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Contributing Factors to road Traffic Accidents in Awka, Anambra State, Nigeria

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ABSTRACT

Road traffic crashes remain a major public-safety, public-health and socioeconomic problem in Nigeria. This study examines the contributing factors associated with road traffic crashes on major roads in Awka, Anambra State. The study combined questionnaire responses from road users and commercial drivers, physical observation of selected road sections, an engineering assessment using the California Bearing Ratio (CBR) test, and documentary crash records obtained from the Federal Road Safety Corps (FRSC). The questionnaire evidence identified reckless and dangerous driving as the most prominent human factor (41.9%), followed by speeding (13.0%) and wrongful overtaking (6.7%). Vehicle-related responses highlighted tyre burst/pull-out (26.0%) and brake failure (21.0%), while bad roads and potholes were the leading physical-environment concern (33.0%). The compiled FRSC records also show that speed violation (502 cases), loss of control (411) and dangerous driving (243) were prominent recorded causes. Buses had the largest number of recorded vehicle involvements (895), followed by cars (759) and motorcycles/tricycles (597). Recorded crashes were concentrated in the daytime, especially between 12:00 noon and 6:00 p.m. Overall, the evidence indicates that road crashes in Awka arise from interactions among driver behaviour, vehicle condition, road engineering, traffic demand and environmental conditions. The study recommends targeted speed management, stronger enforcement, regular vehicle inspection, driver retraining, road rehabilitation, safer junction design, improved traffic control and systematic crash-data management.

Introduction

Road transportation is fundamental to economic and social life because it connects people with employment, education, markets, health services and other activities. The same transport system, however, can produce serious human and economic losses when road users, vehicles and infrastructure interact under unsafe conditions. The World Health Organization (WHO) and World Bank have long recognised road traffic injury as a major but largely preventable public-health problem and have emphasised that effective prevention requires coordinated action across road users, vehicles, roads and the wider transport system (Peden et al., 2004).

The burden is particularly important in low- and middle-income countries. Nantulya and Reich (2002) noted that rapid motorisation, weak infrastructure and inadequate policy responses contributed to the growing road-injury burden in developing countries. Nigerian evidence likewise shows that road traffic injuries produce substantial mortality, disability and health-service demands. For example, Balogun and Abereoje (1992), in a Nigerian teaching-hospital study, found that road traffic accidents constituted a substantial proportion of emergency cases and that young adults and pedestrians were particularly affected.

Awka provides an important local setting for examining these issues. As the capital of Anambra State and an administrative, educational and commercial centre, the city accommodates private cars, commercial buses, heavy vehicles, motorcycles, tricycles and pedestrians. The study identifies several major junctions and road sections where traffic demand, road geometry and inadequate traffic-control

facilities can create conflict between road users. The study therefore provides a useful basis for examining how human, vehicle, engineering and environmental factors combine to influence crash occurrence.

1.2 Aim and Objectives

The aim of the study is to examine the contributing factors associated with road traffic crashes on major roads in Awka, Anambra State. The specific objectives are to:

- determine the pattern and frequency of reported road traffic crashes;
- examine the temporal distribution of crashes;
- identify major human, vehicle, environmental and engineering contributors;
- identify the vehicle categories most frequently represented in the crash records;
- examine crash severity and casualties; and
- propose practical measures for reducing crash occurrence and severity.

2. Study Area

Awka is the capital of Anambra State in south-eastern Nigeria. Its strategic administrative role, commercial activity and connections with neighbouring communities generate substantial daily travel. The supplied investigation describes a road environment containing both dual- and single-carriageway sections, narrow and winding stretches, steep gradients in some locations, and heavy interaction among cars, buses, trucks, tankers, motorcycles, tricycles and pedestrians.

The reconnaissance survey identified locations including Eke-Awka Road, Ezeuzu, Okpuno Road, Ifite Road, Temporary Site/33 Road and the expressway. Particular attention was given to conflict-prone locations around Agu-Awka Junction, Government House and other major junctions.

3. Materials and Methods

The study used a mixed descriptive design combining primary and secondary evidence. Primary data were collected through questionnaires administered to road users and commercial drivers at selected locations. The study reports that 30 completed questionnaires were available for analysis. Secondary data comprised reported road traffic crash records attributed to the FRSC Awka/Anambra commands. The study also incorporated physical road inspection and an engineering assessment using a CBR test of lateritic soil. The questionnaire information was analysed using frequencies and percentages, while the documentary crash records were examined using descriptive statistics and trend analysis. The results of the study were presented in tables, graphs and charts. The CBR test was used to assess the strength characteristics of the sampled subgrade material.

