Perceptions of Vulnerability to Road Traffic Accidents Among Highway Setback Dwellers in Nigeria

Abdulganiyu Olukayode Tijjani[1,3*], Sitti Asmah Hassan[1], Muhammad Zaly Shah Muhammad[2], Mohd Khairul Afzan Mohd Lazi[1], Bayero Salih Farah[3]

[1] Department of Transportation, School of Civil Engineering, University Technology Malaysia, Johor Bahru, Malaysia

[2] Faculty of Built Environment and Surveying, University Technology Malaysia, Johor Bahru, Malaysia

[3] Nigerian Institute of Transport Technology (Nitt), Zaria, Kaduna State, Nigeria

[*] Corresponding author

DOI: https://dx.doi.org/10.47772/IJRISS.2025.9020261

Received: 12 February 2025; Accepted: 16 February 2025; Published: 17 March 2025

ABSTRACT

Residents and squatters engaging in commercial activities on setbacks of both rural and urban highways is a common issue in Nigeria. These people frequently ignore the implications of traffic externalities, with traffic accidents being a significant source of concern. There have been countless occurrences where vehicles collided with individuals, residences, and businesses placed within the highway Right of Way (ROW) or setbacks, resulting in injuries, fatalities, and property damage. As a result, the purpose of this study is to evaluate highway setback dwellers' perception of the impacts of and vulnerability to traffic accidents. The study was conducted in 12 settlements out of the 17 settlements located along a 72-kilometer length of the Kaduna-Zaria highway in Kaduna State, Nigeria. The study used a structured questionnaire to collect data from 412 respondents who were the dwellers carrying out economic activities (formal and informal) within the 45-meter highway RoW from the median of the highway. The findings show that pedestrian accidents and disturbing sight of accident scenes are big problems for communities, even though occurrences of vehicles colliding with shops and houses are rare. Despite acknowledging their business susceptibility to traffic accidents, respondents rely on faith and prayers for protection, believing the site is critical to their survival. To accomplish Sustainable Development Goal 3 of guaranteeing healthy lives and fostering well-being, authorities at all levels in Nigeria must monitor and address the actions of squatters along roads, striving for economic integration and limiting the negative consequences of traffic on them.

Keywords: Economic activities, Highway setback dwellers, Perception evaluation, Traffic accidents Impacts, Vulnerability assessment

INTRODUCTION

Transportation is the foundation of every city's growth, functioning as a critical conduit that provides access to all land uses and enables mobility. Cities are dynamic entities that are constantly evolving, with planned adjustments playing an important part in improving urban living quality. However, given the prevalence of vehicles in contemporary urban landscapes, achieving a really high standard of urban life and creating desirable living settings for people of all economic levels remain complex but admirable goals [1], [2].

However, according to [3] and [2], transportation is critical to promoting economic growth and improving the quality of life in both urban and rural areas. Nonetheless, the growth of urban populations, transportation networks, and related travel lengths has resulted in negative consequences such as congestion, air and noise pollution, and traffic accidents.

According to [4], in recent years, transportation professionals and authorities have been increasingly showing

concern about the issue of road safety worldwide. In spite of the significant breakthroughs in safety measures, road traffic accidents remain a significant global public health risk, menace and concern, killing an estimated 1.35 million people and injuring 50 million more. Furthermore, [5] ascertained that the rise in global road traffic accidents has generated serious concerns regarding road mobility safety worldwide. According to the World Health Organization, the yearly number of road traffic fatalities increased to 1.35 million in 2018, making it the eighth highest cause of death globally. Pedestrians, cyclists, and motorcyclists bear a disproportionate percentage of these accidents, accounting for more than half of all global road traffic deaths, necessitating special care.

Hence, [4] stated that Developing countries bear a substantial burden of these statistics, with road traffic fatalities in these regions being three to four times higher than in developed countries, and the fundamental causes of this worrying difference are the poor supervision and implementation of road safety measures in these locations. In addition, the majority of developing countries, as a result of funds or technological issues for modal shifts, have prioritized road infrastructure development and legislations that encourage high-level motorized transportation in their cities, resulting in fast vehicle ownership and aggravated road safety problems. According to [6], [7], road accidents have had a substantial influence on the socioeconomic well-being of developing countries, resulting in fatalities, limb loss, disability, and property damage for motorists, passengers, and nearby residents to roads and highways.

Like every other nation, most especially developing countries, vehicular transportation plays crucial roles in all facets of Nigeria's socioeconomic activities, and it is overwhelmingly remarkable and rewarding. However, despite its advantageous features, the road system emerges as the most significant offender among all transportation modes. The latent outcomes, including auto crashes, fatalities, injuries to road users, and damage to goods and properties, represent the most troubling consequences of its utilization [2].

According to [7], road accidents have had a substantial impact on developing countries' socioeconomic well-being, resulting in disastrous results such as deaths, injuries, disability, and property damage for both motorists and passengers. These acts have far-reaching effects on families and society in general. The effects of road accidents on people's lives, the financial burden on families and friends, and the pressure on community resources highlight the far-reaching effects of these catastrophes for several parts of society. However, in Nigeria, a category of persons who are neither drivers nor passengers are disproportionately impacted by traffic accidents due to the proximity of their economic activities or residents to roads or highways. These people, who are either residents or squatters, are constantly exposed to the consequences of traffic accidents, and this vulnerability is due to their encroachment on road or highway rights of way (RoW), road setbacks, or road buffer zones.

Despite extensive research on road traffic accidents and their effects on motorists and passengers, there is a paucity of studies focusing on how traffic accidents affect the communities' carrying activities within highway setbacks and the perceptions of these highway setback dwellers on the impacts of road traffic accidents within their neighbourhood. Thus, this study addresses this gap by exploring how the dwellers within highway setbacks perceive their vulnerability to road traffic accidents. Consequently, the objectives are to assess the influence of socioeconomic factors and proximity to highways on perceived vulnerability.

Road Traffic Accidents and its Implications on Roadside Dwellers in Nigeria

According to [3], the majority of countries throughout the world are experiencing increasing transportation challenges, most especially road transport. This increase in the challenges has prompted a search for solutions that shall offer efficient, safe, viable, economical and timely modes of transportation. As these concerns grow, there is a greater need to develop efficient and creative solutions that shall meet the diverse needs of modern transportation networks and the populace in general.

The problems of vehicles colliding into markets, shops, and homes along Nigeria's roads, causing tragic loss of life and property, have been largely overlooked in terms of research publications and policy responses. Awareness of this menace has primarily come from newspaper headlines, which recount various incidents in terms of lives lost, injuries and property damage. Among these, a few examples stand out while Figure 1 and Figure 2 buttress and relay through pictorial, how these types of accidents affect communities by the roadside:

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue II February 2025

According to [8] "Fuel Chains Supply and Incessant Tankers Accidents"

[9] reported that "Vehicle crashes into roadside markets kill 60 people in three months in Nigeria."

According to [10], "Fully-loaded petrol tanker veers off road, mosque, houses, shops razed."

[11] reported that "Rice truck crashes into house, kills infant, others."

Fig. 1 Tanker accidents have led to fire outbreaks into houses and shops by roadside in Nigeria

Fig. 2 Trucks Accidents into Roadside houses and shops in Nigeria

MATERIAL AND METHOD

Study Area

Settlements or towns are frequently seen at kilometer intervals along Nigeria's urban and rural highways,

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue II February 2025

sometimes known as intercity or interstate routes. Each of these settlements along the intercity roads has a diverse range of economic activities, the majority of which are informal, with the notable exception of the ubiquitous presence of petrol filling stations (gas stations) dotted along the length and breadth of all Nigerian roads in these settlements.

