

ASSESSMENT OF RESIDENTS PERCEPTIONS OF PEDESTRIAN OVERHEAD BRIDGES IN CALABAR METROPOLIS CROSS RIVER STATE-NIGERIA

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Abstract

Pedestrian bridges are infrastructural facilities constructed/provided for the purpose of allowing pedestrians to cross a road seamlessly without encountering any motorized object. The study was designed to find out factors that influence non-use of pedestrian bridges in Calabar Metropolis. Qualitative and quantitative analysis were employed for the research. The use rate of four pedestrian bridges was observed in Calabar Metropolis. Surveys were conducted among pedestrians crossing contrary to safe practice under the pedestrian bridges and within 25M distance from the pedestrian bridge at street level for three years (2020-2022). The study observed that the commonest reason people do not use pedestrian bridges in Calabar is because they feel it is time consuming (64%). Data collected were analyzed using ANOVA. The result (F-Value 46.06, P-Value 0.000) indicate that there is variation in the reasons why residents of Calabar opted for level crossing at various locations of the four pedestrian bridges. The study concludes that pedestrian bridges in Calabar are underutilized and that bridge use or non-use is a habit and not a coincidental behaviour. The use rate is likely to improve, if the safety benefits and convenience of using the bridge without considerable time loss are clearly visible to pedestrians. It is recommending adherence to pedestrian bridge use through rehabilitation of the overhead bridges/vandalized portions of the barricades and replacement of angular bars as barricade with concrete dwarf wall at pedestrian bridge location, traffic law enforcement personnel's should be visible at bridge location to prevent would be offenders. A new pedestrian bridge should be constructed along Murtalla Mohammed Highway near Flour Mills linking Essien town with Ikot Ishie/Ansa Axis. These will guarantee safety of pedestrians as well as reduce the time wasted by motorist.

Keywords: Residents, Pedestrians, Perception, Safety, Overhead Bridge, Collision, Vehicular Way, Enforcement.

1. Introduction

Pedestrian overhead bridge is a concrete structure built over a road to enable pedestrians to cross from one side of the road to the other, without necessarily using the vehicular way. The sole reason for the placement or provision of overhead bridge across road at various locations is the safety of road users especially the

pedestrians. Safety of road users is an important component of road design and construction hence, overhead bridge, separation at grade, road markings, road signs, road signals and interchange etc. are all employed to guarantee safety on roads. However, overhead bridges are facilities design specifically for pedestrians to avoid pedestrian vehicular collision/accident.

According to WHO (2013) ‘a pedestrian is any person who is travelling by walking for at least part of his or her journey. In addition to the ordinary form of walking, a pedestrian may be using various modifications and aids to walking...’ The implication of this definition of pedestrian is that, other than a man who is driving, riding, aboard airplane, ship, train, the moment he/she steps out to walk on foot is a pedestrian. The safety of this class of road user is pertinent because everyone at one time or the other is a pedestrian, especially that journey of any kind starts and ends by foot. Solagberu et al., (2012) describe pedestrians as vulnerable road users worldwide. WHO (2013), reveal that more than 5000 pedestrians are killed on the world’s roads each week and more than 270,000 pedestrians lose their lives on the world’s roads each year accounting for 22% of the total 1.24 million road traffic deaths, this prompted the organization to call on government to take steps to improve the safety of pedestrians.

The reason for this fatality is “because their needs have been neglected for decades, often in favor of motorized transport,” says Dr Etienne Krug, WHO Director of the Department of Violence and Injury Prevention and Disability. The concern of the researchers is that, how do residents of Calabar view this facility (overhead bridge) that have been put in place to prevent injury/fatality of pedestrians and to what extent have they put the facilities to use based on their perception. This is more so, since the proportion of pedestrians killed in relation to other road users is highest in the African Region (38%). and lowest in the South-East Asia Region

(12%)(WHO, 2013).Our transports need to be organized in a manner that make walking safe and guarantee the safety of pedestrians lives, since pedestrians have been judged as the most vulnerable road users.

2.0 Conceptual framework/literature review

The Pedestrian Safe System Approach to road safety concept is adopted for the study because the concept recognizes that overhead bridge is provided at location to aid pedestrian to cross a road without any pedestrian/vehicular collision. The concept recognizes that pedestrian safety is guarantee when they use the overhead bridge to cross the road. Non usage of the overhead bridge where provided could either lead to traffic delay which will lead to stress of road user as well as increased energy consumption by motorist or pedestrian/vehicular collision an accident that may result in property damage, minor or major injury that can lead to death and there are situations that the accident due to collision may become fatal due to the impact/degree of the collision.