4. Results and Discussions

4.1 Questionnaire respondents

Characteristic	Category	Frequency	Reported %
Sex	Male	20	68
Sex	Female	5	16
Sex	No response	5	16
Age	20–29	10	46.3
Age	30–39	4	19.3
Age	40–49	5	17.0
Occupation	Student	10	46.3
Occupation	Civil servant	5	17.0
Occupation	Trader/business	3	13.0
Occupation	Artisan/professional	5	17.0

The questionnaire sample was relatively small (30 completed responses) The sample nevertheless provides useful insight into the perceptions of people who use or work around the study roads.

4.2 Perceived frequency and severity of crashes

Reported frequency	Frequency	Percent
Daily	3	13.0
Once or twice a week	11	50.0
Once or twice a month	8	7.0
Once or twice a quarter	5	17.0

No response	3	13.0

Half of the respondents reported witnessing crashes once or twice a week, while a further 13% reported crashes on a daily basis. Because these figures reflect respondent experience rather than an official crash count, they are best interpreted as evidence of perceived crash frequency. Respondents also regarded serious crashes as more common than minor crashes. This perception is consistent with the FRSC documentary evidence, in which serious crashes form the largest severity category over the full study period.

4.3 Human factors

Human-related factor	Frequency	Percent
Reckless/dangerous driving	14	41.9
Stress/fatigue	1	3.0
Pedestrian/road-user negligence	1	3.0
Speeding	3	13.0
Wrongful overtaking	2	6.7
Avoiding obstruction/animals	2	6.7
Alcohol/drugs	1	3.0
Flashing/dazzling headlights	2	6.7
No response	4	16.0

Reckless and dangerous driving was the dominant human factor identified by respondents, accounting for 41.9% of responses. Speeding followed at 13.0%, while wrongful overtaking and attempts to avoid obstructions or animals each accounted for 6.7%. These findings are broadly consistent with the study's FRSC records, in which speed violation, loss of control and dangerous driving were among the leading recorded causes.

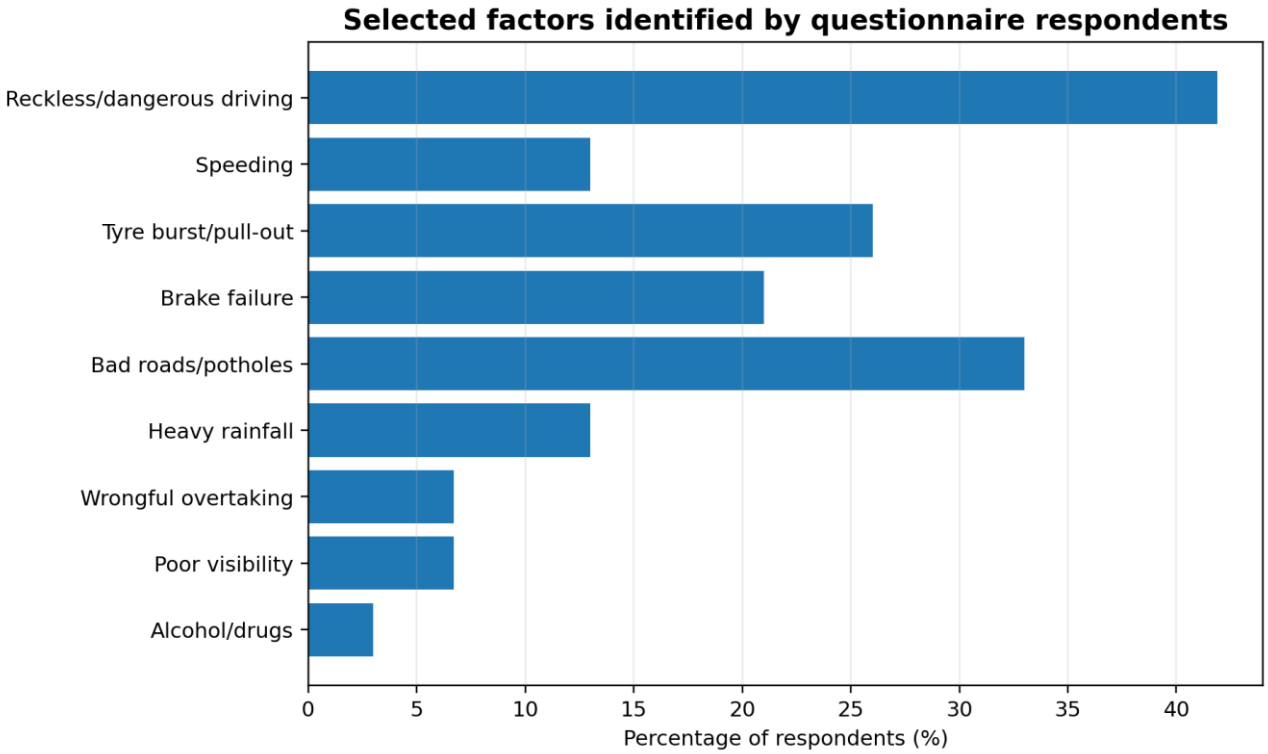

Figure 1. Selected crash factors identified by questionnaire respondents. Source: supplied study questionnaire data.