Consequently, the bulk of activities associated with these settlements take place immediately on the road's right-of-way or inside the road setback [12]. This research focused on one of Nigeria's busiest highways, which has rural, semi-urban, and urban settlements along its route, the Kaduna-Zaria highway. The Kaduna-Zaria highway in northern Nigeria is a 72-kilometre section of road that is part of the Link A2 Abuja-Kaduna-Kano four-lane expressway. This key transportation route connects the most populated North West geopolitical zone to the Federal Capital Territory (FCT) and the country's southern area. This road conveniently facilitates the passage of people and products from northern to southern Nigeria, as well as vice versa, resulting in considerable motor traffic on the route. The research region has a diversified terrain with 17 settlements, as indicated in Figure 3, spanning urban, semi-urban, and rural areas

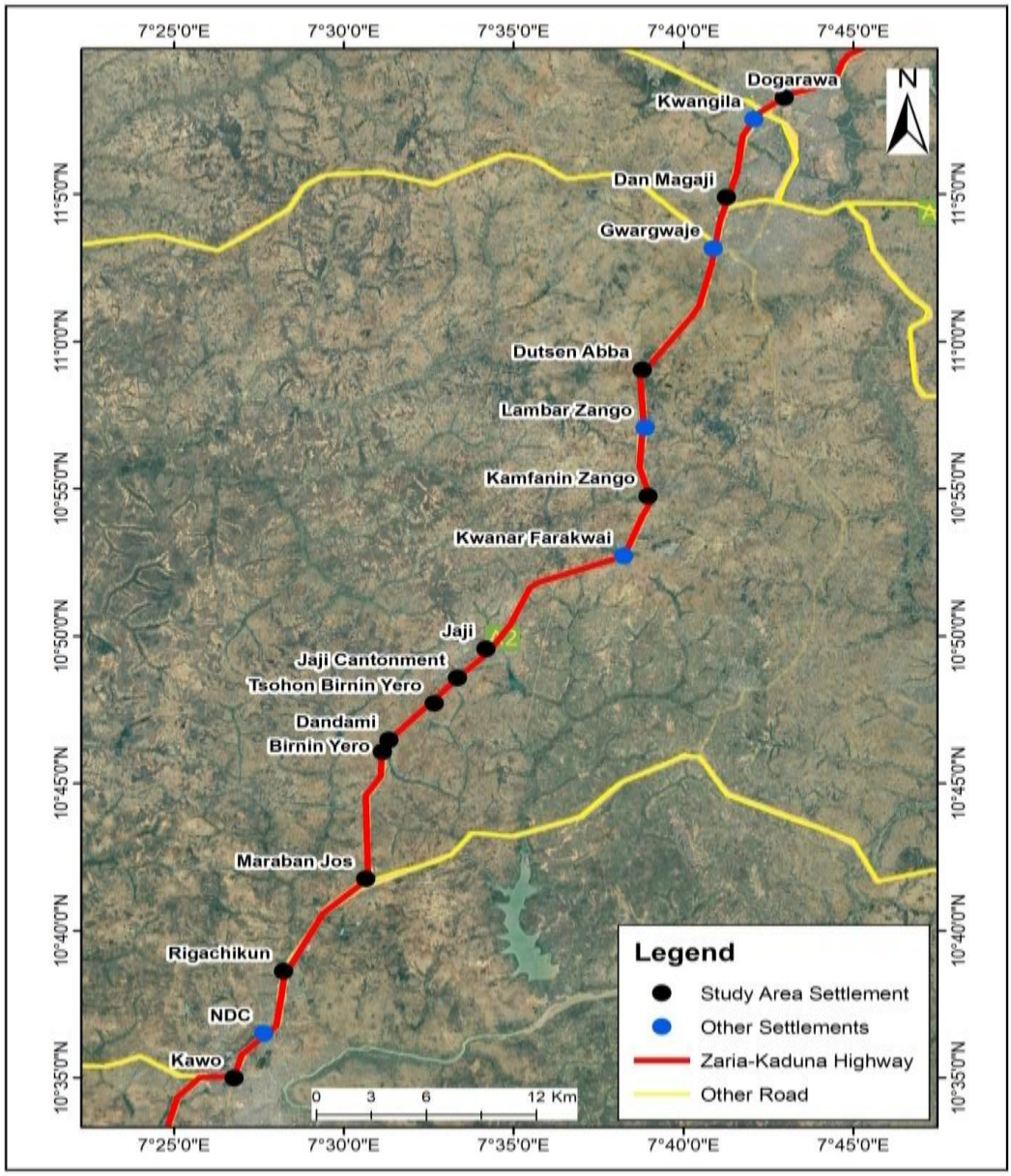

Fig. 3 the map showing the study route and the settlements along the route

Method

This study focused on assessing the awareness level of residents living along the encroached road or highway setback about their sensitivity to the impacts of traffic accidents along the route, as well as the variables that

lead to their presence in the highway buffer zone. To achieve this, a structured and validated questionnaire with a calculated Content Validity Coefficient (CVC) of an average of 0.85 was used, and according to [13], any Content Validity Coefficient (CVC) value greater than 0.75 shows that the instrument has a strong validity enough for the study. The questionnaire was distributed across 12 out of the 17 settlements along the route, using a stratified technique to divide the settlements into rural, semi-urban, and urban sectors. Four (4) settlements were selected from each category. However, the population of the dwellers that are carrying out various economic activities on encroached highway setbacks on the study route is infinite, so the study adopted the [14] formula to get the minimal sample size for the study of 385 responses at a margin of error (ME) of 5%. This means that at least 385 questionnaires will be distributed for this study. However, not fewer than 385 questionnaires will be required to verify and generalize the study results at a ME of 5%. To avoid falling below the minimum required number of 385 returned questionnaires due to invalid questionnaires and missing questionnaires in transit, a buffer number of 45 (choice of researcher) questionnaires was added to make the minimum number of questionnaires administered to a total of 430 and out of which 412 was finally used for analysis using IBM SPSS 27 to generate frequencies. The reliability statistics of the questions using IBM SPSS 27 were 0.775, as presented in Table 1. According to George (2011), a Coefficient of Cronbach's Alpha range of 0.70-0.79 is graded as acceptable reliability.

Table 1 Questionnaire Reliability and Validity Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items	Means	Validity
0.775	0.719	16	2.225	0.85

RESULTS

This section delves into the findings from the examination of the administered questionnaire. The questionnaire detailed the socio-economic characteristics of the respondents in terms of gender distribution, age structure, educational background, marital status, the type of economic activities the respondents engage in on the road setback, their daily incomes, and how long the respondents have been on the roadside, among other questions relating to safety and well-being by the roadside, as shown in Table 2.

Table 2 Socio-Economic and Demographic Characteristics of the Road Setback Dwellers

Respondents Details	Frequency	Percent (%)	Mean	Median	Mode	Std. Deviation
Gender			1.17	1.00	1.00	0.374
Male	343	83.3	-	-	-	-
Female	69	16.7	-	-	-	-
Age Distribution	Frequency	Percent (%)	Mean	Median	Mode	Std. Deviation
			2.34	2.00	2.00	0.826
0-17 Years	39	9.5	-	-	-	-
18 - 40 Years	250	60.7	-	-	-	-
41-49 Years	68	16.5	-	-	-	-
50 Years and above	55	13.3	-	-	-	-
Marital Status	Frequency	Percent (%)	Mean	Median	Mode	Std. Deviation
			1.69	2.00	2.00	0.643
Single	153	37.1	-	-	-	-
Married	246	59.7	-	-	-	-

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Separated	2	.5	-	-	-	-
Divorced	9	2.2	-	-	-	-
Widow	2	.5	-	-	-	-
Educational Level	Frequency	Percent (%)	Mean	Median	Mode	Std. Deviation
			2.64	3.00	3.00	1.080
No Formal Education	74	18.0	-	-	-	-
Primary Education	172	41.7	-	-	-	-
Secondary Education	96	23.3	-	-	-	-
NCE/OND	46	11.2	-	-	-	-
HND/BSc	24	5.8	-	-	-	-
Average Daily Income	Frequency	Percent (%)	Mean	Median	Mode	Std. Deviation
			2.25	2.00	2.00	1.171
2000 and less	119	28.9	-	-	-	-
2001-5000	162	39.3	-	-	-	-
5001-10000	71	17.2	-	-	-	-
10001-20000	28	6.8	-	-	-	-
20001 and more	32	7.8	-	-	-	-

Table 2 gives the socio-economic and demographic details of the dwellers on the road setbacks. Regarding gender distribution, Table 2 shows that respondents who do business on road seatbacks are primarily male (83.3%) and female (16.7%) of the dwellers. This data demonstrates a clear male majority in enterprises operating on road setbacks or highway rights-of-way in the study area.

The age distribution of dwellers indicated that the majority (60.7%) are between the ages of 18 and 40, followed by (16.5%) of those within the age of 41 to 49 years. However, this result shows a young population engaging in economic activities on the highway setback regions, and the mean age is 2.34, with a median and mode of 2.00, indicating a small bias toward younger people. The standard deviation of 0.826 suggests a limited spread of ages around the median, meaning that the age distribution is primarily concentrated within this range of young people who are ready to take as many risks for surviving.

The Marital status among the road setback dwellers reveals that a considerable fraction (59.7%) are married, followed by singles (37.1%), with lower percentages separated, divorced, or widowed. The mean marital status score is 1.69, with a median and mode of 2.00, indicating a slight lean toward married individuals. The marital status standard deviation of 0.643 suggests that married status varies very little within the examined population. Consequently,

The educational distribution of the dwellers by the roadside shows that the majority of respondents (41.7%) received only primary education, followed by secondary education (23.3%). Higher education levels, including NCE/OND and HND/BSc, were just (17.0%) of the dwellers. Then, the mean educational level score of 2.64 and a median and mode of 3.00 indicate a trend toward lower educational attainment by the dwellers. The standard deviation of 1.080 suggests significant educational variation among respondents. This shows that perceptions and vulnerabilities may differ depending on educational level, which has consequences for road safety knowledge and comprehension.

