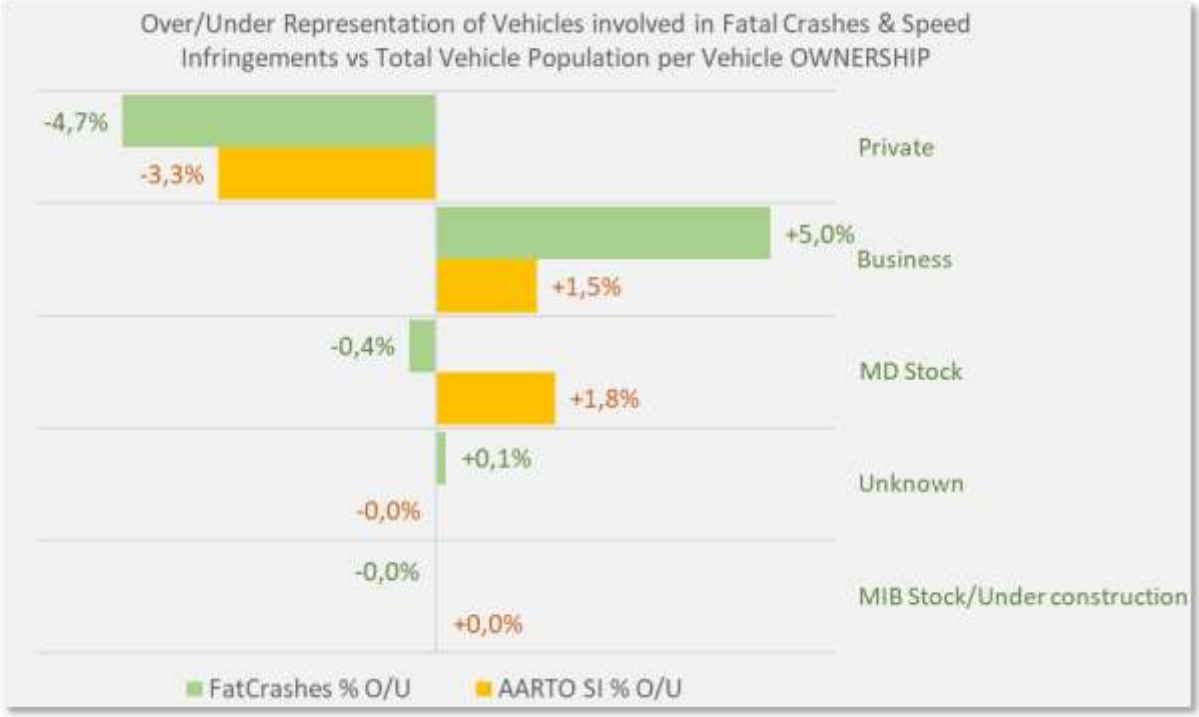


Figure 16 below depicts a visual illustration of the over/under representation of vehicles of different ownership involved in fatal crashes and SIs vs TVP respectively.

Vehicles registered to private individuals are underrepresented in both SIs vs TVP and in fatal crashes by 4.7% and 3.3% respectively. On the other hand, vehicles registered to business entities overrepresented in both SIs vs TVP and in fatal crashes by 5.0% and 1.5% respectively. The only other over- or underrepresentation of note is vehicles still owned by a manufacturer or dealer (MD Stock) which is overrepresented by 1.8% for SIs vs TVP.

The under- or overrepresentation discussed related to vehicle ownership need to be further analysed to conclude on any rationale for such.

Figure 16 Over/Under: Vehicle OWNERSHIP



5.9. Vehicle Make, Model & Colour

Towards more providing more detailed vehicle parameters involved in fatal crashes, Sections 5.9 to 5.12 were analysed with two or more combinations of Sections 5.1. to 5.8.

White Toyota Quantum vehicles are involved in most fatal crashes when ranked by the grouping of vehicle make, model and colour with 5.4% of all fatal crashes followed by White Toyota Hilux vehicles with 3.1% involved in fatal crashes. The top 20 grouping of vehicles indicated in the Table 14 below and illustrated in Figure 18 below were involved in a third or 33.3% of all fatal crashes analysed.

The top 20 grouped vehicles by make model and colour represents 23.5% of the vehicle population and these vehicles received 24.2% of all SIs.