4.4 Vehicle-related factors

Vehicle-related factor	Frequency	Percent
Tyre burst/pull-out	8	26.0
Brake failure	7	21.0
Steering/wheel lock	4	16.0
Defective lights/signals	4	16.0
No response	7	21.0

Tyre failure was the most frequently identified vehicle-related factor, followed by brake failure. These findings underline the importance of vehicle roadworthiness, preventive maintenance and inspection. A defective tyre or braking system becomes particularly dangerous when combined with high speed, wet pavement or heavy traffic.

4.5 Physical and environmental factors

Physical/environmental factor	Frequency	Percent
Bad roads/potholes	11	33.0
Poor visibility/fog	2	6.7
Heavy rainfall	3	13.0
Bad weather	2	6.7
Absence of road traffic signs	3	13.0
No response	9	27.6

Bad roads and potholes were the leading environmental concern reported by respondents. Rainfall and the absence of adequate traffic signs were also identified. These findings do not imply that road conditions alone cause crashes; rather, they can increase the probability that a driver will lose control or have insufficient time and space to respond to a hazard.

4.6 Recorded crash causes

Recorded cause	Total cases
Speed violation	502
Loss of control	411
Dangerous driving	243
Light-caution violation	126
Tyre burst	87
Wrong overtaking	83
Dangerous overtaking	69
Obstruction	43
Alcohol-impaired driving	27

The compiled FRSC records identify speed violation as the largest recorded cause (502 cases), followed by loss of control (411) and dangerous driving (243). Light-caution violations, tyre bursts, wrong overtaking and dangerous overtaking were also represented. Taken together, these categories indicate the substantial role of driver behaviour, vehicle condition and traffic-rule compliance in the crash burden recorded by the study.

