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Economic Implication of Urban Growth Pattern on Transportation: Empirical Evidence from Damaturu Metropolis, Yobe State, Nigeria.

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Abstract

The aim of this study is to examine the economic implications of urban growth patterns on transportation in Damaturu Metropolis, Yobe State, Nigeria. The study used a high-resolution satellite image of Damaturu town and the respondents' residents to achieve its aim. The study employed GIS spatial analysis techniques and descriptive statistics tools in analyzing the data. The findings of the study revealed that within the town of less than 50 km2, the residence traveled a distance of about 15 km to a place of work and other daily activities. The average monthly expenditure of some households is ₦67,000, N21,000, and ₦2,000 for high-, medium-, and low-income households, respectively. The state civil servants' monthly wages are between ₦30,000 ($75) and ₦450,000 ($1125), with more than 75% earning less than ₦100,000 ($250). The results also revealed that the civil servants who used their private vehicles spent between ₦5,000 and ₦40,000 on fuel in the 21 working days of the month. Therefore, this study concluded that any government policy that increases the cost of transportation will have a significant impact on the general livelihood of residents and the economy of Damaturu.

Keywords: Economic implication, growth pattern, Metropolis, Transportation, Urban

1. Introduction

The growth of cities will be the single largest influence on development in the 21st century'' (United Nations Population Funds, 1996). According to the UN projection (2009), by the mid-of this century, majority of the world's urban population will be living in small cities and towns with less than 500,000 inhabitants. In this regard, the World Urban Forums (WUF) 1 and 2 were of the view that managing rapid urbanization will be one of the most pressing problems confronting humanity in the 21st century.

The notion of developed and developing countries is not crucial regarding the effect of unhealthy urban growth, which they

Most of the developing countries urban centres are characterized by haphazard development caused by rapid urbanization, which they are not planned to accommodate. This, according to Olusoye (2006) has caused several environmental and socio-economic problems. Furthermore, Inter-American Development Bank (2006), are of the view that medium sized cities/towns that are experiencing faster growth rates may find themselves less well prepared to accommodate the added population.

ultimately limited to the region land use mainly resulting in loss of prime agricultural lands and water bodies, which Sudhila (2004)

considered as endemic phenomena, which an impact on the structural growth of any city or towns. As the structure of urban growth has an impact on urban socio-economic activities and ecosystem, the (WUF 6, 2010) dialogue 3, calls on urban planning authorities to encourage more compact urban development, to a high build-up density in order to take advantage of agglomerate economies which is crucial catalyst to the city's properities.

It's an established fact that urbanization in Nigeria is largely based on government policies derived via state and local governments' creation where the new states and local government headquarters become migration pulls (Daura *et. al.,* 2006). Damaturu metropolis being an administrative capital of Yobe State has not been an exception since the creation of Yobe State in 1991. Since then, Damaturu has been experiencing a rapid structural and functional changes with its attendant urbanization

The urban problems of Damaturu have attracted a lot of studies, such as Daura *et al.,* (2006) who studied the problems of Damaturu urban development focusing on the growth of residential neighborhoods. Also, Mamudo (2007) carried out the appraisal of Damaturu developmental plan of 1992 with he focused on conformity analysis. Isma'il, Musa and Jajere (2014) analysed the

More so, Tiwary (2017) studied the challenges of sustainable living environment, while Babalola et al (2010) analysed the practice and challenges of solid waste management of the town. Isma'il, Musa and Jajere (2014) studied the geographical determinants of the structural and functional growth of the town. Yusuf (2015) studied the impact of the emerging climate change risks

Sustainable land management and urban development planning required a scientific understanding of complex growth pattern and process (Jianguan, 2003), which is possible using remote sensing and geographic information system (GIS). urban growth is largely based on important event that take place based on the transition, thus not all transition that may or may not happen at every time steep.