Table 14 Data per Vehicle MAKE | MODEL | COLOUR

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle MAKE | MODEL | COLOUR							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	23,5%		33,3%		24,2%	
	Subtotal:	2 718 505		10 782		2 930 392	
#	Vehicle MAKE | MODEL | COLOUR	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	TOYOTA | QUANTUM | White	145 763	1,3%	1 868	5,4%	290 923	2,4%
2	TOYOTA | HILUX | White	442 997	3,8%	1 734	3,1%	280 220	2,3%
3	VOLKSWAGEN | POLO | White	316 362	2,7%	1 003	2,4%	445 001	3,7%
4	ISUZU | KB SERIES | White	194 169	1,7%	770	2,1%	93 465	0,8%
5	VOLKSWAGEN | POLO | Silver	197 656	1,7%	695	2,0%	269 808	2,2%
6	FORD | RANGER | White	217 290	1,9%	649	1,7%	254 044	2,1%
7	TOYOTA | COROLLA | White	200 006	1,7%	540	1,2%	206 873	1,7%
8	TOYOTA | HIACE | White	63 629	0,6%	396	1,1%	78 137	0,6%
9	NISSAN | NP200 | White	143 701	1,2%	367	1,1%	208 283	1,7%
10	VOLKSWAGEN | GOLF | White	119 342	1,0%	362	0,9%	111 792	0,9%
11	TOYOTA | COROLLA | Silver	100 722	0,9%	295	0,9%	139 156	1,1%
12	NISSAN | HARDBODY | White	83 136	0,7%	286	0,8%	27 853	0,2%
13	NISSAN | NP300 | White	66 492	0,6%	269	0,8%	66 371	0,5%
14	VOLKSWAGEN | POLO | Red	66 077	0,6%	258	0,8%	96 061	0,8%
15	TOYOTA | HILUX | Silver	57 626	0,5%	247	0,8%	48 079	0,4%
16	VOLKSWAGEN | POLO | Blue	77 125	0,7%	244	0,7%	95 004	0,8%
17	TOYOTA | COROLLA | Blue	81 347	0,7%	232	0,6%	72 848	0,6%
18	TOYOTA | AVANZA | White	30 349	0,3%	193	0,6%	25 586	0,2%
19	VOLKSWAGEN | POLO | Grey	58 642	0,5%	188	0,6%	88 952	0,7%
20	VOLKSWAGEN | GOLF | Blue	56 074	0,5%	186	0,0%	31 936	0,3%

Figure 17 Data per Vehicle MAKE | MODEL | COLOUR

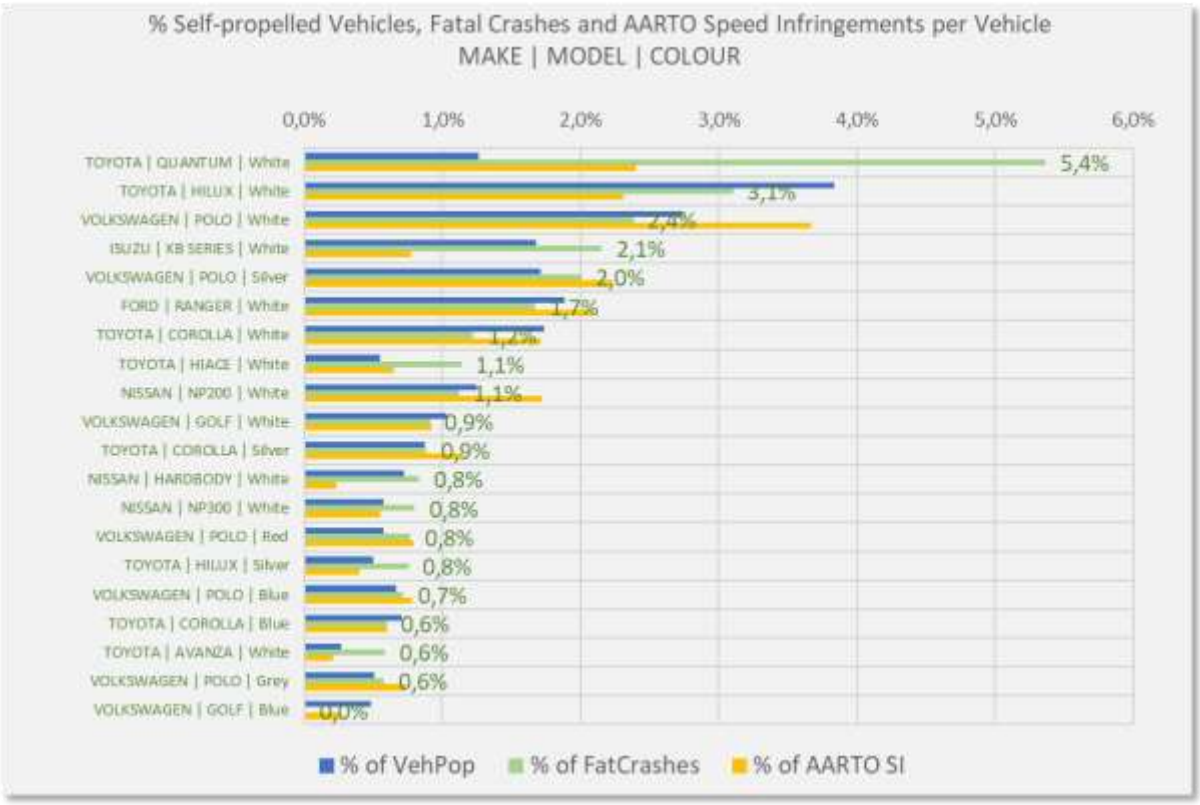
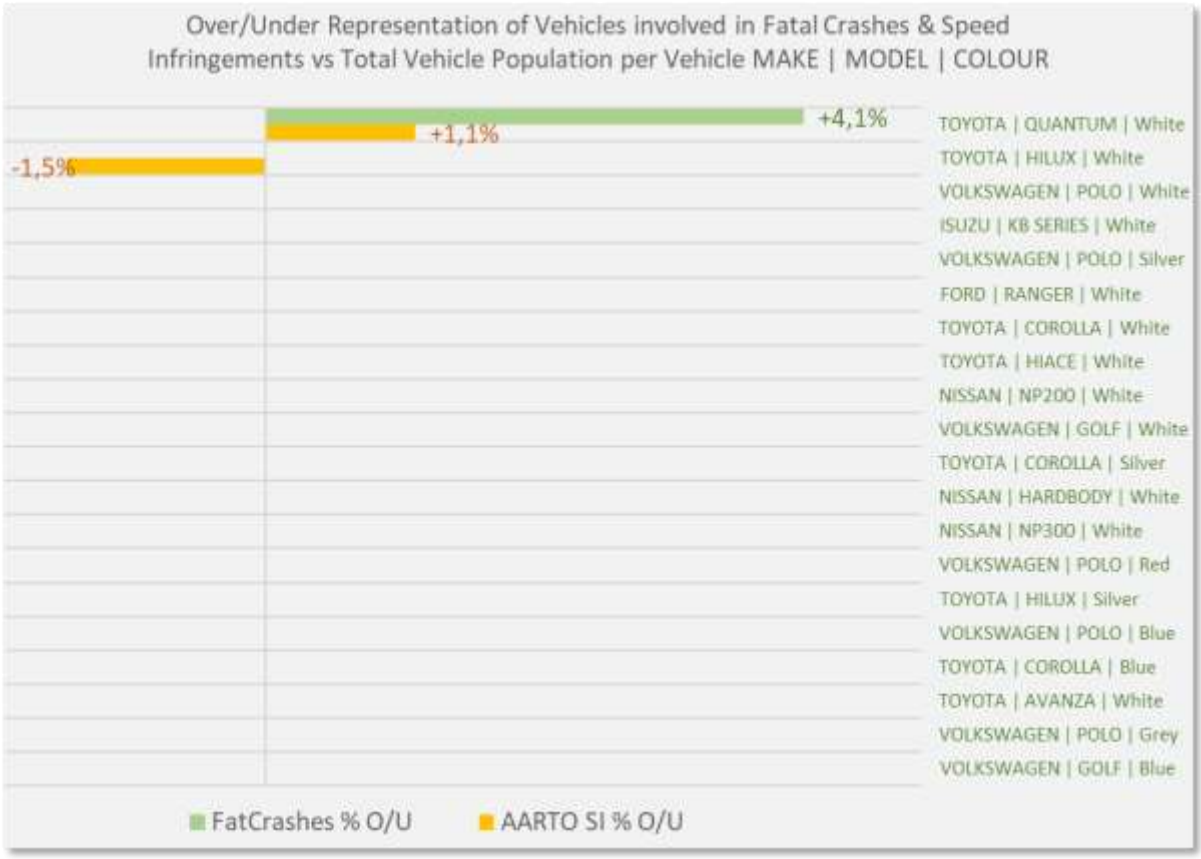