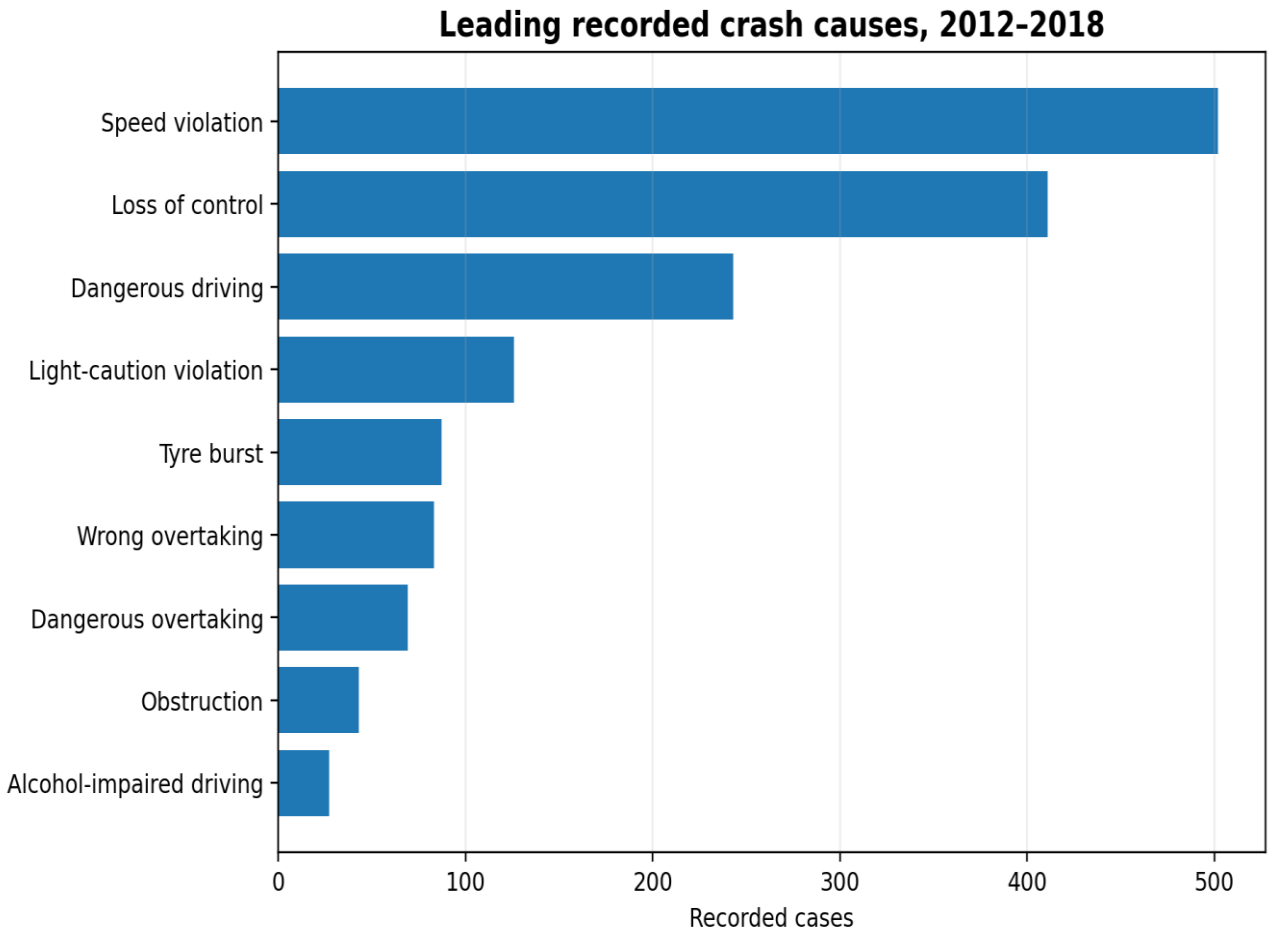

Figure 2. Leading recorded causes of crashes in the supplied FRSC dataset

4.7 Vehicle categories involved

Vehicle category	Total recorded involvements
Buses	895
Cars	759
Motorcycles/tricycles	597
Trucks/lorries	438
Trailers/tankers	298
Pick-up/vans	70
Bicycles	4

Buses recorded the largest number of involvements (895), followed by cars (759) and motorcycles/tricycles (597). These figures should not be interpreted as risk rates because the dataset does not provide exposure measures such as vehicle-kilometres travelled or the number of each vehicle type using the roads. A high number of bus involvements may partly reflect high commercial-bus exposure on the road network.