challenges and problems like pollution, high cost of transportation, traffic congestions, housing deficits and the likes. Although the metropolis is at its infant growth stage, rapid changes have been taking place needs to be understand in terms of rate, pattern and degree of environmental and socio-economic functional changes, in order to avoid wrong decisions, enhance effective planning, land management, avoiding some major urbanization problems and plan for growth.

future urban growth scenario, while Bukar, Mohammed and Ngada (2021) explored the causes and consequences of rural-urban migration of the town. In addition, Abdullahi, Mahadi and Kyari (2019) investigated geographical causes of rural urban migration in Damaturu. Jajere and Ismail (2015) analysed the landuse/landcover change in Damaturu.

on sustainable urban growth. Maina (2015) investigated the impact of the emerging climate change risks on sustainable urban growth. Geidam etal (2020) analysed urban sprawl trend using remote sensing data and GIS techniques. Karagama, Adnan and Umar (2020) analysed land use land cover changes using remote sensing data and geographical information systems (GIS) at an urban set up

of Damaturu. What is clearly missing from the literature is the study that focuses on economic implication of urban growth pattern with specific focus on transportation

2. Area of the Study

Damaturu is the capital city of Yobe State in northern Nigeria. It is the headquarters of the Damaturu Emirate. Damaturu came into existence as a colony when it was carved out of the Alagarno district by the British. It

cost. Hence, the focus of this study is to examine the economic implication of urban growth pattern in the Damaturu town with emphasis on transport costs and challenges.

resulted in the conquest of the Bornu Empire in 1902 by colonial forces under the command of Colonel Thomas Morland. The geographical map of the area is presented in figure 1.
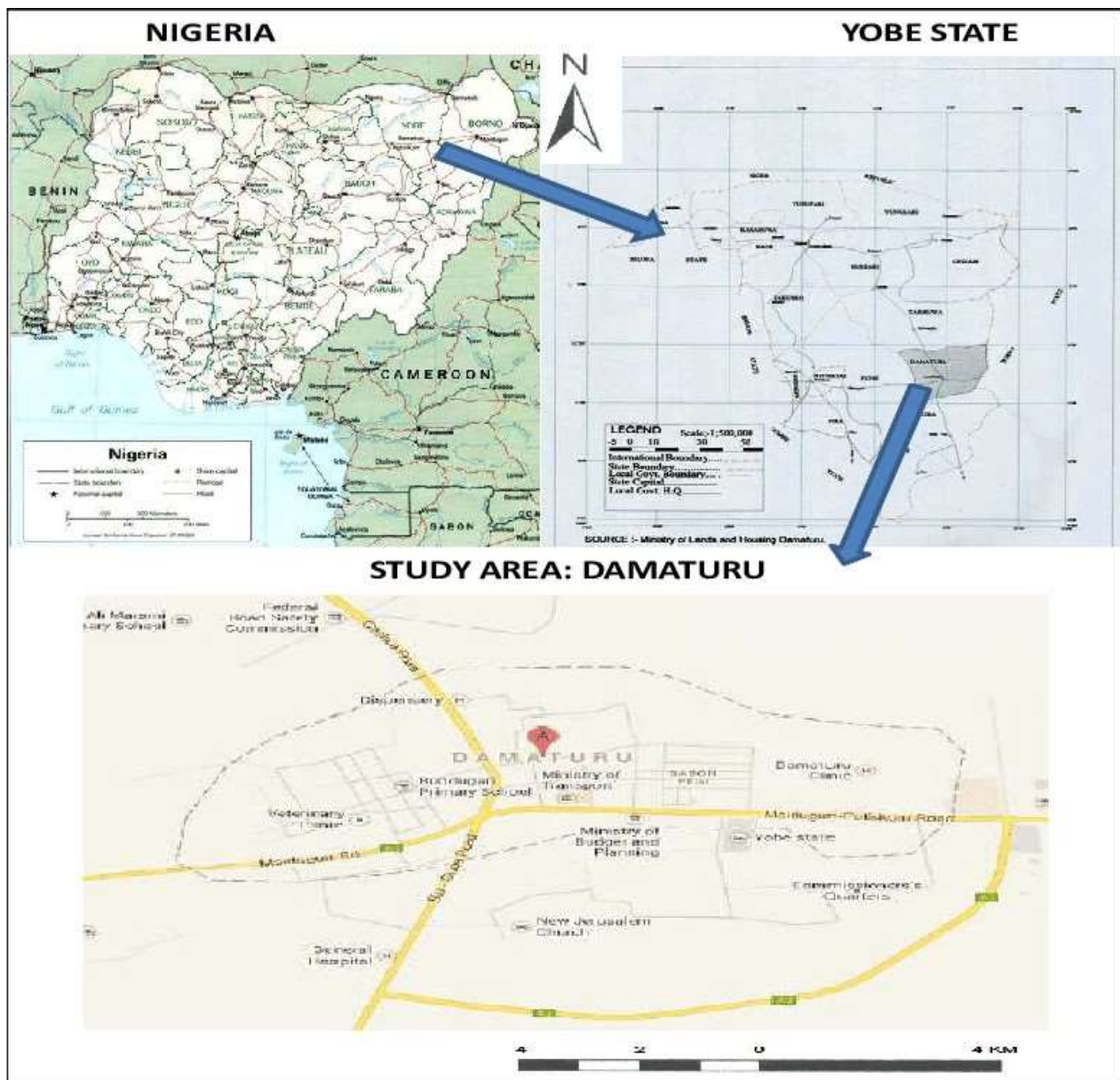
Figure 1: Geographical location of Damaturu town
Source: RS and GIS unit, Department of Geography, Federal Unversity, Kashere (2023)

