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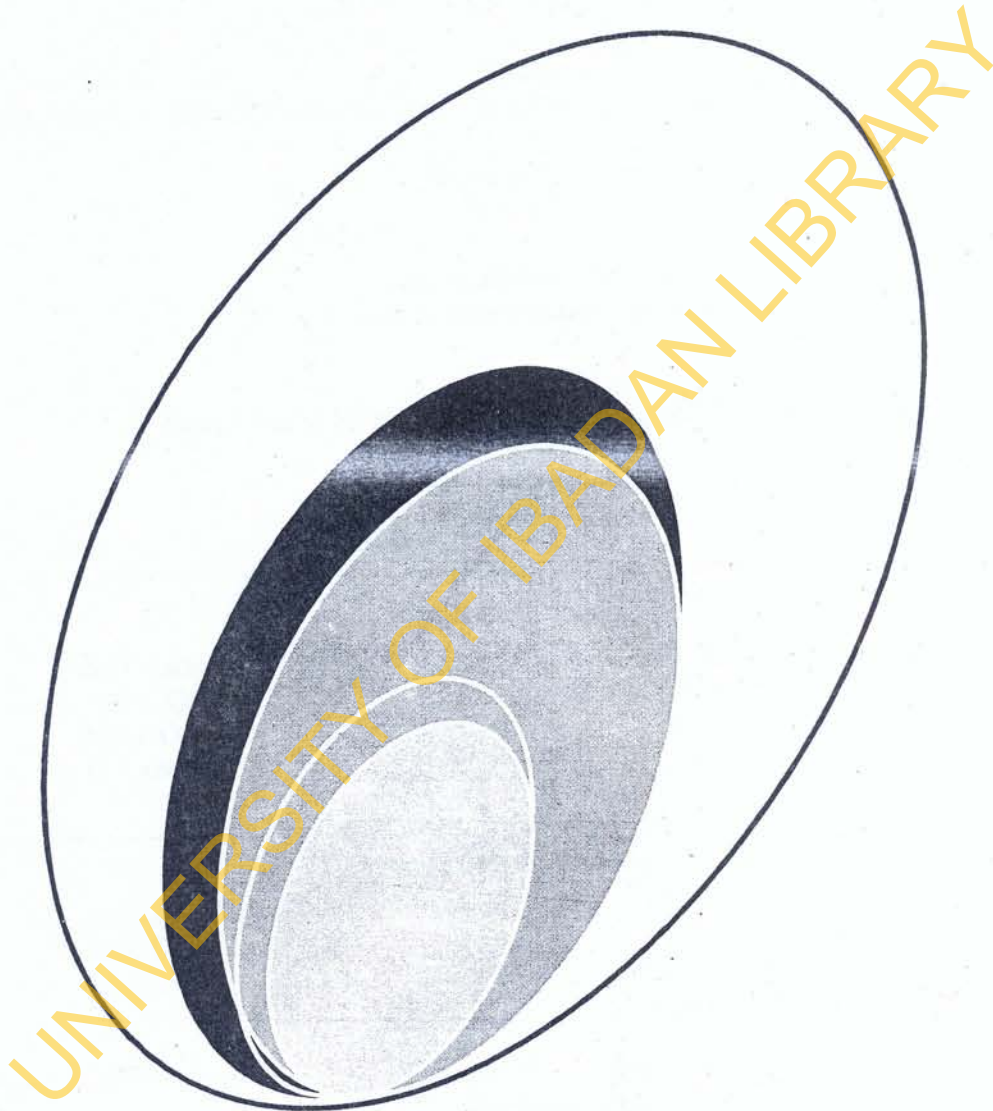


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Pedestrian Mobility and Constraints in the Dormitory Suburbs of Agbowo and Orogun in Ibadan

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Abstract

The study examined the constraints faced by pedestrian movement in Agbowo and Orogun communities in Ibadan. These are dormitory suburbs to members of educational and commercial concerns with a rapidly growing population and inadequate infrastructural provision that has contributed to the deteriorating residential environment. A mean traffic volume of pedestrians per hour of 5296 was obtained in the pedestrian count for Agbowo and 1369 for Orogun. From these figures, a sample size of 106 and 27 was derived for the two communities respectively and respondents were interviewed by the administration of structured questionnaires using an accidental sampling technique. Trip characteristics of the respondents reveal that daily trip frequencies rank very high in both communities and these are to activity centres located at short distances within the communities. The waiting time at the various bus stops was found out to be a motivating factor to trek. However, identified constraints of pedestrian mobility include bad roads 86.8% and 92.6%; absence of pedestrian walkway 74.5% and 74.1%. on street parking 59.1% and 77.8%, road side trading 55.7% and 70.4% in Agbowo and Orogun respectively. The study recommends the incorporation of pedestrian walkway as an integral part of road design within the two communities, enforcement of the planning regulations with reference to development control and an urgent improvement on the communities' road network to facilitate effective shared use with pedestrians.