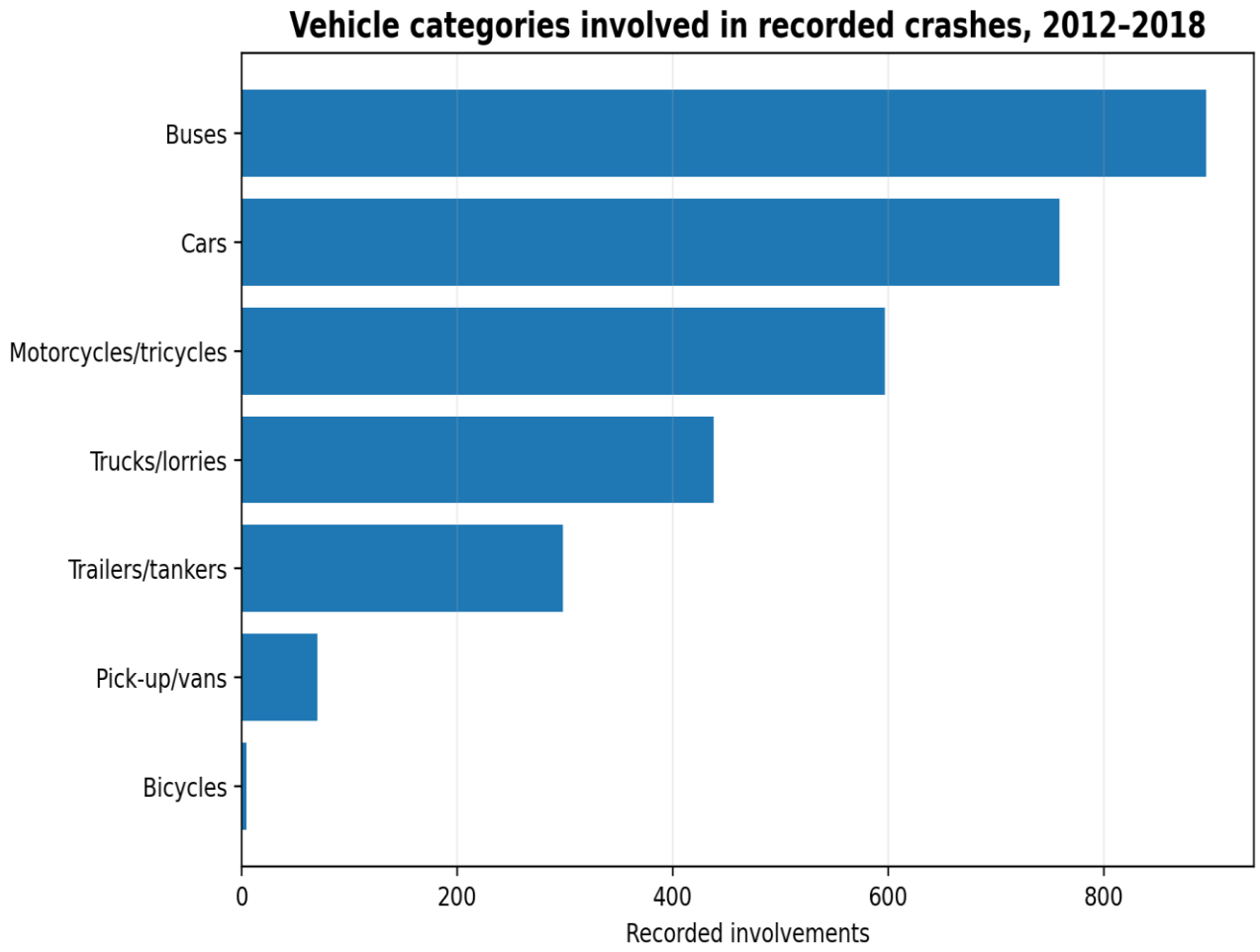

Figure 3. Vehicle categories represented in recorded crash involvements

4.8 Crash trend and severity

Year	Fatal	Serious	Minor	Total
2012	67	178	61	306
2013	74	140	13	227
2014	82	160	32	274
2015	22	53	6	81
2016	54	126	45	225
2017	48	37	63	148
2018	48	94	14	156

The trend data show substantial year-to-year variation. Serious crashes were the largest severity category in the compiled dataset, with 788 cases over the seven-year period, compared with 395 fatal and 234 minor cases. The total number of recorded crashes fell sharply in 2015 and remained below the earlier peak levels in subsequent years.