On the issue of average daily income, the dwellers indicated a wide range of typical average daily income from

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue II February 2025

business activities, with the majority (39.3%) earning between 2001 and 5000 Naira daily, followed by those making 2000 Naira or less (28.9%) while 15.6% earned or generated an average daily income of above N10,000. The mean income score of 2.25, with a median and mode of 2.00, indicates a general preference for lower income categories. The standard deviation of 1.171 indicates that respondents' income levels vary significantly.

Figure 4 shows the results of the analysis concerning the duration of time that individuals have been engaged in economic activities within the road setback.

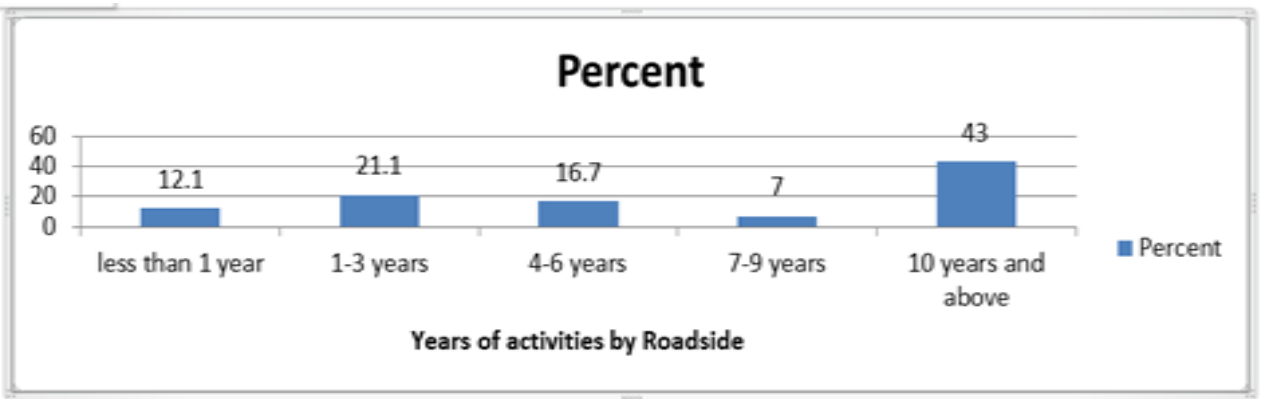

Fig. 4 Length of time for the respondents carrying out business activities at the vulnerable location

The dwellers have taken the highway setback as the location where they earn daily income over some time in years. Thus, Figure 4 illustrates that a sizable proportion of road setback dwellers, 43%, have spent a decade or more carrying out various business activities within the encroached highway setback. This is followed by a smaller but still significant number, 21.1%, has engaged in business activities on the highway right of way over a shorter period of one to three years. However, when considering the overall population, 66.7% have been in business for four years or more, demonstrating a high level of stability in roadside economic operations on the highway. Meanwhile, just 33.2% of dwellers had spent three years or fewer years engaged in business activities along the highway buffer zone.

Figure 5 depicts the proportions of the various types of business activities in which the dwellers within the road setback are involved along the highway to sustain their livelihoods.

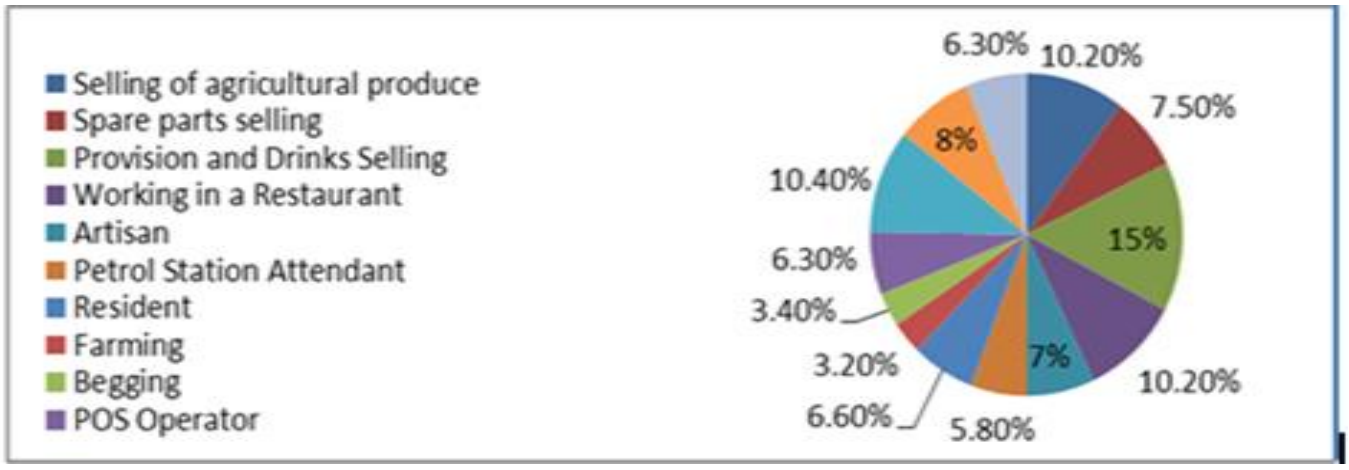

Fig. 5 Types of economic activities engaged in by the encroached roadside dwellers

Informal activities comprise a wide range of economic activities, such as agricultural commodity sales, provisions and beverages, restaurant jobs, and block industry work. Figure 5 shows that these informal jobs account for 45.9% of all business activities on the highway setback. Hence, among the economic activities happening within the highway setback, gas stations appear as the formal business, accounting for 5.8% of the total business activities. Meanwhile, the other economic activities each account for less than 10% individually

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but collectively contribute considerably to the informal sector, accounting for 48.3% of all the business activities. This emphasizes the prevalence of informal economic activity within the highway setback, as well as the varied variety of informal livelihoods that thrive within.

Figure 6 presents the various types of structures utilized by the road setback dwellers for conducting business activities along the highway, as well as the proportion of each type. The data presented in the figure provides a comprehensive overview of the architectural landscape that supports economic activities in this area.

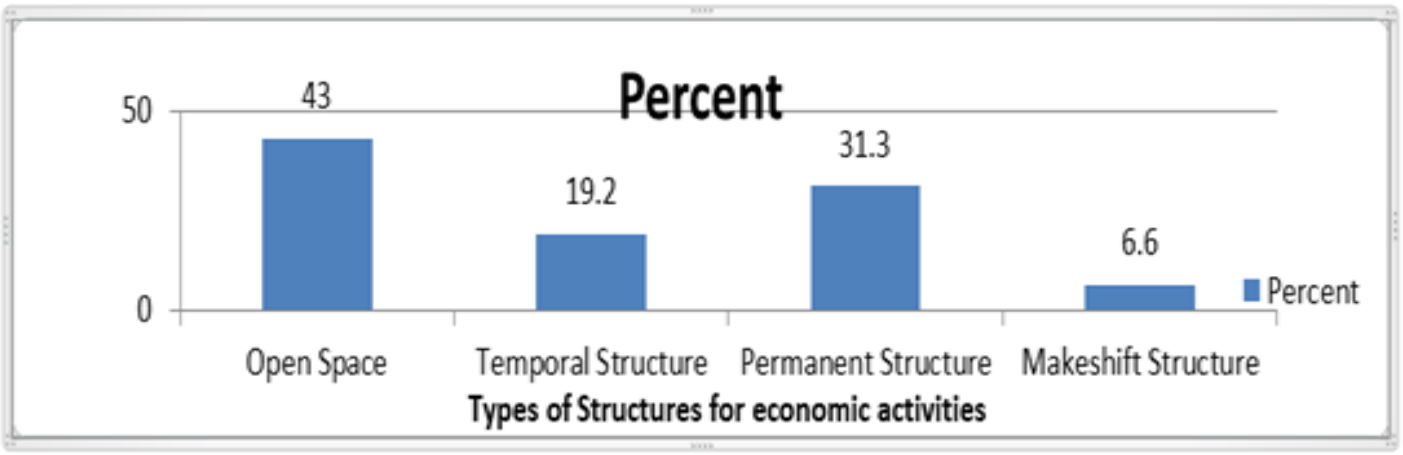

Fig. 6 Nature of the structure for the business of the respondents at the vulnerable location

With reference to Figure 5 illustrates that the significant engagement of roadside dwellers is in informal sector operations; thus, 43% of these economic activities take place in open spaces within the road seatback. Following that, 31.3% of activities take place within permanent buildings, such as shops and houses. The remaining 25.8% of the economic activities take place in temporary and improvised structures, as shown in Figure 6. This distribution demonstrates the many situations in which informal sector activities thrive along the roadside, including both permanent and temporary buildings.

