

# Socio- Economic Development of Transportation in Fufore, Nigeria

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**Abstract:** Public transport has a significant influence for the successful economic advancement of a nation. Scarce transportation system restricts the populace potential to take advantage of its natural resources, the distribution of goods and other processed products. Therefore, transportation bears the most premise for growth and economic development in general. The study appraises the effect of Transportation system on the economic advancement of Fufore local government area in Nigeria. The study encompasses five villages which were chosen using multistage sampling technique. About 105 interviewee were also selected and a set of questionnaires administered using random method. Descriptive statistical analysis was used on data obtained. The results of the evaluation indicated that 44.79% of the respondents were farmers. It also revealed that the prevailing mode of transportation in the area is by motorcycles which accompanied by lack of good roads, as more than 65.63% of roads in the area are in a bad condition, makes accessibility to good markets by the respondents difficult for their farm produce, which indirectly also aggravated the cost of transportation. This trend was discovered to have affected the economic activities of the populace thereby increasing the level of poverty in communities of the area. The development of new roads and maintenance of existing ones is recommended to minimise cost of transportation of goods and services thereby abating poverty and fostering economic prosperity.

**Keywords:** Economic development, Fufore, Respondents, Road conditions, Transportation

**Keyword:**

**Keywords:** Keyword 1, keyword 2, number of keywords is usually 3-7, but more is allowed if deemed necessary

## 1. Introduction

Economic development requires a highly organized system of transport. A planned and organized system of transport is one of the indications of a country's development [1]. If we economically compare advanced countries with developing countries, we would find a better system of transport in advance countries while according to Emmanuel [2] traffic jams and other irregularities are in the system of transport in developing countries. The means of transportation is the basic for infrastructure of any country. While natural resources (i.e. minerals, agricultural produce, etc.) form the basis of economic development, their existence is not a guarantee for economic development but their efficient utilization. Emmanuel [2] affirmed that the

efficient supply of raw materials depends upon transportation.

Transportation system in Nigeria over the years and since independence has continued on a relatively slow pace and experienced a lot of problems. Inadequacies in this sector have grossly affected many areas thereby greatly influencing the country's economic development [2]. Most roads in Adamawa state, including Fufore L.G.A are in very poor condition and require rehabilitation. Some of the roads were constructed over 10 years ago and have not been rehabilitated for once.

This has resulted in major cracks (longitudinal and transverse), depressions, broken down bridges and numerous potholes that make road transport slow and unsafe [3]. The state of roads in Fufore L.G.A

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has remained poor for a number of reasons, which include; lack of drainage system and a very thin coating that is easily washed away. Others are excessive use of roads network given the underdeveloped nature of railways and water ways which could serve as an alternative means of transport, and absence of an articulated road program and inadequate funding for road maintenance [3]. These problems have affected the maximum exploitation of natural resources, expansion of trade between communities, neglect on human resources which all result in isolation and under development [4].

The people suffer poor accessibility, which in turn has strong negative effects on the people's economic activity. Most of the people in Fufore L.G.A are farmers, much of their farm produce are lost when they cannot be transported to the markets, cities and other urban centers [5].

## 2. Literature Review

Transport, the conveyance of people, goods and services from one geographical area to the other is vital to the socio-economic development of any region or country. It is so key and indispensable that meaningful development may elude any economy that does not take it seriously. It is the life wire upon which other economic activities of any nation depend [6]. Transportation sector is the major sector of any economy having significant influence on economic growth through enhancing economies of scale production process [7].

Mobility is one of the most fundamental and important characteristics of economic activity as it satisfies the basic need of going from one location to the other, a need shared by passengers, freight and information [8]. All economies and regions do not share the same level of mobility as most are in different stage in their mobility transition towards motorized forms of transport. Economies that possess greater means of transportation are often those with better opportunities to develop than those with inadequate means of transport. Reduced mobility impedes development while greater mobility is a catalyst for development. Mobility is thus reliable indicator. According to Johansson et al. [8], providing mobility is an industry that offers services to its customers, employs people and disburses wages, invests capital, generates income and provides taxation revenue.