Keywords: Pedestrian, Agbowo, Orogun, Mobility.

Introduction

Urban areas all over the world are characterized by activities which account for the concentration of people in them. Activities such as manufacturing, trading,

and other things combine to generate spatial configuration and segregation that are revealed in transport flow and physical infrastructure that support them. These spatial configurations bring about spatial

movements which comprises of both motorized and non-motorized modes.

Pedestrianization as a non-motorized mode, involves walking which is adjudged as the oldest and the most basic form of human mobility. Walking, whether day or part of a journey offers the greatest flexibility in respect of origins and destinations because it starts and ends many long distance journeys (Brown, 2006; Raji, 2009) Walking as a mode of transportation provides health and environmental benefits to its users as it reduces the use of fossil fuel, emission of Carbon dioxide (CO₂), Nitrogen Oxide (NO), Volatile Organic Compounds (VOC), road way congestion at peak travel times, vehicle mile travelled and increased body physical fitness (Litman 2010).

In Nigeria, the National Transportation Policy does not specifically provide for pedestrians, rather it provides a consistent general approach and guide as solution to transportation problems. The increasing rate of urbanization in Nigeria cities has resulted in acute pedestrian traffic flow problems because no provision is made for non-motorized transport in our city road designs. Globally, major cities are known to face mobility crisis as a result of increasing urban population and unprecedented growth of personal automobiles. Large shares of trips by these private automobiles contribute immensely to traffic congestion in the cities (Litman, 2010) Walking in this instance, provides the basic connection among the various modes destination and activities.

The type of urbanization in most cities of developing countries is the technologically deficient and socio-economically handicapped one that brings about an uncontrolled growth of the cities, haphazard arrangement of buildings and slow pace of modernization, all of which are contributory to city decay and

increasing slum development. Agbowo and Orogun communities in Ibadan are indeed dormitory suburbs with such uncontrolled growth. This may be attributed to the concentration of commercial activities, educational activities and the siting of public institutions in these areas which make it expectedly a major focus for both pedestrian and vehicular traffic. Another prominent feature of these communities is the haphazard arrangement of building structures and its negative effect on road connectivity.

Even in areas with semblance of better planning, there are no adequate provision of sidewalks to facilitate pedestrian movements, where sidewalks exists, roadside hawkers and traders have taken over such, thus forcing more pedestrians to walk on road pavement. Hence, there has always been a struggle for the right of way between pedestrians, motorcyclists and motorists. Pedestrian motor vehicle accidents are common occurrences on many roads within the zones.

The rationale for this study therefore stems from the fact that the issue of urban mobility problems in Nigeria pays less attention to non-motorized transport modes especially pedestrians. Also, existing literature and research efforts on mobility problems focus especially on road, rail, water and air transport with little or no emphasis on pedestrianization. Wigen (1989) emphasized the fact that walking as a form of travel has received little or no attention in relation to other modes in the country. With the global awareness of clean transportation and new urbanism to mitigate global warming, the importance of encouraging pedestrian mobility cannot be undermined. More people are expected to walk if impediments and constraints to pedestrianization are adequately addressed.

It is on this basis that this research is set

to examine pedestrian mobility and constraints in the dormitory suburbs of Agbowo and Orogun in Ibadan. Specific issues to be examined include the determination of the traffic volume of pedestrians per hour, their trip characteristics and the constraints faced with a view to evolving possible strategies that would ameliorate the identified constraints and improve pedestrian access and safety to their destinations.

Theoretical/Conceptual Framework

This study is anchored on the Spatial Interaction Theory of Ullman (1956) and The Walking Distance Concept developed by the Swedish Public Transport Association (1969). Ullman advanced the three principles to explain the interaction involving transportation. These are complementarity, intervening opportunity and transferability. Complementarity means areal differentiation and the existence of supply and demand in different areas. That is, for two spatially separated points (A) and supply in the other point (B) and that the demand and supply must be complementary.