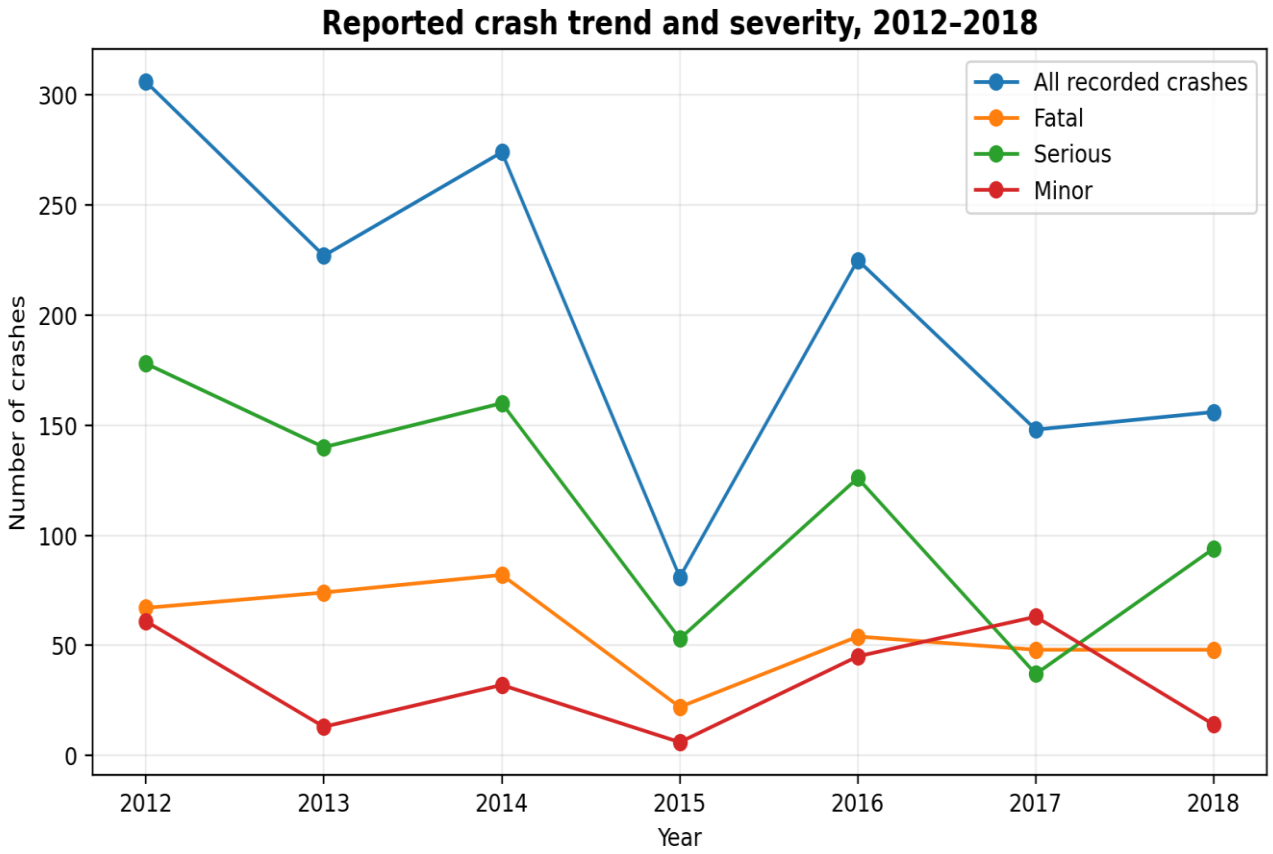

Figure 4. Reported crash trend and severity, 2012–2018. Source: FRSC records reproduced in the supplied study.

4.9 Casualties

Year	Injured	Killed	Persons involved
2012	629	90	1947
2013	748	127	2218
2014	644	110	1832
2015	628	175	1728
2016	534	77	1847
2017	601	69	1684
2018	522	70	1234
Total	5360	718	12490

Across the reported seven-year casualty table, 5,360 people were recorded as injured and 718 as killed, while 12,490 people were reported as involved in crashes. The figures demonstrate that the consequences extend beyond the crash event itself to injury treatment, disability, loss of income, family disruption and damage to productive assets.

4.10 Time of crash occurrence

Time period	2012	2013	2014	2015	2016	2017	2018	Total
12am–6am	10	10	10	10	10	10	4	64
6am–12pm	121	104	107	107	86	85	53	663
12pm–6pm	148	135	122	122	94	108	87	816
6pm–12am	32	45	35	35	39	22	15	223

The largest number of recorded crashes occurred between 12:00 noon and 6:00 p.m. (816 cases), followed by 6:00 a.m. to 12:00 noon (663 cases). Thus, 1,479 of the 1,766 recorded cases in this time-of-day table occurred between 6:00 a.m. and 6:00 p.m., representing approximately 83.7% of the

recorded cases. The pattern is plausible in a busy urban corridor because daytime travel is associated with commuting, commercial activity and greater interaction among road users. It should not, however, be assumed that night-time crashes are unimportant, because lower frequency can coexist with greater severity in particular circumstances.