Road is the primary mode of transportation in Nigeria and durable road infrastructure is essential to economic growth and social development [9]. Roads accounts for over 90% of all inter and intra city movements of persons, goods, farm produce,

merchandise, animals and mobile services. Road is a significant contributor to national wealth and is a vital element of the social fabric in many nations. Road also represents a significant component of national infrastructure capital [10]. Ubogu et al. [10] found strong evidence of causality between kilometres of paved roads and GDP among a significant number of the countries investigated. The predominance of road transport as a means of passenger and freight movement in Sub-Saharan Africa underlies the economic importance of road [12].

Transportation is the basis for economic, social and political development in most societies as it exhibits a close relationship to the style and quality of living of the society [13]. The provision of transport infrastructure and services helps in reducing poverty. It needs no emphasis that various public actions aimed at reducing poverty cannot be successful without adequate transport infrastructure and services. It is difficult to visualize meeting the targets or universal education and healthcare for all without first providing adequate transport facilities [14].

In the current global economy, the ability of transportation sector to catalyze the process of economic growth and development requires to be examined in greater detail [15]. In recognition of the recent world-wide investment in transportation, quantifying the impact of transportation in economic growth and development continue to attract greater focus [15].

Transportation activities affect the consumption of resources, including land, energy and human lives. Policy and planning practices that increase transportation system efficiency can provide huge benefits [16-25]. Pradhan and Bagchi [16] argued that the interface between transportation investment and economic development has broad ramifications that go beyond transportation's basic purpose of moving goods and people from one place to another. Whereas there is no doubt that transportation is essential in the operation of market economy, much still needs to be understood about ways in which an efficient transport system can improve the productivity of an economy. Spieser et al [26] concurs that mobility provides many benefits, but also incurs significant cost. Maximizing transport system benefit therefore requires achieving the optimal amount and mix of mobility.

## 3. Methodology

### 3.1 Sources of Data

The sources of data for this study include both the primary and secondary sources. The primary source of data for this research work was a detailed,

self-administered questionnaire. The secondary sources of data included information obtained from books, journals, conference proceedings, the internet and other relevant materials. The information gathered formed the basis for understanding the concept of transportation and economic development.

### 3.2 Sampling Technique

Multi-stage sampling technique was employed in the collection of data for the study. Multi-stage sampling technique involves dividing the region in which the study population is located into zones i.e. from districts to wards and then to villages [28]. The area of this investigation is Fufore local government area in Nigeria; Fufore is endowed with an area of 4972km having a population of 209,460. It also lies between latitude 9 13'North and longitude 12 39' East of Greenwich Meridian. There are distinct dry and wet season in the area with humidity and temperature fluctuating within the seasons, average annual rainfall ranges from 750mm- 1000mm [29]. The site for this survey chosen using random table number include: Wuro Tunga, W. Dobowo, Bokanti, Bartingo and Dajidere.

### 3.3 Questionnaire Design and Administration

The population of Fufore L.G.A is 209,460 [20]. The research work made use of 0.05% of the total population and this is because of financial and time factors, and the inaccessibility of some areas. Hence, the questionnaire was administered to 105 respondents and taking 21 respondents from each village.

## 4. Results and Discussion

### 4.1 Socio economic data of respondents

Information on the socio economic characteristics of the respondents were collected, analyzed and presented in Figures 1 to 5. These included the analysis on gender, age, marital status, education qualification and occupation of the respondents.

Fig. 1 reveals that 73.96% of the respondents are males while the females constitute 26.04% of the sample population. This could be attributed to the accessibility of the authors to the respondents; most the respondents that were reached were the males.