The town of Damaturu is on the A3 highway and in 2010 had an estimated population of 44,268. The northeasterly line of equal latitude and longitude passes through the area, including 12°00′00″N 12°00′00″E in the north. The major tribes in the area are the Fulani and Kanuri. Others are the Hausas,

Kare - Kare, Bade, Igbo and Yoruba. The major occupations in the area are civil service and trading. The other important economic enterprises include pottery, textile

manufacturing, cattle rearing and trade with the LGA playing host to several markets. The map of the town is shown in figure 1.

3. Methodology

a. Data

The study sourced and utilized both primary and secondary data generated from various sources. As presented in table1, spatial distances between points and high-resolution images were sourced from Google images.

Cost of transportation was estimated based on key informant interviews from the respondents. However, household/civil servants' expenditure on transportation were generated from key informants' interview, and from household/individual interview

Table 1: Sources of data

Data Used		Source
Spatial Distances between points	-------	Google Image
High resolution Image	------	Google Image
Cost of transportation	------	Key informants' interview
Household/civil servants expenditure on transportation	------	Key informants' interview, and household/individual interview

Source: Field work, 2023

b. Sampling frame and techniques

For analytical purpose, Damaturu town was stratified into three (3) strata namely low-income neighborhoods, middle income neighborhoods and high-income

neighborhoods. Twelve (12) households were then selected from each of income neighborhood systematically. Details of the sampling is contained in Table 2.

Table 2: Sample Wards/ Layouts

S/N	Strata	Sample Wards/Layout	Sample Size	Total Sample Size Per Zone
1.	Low income Neighbourhoods	Pompomari Ward	12	
		Abbari Ward	12	36
		Nayi-nawa Ward	12	
2.	Medium income Neighbourhoods	Sabon Fegi Ward	12	
		3-bedroom Gujba Road	12	36
		Buhari Housing Estate	12	
3.	High income Neighbourhoods	GRA	12	
		New Bra-Bra Estate	12	36
		Don-Etibet Estate	12	
		Total	108	108