Figure 18 below depicts a visual illustration of the over/under representation of vehicles of the grouping of vehicle make, model and colour involved in fatal crashes and SIs vs TVP respectively.

The only over- or underrepresentation of note, or larger than 1% vs TVP are for White Toyota Quantum vehicles which is overrepresented in both fatal crashes and SIs per TVP by 4.1% and 1.1% respectively; White Toyota Hilux vehicles were underrepresented by 1.5% in fatal crashes vs TVP.

Figure 18 Over/Under: Vehicle MAKE | MODEL | COLOUR



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

5.10. Vehicle Make, Model & Age

1) Volkswagen Polo vehicles aged 5-10 years are involved in most fatal crashes when ranked by the grouping of vehicle make, model and age with 3.2% of all fatal crashes followed by Toyota Quantum vehicles aged 5-10 years with 2.4% involved in fatal crashes. The top 20 grouping of vehicles indicated in the Table 15 below and illustrated in Figure 19 below were involved in a third or 31.6% of all fatal crashes analysed.

The top 20 grouped vehicles by make model and colour represents 20.3% of the vehicle population and these vehicles received 20.2% of all SIs.

Table 15 Data per Vehicle MAKE | MODEL | AGE

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle MAKE | MODEL | AGE							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	20,3%		31,6%		20,2%	
	Subtotal:	2 349 011		10 225		2 447 097	
#	Vehicle MAKE | MODEL | AGE	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	VOLKSWAGEN - POLO - 5-10 yrs	267 908	2,3%	1 047	3,2%	416 071	3,4%
2	TOYOTA - QUANTUM - 5-10 yrs	53 519	0,5%	788	2,4%	111 755	0,9%
3	VOLKSWAGEN - POLO - 2-5 yrs	204 761	1,8%	787	2,4%	430 086	3,5%
4	TOYOTA - QUANTUM - 2-5 yrs	52 289	0,5%	763	2,4%	125 671	1,0%
5	TOYOTA - HILUX - 10-20 yrs	172 544	1,5%	759	2,3%	82 379	0,7%
6	VOLKSWAGEN - POLO - 10-20 yrs	211 179	1,8%	686	2,1%	176 266	1,5%
7	TOYOTA - HILUX - 5-10 yrs	134 269	1,2%	660	2,0%	103 569	0,9%
8	VOLKSWAGEN - GOLF - 10-20 yrs	155 159	1,3%	536	1,7%	94 979	0,8%
9	TOYOTA - COROLLA - 10-20 yrs	178 787	1,5%	522	1,6%	125 093	1,0%
10	TOYOTA - HILUX - 2-5 yrs	125 389	1,1%	482	1,5%	156 487	1,3%
11	ISUZU - KB SERIES - 10-20 yrs	100 084	0,9%	410	1,3%	30 714	0,3%
12	TOYOTA - QUANTUM - 10-20 yrs	44 752	0,4%	401	1,2%	71 996	0,6%
13	TOYOTA - COROLLA - 20-30 yrs	132 521	1,1%	383	1,2%	39 661	0,3%
14	FORD - RANGER - 2-5 yrs	111 824	1,0%	349	1,1%	215 918	1,8%
15	NISSAN - HARDBODY - 10-20 yrs	84 657	0,7%	295	0,9%	31 405	0,3%
16	FORD - RANGER - 5-10 yrs	86 265	0,7%	291	0,9%	112 401	0,9%
17	ISUZU - KB SERIES - 5-10 yrs	57 862	0,5%	289	0,9%	42 752	0,4%
18	TOYOTA - CONQUEST - 20-30 yrs.	79 418	0,7%	269	0,8%	20 842	0,2%
19	TOYOTA - HIACE - 10-20 yrs	27 938	0,2%	256	0,8%	52 971	0,4%
20	TOYOTA - HILUX - 20-30 yrs	67 886	0,6%	252	0,8%	6 081	0,1%