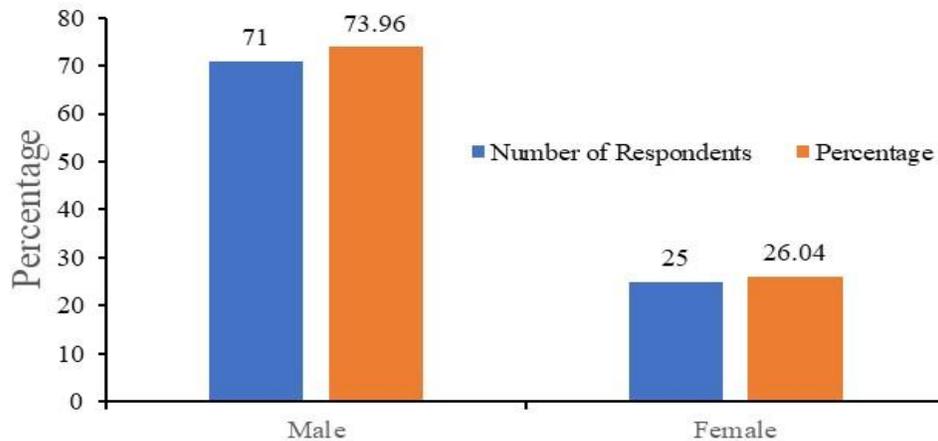


Fig. 1: Frequency of Responses by gender

The Fig. 2 shows the age distribution of the respondents. 43.75% of the respondents were between ages 26 to 35, 31.25% were in the 36 to 45 age group while 25% were between ages 46 to 55

years. This result has revealed that majority of population of the study area of working age (labor force).

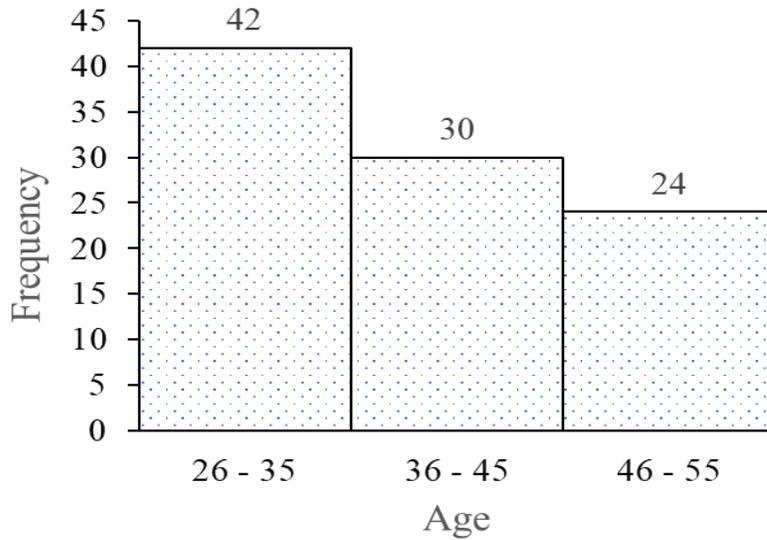


Fig. 2: Age of Respondents

Fig. 3 indicates that 26.04% of the population were single, 45.83% were married, 16.67% were divorced while 11.46% constitute the widowed.

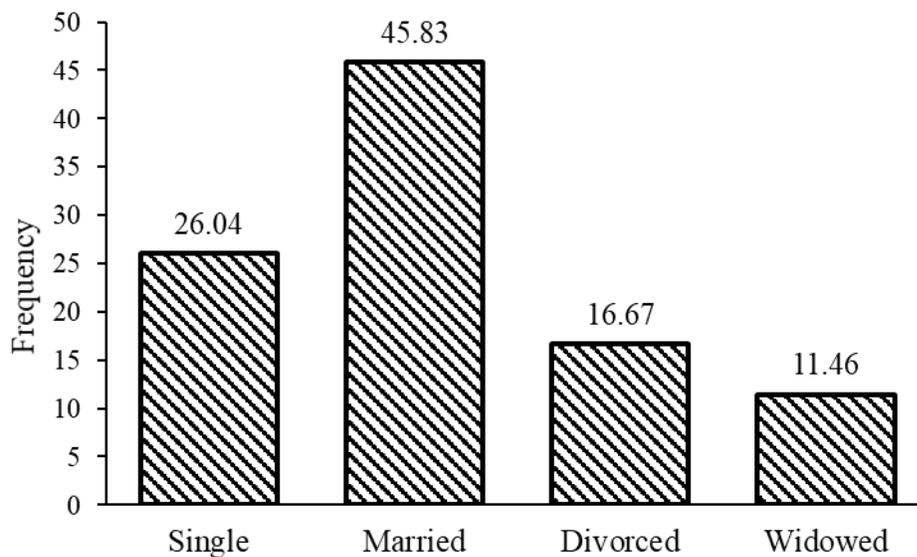


Fig. 3: Marital Status of Respondents

Information on the education qualification of the respondents as shown in Fig. 4 shows that 10.41% of the sample population has no form of formal education, 50% of the sample population has primary education, 25% of the population has secondary

school education as their qualification while 14.58% have post-secondary education. This shows that illiteracy rate is high in the study area; though most of the respondent had minimum of primary school education, the respondents are not well educated.