Intervening opportunities set up constraints as to the possibility of interaction taking place. It implies that even when there is a supply in an area and a demand in another, interaction would only take place if there are no alternative sources of the same material. (Ayeni, 1979, Oyesiku, 1990) The argument is that if there are alternative sources of supply in point C which satisfies the demands of people in point 'A', interaction between A and B though complementary, may not take place.

The principle of intervening opportunity and complementarity to a great extent, explains why interaction take place between two spatially separated points. How this is

achieved is explained by the principle of transferability which is the case with which demand is met. Transferability is the friction of distance or constraints imposed on movement and distance measured in real time and money cost. These factors result in agglomeration of human activities in space. Transferability can occur in spite of perfect complementarity and the absence of intervening opportunities. This reveals the significance of cost money and time in urban movement.

The spatial interaction theory offers some explanation to the issue of spatial interaction in urban centres. The day-to-day movement of people which involve activities like trip making to and from places of work, markets and shopping centres, recreation and educational facilities are important in the spatial structure (internal locational organization of a distribution in space) of cities. Travel behaviour of urban residents is the consequence of spatial separation of points of origin and destinations as well as the characteristics of the travellers (Barber, 1995). In other words, it provides some explanations on why people have to move in space or why interaction takes place in space.

The above theory being largely theoretical than empirical in explaining urban mobility pattern did not adequately capture the underlying processes of observed travel pattern, that is, the constraints experienced during movement. Consequently, these theories were limited in the use particularly for planning and forecasting purposes. They however form a basis from which other satisfactory framework could be explored.

Walking distance as a concept is defined as the distance from home or origin of a trip to the bus stops or other transport pick up points. Put in a broader perspective, it is the hypothetical all distance which people,

usually those without a car, would be expected to walk to public transport stops or other locations of facilities (Okoko, 2006). For instance, in the United Kingdom, 15 minutes or (900 metres) is assumed to be the maximum walking distance for those who do not readily have the use of a private car and 5 minutes is taken as the maximum distance that a car owner is expected to walk to local facilities or public transport pick up points, without the use of a car. Factors like trip purpose, car ownership, socio-economic status, local topography and climatic conditions directly or indirectly influence walking distance in cities. Nevertheless, one of the short comings of the concept is that it is assumed that pedestrians only walk to bus stops, whereas in real-life situations, especially in developing countries, pedestrians walk from origin to destination and back without boarding buses, taxis or motorcycles.

Related Literature

Mobility according to Yu (1982), cited in Olufemi and Oluseyi (2007), is the bone of activity system of human race. Globally major cities face mobility crisis. This mobility crisis is portrayed daily by the enormous traffic jams and the time wasted by the citizens who use the public transport system whose buses are stuck in the car filled traffic jams (Akinbamijo 2008 and Lyons 2003), Akinbamijo and Lyons see transport as a means of providing accessibility, that is to say, mobility is not important in itself as much as in its provision of access. The greater the accessibility, the lower the need for transportation such that transport planning will be more environment friendly if it looks beyond road expansion or elongations to highly articulated land use mix across cities. According to Vasconcelos (1996), mobility

is an attribute associated to people and goods. It corresponds to the different answers provided by individual and economic agents to their transportation needs, taking into consideration the dimensions of urban space and complexity of activities developed there in. Also according to Vasconcelos (2001), accessibility can be viewed by the number and the nature of the desired destinations that can be reached by one person, taking into consideration the necessary time and cost. He explained further that mobility is a public function that tends to ensure accessibility for all and this objective suggests obedience to norms and priorities that satisfy the different transportation demands.

Olufemi and Oluseyi (2007), opined that government factors like lack of provision of transport infrastructural facilities, poor management of existing transport facilities (road condition), poor physical development activities and inappropriate adoption of professional planning theories, role conflict and ambiguity are factors responsible for mobility crisis in most cities. They also identified the individual factors like household automobile ownership, income, household size and types as also responsible for mobility stress in most cities. According to Pucher et al (2003), rapid growth, low income, and extreme inequality among others are the main underlying causes of mobility problems in developing countries. He is of the view that virtually all developing countries suffer from the following:

- Unplanned, haphazard development without adequate infrastructure, transport and other public services.
- Limited network of roads, often narrow, poorly maintained, and unpaved.
- Extremely congested roads with an incompatible mix of both motorized and non-motorized vehicles travelling

at unduly different speeds.

- Rapidly increasing ownership and use of private cars and motorcycles.
- Inadequate roadway accommodation for buses and non-motorized transport.
- Extremely high and rapidly rising traffic fatalities, especially among pedestrian and motorist.