The concept as illustrated in figure 1, shows that to cross a road two methods are involved, level crossing and using the overhead bridge. Each has consequences, while crossing at grade may ultimately leads to fatality using the overhead bridge remain the only safe way to safety when crossing the road. See figure1.

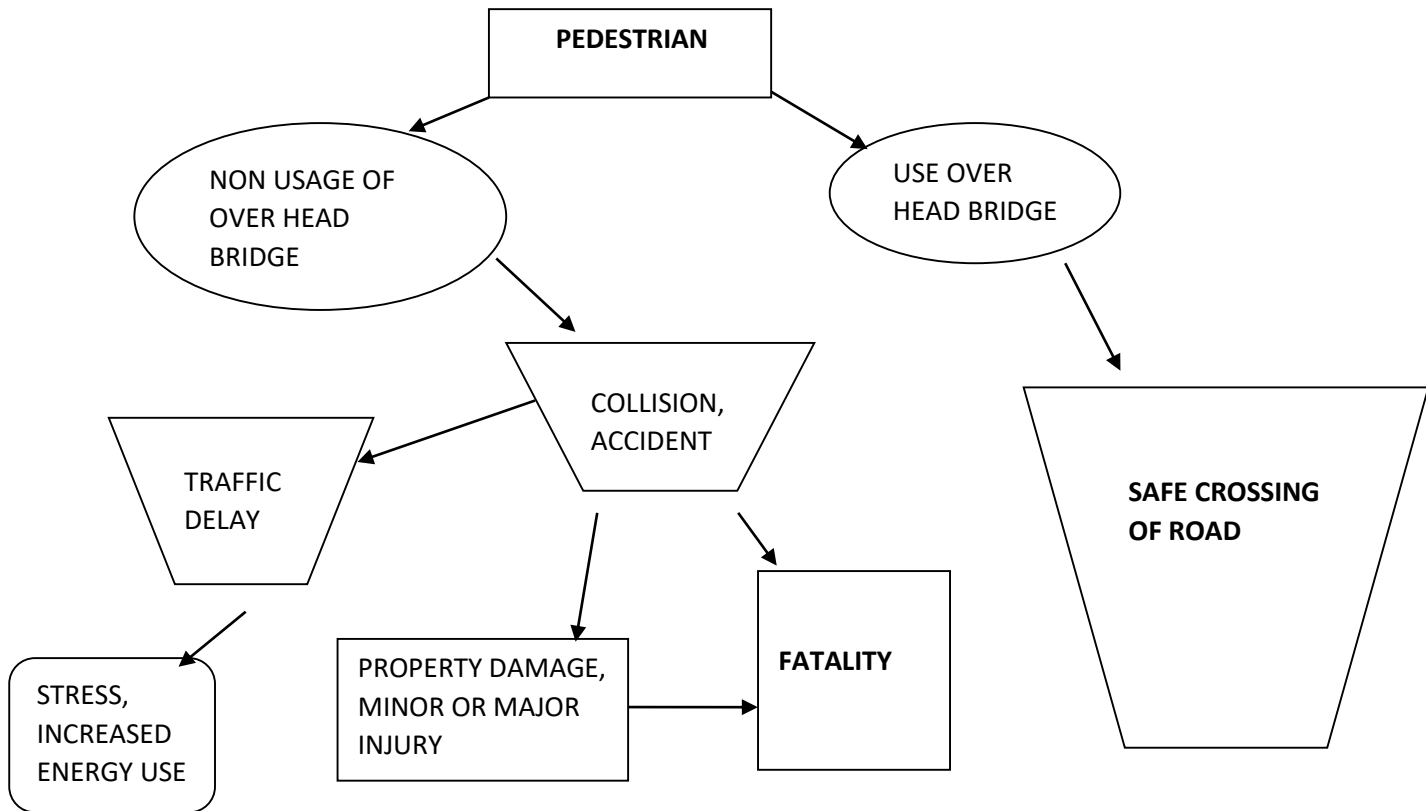


Figure 1: Pedestrian Safety System Approach

3.0 Literature review

Road safety is about a full spectrum of actions which need to be taken by governments to impact how users behave on the road, how vehicles and infrastructure are constructed and maintained to be safe and how post-crash response is organized. Road safety means methods and measures aimed at reducing the likelihood or the risk of persons using the road network getting involved in a collision or an accident that may cause property damages, serious injuries and/or death <https://www.emerald.com>. Road safety further requires from governments that they have institutions in place that have the necessary capacity and budget and are empowered to take actions. Road safety is important, so that all roads users reach their destination safely, this include pedestrians. The impact can be exercised by creating rules and regulations, through a legislative action. The latter might however have only little impact if rules and regulations are not enforced, thus enforcement and a compliance

action is necessary. Traffic laws are important to obey because they protect the safety of drivers, passengers and pedestrians. These laws are often created as a result of studies and research that proves they will be effective. The impact may also be achieved or supported through actions in education and technology in addition or supportive to the enforcement action. Road safety further requires from governments that they have institutions in place that have the necessary capacity and budget and are empowered to take actions.