Figure 19 Data per Vehicle MAKE | MODEL | AGE

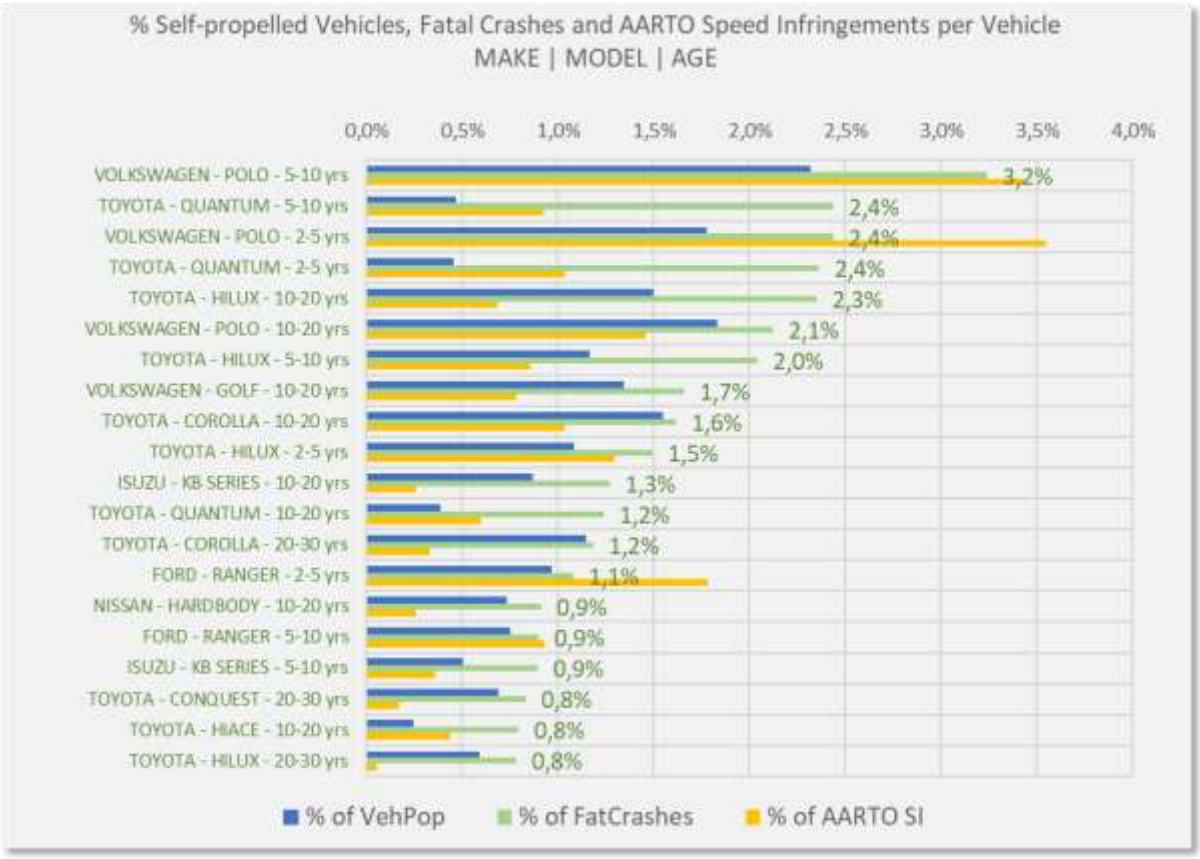
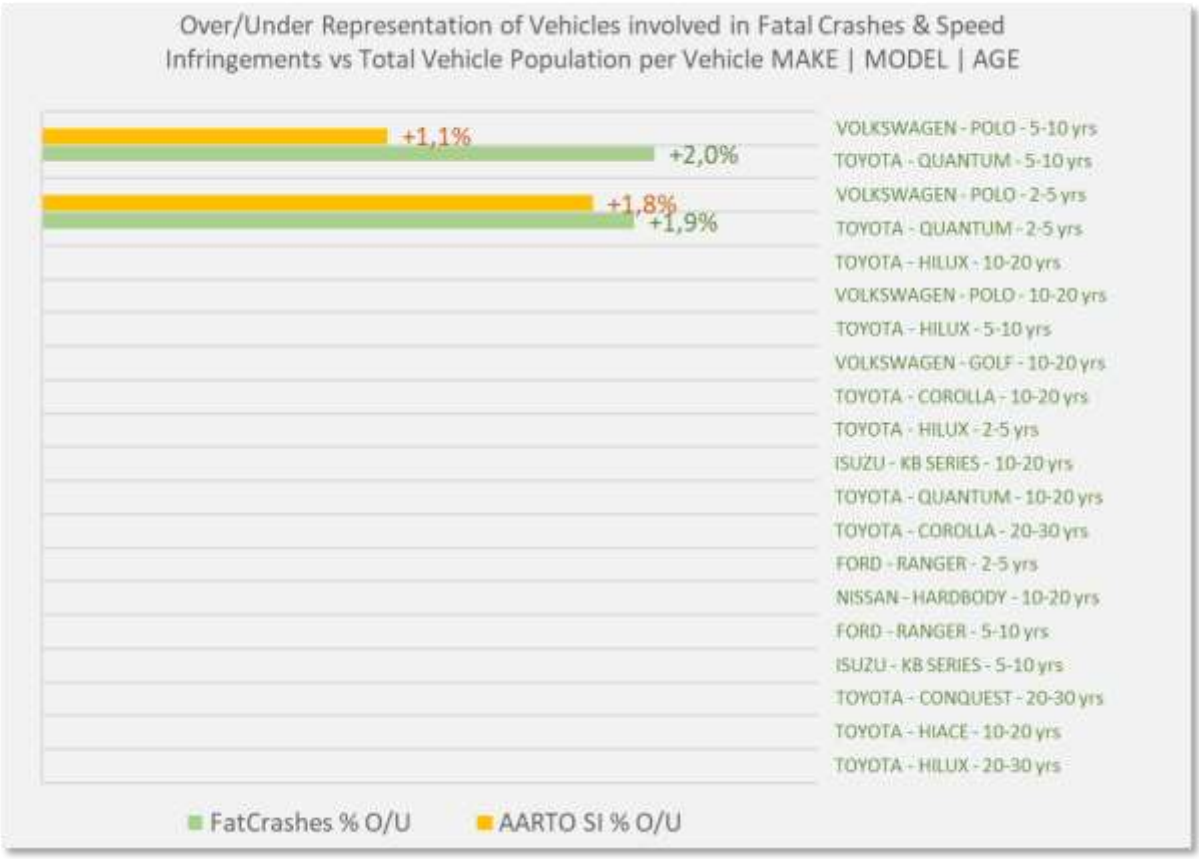


Figure 20 below depicts a visual illustration of the over/under representation of vehicles of the grouping of vehicle make, model and colour involved in fatal crashes and SIs vs TVP respectively.

The only over- or underrepresentation of note, or larger than 1% vs TVP are for Volkswagen Polo vehicles aged between 2-5 years 5-10 years which is overrepresented in SIs per TVP by 1.8% and 1.1% respectively as well as Toyota Quantum vehicles aged between 2-5 years and 5-10 years which are overrepresented in fatal crashes vs TVP by 1.9% and 2.0% respectively.

Figure 20 Over/Under: Vehicle MAKE | MODEL | AGE



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

5.11. Vehicle Make, Model, Person Type

Volkswagen Polo vehicles registered by male persons are involved in most fatal crashes when ranked by the grouping of vehicle make, model and person type with 5.5% of all fatal crashes followed by Toyota Quantum vehicles registered by male persons with 4.5% involved in fatal crashes. The top 20 grouping of vehicles indicated in the Table 16 below and illustrated in Figure 21 below were involved in just over a third or 35.5% of all fatal crashes analysed.

The top 20 grouped vehicles by make model and person type represents 26.5% of the vehicle population and these vehicles received 25.1% of all SIs.