In India, cities face transport crisis characterized by levels of congestion, noise, pollution, traffic fatalities and injuries {over 50% and almost 80% of traffic fatalities in Delhi and Mumbai respectively are pedestrians (Mohan, 2004 cited in Pucher *et al.*, 2003)}. The transport crisis has been exacerbated by the extremely rapid growth of India's largest cities in a context of low incomes, limited and outdated infrastructure, rampant suburban sprawl, and sharply rising motor vehicle ownership and use, deteriorating bus services, a wide range of motorized and non-motorized modes sharing roadway and inadequate as well as uncoordinated land use and transport (Madhav, 2005).

The situation above is not different from that observed in Nigerian cities. Nigerian cities are becoming increasingly complex, tension ridden and a great source of stress. A clear indication of the extent of urban mobility problems in Nigerian cities can be gleaned from the level or state of transport infrastructure, the deplorable state of public transport, increased accident rate, transport insecurity, prolonged waiting and travel time and ineffective transport policy. According to Filani, (1994), most Nigerian cities lack adequate sidewalks that facilitate or enhance pedestrian movement. A more disturbing fact is that where sidewalks exist, they are often taken over by roadside traders. As a result, most transport infrastructure users often feel psychologically disturbed, emotionally drained and physically expended

due to prolonged waiting at bus-stops and excessive walking. The ability to walk as a form of mobility is contingent upon the adequacy of a pedestrian friendly environment with sidewalks and crosswalks as well as a more compact, mixed use walk, retail establishment and schools within walking distance.

The encouragement of walking is strategically important for reducing reliance of vehicles, reducing congestion, improving public health and underpinning sustainable transport. Hence, it is therefore important for pedestrian mobility planning to meet the mobility needs of the urban dwellers.

Methodology and the Study Area

The Study employed Survey design in data collection process. Data were sourced from both primary and secondary sources. The primary sources relied on the use of structured questionnaires to elicit information from 120 households, 133 pedestrians and 44 public transport operators within the two communities.

For the household survey, 61 and 59 household units were drawn from Agbowo and Orogun respectively using the systematic random sampling technique from a total of 657 housing units. For the pedestrian survey, a mean hourly traffic volume of 5296 and 1369 was recorded for Agbowo and Orogun respectively after a three day count from which a sample of 106 and 27 pedestrians representing 0.02% was drawn.

Agbowo and Orogun are two different communities that are contiguous as they share common boundary. Both are located in two different local government areas of Oyo State. Agbowo with a total expanse of 81.37 sq km is located in Ibadan North Local Government, while Orogun which spans 575 sq km is located in Akinyele Local Government. Both communities share almost

the same socio-economic outlook as they serve as dormitory suburbs for the educational facilities of the University of Ibadan, Nigerian Social and Economic Research Institute (NISER) and a host of other commercial complexes like the Bodija market, Agbowo Shopping Complex, banking facilities located along the Ibadan-Oyo highway and a host of shops and business centres within the axes.

A projection of the 1991 census put the populations of Agbowo and Orogun as 82,194 and 103,702 respectively. The population though heterogeneous in character is predominantly Yoruba. The settlement pattern is highly nucleated and the proximity of the various institutions assisted in the rapid increase of population comprising mainly of workers, students and traders alike. Most of the housing units along the major roads perform dual functions (residential cum commercial), In Agbowo for instance, where there were about 37 streets, most of the streets were found to be filthy and dirty due to lack of adequate drainages from the residential units. Water from bathrooms and other domestic utilities are channelled to the streets, adding to the environmental pollution.

Both communities share road transport as the major mode and the major streets are effectively linked with the inter-City highways. Most of the street's pavements are irregular in width and winding with lots of potholes and in very poor motorable condition. The traffic capacity of these roads is grossly reduced due to street trading and on-street parking. The competition for the remaining space on the road between motorists, motorcycles and human traffic is better left imagined.

Commercial and economic activities in the area, apart from the noticeable spread along the major roads are largely concentrated in the Agbowo Shopping Complex and the

adjoining Bodija and Ojoo markets respectively.

Presentation of Results and Discussion

From the figures recorded for the pedestrian survey, a total of 133 pedestrians were interviewed in 37 streets in the study area using accidental sampling technique. This comprises of 106 respondents drawn from 26 streets in Agbowo and 27 respondents from 15 streets in Orogun. The final figure of respondents is derived from the mean hourly pedestrian count for the two communities and is a reflection of more pedestrians in Agbowo than in Orogun.