According to Akpoghomeh, (1998), road traffic accident is an issue of great international concern as it has emerged as the single greatest source of death all over the world. In the developing countries where the number of motor vehicles relating to population is generally much lower than in the developed countries, fatalities from automobile crashes are higher. It has been shown, for instance, that accidents in developing countries cost almost one percent of these

countries Annual Gross National Product utilizing scarce financial resources they can ill-afford to lose. Sumaila, (2001) said road traffic accidents have claimed more lives than deaths resulting from all communicable diseases put together including the dreaded Acquired Immune Deficiency Syndrome AIDS). Thus, the government and residents of Calabar should be deeply concerned about the perception/non usage of the overhead bridge at locations where they are provided. Non usage of overhead bridge by pedestrians to cross the road could lead to road accidents and the unnecessary consequential waste of lives and properties of residents.

Conventional analysis of road traffic injury risk has considered road users, vehicles and the road environment separately (Stigson, Krafft, and Tingvall, 2008). There is also a tendency among researchers and practitioners to focus on one or few factors, when in reality several interacting factors typically define any specific road traffic context (Stigson, Krafft, and Tingvall, 2008, WHO 2006). This uneven focus can limit the effectiveness of road traffic injury prevention efforts and may lead to an emphasis on interventions that leaves pedestrian at risk.

A road traffic accident is said to occur when vehicle collides with another vehicle, pedestrian, animal or geographical or architectural obstacle, which can result in minor or major injury, fatality and damage to property. According to Jha, et al. (2004) Road accident is an accident which took place on the road between two or more objects, one of which must be any kind of a moving vehicle. Pedestrian vulnerability is further heightened in settings where traffic laws are inadequately enforced (Job, 2012), The elderly and visually impaired pedestrians are very vulnerable road users as they find it difficult to meander on the roadways as other pedestrians do (Upuji, et al. 2016). Reduction or elimination of the risks faced by pedestrians is important and achievable. Pedestrian collisions, like other road traffic clashes, should not be acceptable as

inevitable because they are both predictable and preventable. There is a close association between the walking environment and pedestrian safety. Walking in an environment that lacks pedestrian infrastructure and that permits use of high-speed vehicles increases the risk of pedestrian injury. The risk of a motor vehicle colliding with a pedestrian increases in proportion to the number of motor vehicles interacting with pedestrians Jacobsen, (2003). It is believed that pedestrian safety measures improve walking environments and contribute to urban renewal, local economic growth, social cohesion, improved air quality and reduction in the harmful effects of traffic noise (Job,1996, Litman, 2004, Kumar and Ross, 2006; Dokmeci , Altunbas and Yazgi, 2007). They also have supplementary benefits for other road users, such as motorists and cyclists.

Nigeria developed its first National Road Safety Strategy (NRSS I, 2014 – 2018) on the basis of the five pillars of the Global Plan of the Decade of Action for Road Safety (UNECE,2020), with 2012 as the base year, its objectives were a cohesive and efficient road safety administrative system, improved road infrastructure for all road users, general compliance with vehicle and other road machinery standards, a culture of personal responsibility for safe road use, and prompt and effective emergency response and care. The aim is to by the year 2023 reduce road accidents by35 percent, with2018 as base year.

Safe walking is very vital especially, that we are all pedestrians. Walking is a basic and common mode of transport in all societies around the world. Virtually every trip begins and ends with walking. Walking comprises the sole means of travel on some journeys, whether a long trip or a short stroll to a shop. In other journeys, a person may walk for one or more portion of the trip, for example, walking to and from bus stops, with a bus trip in between. Walking has well established health and environmental benefits such as increasing physical activity that may lead to

reduced cardiovascular and obesity-related diseases, and many countries have begun to implement policies to encourage walking as an important mode of transport (Basset, 2008, WHO, 2010, Rabl, 2012). Unfortunately, in some situations increased walking can lead to increased risk of road traffic crashes and injury. Due to the dramatic growth in the number of motor vehicles and the frequency of their use around the world as well as the general neglect of pedestrian needs in roadway design and land-use planning. Pedestrians are increasingly susceptible to road traffic injury Zegeer and Bushell (2012). Pedestrian vulnerability is further heightened in settings where traffic laws are inadequately enforced Job, (2012).

and Calabar Rivers meet before joining the Atlantic Ocean. It has an area of 331.551 square kilometers. See Figures2.