Figure 7 reveals the experiences of dwellers living by the road setback in terms of witnessing traffic accidents, particularly those that impact people within the neighbourhood, with a special focus on pedestrians.

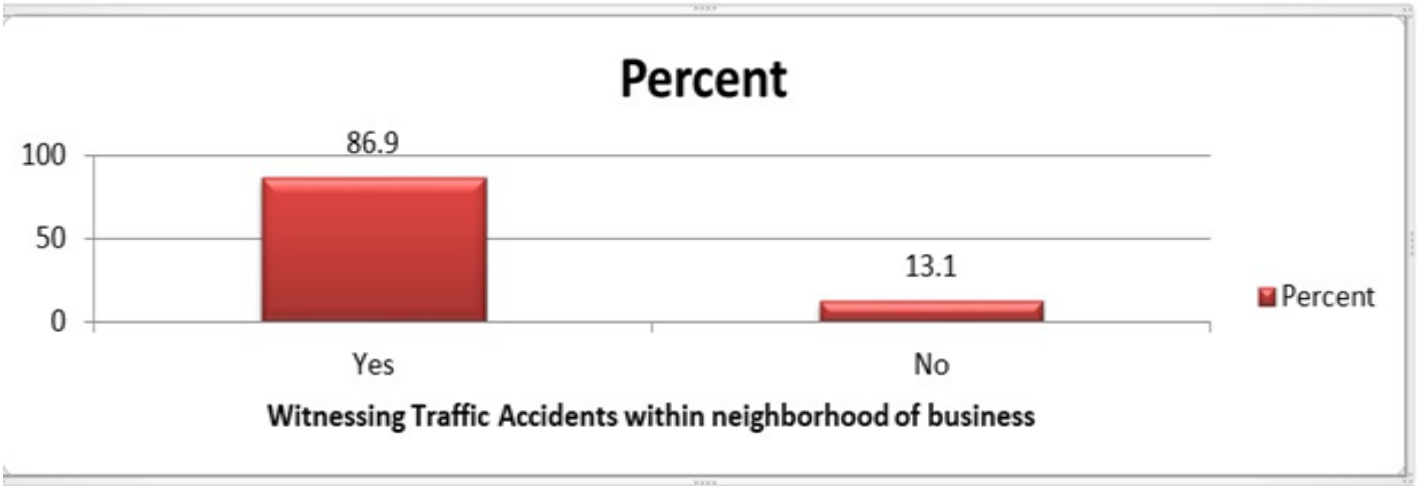

Fig. 7 Respondents ever witness road traffic accident that affects people or property within the neighborhood

Staying or carrying out activities on a busy highway roadside increases the probability of witnessing the occurrence of road traffic accidents along the road. Figure 7 presents the responses of the roadside dwellers regarding ever witnessed the occurrence of road traffic accidents that affect people or property within the neighbourhood. The result revealed that 86.9% of the respondents agreed that they had witnessed traffic accidents that have impacted on them or people or property within the vicinity of their business along the

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highway, while only 13.1 stated otherwise.

Figure 8 provides detailed information on the frequency of road traffic accidents occurring within the neighbourhood, particularly incidents that impact pedestrians attempting to cross the highway, by showing the prevalence and risk faced by the pedestrians in this area.

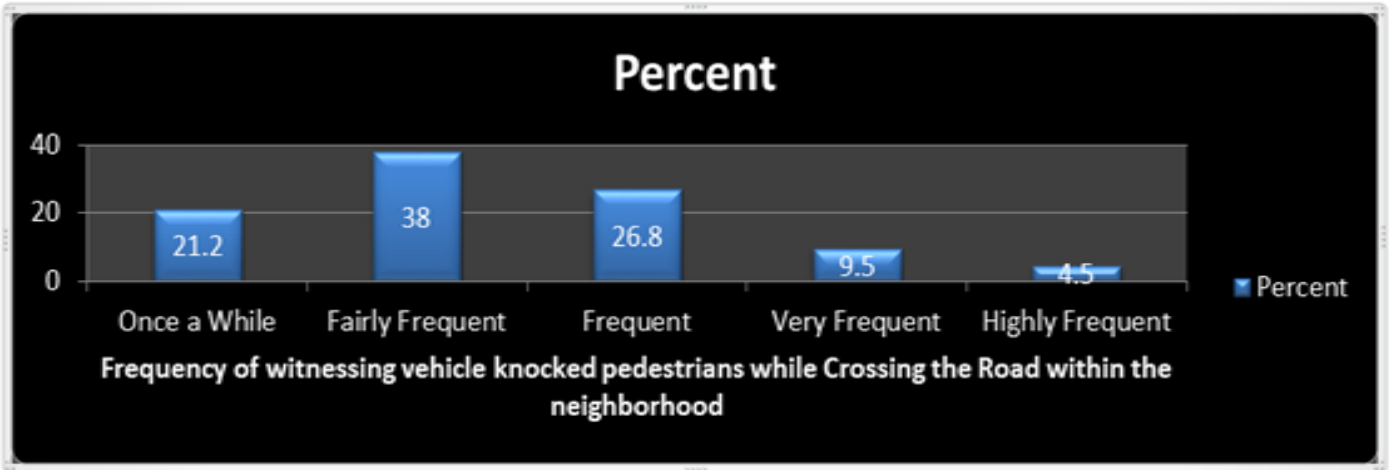

Fig. 8 Frequency of witnessing vehicle knocked someone while Crossing the Road (Pedestrians) Accidents

Pedestrians residing in settlements along highways sometimes face heavy traffic and fast-moving vehicles when attempting to cross the road within their neighbourhood. Figure 8 depicts the frequency of pedestrian accidents on the highway in the study area. A significant 64.8% of respondents reported either fairly frequent or frequent occurrences of pedestrian accidents, indicating a notable prevalence of such incidents on the highway within their neighbourhood. Hence, 21.2% indicated that pedestrian accidents were rare, while 15% stated that pedestrian accidents were a regular occurrence in their community. Thus, pedestrian accidents are becoming a significant safety problem along highways.

Figure 9 explains the responses from residents living alongside the highway regarding the frequency with which they witness traffic accidents that veer off the road and collide with houses and shops within the neighborhood.

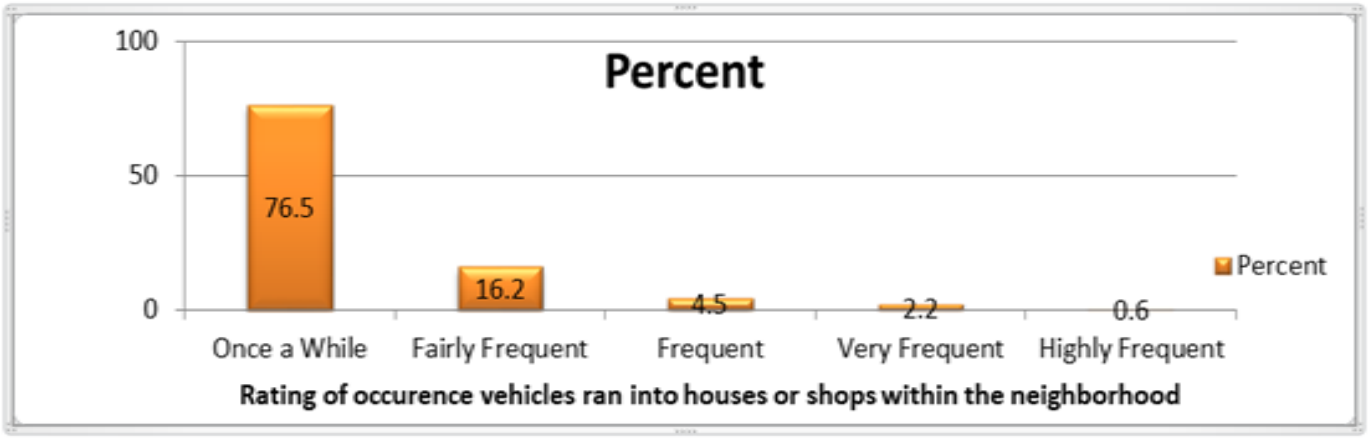

Fig. 9 Frequency of witnessing Vehicle Ran into House/Shop by the Roadside

The closeness of structures, such as residences and businesses, to the road, particularly inside the road setback, makes them more vulnerable to collisions with vehicles that swerve off the road owing to malfunctions or crashes with other vehicles. Figure 9 depicts the frequency with which vehicles veered off the highway into houses, shops, or marketplaces along the neighborhood's roadside. According to the findings, 76.5% of respondents agreed that such incidents are rare, while the remaining 23.5% recognized that they occur occasionally. This data reveals that while such occurrences are not common, they nonetheless represent a risk

to people and properties positioned close to the roadway.