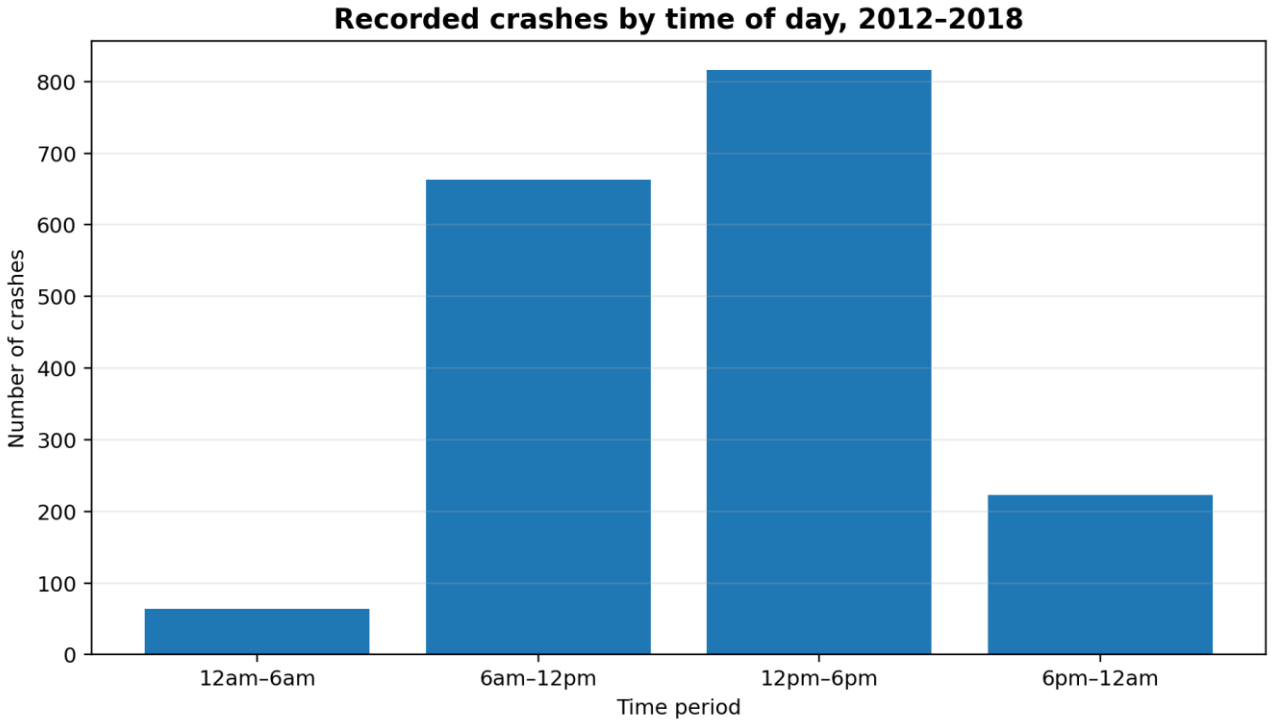

Figure 5. Recorded crashes by time of day, 2012–2018. Source: computed from FRSC records reproduced in the supplied study.

4.11 Road engineering and CBR observation

The investigation reports physical characteristics such as narrow and winding sections, sharp bends, cross-sections without adequate traffic-control facilities, potholes and slippery surfaces. Agu-Awka Junction was repeatedly identified as a critical location because of competing traffic movements and limited traffic-control capacity. The study therefore recommends redesign, improved junction control, road expansion where justified, and appropriate grade-separated or rotary solutions where engineering assessment supports them.

The laboratory CBR assessment reported a value of approximately 23% for the tested subgrade material. A CBR result can inform pavement design and subgrade assessment, but it cannot by itself establish that a road is unsafe. Pavement safety depends on the combined performance of the pavement structure, surface texture, drainage, geometric design, maintenance and traffic loading.

4.12 Discussion

The findings indicate that the dominant contributors to crashes in the study area are not isolated variables. Instead, crashes emerge from an interaction of driver behaviour, vehicle condition, road design, traffic volume and environmental circumstances. This interpretation is consistent with the systems perspective advocated in road-safety literature, in which the road-user, vehicle and road environment are treated as parts of one safety system (Peden et al., 2004).

Speeding is particularly important because it can amplify other hazards. A driver travelling too fast has less time to react to a pothole, pedestrian, turning vehicle or obstruction and requires a longer distance to stop. If a vehicle also has worn tyres or defective brakes, the combined risk becomes greater. The prominence of speed violation in the FRSC records therefore deserves priority in prevention programmes.

Dangerous driving, loss of control and overtaking-related violations further demonstrate the importance of driver decision-making. These behaviours can be influenced by time pressure, fatigue, inadequate training, overconfidence, poor compliance with traffic rules and the desire to maximise

commercial trips. Sumaila (2013) argues that road-safety management in Nigeria requires attention not only to crash statistics but also to the effectiveness of existing safety measures and enforcement.

Vehicle condition is a second major concern. Tyre bursts and brake failures identified in the questionnaire can turn an otherwise manageable situation into a crash. Regular inspection is therefore not merely an administrative requirement; it is a practical risk-control measure. The large number of bus involvements also indicates the importance of focusing safety interventions on commercial passenger transport, while recognising that raw involvement counts do not measure exposure-based risk.

Road and environmental conditions form the third part of the risk picture. Potholes, inadequate signs, sharp bends, slippery surfaces and difficult junctions can increase the demands placed on drivers. Rainfall can further reduce visibility and tyre-road friction. These factors reinforce the need for maintenance and engineering interventions alongside behavioural enforcement.

The time-of-day results provide another important planning insight. Most recorded crashes occurred during daylight hours, particularly the afternoon. Rather than implying that the afternoon itself causes crashes, the pattern likely reflects the concentration of traffic activity during the period. Road-safety agencies can therefore use temporal crash information to target patrols, traffic management and public-awareness operations to periods of greatest exposure.

5.0 Conclusion and Recommendation

5.1 Conclusion

Road traffic crashes on major roads in Awka cannot be explained by a single cause. The evidence in the study points most strongly to human factors—especially speeding, dangerous driving and loss of control—while vehicle defects, poor road conditions, traffic congestion and environmental conditions add to the risk. The prominence of buses, cars and motorcycles/tricycles in the recorded vehicle data reflects the mixed and commercially active nature of the road environment, although involvement counts should not be confused with exposure-based risk.