Socio-Demographic Profile of Respondents

Table 1 which shows the socio-demographic profile of respondents reveals that both male and female of the two communities have equal representation. Respondents within the age bracket of 30-39 years had the highest frequency of 35.3 percent for Agbowo and 51.8 percent for Orogun respectively. This age range represents young energetic and highly active group that can undertake walking more frequently. Ironically, more married people are engaged in walking in both communities. The study recorded 54.7 percent for Agbowo and 70.4 percent for Orogun. There is a link however between those married and trading activities within the study area. About 28.3 percent of respondents in Agbowo are traders and 55.5 percent were recorded for Orogun. As for the unemployed, Agbowo recorded more unemployed respondents (29.4 percent) to Orogun's 7.4 percent. The educational attainment statistics shows that the respondents have a high level of literacy in both communities. For Instance, Agbowo recorded 44.3 percent of the respondents as

having attained OND and above while Orogun has about 55.6 percent with Secondary School education. From Table 1, it was also found out that the figure of those earning less than 10,000 Naira monthly in both communities were high (Agbowo, 50.7 percent and Orogun, 81.5 percent). Those earning above N50,000 recorded low

figures in both communities. This however implies that those with lower income are more prone to walking as a form of movement when compared with those with higher income. It could thus be said that the income level of an individual dictates his modal choice.

Table 1: Socio-Demographic Characteristics of Pedestrians in Agbowo and Orogun

Characteristics	Frequency/Percentages			
	Agbowo	%	Orogun	%
1. Gender				
Male	56	52.8	13	48.1
Female	50	42.2	14	51.9
2. Age (Yrs)				
20-29	36	34.8	4	14.8
30-39	49	45.3	14	51.8
40-49	17	15.8	5	18.5
Above 50	3	2.7	4	14.8
3. Marital Status				
Single	35	33.0	7	25.9
Married	58	45.7	19	70.4
Separated	4	3.8	1	3.7
Divorced	5	4.7	-	-
Widowed	4	3.8	-	-
4. Occupation				
Civil Servant	19	17.9	3	11.2
Trading	30	28.3	15	55.5
Artisan	28	26.4	7	25.9
Unemployed	29	29.4	2	7.4
5. Educational Attainment				
No formal education	14	13.2	2	7.4
Primary Education	7	6.6	4	14.8
Secondary Education	38	35.8	15	55.6
Tertiary (OND & Above)	47	44.3	6	22.2
6. Monthly Income (N)				
Less than 10,000	53	50.7	16	81.5
10,001-20,000	42	39.6	7	25.9
20,001-50,00	9	8.3	4	11.6
Above- 50,000	3	1.4	-	-

Source: Authors' Field Survey, 2011.

Table 2: Trip Characteristics of Pedestrians in Agbowo and Orogun.

Trip Frequency	Agbowo	%	Orogun	%
Daily	64	60.3	14	51.9
Every other day	35	33.0	10	37.0
Twice a week	4	3.8	2	7.4
Once in a while	3	2.9	1	3.7
Reason for Walking				
Short Distance	71	67.0	16	59.3
Economic Reason	23	21.7	8	29.6
Bus Stop Waiting Time	6	5.6	2	7.4
Motorcycle Phobia	2	1.9	-	-
To keep Fit	4	3.8	1	3.7
Preferred Mode of Transport				
Bus	27	28.0	10	37.0
Taxi	25	21.0	10	37.0
Motor/Cycle	26	24.6	5	18.5
Walking	28	26.4	11	40.8

Source: Author's Field Survey, 2011

Trip Characteristic of Respondents

The trip characteristics of respondents are measured mainly by the variables of trip frequency, reasons adduced for walking and their preferred mode of transport. It was found out during the study that most of the trip generated originated from Agbowo and Orogun with destinations falling within the outlying districts and activity centres of the University of Ibadan, The Polytechnic, Bodija Market, Ojoo, Iwo Road and Sasa among others. Daily trip frequency ranks very high in the two communities as shown in Table 2.

Reasons adduced for walking was majorly the proximity of the activity centres to the respondents. This fact was attested to by 67.0 percent and 59.3 percent respondents in Agbowo and Orogun respectively. With a high proportion of low income group in both

communities the economic factor prevailed as a reason for trekking to activity points after the nearness factor. The waiting time at the intermediate bus stops is also considered by 5.6 percent and 7.4 percent of the respondents as a motivating factor to trek to different locations within the two communities.