Figure 10 presents the dwellers' response to road setbacks and the frequency of witnessing such traffic accidents that result in fire outbreaks, which affect the community in one way or another.

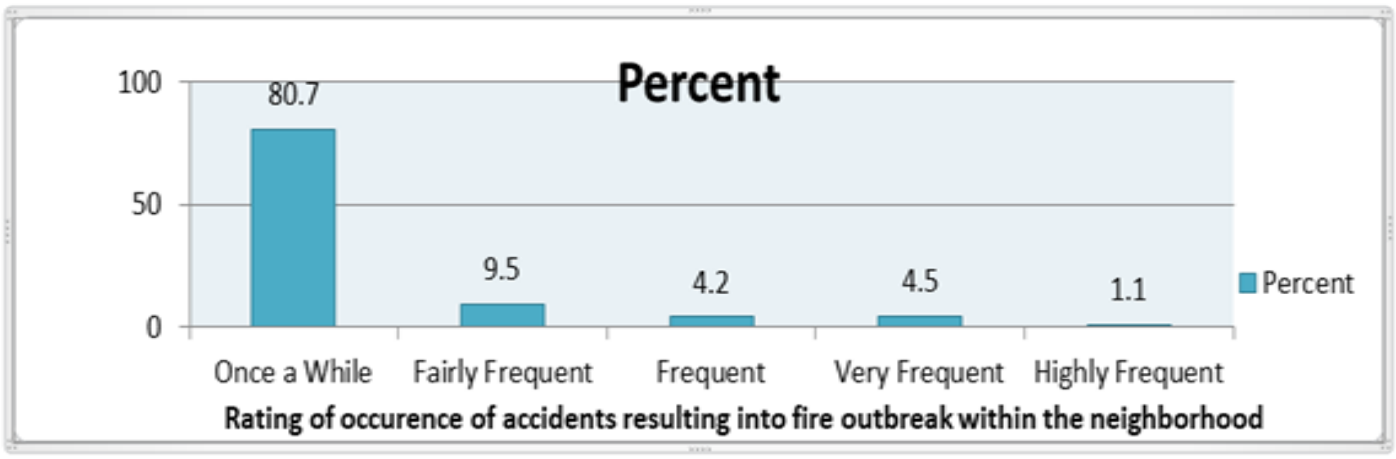

Fig. 10 Frequency of witnessing accident vehicles resulting into fire outbreak

Traffic accidents from trucks carrying inflammable materials such as petroleum products, gases, and chemicals are major causes of fire outbreaks affecting settlements near roads. Figure 10 illustrates respondents' assessments of how often traffic accidents lead to fire outbreaks in the area. A large majority, 80.7%, stated that such incidents are rare, while 19.3% acknowledged that such incidents are rare, while 19.3% acknowledged that they occur, although infrequently, but are always disastrous when they occur.

Figure 11 shows how frequently roadside dwellers witness the horrific sights of accident victims within their vicinity. This data emphasizes the emotional and psychological impact such incidents have on the local community.

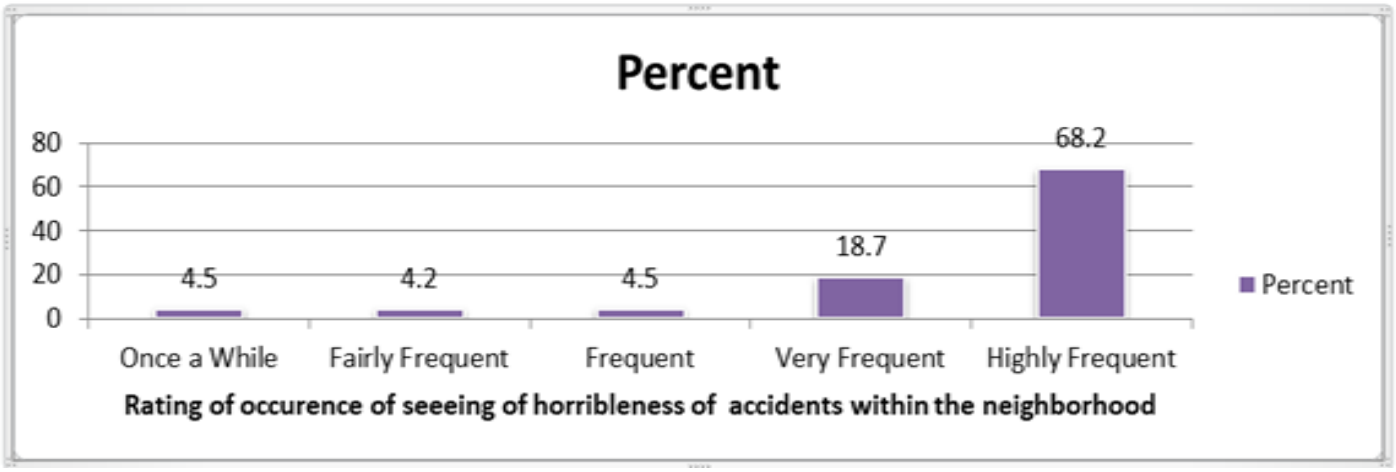

Fig. 11 Frequency of witnessing Horrible Sight of the Accident Scene

Accidents along highways or roads often result in a distressing scene for towns or residents nearby, especially witnessing injured or dead accident victims. Figure 11 shows respondents' perspectives on this occurrence. The majority, comprising 68.2% of respondents, indicated that witnessing injured or dead accident victims is a widespread experience whenever accidents occur. Additionally, 23.2% agreed that it happens pretty regularly. However, only a small percentage, 8.7%, believes this to be an uncommon event. This data underscores the frequency and impact of such traumatic experiences on communities located near roadways.

Figure 12 presents the responses of dwellers living near the highway regarding their acceptance of conducting business activities in vulnerable areas situated too close to the road.

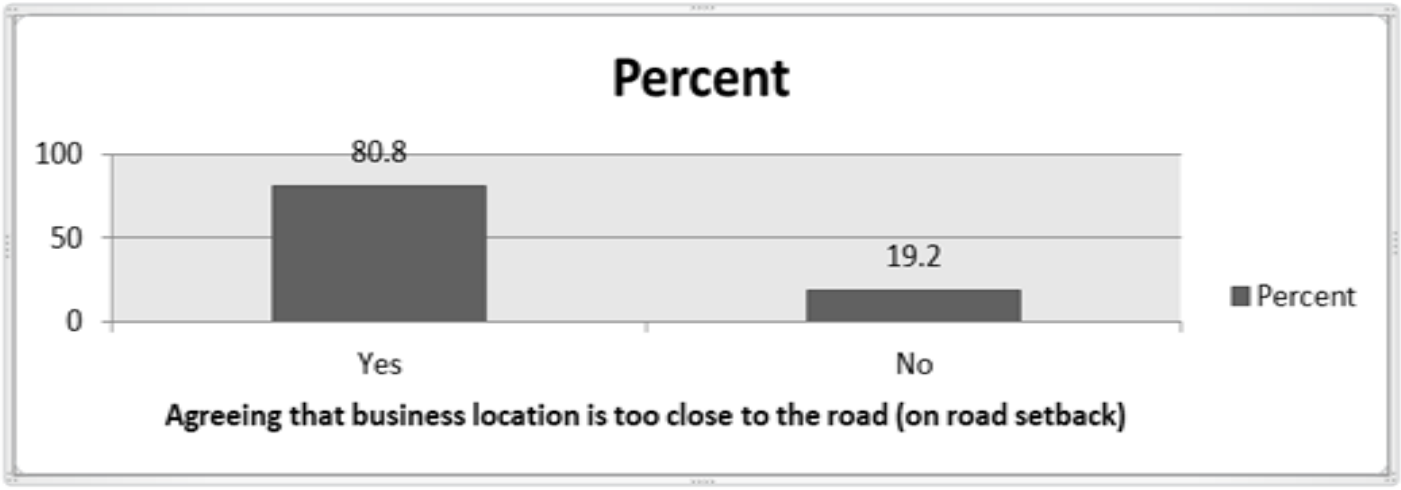

Fig. 12 Awareness about the location of business being too close to the road

The respondents in this study are residents who conduct business activities along road setbacks, placing them in close proximity to the highway by default. Their perceptions regarding this proximity were sought to understand their opinions and awareness of being situated so close to the highway. Figure 12 reveals that a significant majority of respondents, accounting for 80.8%, agreed that the location of their business is indeed too near to the highway. On the other hand, 19.2% of the respondents expressed a differing opinion on this matter and believe that the location of their business is not close to the road even though it is a road setback.

Figure 13 presents the level of agreement among roadside dwellers on how vulnerable they feel to the effects of road traffic accidents at the locations of their business activities. This figure highlights the community's perception of risk and their awareness of the potential dangers posed by their proximity to the road.