The most effective response is therefore an integrated road-safety strategy. Driver behaviour must be addressed through training, enforcement and speed management; vehicle defects must be controlled through credible inspection and maintenance; and road authorities must address pavement defects, junction design, drainage, signs and traffic capacity. Finally, crash data should be harmonised and analysed spatially and temporally so that interventions can be directed toward the locations, periods and road-user groups facing the greatest risk.

In practical terms, the study supports a shift from reacting to individual crashes to managing the road system as a whole. Such an approach is more consistent with established road-safety practice and offers a stronger basis for reducing preventable deaths, injuries and economic losses in Awka.

5.2 Limitations of the Study

The questionnaire sample consisted of only 30 completed responses, which limits generalization beyond the surveyed locations. Some FRSC-data combine Awka major roads with other road segments in Anambra State; therefore, they should not be presented as a perfectly city-specific dataset. The study also relies on reported crashes. Under-reporting is possible, especially for less severe incidents. Consequently, hospital records, police records, insurance records and geospatial crash-location data could be incorporated in future research to provide a more complete picture.

5.3 Major Contributing Factors Identified

Factor group	Key contributors identified in the study
Human factors	Speed violation, reckless/dangerous driving, loss of control, unsafe overtaking, fatigue and poor compliance with traffic rules.
Vehicle factors	Tyre failure, brake failure, steering problems and defective lights/signals.
Road-engineering factors	Potholes, narrow/winding sections, difficult junction geometry, inadequate traffic-control facilities and insufficient road capacity at conflict points.
Environmental factors	Rainfall, poor visibility and wet/slippery road surfaces.
Traffic and land-use factors	High daytime traffic demand, commercial activity, mixed traffic and competition for limited road space.

5.4. Recommendations

Recommendation	Action
1. Strengthen speed management.	Speed limits should be clearly communicated and consistently enforced, particularly at high-risk junctions, built-up areas and pedestrian activity zones.
2. Intensify commercial-vehicle inspection.	FRSC and VIO should give particular attention to braking systems, tyres, steering, lights and other safety-critical components.
3. Improve driver training and retraining.	Commercial drivers should receive periodic training in defensive driving, safe overtaking, fatigue management, hazard perception and traffic regulations.
4. Redesign high-conflict junctions.	Locations such as Agu-Awka Junction should be subjected to professional road-safety and traffic-engineering assessment to determine the most appropriate combination of signals, channelisation, roundabout or grade-separated solutions.
5. Repair pavement defects and improve drainage.	Potholes, failed shoulders, poor drainage and surface defects should be addressed through routine and periodic maintenance.
6. Improve road signs and markings.	Clear lane markings, warning signs, directional signs and other traffic-control devices should be maintained and made visible in both daytime and low-visibility conditions.
7. Protect pedestrians and vulnerable road users.	Safe crossing points, walkways and other appropriate facilities should be provided where pedestrian demand is high.
8. Target enforcement to high-risk periods and locations.	Crash records should guide the deployment of patrols and enforcement resources rather than relying only on generalised enforcement.
9. Establish a harmonised crash database.	FRSC, VIO, police, health facilities and road authorities should use compatible definitions and fields for location, severity, cause, vehicle type, time, weather and casualty outcomes.
10. Use exposure-based analysis in future research.	Future studies should relate crash counts to traffic volume, vehicle-kilometres travelled and vehicle-category exposure so that true risk rates can be estimated.

References

1. Balogun, J. A., & Abereoje, O. K. (1992). Pattern of road traffic accident cases in a Nigerian university teaching hospital between 1987 and 1990. Journal of Tropical Medicine and Hygiene, 95(1), 23–29.

2. Federal Road Safety Corps, Awka Sector Command (RS5.3). (2012–2018). Road traffic crash records. Unpublished administrative records reproduced in the supplied study.

3. Jha, N., Srinivasa, D. K., Roy, G., Jagdish, S., & Minocha, R. K. (2004). Epidemiological study of road traffic accident cases: A study from South India. Indian Journal of Community Medicine, 29(1), 20–24.

4. Nantulya, V. M., & Reich, M. R. (2002). The neglected epidemic: Road traffic injuries in developing countries. BMJ, 324(7346), 1139–1141. https://doi.org/10.1136/bmj.324.7346.1139.

5. Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A. A., Jarawan, E., & Mathers, C. (Eds.). (2004). World report on road traffic injury prevention. Geneva: World Health Organization.

6. Sumaila, A. G. (2013). Road crashes trends and safety management in Nigeria. Journal of Geography and Regional Planning, 6(3), 53–62. https://doi.org/10.5897/JGRP2013.0318.