It was quite ironical to find some of the respondents (1.9%) in Agbowo declare that they have a phobia for motor cycle riding when the whole place is Swarming with motorcycles as a popular mode of commuting. However, the preferred mode of transport is dictated by the available modes in the two communities. The taxis appear to be very popular in demand by the respondents probably because of its limited number of passengers and shorter waiting time at the bus stops for commuters.

Constraints of Pedestrian Mobility

Respondents in the two communities clearly identified bad roads, road side trading, vehicular movements and inadequate building set-back as major constraints of pedestrian's traffic flow. In terms of severity, bad road (86.8%), road side trading (55.5%), parked vehicles along the streets (59.1%) and moving motor cycles (50.0%) are very severe constraints. About 74.5% of the respondents in the study area are of the opinion that the absence of pedestrian

walkway as part of road design equally poses very serious constraints to pedestrian mobility. Table 3, is an account of the perceived factors that are responsible for the constraints. In Agbowo, the respondents listed factors as poor road design (82.1%) absence of designated area of trading (55.7%), absence of buses lay-by or parking lot (67.0%), narrow width of road (69.0%); poor drainage (50.3%) and inadequate road maintenance (58.5%). All these factors are replicated with higher percentages at Orogun.

Table 3: Constraints of Pedestrians Mobility

S/N	Constraints	Frequency						Percentage (%)					
		Agbowo	N.S	S	F.S	V.S	U.D	Total	N.S	S	F.S	V.S	U.D
1.	Bad road	-	1	12	92	1	106	-	0.9	11.3	86.8	0.9	100
2.	Road Side Trading	1	4	42	59	-	106	0.9	3.8	39.6	55.7	-	100
3.	Parked vehicle	-	4	50	52	-	106	-	3.8	47.2	59.1	-	100
4.	Moving vehicle.	2	7	53	42	-	106	1.9	6.6	51.9	39.6	-	100
5.	Moving Motorcycle	1	14	38	53	-	106	1.9	13.2	35.8	50.0	-	100
6.	Building set back	-	12	37	57	-	106	-	11.3	34.9	53.8	-	100
7.	Absence of Pedestrian walk way	2	4	21	79	-	106	1.9	3.8	19.8	74.5	-	100
Orogun													
1	Bad road	1	-	-	25	1	27	3.7	-	-	92.6	3.7	100
2	Road side trading	-	2	5	19	1	27	-	7.4	18.5	70.4	3.7	100
3	Parked vehicle	-	1	4	21	1	27	-	3.7	14.8	77.8	3.7	100
4	Moving vehicle	-	-	6	20	1	27	-	-	22.2	74.1	3.7	100
5	Moving motorcycle	-	1	6	19	1	27	-	3.7	22.2	70.4	3.7	100
6	Building set back	1	4	5	16	1	27	3.7	14.8	18.5	59.3	3.7	100
7	Absence of pedestrian walkway	1	-	6	20	1	27	-	-	22.2	74.1	3.7	100

NS- Not Severe; S- Severe; FS- Fairly Severe; VS- Very Severe; UD-Undecided..

Source: Author's Field Survey, 2011

Suggested Solutions and Conclusion

Transportation planning is concerned, among other things, with social and economic issues, which include the identification of public needs (common and specialized) of different groups. Pedestrians are a special group in the transportation system, which have been given little attention in the planning and design of transportation routes in Nigeria. Undertaking a study of this nature has exposed the many short comings and inadequacies that have contributed to the rate of accidents occurrence on our urban roads. Apart from the universally acclaimed underlying causes of mobility problems in developing countries listed by Pucher et al (2003) in the literature section of this study, the provision of pedestrian walkway on our busy roads ranks very high on the demand chart by pedestrians. The demand is not only in terms of provisions but also in the area of enforcement.

Similar provisions in some other locations have been encroached upon by roadside hawkers who consider such as free space. In view of the commercial cum residential function of most of the houses along the major streets and the nature of the traffic density mix, and urgent improvement on the road network is recommended, to facilitate effective shared use with pedestrians. The improvement should include an expansion of the road width and effective drainage, provision of buses lay-by and the creation of parking lots to take off the on-street parking habit of the residents. There is indeed an urgent need for town planning officials to enforce development control more proactively to prevent the erection of illegal structures in the study area.

On a long-term, the State Government should consider an urban renewal programme that would embrace the two Communities without delay in order to curb the urban decay that has overtaken the two communities.

In conclusion, the major thrusts of this study is to incorporate pedestrians mobility designs as a National Transport Policy articulation since safe and convenient pedestrian travel is an essential element of a comprehensive multi-modal transportation system.

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