Table 16 Data per Vehicle MAKE | MODEL | PERSON TYPE

% Self-propelled Vehicles, Fatal Crashes and AARTO Speed Infringements per Vehicle MAKE | MODEL | PERSON TYPE							
	Total:	11 546 383		32 333		32 333	
	% Of Total:	26,5%		35,5%		25,1%	
	Subtotal:	3 054 897		11 487		3 040 290	
#	Vehicle MAKE | MODEL | PERSON TYPE	VehPop	% Of Total	Fatal Crashes	% Of Total	AARTO SI	% Of Total
1	VOLKSWAGEN | POLO | Male	425 516	3,7%	1 794	5,5%	573 648	4,7%
2	TOYOTA | QUANTUM | Male	100 068	0,9%	1 451	4,5%	241 841	2,0%
3	TOYOTA | HILUX | Male	333 860	2,9%	1 315	4,1%	173 622	1,4%
4	TOYOTA | COROLLA | Male	339 938	2,9%	993	3,1%	299 569	2,5%
5	VOLKSWAGEN | GOLF | Male	224 066	1,9%	791	2,4%	177 550	1,5%
6	ISUZU | KB SERIES | Male	171 905	1,5%	656	2,0%	60 565	0,5%
7	VOLKSWAGEN | POLO | Female	285 378	2,5%	630	1,9%	342 399	2,8%
8	FORD | RANGER | Male	165 871	1,4%	466	1,4%	187 677	1,5%
9	BMW | 3 SERIES | Male	142 489	1,2%	385	1,2%	237 479	2,0%
10	TOYOTA | QUANTUM | Female	25 746	0,2%	360	1,1%	47 092	0,4%
11	TOYOTA | HIACE | Male	52 804	0,5%	354	1,1%	75 960	0,6%
12	TOYOTA | COROLLA | Female	144 072	1,2%	341	1,1%	126 971	1,0%
13	TOYOTA | HILUX | Female	74 911	0,6%	338	1,0%	33 828	0,3%
14	TOYOTA | AVANZA | Male	37 301	0,3%	271	0,8%	20 965	0,2%
15	NISSAN | HARDBODY | Male	75 075	0,7%	246	0,8%	25 043	0,2%
16	TOYOTA | CONQUEST | Male	61 228	0,5%	229	0,7%	15 263	0,1%
17	OPEL | CORSA | Male	148 284	1,3%	226	0,7%	76 692	0,6%
18	MERCEDES-BENZ | W2 SERIES | Male	120 904	1,0%	218	0,7%	186 706	1,5%
19	TOYOTA | HILUX | Private company	69 545	0,6%	212	0,7%	75 271	0,6%
20	TOYOTA | HILUX | Close corporation	55 936	0,5%	211	0,7%	62 149	0,5%