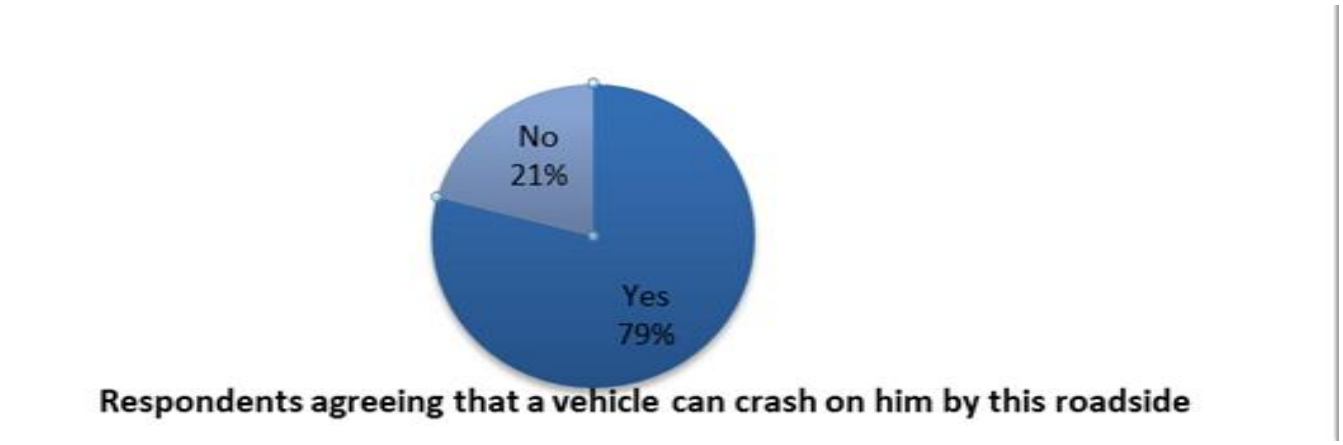

Fig. 13 Respondents agreeing that a vehicle can crash on him by this roadside

The study aimed to understand the perception of dwellers regarding their vulnerability to traffic accidents and their effects on their location. Figure 13 illustrates the residents' perceptions regarding the acceptability of being exposed to road traffic crashes due to their business activity's location on the highway right of way. An overwhelming majority (79.1%) of respondents agreed that their decision to locate their businesses in this area exposes them to a high risk of being impacted by road traffic accidents. However, only 20.9% of respondents held a differing opinion that they cannot be affected by traffic accidents. This data highlights the widespread recognition among residents of the considerable risks associated with conducting business activities in such proximity to the highway, emphasizing the importance of addressing safety concerns in these areas.

Figure 14 presents the reasons given by the dwellers who believe they are not vulnerable to traffic accidents at their business locations, despite operating within a buffer zone that inherently increases their risk.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue II February 2025

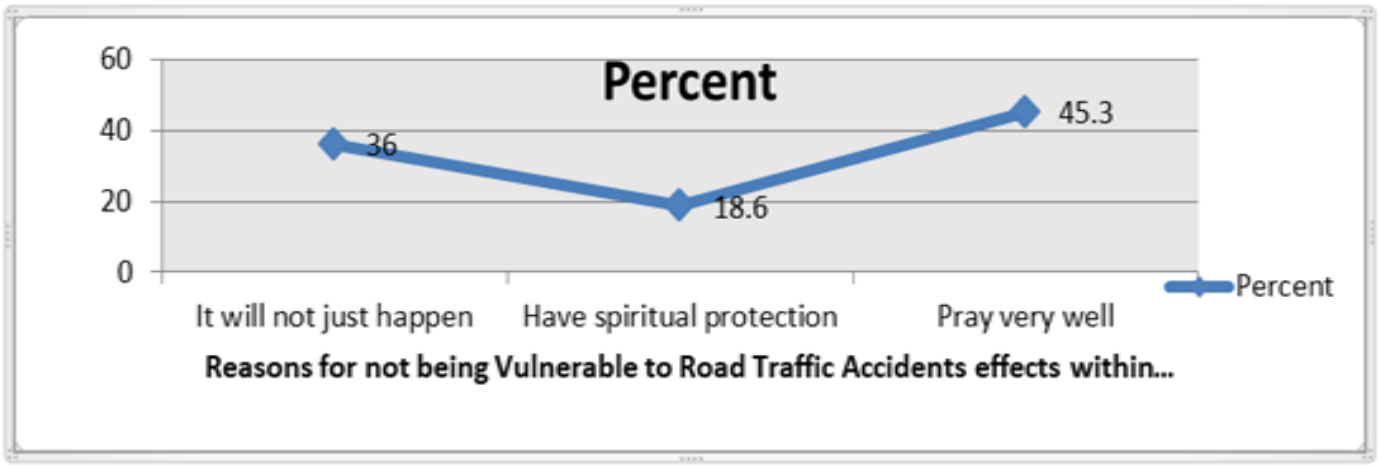

Fig. 14 Reasons for not agreeing that vehicle can crash into the business location by the roadside

The study explored the perspectives of dwellers by road setbacks who believe they are not vulnerable to the effects of road traffic accidents despite residing in a risky location. Figure 14 provides insights into the rationale behind the stance. Among respondents who disagreed about being subject to the impacts of road traffic crashes due to their business activities being too close to the highway, various reasons were identified. The majority (45.3%) of respondents attributed their perceived safety to successful prayers against the negative impacts of traffic accidents. Meanwhile, 36% believed that such accidents would not occur in their vicinity. Furthermore, 18.6% of respondents expressed the belief that they were protected by spiritual powers or items they possessed. Thus, the result highlights the diverse range of beliefs and perceptions among residents regarding their safety in proximity to the highway, emphasizing the multifaceted nature of attitudes towards risk mitigation in such environments.

Figure 15 shows the dwellers' readiness to continue conducting business by the road setback despite being aware of the risks posed by traffic accidents and knowing that this location is supposed to be free of such activities.

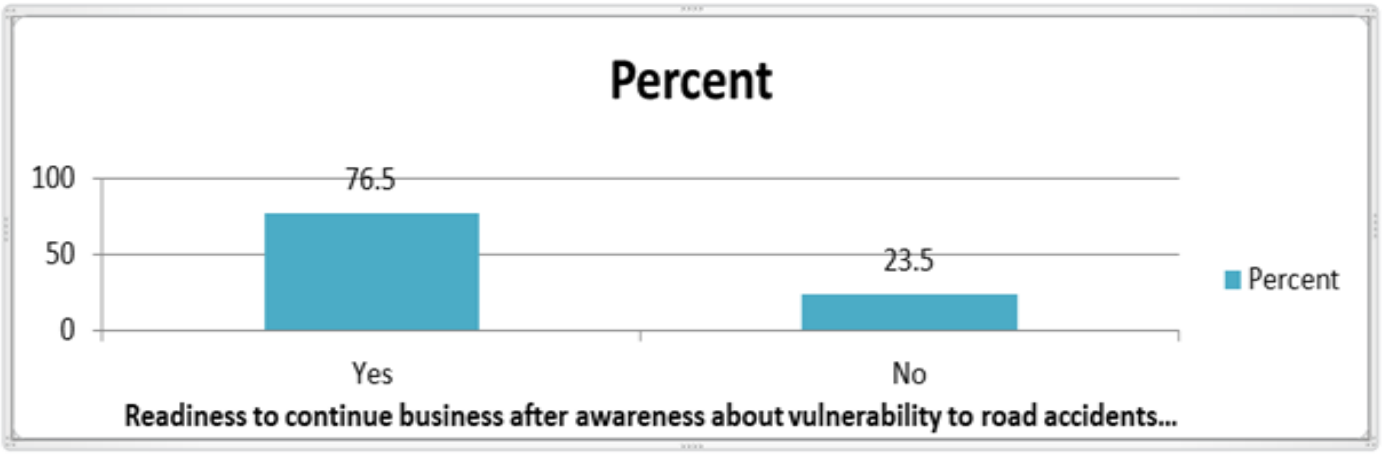

Fig. 15 Willingness of the respondents to continue to carry out business at the vulnerable location despite awareness about the safety implication.

The study process has brought to light the extent and seriousness of health risks faced by dwellers on road setbacks from traffic externalities, particularly traffic accidents, as well as issues concerning road setbacks or right of way. Building on this awareness, the study sought to determine whether residents, armed with this

newfound understanding, were prepared to relocate from these hazardous locations for the sake of their health and well-being. From Figure 15, a significant majority of respondents, comprising 76.5%, expressed their intention to persist with their business operations at the current site despite being aware of their vulnerability.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue II February 2025

In comparison, only 23.5% of respondents held a differing view on this matter and were ready to vacate without any condition.