4.0 Study area

The area of study is Calabar the state capital of Cross River State, administratively divided into two local government areas, (Calabar Municipality and Calabar South Local Government). It lies approximately in between Longitudes 8°18'25''E and 8°22' 29.04''E of the Greenwich meridian and latitudes 5° 06' 10.56''N and 4° 54' 43.21''N of the Equator, Calabar Urban Area shares boundaries with Odukpani Local Government Area in the North and West, in the South by the estuaries, Great Kwa River in the East, Akpabuyo Local Government Area in the East and Calabar. The city is about 48km from the estuary where Cross River

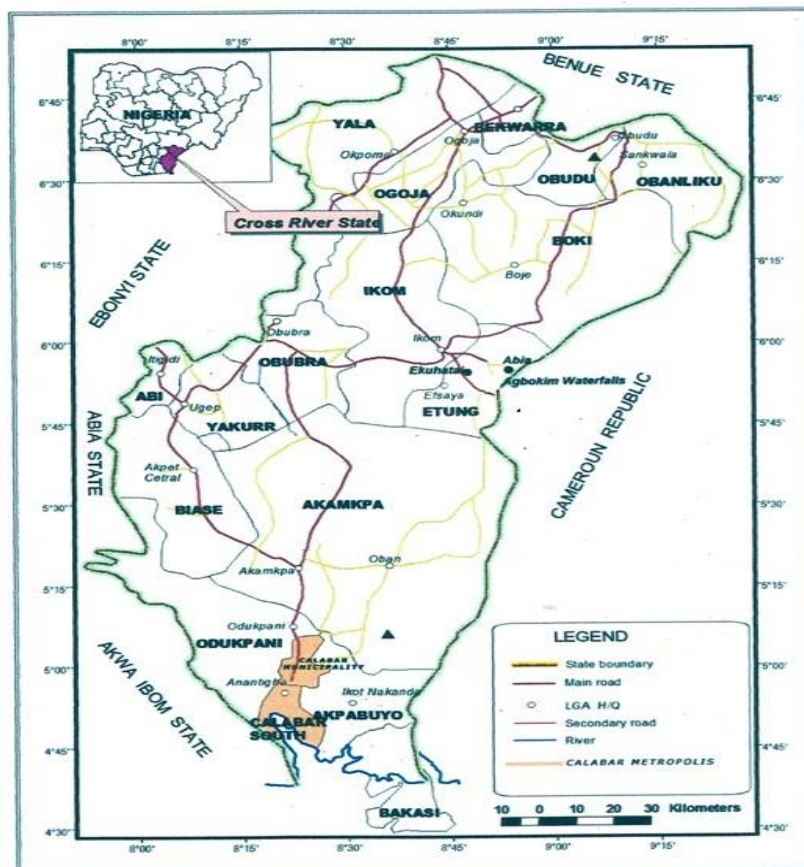


Figure 2: Map of Cross River State Showing Calabar Metropolis

The population of Calabar has been rising steadily over the years. In the 1963 census the population was 99,350 (Ojikpong, Agbor and Emri, 2016). By the census figures of 1991 the population of Calabar had astronomically risen to 328,876 (NPC, 1991). According to the census figure 2006, Calabar has a population of 371022 (NPC), projected to 2022 with a growth rate of 3.0 percent put the population at 595,490 persons.

The ancient city of Calabar has a long history and a fascinating heritage. Nearly after a century of contact with European sailors, Calabar gained recognition as an International Sea Port in the 16th century. From 17th to 19th century, Calabar became a major slave trade port in West Africa. Calabar accounted for approximately 30 percent of Africans carted away to the new world (America) as slaves from Africa. This represented the largest exit of slaves from a single point in Africa (Ojikpong, Agbor and Emri, 2016). The study area is inhabited by the Efiks, the Quas and Efuts. The people speak Efik and English fluently.

The occupation of the people includes farming, fishing, trading and the public service. The residents are mostly engaged in civil service and trading activities. With this population, it is obvious that the need to provide for the safety of the residents is necessary. The people practice simple administrative structure which is based on the Village Assembly. The organization of the society is based on segmented principles and administration which originates from genealogical lineage

Calabar is endowed with four main vegetation belts, namely; saline water swamps, swamp forests (mangrove), fresh water swamps and tropical rain forest. Generally, the favorable climatic conditions place the city within the tropical vegetation zone of green foliage of trees, shrubs and oil palm relics. Calabar is abundantly blessed with luxuriant forest trees.

The maximum temperature is above 27°C with a peak at about 35°C during January to February, the

daily maximum and mean annual maximum temperature increase from the coastal temperature (30°C). The moderating influences in the coastal region are due to proximity to the sea. The mean daily maximum temperature does not fall below 10°C except during Hamattan, where variation exists (Afangideh, Joseph, and Atu, 2012). The study area has an annual rainfall ranging between 2891.1 – 3770.3mm, (according to the Meteorological Centre of Calabar, Margaret Ekpo International Airport). More than 30 percent of the rainfall is received between April and November.