Source: Field work, 2023

Being predominantly a civil servant town, six (6) major work places were purposively selected for analyzing the cost of daily distance using different means of the transportation. The selected workplaces are Yobe State University, Yobe State University Teaching Hospital, federal secteriat, State secretariat, federal secretariat and police headquarters. The workforce was stratified into junior, senior and management cadres. Nine (9), six (6) and three (3) respondents were randomly selected respectively from each of the work place. This gives a total respondent of one hundred and eight (108). Details of the sampling is contained in Table 3.

c. Method of Data analysis

The data was analyzed using simple descriptive statistics. Monetary expenditure was aggregated using naira and was converted into dollar based on official exchange rate of (1$ = ₦400). Distances between places were estimated in kilometers. Expenditures on transportation was computed based average, minimum and maximum levels.

Table 3: Civil servants sampling frame

S/N	Work place	Strata	Sample Size	Total Sample Size Per Place
1.	Yobe State University	Junior Cadre	9	
		Senior Cadre	6	18
		Management	3	
2.	Yobe State University Teaching Hospital	Junior Cadre	9	
		Senior Cadre	6	18
		Management	3	
3.	Federal Secretariat	Junior Cadre	9	
		Senior Cadre	6	18
		Management	3	
4.	State Secretariat	Junior Cadre	9	18
		Senior Cadre	6	
		Management	3	
5.	Federal Polytechnic	Junior Cadre	9	18
		Senior Cadre	6	
		Management	3	
6.	Police Headquarters	Junior Cadre	9	18
		Senior Cadre	6	
		Management	3	
	Total		108	108

Source: Field work, 2023

4. Results and Discussion

a. Causes of Urban sprawl in Damaturu

Damaturu was a very small town before it was made a state capital in 1991, the size of the town was only 3.5sqkm (Jajere 2015). The government policies of locating ministries and some important government building derive the town grow the pattern along major roads. According the key informants the major causes of Damaturu Urban sprawl include Government policies of locating strategies infrastructures at far distances from the main town, engulfment of villages by the urban expansion which was reported by (Jajere *et-al,* 2014). Others are availability of plain land for ease of development, etc.

b. Analysis of Spatial Distance between places within the Town

Accordingly, Sudhila (2004) is of the view that structural growth of urban areas has an impact on urban socio-economic activities and ecosystem. According, to WUF 6 (2010), spatial areal expansion and urban sprawl increase travelling distance within the city. Table 5 shows the distance charts in kilometers between outskirt residential areas and some strategic important places.

Table 5: Distance chart between Outskirt residential areas and some strategic places

	University	Federal Polytechnic	State Secretariat	Federal Secretariat	Central business District
Nyanya	3.53	6.99	6.2	7.47	3.17
Red Bricks	13.74	5.6	4.04	12.3	4.59
Ben-Kalio	11	2.7	1.36	9.66	4.59
Zanna Zakaria	11	6	8.33	00	4.3