Figure 16 presents the rating of the risky business location along the highway setback as the only place for economic survival for the dwellers carrying out business activities on the highway setback. This figure underscores the dire importance of this location for their livelihoods despite the inherent health and safety risks.

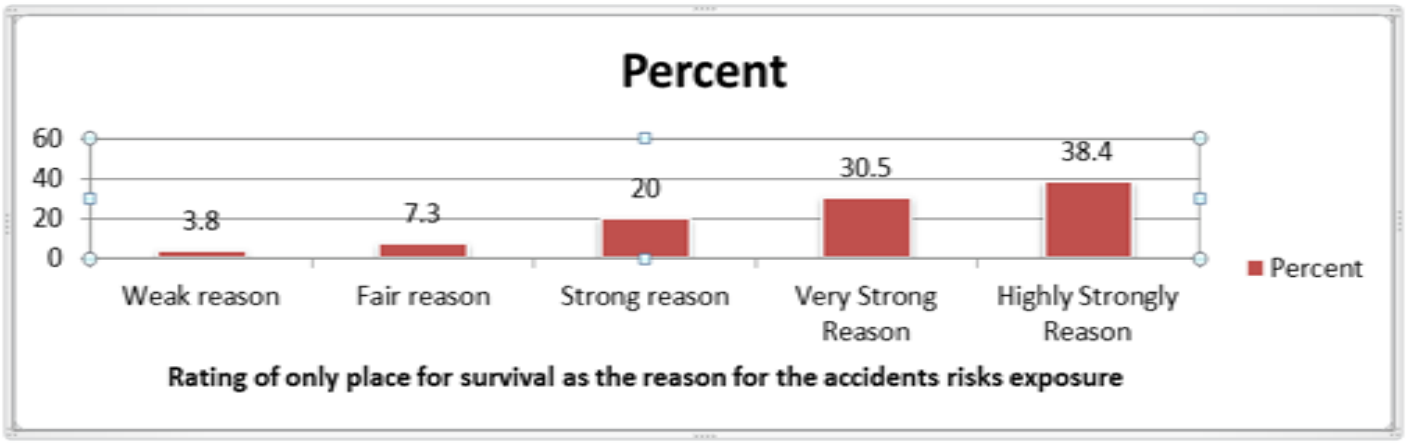

Fig. 16 Respondents seeing the vulnerable place as the only place for survival

The road setback vulnerable location is perceived as the only feasible place of survival for the dwellers, and a comprehensive assessment of its flexibility and possibility was undertaken. Figure 16 delved into the rating of this reason by measuring the level of strongness using the Likert scale. Hence, an overwhelming 88.9% of respondents expressed a strong conviction that this location represents their only viable means of survival, and they are willing to confront the potential repercussions. Meanwhile, a minority, constituting 10.1% of respondents, regarded this rationale as weak and deemed it a fair reason to consider alternative options.

Figure 17 presents the dwellers' responses regarding their readiness to relocate to a safer place if adequately empowered to do so. Thus, this figure highlights the community's willingness to move away from hazardous areas, provided they receive sufficient support and resources from appropriate authorities.

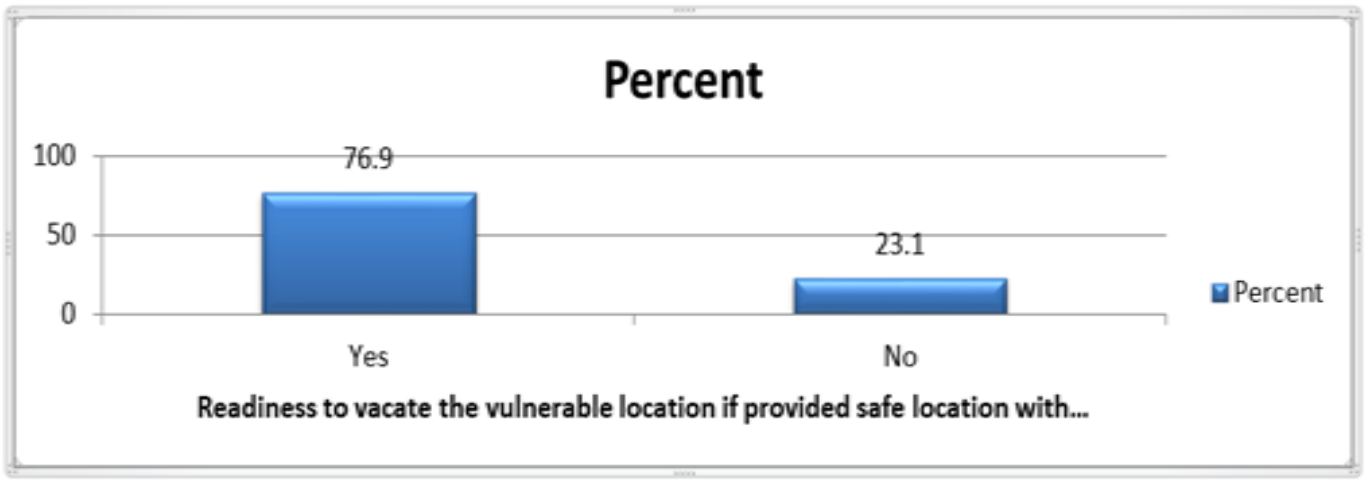

Fig. 17 Readiness to vacate the vulnerable business location if provided a safe location

The majority of dwellers engaged in informal business activities along the road setback belong to the low-income category of the population, with financial constraints yet driven by a resolute determination to survive despite the inherent risks to their health and well-being at the location of their business. Figure 17 provided insights into the responses of these dwellers regarding their willingness to relocate from the vulnerable

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue II February 2025

location to a safer alternative if given the opportunity. A significant 76.9% of respondents expressed their readiness to vacate the highway setback and move to a more secure and suitable location if empowered to do so by relevant government agencies. A minority (23.1%) of respondents indicated their preference to remain in their current location even if offered and empowered to move to a safer alternative.

Figure 18 displays the responses of the dwellers regarding whether they have been contacted by the appropriate authority informing them that they are located within the highway right-of-way and need to vacate the premises.

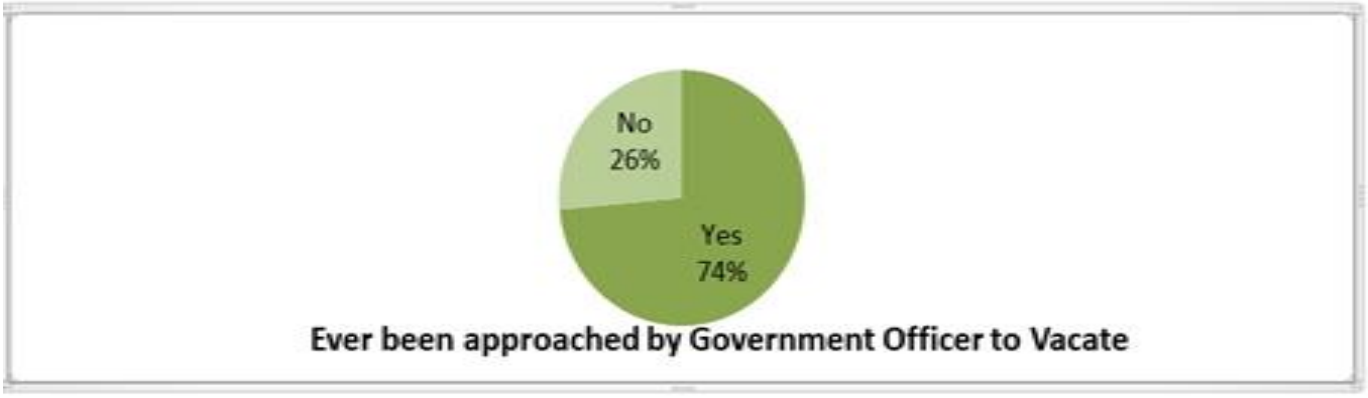

Fig. 18 Ever been approached by Government Officer to Vacate

The responsibility lies with the relevant authorities to safeguard the road and highway right of way from any form of encroachment while also ensuring the protection of the populace from any vulnerabilities coming up from their activities. Figure 18 illustrates the efforts made by the government to enforce restrictions on the right of way, aiming to eliminate activities by residents encroaching on the roadside within the highway setback. According to the findings, a significant majority (73.5%) of respondents reported being approached by government entities at various times, urging them to vacate the hazardous sites along the highway, while only 26.5% reported not receiving any such communication from government authorities.