Calabar Metropolis can be accessed through air, water and road. Selected road surfaces are tarred while others are not tarred. The number of tarred road surfaces grew when urban renewal became a useful strategy by the state government (Sule, 1982). Since the ban on commercial motorcycles, taxi, cabs, buses and tricycles are the major commercial modes of transportation while vehicular ownership has increased. There exist several network providers in the study area for the purpose of information and communication.

5.0 Materials and method

Both primary and secondary sources were employed for data collection. The primary data was obtained through questionnaires and physical observation while the secondary data were from journals, internet and government agencies. The study adopted a purposive sampling technique where the sampling elements are the people crossing the roads through the portions of the barricade that have been vandalized previously (not using the pedestrian bridge). The data for the four pedestrian bridges were collected. The sampling frames are the people crossing the road within 20 meters of pedestrian bridge. This was done Saturday, Monday, Wednesday and Friday in the peak hours of morning (7–9am), afternoon (2–4pm) and in the evening (5–7pm). A total of 384 questionnaires were administered in the four locations at Calabar Road by Watt Market, Etta Agbor by UNICAL, Ndidem Usang Iso Road by

Marian Market and Murtala Mohammed Highway by 8Miles. See figure 3.

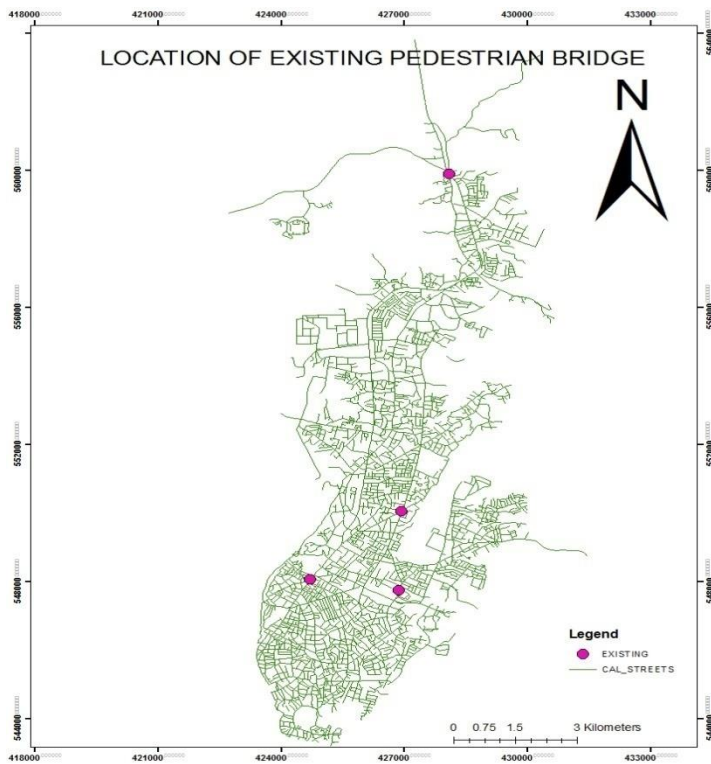


Figure 3: Spatial Distribution of Existing Pedestrian Bridges in Calabar Metropolis

An average of eight questionnaires each in the three stated peak hours for the four pedestrian bridges in Calabar Metropolis. GPS device (GARMIN GPSmap60Cx) was used to locate the coordinates of the existing pedestrian bridges while ArcGIS 10.2 Software was employed in mapping their spatial distribution. The use of descriptive

tools (Tables) was employed in the analysis of response.

6.0 Results and discussion

The four existing pedestrian bridges are located at the following coordinates. See table 1.

Table1: Existing Pedestrian Bridges

LOCATION	EASTING	NORTHING
Calabar Road by Watt Market	424710	548078
Etta Agbor by UNICAL	426873	547762
Ndidem Usang Iso by Marian Market	426930	550067
Murtala Mohammed Highway by 8Miles	426930	559890

Source: Field Survey 2022

The pedestrian bridges length and the barricades (intact and vandalized portions) were measured

to ascertain the level of damage done. This information is contained in table 2, 3, 4 and 5.

Table2: Pedestrian Bridge Length/Barricade at Calabar Road by Watt Market

Description	Portion	Length (M)	Percentage
Intact Bars	5	51.7	65.44
Vandalized Bars	6	25.8	32.66
Column Width	1	1.5	1.9
Total	12	79	100

Source: Field Survey 2022

The total length of the pedestrian bridge width and the length of the barricade along Calabar road is 79 M. It comprised of Intact Portions 51.7M, vandalized portions 25.8 M and the

Column Width is 1.5M. The numbers of intact portions are 5 (65.44%), while the vandalized portions are 6 and account for 32.66% of the fault area of the bridge.