Source: Field work, 2023

The strategic locations: Yobe State University, Yobe State University Teaching Hospital, federal secretariat, State secretariat, federal secretariat and police headquarters are shown in Figure 2**.**
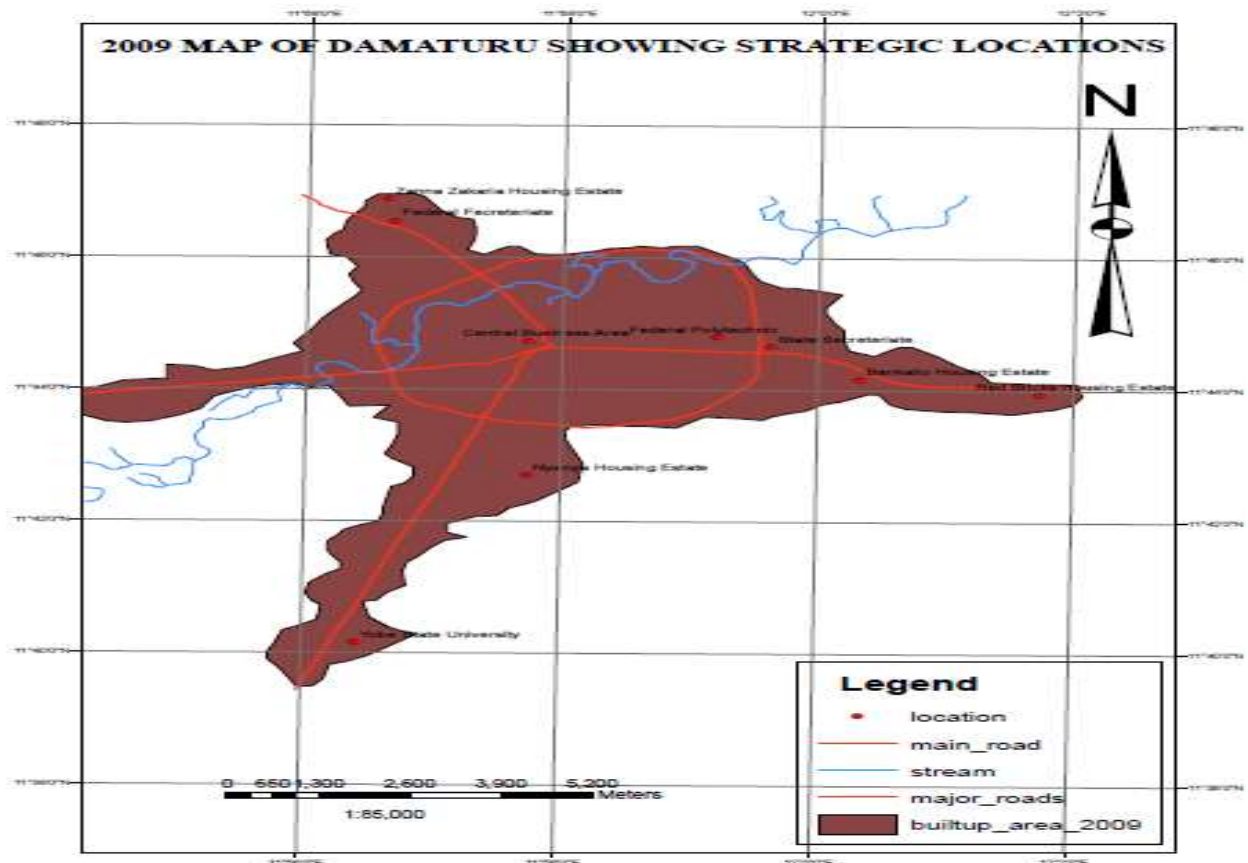
Figure 2: strategic locations in Damaturu
Source: RS and GIS unit, Department of Geography, Federal Unversity, Kashere (2023)

c. Provision of Facilities and Basic Amenities

The urbanization process in third world countries is associated with the problems of urban poverty, unemployment, inadequate facilities poor hygiene growth of slums and ghettos, as well as general environmental degradation. The four (4) major roads of (Maiduguri, Potiskum, Gujba and Gashua) as well as the ring road are fully dualized with solar security light. These roads link most of the strategic places as it can be seen in figure 7 and all most all the 22 housing estates of Damaturu are located along these major roads, thus the access road within the housing estates are not tarred with the exception of the access roads, within the traditional settlement and private developed layouts of Nasarawa, Pompomari extension, Kirikasamma. Also, considerable number of access roads within Sabon Fegi and G.R.A are tarred with drainage, as it can be seen 38% of the respondents from traditional settlement have tarred road and drainage in their streets. The whole of Damaturu urban area is fully connected with electricity and G.S.M communication networks. Pipe-bone waters is the most serious problem, with exception

of few newly developed housing estates, most of the Damaturu urban area residence don't have access to pipe born water 85% of