Figure 19 outlines the reasons provided by the dwellers for being asked to vacate the road setback, as indicated in Figure 18

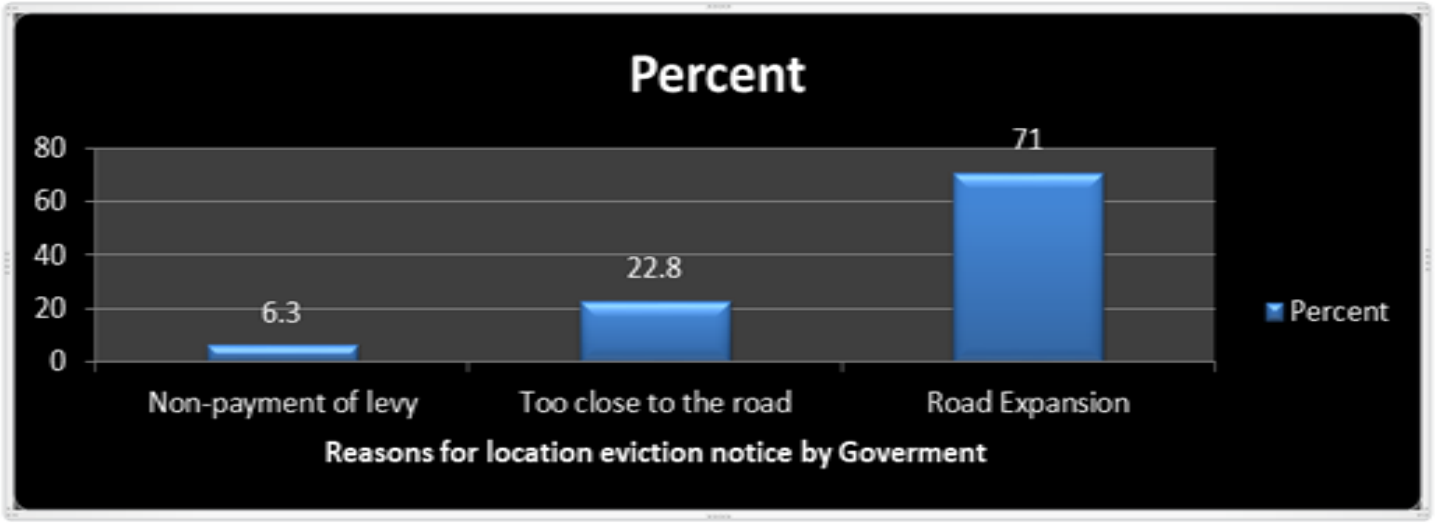

Fig. 19 Reason for Government order to vacate the vulnerable location of business

With the focus on delving into the reasons why dwellers by the roadside were asked to vacate their locations by the concerned authorities, Figure 19 provides valuable insights into the underlying motivations behind the

issuance of vacation notices to respondents within the highway right of way. The data shows that 71.0% of respondents attributed the reason for vacating notice road expansion initiatives to the government. This was followed by 22.8% of respondents who were approached due to violations of right-of-way regulations.

DISCUSSION

The Socio-economic and demographic characteristics of the dwellers at the highway setback

[15], [16], [17] argued that the majority of individuals found in street trading or roadside markets are typically unemployed youth with low levels of education or literacy, and they often belong to the lower income level of the populace. Hence, the assertions from researchers were supported by the findings in Table 2, which revealed that 60.7% of individuals found in roadside business activities are between the youth age of 18 and 40 years. Furthermore, in terms of education, the majority of respondents (41.7%) had only completed primary education, while an additional 18% had no formal education. Consequently, the data showed that 39.3% of these individuals earned an average daily income between 2001 and 5000 Naira, while another 28.9% earned 2000 Naira or less, categorizing them as low-income earners in the country.

Nature of economic activities by the encroached roadside or highway setback

In developing nations, the informal economy employs the vast majority of workers. In Africa's low-income countries, the informal sector accounts for almost half of national production, 80% of overall employment, and 90% of new jobs. The informal sector accounts for over 70% of employment in Nigeria, 50% in Israel, and roughly 80% in India [18]. However, according to [12], [19], the rapid expansion of slums and informal developments, as well as the proliferation of hawker activities, reflect a widespread tendency of informal sector encroachment on highway roadsides, urban roadsides, pedestrian walkways, footpaths, and urban green areas in developing countries. This trend is especially noticeable because the informal sector has emerged as the principal source of income for a sizable segment of the lower-class population. Thus, Figure 5, with 94.2% of informal activities along the encroached highway setback, justified the assertion from [20], [12], which indicated that the majority of activities on the encroached roads or highways are informal and hold the economic fabric of developing countries like Nigeria.

Effects of the Traffic Accidents on the communities along the road or highway

There are many ways in which traffic accidents impact the communities along the road or highway, such as the destruction of houses and shops, contamination of soil and water from accident spills, and mass death of entrapped residents along the roads, among others. However, one of the most pronounced ones, according to Figure, is pedestrian accidents. According to [5], pedestrians are considered the most vulnerable road users in the transportation system. They are the most vulnerable road users because of their fragility, poor speed, and lack of protection. Consequently, [21] state that pedestrian fatalities on roads and highways are associated with a high vehicular volume, higher pedestrian-vehicle interaction, high approach speed, overtaking tendency of vehicles, specific land-use types, encroachment of the footpath or setback, inadequate sight distance, inaccessible pedestrian crosswalk, wider minor carriageway, the absence of a pedestrian signal head, and lack of enforcement. Thus, communities along the highway are highly vulnerable to pedestrians' safety being compromised.

Traffic accident vulnerability awareness of the road setback dwellers

[17] identified the risks faced by street hawkers or traders on highway setbacks, including being hit by vehicles (BHV), loss of goods (LGDS), exposure to high concentrations of air pollutants such as vehicle exhaust (EHCP), exposure to hot sun and inclement weather (ESIW), crime and theft (CRMT), sexual harassment (SXH), and kidnapping (KDNP), among others. The vulnerability to road traffic accidents is asserted in Figure 7, in which 86% of the respondents agreed that they had witnessed traffic accidents affecting people within the neighbourhood. In comparison, 80.8% in Figure 12 agreed that they are vulnerable to road traffic accidents by choosing the location of their business activities.

Factors facilitating the highway setback encroachment activities by the dwellers'

According to [20], [12] the unprecedented growth of the activities of the hawkers, squatters, and street traders on the right of way of rural and urban highways, urban roads, and urban green spaces in developing countries like Nigeria is generally being facilitated by many factors, among which is the Survival Strategies for the Unemployed Youth or low class of the populace who engaged in acts of hawking, street trading, and squatting on the roadside and urban open spaces. The data presentation in Figure 16 highly corroborates this assertion because 88.9% of the respondents strongly feel that the location is the only place for them to survive.

RECOMMENDATIONS

Low-income earners with limited educational backgrounds and predominantly youths often turn to roadside or highway setback business activities for survival, regardless of the degree of vulnerability or the presence of hazards. This demographic requires significant attention from the government, particularly in terms of entrepreneurship and vocational training, as well as empowerment initiatives. By providing support in these areas, they can become more productive while being exposed to fewer risky health situations, ultimately alleviating the burden on society.

Furthermore, studies have shown that the majority of people engaged in handiwork, hawking, street trading, and roadside markets, which often lead to encroachments, belong to the informal sector in developing countries like Nigeria, and they play a crucial role in the economy. Therefore, it is recommended that authorities at all levels devise strategies for integrating and enhancing their economic activities by transitioning them into organized small and medium enterprises located in safe and legal areas.

Pedestrians and residents living in communities along highways, especially those near road setbacks, face significant risks from traffic accidents. To mitigate these risks, appropriate authorities should introduce pedestrian bridges and underpasses where needed and strictly enforce planning and zoning regulations. Additionally, introducing infrastructure like fencing and clear demarcation of right-of-way areas can help reduce encroachment and ensure safer mobility along Nigerian highways.

Community awareness and enlightenment programmes on the effects of traffic externalities on the health and well-being of dwellers carrying out activities in the highway buffer zones are needed to minimize residents' exposure to hazards from transport operations.

Economic survival is a significant reason that makes the dwellers in communities along highway damn the consequences of traffic accidents and other traffic externalities, so there is the need to address the underlying socioeconomic difficulties, such as unemployment and poverty, through targeted interventions, such as job creation programs and social welfare efforts, to reduce the pressure that drives people to participate in informal sector activities on highways and city streets.

CONCLUSION

In conclusion, addressing roadside encroachment and informal sector activities requires a multifaceted approach as strict enforcement of regulations is essential to curb encroachment and ensure compliance with urban planning standards while supporting measures like flexible financing aid roadside vendors in transitioning to legal businesses, promoting safety and legality and formalizing informal sector activities through robust economic empowerment policies and interventions that shall improves worker safety and access to social services are highly essential in order to reduce the menace of traffic accidents and traffic externalities in general on the residents along highway in Nigeria.

ACKNOWLEDGEMENT

The authors would like to acknowledge and express their sincere gratitude to the entire management of the Nigerian Institute of Transport Technology (NITT) Nigeria for their valuable support which greatly enhanced the completion of this research paper

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