Figure 21 Data per Vehicle MAKE | MODEL | PERSON TYPE

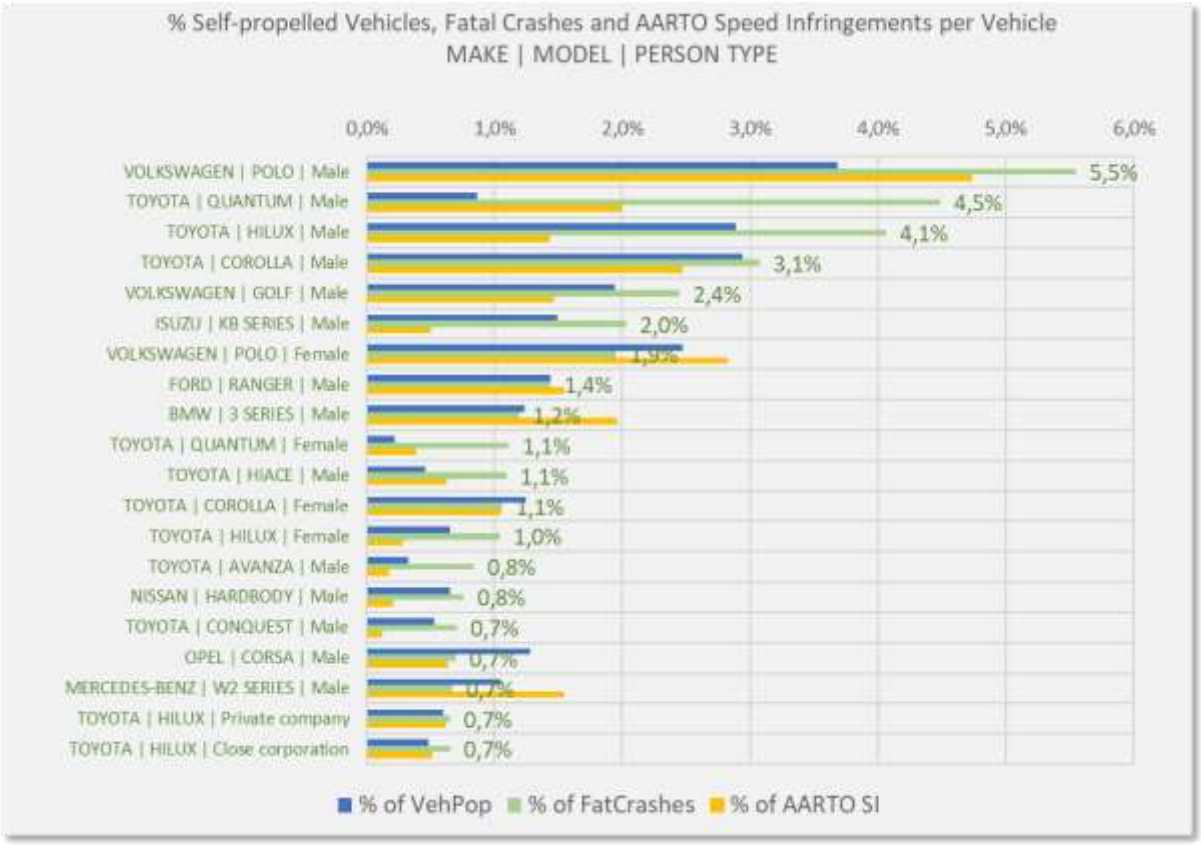
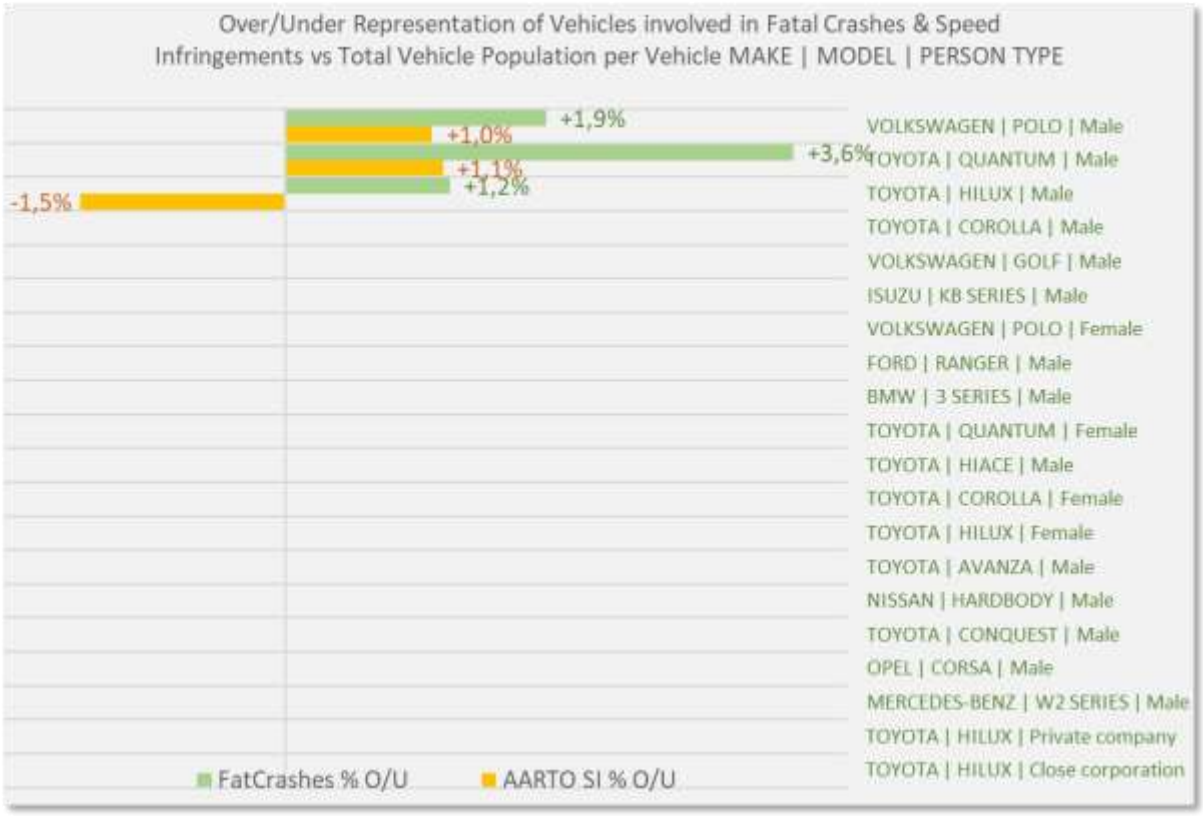


Figure 22 below depicts a visual illustration of the over/under representation of vehicles of the grouping of vehicle make, model and person type involved in fatal crashes and SIs vs TVP respectively.

Over- or underrepresentation larger than 1% vs TVP are for Volkswagen Polo vehicles registered by male persons which is overrepresented in SIs and fatal crashes per TVP by 1.0% and 1.9% respectively; Toyota Quantum vehicles registered by male persons are overrepresented in fatal crashes and SIs vs TVP by 3.6% and 1.1% respectively.

Figure 22 Over/Under: Vehicle MAKE | MODEL | PERSON TYPE



Note: To avoid cluttering only values -1.0% < x > 1.0% are shown on graph.

6. FURTHER RESEARCH/ANALYSIS RECOMMENDATIONS

Emanating from this study, in depth detail analysis is recommended on the following:

- Type and ownership of Buses/Minibus & Midibus Taxis involved in fatal crashes and speed infringement.
- South African Police Service (SAPS) vehicles involved in fatal crashes and speed infringement.
- Government Garage (GG) vehicles involved in fatal crashes and speed infringement.
- South African National Defence Force (SANDF) vehicles involved in fatal crashes and speed infringement.
- Emergency Medical Services (EMS) vehicles involved in fatal crashes and speed infringement.
- Hazardous Substance Vehicles (HSV) vehicles involved in fatal crashes and speed infringement.
- Foreign Vehicles involved in fatal crashes and speed infringement.
- Fatalities on private roads vs public roads.
- Habitual speed infringers in all vehicle Description classes.