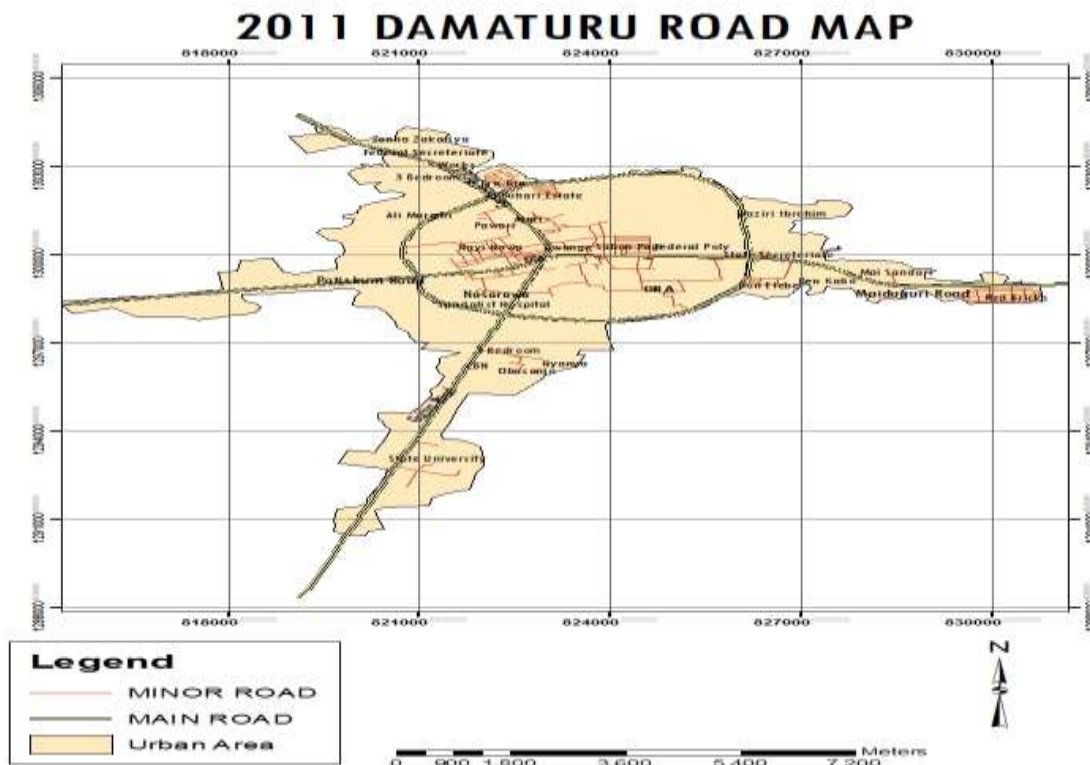respondents depend on water vendors for their waters supply.

Figure 3: Damaturu roads map

Source: RS and GIS unit, Department of Geography, Federal Unversity, Kashere (2023)

Table 4: Impact of Damaturu Urban growth pattern on provision of infrastructure

Infrastructure	Frequency	Coverage
Electricity	---	More than 80%
Water	276 public boreholes	More than 60%
Roads	Several Distributors and Access roads	Less than 50% coverage (see figure 2)

Source: Field work, 2023

As it can be seen from Table 4, the electricity coverage in Damaturu town is more than 80%. This revealed that despite the rapid spatial expansion as reported by (Jajere *et al* 2014), the provision of electricity facilities is almost at same pace with urban expansion.