Table3: Pedestrian Bridge Length/Barricade at Etta Agbor by UNICAL

Description	Portion	Length (M)	Percentage
Intact Bars	8	126.4	60.45
Vandalized Bars	7	81	38.74
Column Width	1	1.7	0.81
Total	16	209.1	100

Source: Field Survey 2022

The total length of the pedestrian bridge width and the length of the barricade at Etta Agbor by UNICAL is 209.1M. It comprised of Intact Portions 126.4M, vandalized portions 81 M and the Column Width is 1.7M. The numbers of

intact portions are 8 (60.45%), while the vandalized portions are 7 and account for 38.74% as the faulty area of the bridge.

Table4: Pedestrian Bridge Length/Barricade at Ndidem Usang Iso by Marian Market

Description	Portion	Length (M)	Percentage
Intact Bars	5	340.3	90.674
Vandalized Bars	5	33.3	8.873
Column Width	1	1.7	0.453
Total	11	375.3	100

Source: Field Survey 2022

The total length of the pedestrian bridge across Ndidem Usang Iso by Marian Market is 375.3M. It comprised of Intact Portions 340.3M, vandalized portions 33.3M and the Column Width is 1.7M. The numbers of intact portions

are 5 (90.674%), while the vandalized portions are 5 and account for 8.873% as the faulty area of the bridge.

Table5: Pedestrian Bridge Length/Barricade at Murtala Mohammed Highway by 8Miles (Ikot Omin)

Description	Portion	Length (M)	Percentage
Intact Bars	9	103.9	50.05
Vandalized Bars	10	101.5	48.90
Column Width	1	2.2	1.05
Total	20	207.5	100

Source: Field Survey 2022

The total length of the pedestrian bridge across Murtala Mohammed by 8Mile is 207.6 M. It comprised of Intact Portions 103.9M, vandalized portions 101.5 M and the Column Width is 2.2M.

The numbers of intact portions are 9 (50.05%), while the vandalized portions are 10 and account for 48.90% as the faulty area of the bridge.

Table 6: Residents Reason for not using the overhead bridges

Location	Fears of height	Waste of time	Insecurity	Lack of Access	safety	Total
Calabar Road by Watt	13	44	7	21	11	96
Etta Agbor by UNICAL	17	68	4	0	7	96
Ndidem Usang Iso by Marian MKT	11	63	6	11	5	96
Highway by 8Miles (Ikot Omin)	9	71	2	10	4	96
Total	50	246	19	42	27	384
Percentage	13	64	5	11	7	100

Source: Field Survey 2022

Table 6 shows that 13% of the respondents gave their reason for not using the overhead bridge is as a result of phobia for height, 64% see it as a waste of time using the overhead bridge, 5% gave their reason as insecurity, 11% attribute the non-usage to the fact that the legs of the bridges are blocked by trader’s wares, while 27% sees the bridges as being structurally unsuitable.

It was discovered that within the period (2020-2022) of this study, the situation continues to deteriorate at three of the locations (Watt Market by Calabar Road, Etta Agbor by UNICAL and Murtala Mohammed Highway by 8Miles), where the angle bars are totally missing, the use of pedestrian bridge is zero and the bridge legs are now ware house as they were as at 2020 when the study began. The pedestrian bridge at Marian

Market has some improvement as the vandalize portion has decreased from 5 to 2 because some previously vandalized portions have been rehabilitated. However, the Uniform Personnel present at that spot are seen assisting pedestrians to cross the road at level crossing while preventing vehicular movement temporary for safety reason. The presence of these Uniform men is not to enforce usage of the pedestrian bridge rather it is to conduct pedestrians across the road bearing safety in mind.

The data in table 6 were subjected to further test to see if there is significance difference in reasons for non usage of the overhead bridges at various locations within the study area. Using Minitab to run an ANOVA

One-way ANOVA: C2 versus C1

Method

Null hypothesis All means are equal
 Alternative hypothesis At least one mean is different
 Significance level $\alpha = 0.05$

Equal variances were assumed for the analysis.

Factor Information

Factor Levels Values
 C1 5 1, 2, 3, 4, 5

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
C1	4	9094.7	2273.67	46.06	0.000

Error	15	641.5	49.37
Total	19	9835.2	

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
7.02614	92.47%	90.46%	86.61%

Means

C1	N	Mean	St Dev	95% CI
1	4	12.50	3.42	(5.01, 19.99)
2	4	61.50	12.12	(54.01, 68.99)
3	4	4.75	2.22	(-2.74, 12.24)
4	4	10.50	8.58	(3.01, 17.99)
5	4	6.75	3.10	(-0.74, 14.24)

Pooled St Dev = 7.02614

Since FC (46.06) is greater than FT 3.06 (P-Value 0.000), HO: was rejected that there is no variation in the reason why residents chose not to use the overhead bridges.