It is also recommended that on the NCDMS each person involved in a fatal crash be linked to a specific vehicle to include gender and age in future analysis and linkage with driver's license particulars such as time a driver had a specific license to drivers involved in crashes with impairments.

In addition, the analysis in this report, as well as further analysis recommendations would provide better intelligence if available not only from a national level, but on a provincial and metro level, for all crash types and separately for pedestrian, public transport type fatal crashes.

Ultimately, when sufficient history is accumulated for the whole spectrum of fatal crash types from fatal crashes to no injury crashes, the scope of this baseline analysis can be broadened even more.

7. CONCLUSIONS

The aim of this report is to provide input to road safety programmes regarding the 'type of vehicle' which is involved in fatal crashes. In addition, through the analysis of speed infringements of the type of vehicle that is involved in fatal crashes, possible over-underrepresentation of vehicle type in fatal crashes and or involved speed infringements are analysed and discussed.

This report further provides baseline analysis for further research as well as recommendations for further research and analysis that would provide scientific input towards reducing death and injury because of road crashes.

Further research/analysis identified during this study is recommended in Section 6 of this report.

The NaTIS defined vehicle parameters for vehicles viz. vehicle category, description, make, model, vehicle colour, ownership, age as well as combinations thereof, extracted from the RTMC NaTIS are used as variable ranked for vehicles involved in fatal crashes.

The analysis period for vehicles involved in fatal crashes is between 1 October 2017 to 30 June 2021, a period of 3.8 years, 114 months, or 1,369 days.

Comparative analysis is conducted on the over/under representation of the top count of vehicles parameter type involved in fatal crashes with:

- Total number of NaTIS registered self-propelled vehicles, and
- AARTO speed infringements for the same vehicle classification

This study is linked to NRSS interventions indicated in Section 3.4 of this report and the limitations of the data used in the analyses are documented under Section 4 of this report.

Overrepresentation for both heavy passenger vehicles and heavy load vehicles (equipped to draw) by 6.9% and 5.4%respectively for fatal crashes vs TVP is very concerning. Considering that heavy passenger vehicles (mostly public transport type vehicles) and heavy load vehicles travel more million vehicle kilometres vs other classes and would thus be exposed to more on road conflict situations and/or to driver fatigue, one could expect more fatal crashes for this type of classes. The rationale for the over/under representation needs to be further analysed

per province/metro to provide better intelligence. More concentrated traffic law enforcement, or speed over distance enforcement could address overrepresentation in SIs indicated.

Toyota Quantum vehicles are overrepresented by 9.0% on SIs and by 2.9% for fatal crashes vs TVP, which is reason for serious concern. The number of Volkswagen Polo vehicles involved in fatal crashes are within 1.0% of the TVP but are overrepresented by 4.5% for SIs vs TVP. Other over- or underrepresentation of note are 3.2% and 1.9% overrepresentation for both BMW 3 Series and Mercedes-Benz W2 Series vehicles respectively for SIs.

It would appear that contrary to common belief, the results international research does not apply to SA statistics as the number of white vehicles involved in fatal crashes are in fact overrepresented by 7% vs TVP. However, consideration should be given that most mini/minibus taxis, LDV type and fleet vehicles are mostly white which could skew the results as these vehicles travel more million vehicle kilometres at higher risk than the norm.

Vehicles up to two years old are underrepresented by 5.2% in fatal crashes vs TVP which, is most probably due to better vehicle safety features on newer model vehicles. However, concerning is the overrepresentation of vehicles aged between 2 and 10 years which are overrepresented by 7.8% in fatal crashes vs TVP. Of note is that vehicles aged between 10 to 30 years old are underrepresented by 20.2% in SIs vs TVP however, vehicles ages 2 to 10 years old are overrepresented by 27.4% vs TVP.

Vehicles registered to females are underrepresented by 7.8% in fatal crashes vs TVP but overrepresented by 1.8% in SIs vs TVP whereas vehicles registered to their male counterparts were inversely overrepresented in fatal crashes vs TVP by 2.2% and underrepresented by 4.7% in SIs vs TVP. The interpretation of the latter should be done cautiously as in SA, many vehicles registered by male persons who are the breadwinners but are 'owned' driven by family members which include females.

Vehicles registered to private individuals are underrepresented in both SIs vs TVP and in fatal crashes by 4.7% and 3.3% respectively. On the other hand, vehicles registered to business entities are overrepresented in both SIs vs TVP and in fatal crashes by 5.0% and 1.5% respectively.

White Toyota Quantum vehicles are involved in most fatal crashes when ranked by the grouping of vehicle make, model and colour with 5.4% of all fatal crashes followed by White Toyota Hilux vehicles with 3.1% involved in fatal crashes.

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