Result from the field observation also shows that the entire town is covered with electricity facilities with the exception of few pockets at developing layouts. The water supply of Damaturu is mainly from ground water sources. The residents mostly used water

from public and private boreholes. The spatial pattern of town is affecting the water distribution despite the effort of government agencies and non-governmental organizations (NGOs). Although, the growth pattern of town is linear along four major high ways that cross the town, only the major distributor roads and few access roads were tarred. The resident and key informant reports the hydrology/relief of the town is making access road within residential neighborhoods non-motorable during the rainy season, thus providing roads and drainage facilities will require a huge capital investment.

d. Cost of Transportation

The cost of local transportation within the town is very high, as a results of long distances between the places within the town. The expenditure on transportation is a function of the income level. The high-income households spend an average of about ₦70,000 ($175), far above the national minimum wage of ₦30,000 ($75). The reported household monthly cost of transportation is ₦2000 which is about 15% of state minimum wage of Local government staff. The estimated transport cost between the strategic places is presented in table 6.

Table 6: Residential areas (Travelling cost using Tricycles in Naira)

	University	Federal Polytechnic	State Secretariat	Federal Secretariat	Central Business District
Nyanya	150	300	300	500	200
Red Bricks	400	150	150	600	300
Ben-Kalio	400	150	150	500	300
Zanna Zakaria	600	300	300	100	400

Source: Field work, 2023

The monthly household expenditures in Damaturu are calculated in Table 7.

Table 7: Household Monthly expenditure on Transport

Income group	Using public transport	Using Private transport
High income		
Min	2,000	21,000
Mean	7,000	67,000
Max	15,000	150,000
Medium income		
Min	6,000	0
Mean	15,000	17,000
Max	20,000	25,000
Low income		
Min	2,000	0
Mean	5,000	2,000
Max	19,000	10,000

Source: Field work, 2023

Damaturu town can be termed as civil servants' settlement as greater proportion of population of the town are civil servants working the state and federal civil services. The state civil servants' monthly wages are between ₦30,000 ($75) and ₦450,000 ($1125). With more than 75% of the population earn less than ₦100,000 ($250). The results presented in table 8. Revealed that civil servants that used their private vehicles spent between ₦5,000 and ₦40,000 on fuel for 21 working days of the month

Table 8: Civil servants' Monthly expenditure on Transport

Places		Using public transport (₦)	Using Private transport (₦)
Yobe State University			
Min		4,200	12,000
	Mean	12,600	25,000
Max		21,000	40,000
Yobe State University Teaching Hospital			
Min		2,200	10,000
	Mean	6,600	15,000
Max		12,000	25,000
Federal Secretariat			
Min		00	10,000
	Mean	12,000	15,000
Max		16,000	25,000
State Secretariat			
Min		00	10,000
	Mean	4,000	16,000
Max		16,000	25,000
Federal Polytechnic			
Min		00	5,000
	Mean	12,000	13,000
Max		16,000	25,000
Police Headquarters			
Min		00	10,000
	Mean	10,000	15,000
Max		15,000	25,000

Source: Field work, 2023

5. Recommendations

Based on the finding of this study the growth pattern is affecting cost of Damaturu Urban management on provision on infrastructural facilities and amenities. The growth pattern is also affecting cost of living of the predominantly civil servants' population. Therefore, this study offers the following recommendation to avoid further impact of growth on cost of urban management and cost living:

i. The urban planners and urban mangers should encourage compacted development,

ii. Construction of more alternative roads that will shorten the distance between the places

iii. Decision makers should provide transportation palliatives to reduce transportation cost especially for students of High institutions of learning.

6. Conclusion

The finding of the study revealed that within the town that is less than 50km^2, the residence travelled a distance of about 15kms to a place of works and other daily activities. The average monthly expenditure of some households is ₦67,000, ₦ 21,000 and ₦2,000 for High, medium and low-income household respectively, while the state civil servants' monthly wages is between ₦30,000 ($75) to ₦450,000 ($1125); with more than 75% earning less than ₦100,000 ($250). The findings also revealed that the civil servants that used their private vehicles spent about ₦ 5000 to ₦40,000 on fuel in 21 working days of the month. Therefore, it is concluded that any government policy that increase the cost of transportation will have significant impact on general livelihood of residents and economy of Damaturu.

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