The bridge legs are being used to display goods as well as warehouse by traders at both Watt and Marian Market. This has subsequently prevented the public from accessing the pedestrian bridges at these locations. The unauthorized convention of the circulation use into storage/commercial use is unacceptable and should be discouraged. The facility is meant to facilitate safety (movement) of human beings and not a storage facility for traders. See Plate 1, 2 and 3.

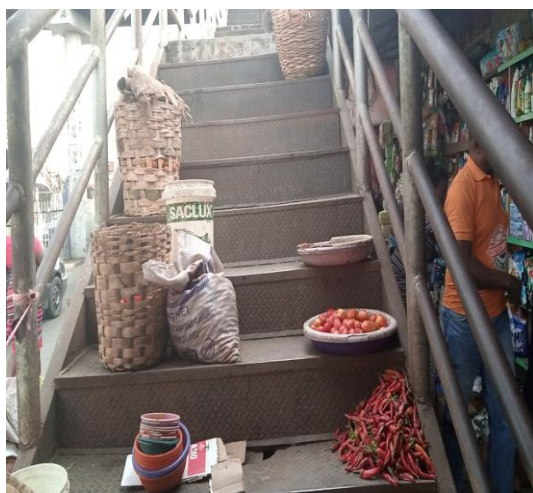


Plate 1: Legs of the pedestrian bridge blocked with goods at Watt Market

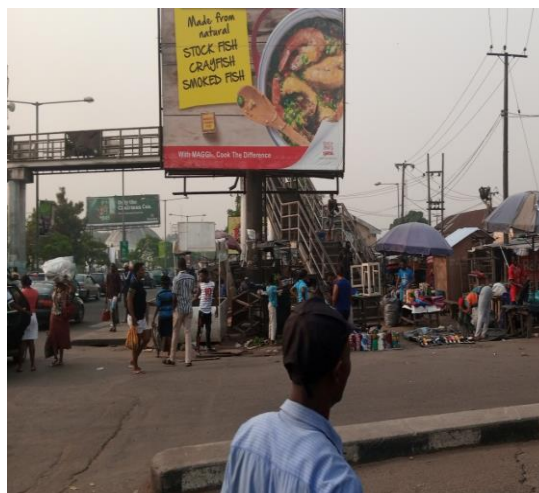


Plate 2: Pedestrian bridge leg blocked with goods at Marian Market

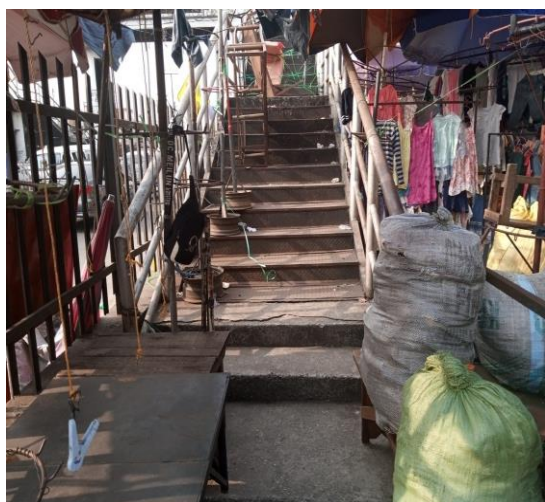


Plate 3: Pedestrian bridge leg use as warehouse at Watt Market



Plate 4: Blocked drainage/filthy environment at the leg of the pedestrian bridge at Watt Market

The environment around the pedestrian bridge is quite filthy due to the activities of traders in the market. It was observed that place is littered with left over unwanted goods, their package, waste water are freely thrown on the ground. The

drainages are filled with cabbage from their commercial activity. The blocked drainage is not only an eyesore the stagnated water ooze and filled the air with poignant odor. See Plate 4



Plate 5: Gridlock due to cross at grade level at Ndidem Iso by Marian Market

7.0 Planning implications and recommendation

1. The chain is said to be as strong as its weakest link. The weakest link that has makes the functionality of these facilities to be at the lowest ebb is the absence of enforcement. It will be necessary to enforce the usage of the facilities to achieve efficiency and offenders apprehended and such violators should be made to pay a prescribe fee as fine or even go through corporal punishment.
2. Vandalized portion of the barricades should be rehabilitated in the interim. However, replacement of angular bars as barricade with concrete dwarf wall as median strip will be more appropriate as solution to the issue of vandalism.
3. The public should be sensitized on the reason for them to use the bridge as against crossing the road at level crossing. The risk of crossing the

road at level crossing is more than the time gained when crossing without using the pedestrian bridge.

4. The bridge should be cleared of all obstacles. The bridge legs being used as a warehouse by traders at both Watt and Marian Market is unacceptable and should be discouraged. The facility is to facilitate movement of human beings and not a storage facility.

5. It is recommended that a pedestrian bridge should be built along Murtala Mohammed Highway linking Old Odukpani Road Essien Town with Old Odukpani Road Ikot Ishie/Ikot Ansa Axis (Coordinate: 426106E and 551595N), as this will reduce the frictions that do occur on that portion, especially when “Special Marshal” have left after their morning hour voluntary service safety duty. Besides, the volume of pedestrian traffic crossing the highway at that location is high. See figure 4.

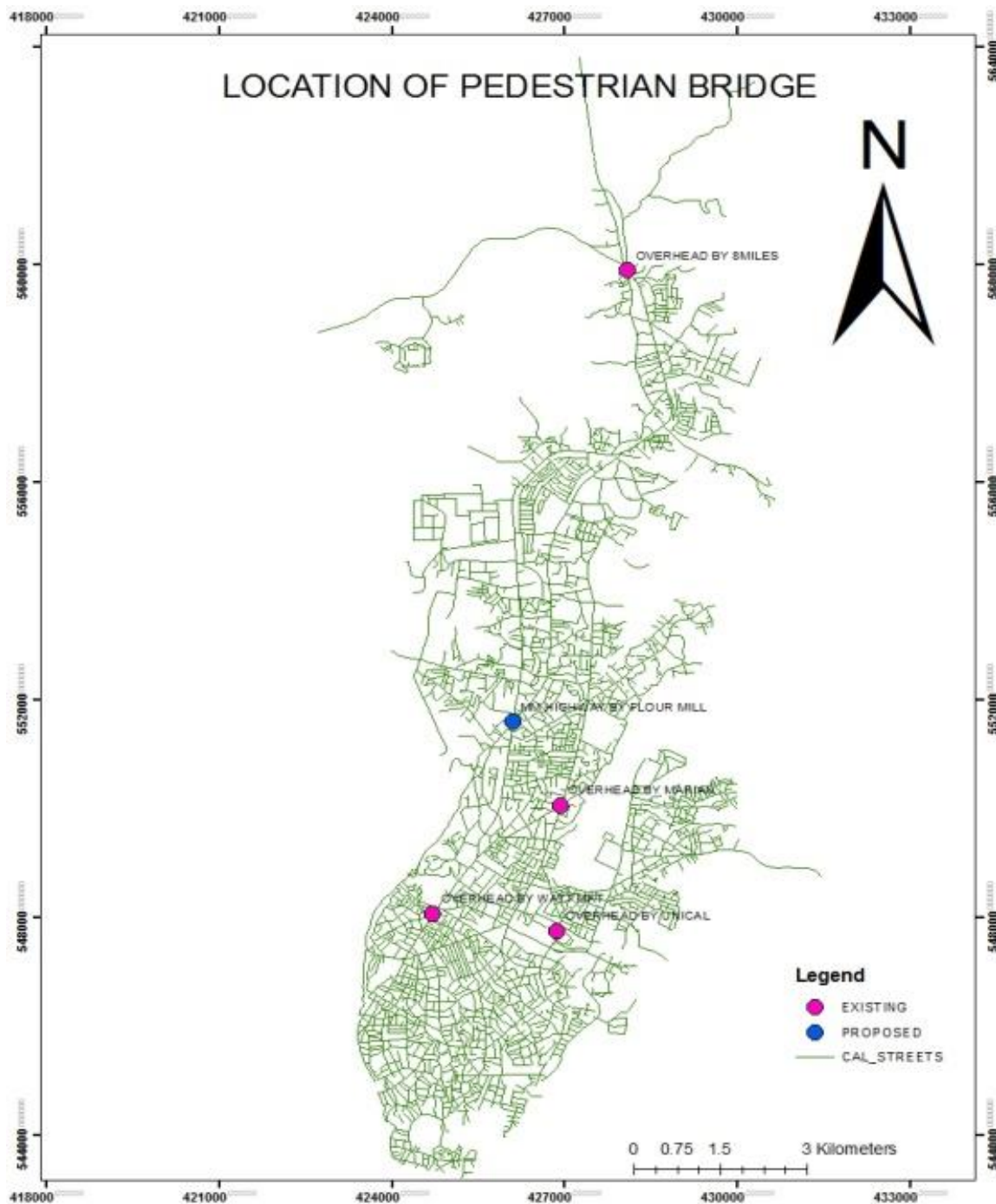


Figure 4: Spatial Location of Proposed and Existing Pedestrian Bridges

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