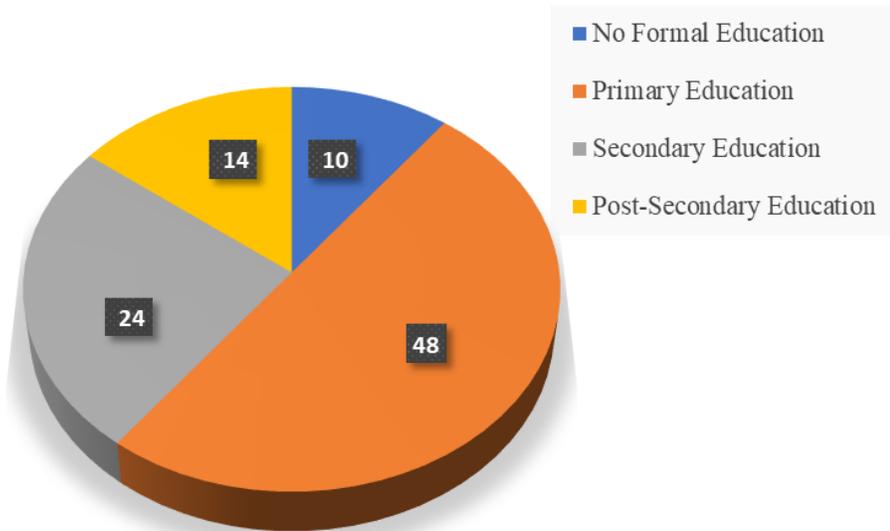


Fig. 4: Educational Qualification of Respondents

Fig. 5 show that 44.79% of the respondents are farmers, trading accounts for 20.83% of the respondents, civil servants constitute only 8.3%, 18.75% constitute the artisan while other occupations like tailors, drivers, house wives, etc. constitute

7.29%, of the respondents. This has shown that majority of the people in the study area constitute the unskilled labor force having less number of skilled labor force.

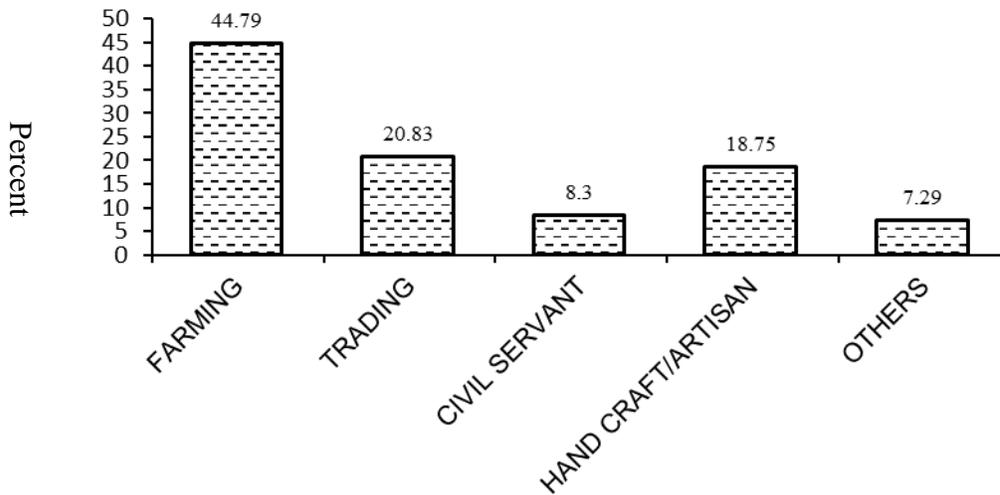


Fig. 5: Occupation Status of Respondents

#### 4.2 Transportation and Economic Development

Data collected on the various means of transportation presented in Fig. 6 shows that 37 (38.54%) respondents use motor cycle as means of

transportation. 12 respondents use bicycle, 18 respondents use trucks, 20 respondents use cars and buses while 9 of respondents themselves and their produce on foot.

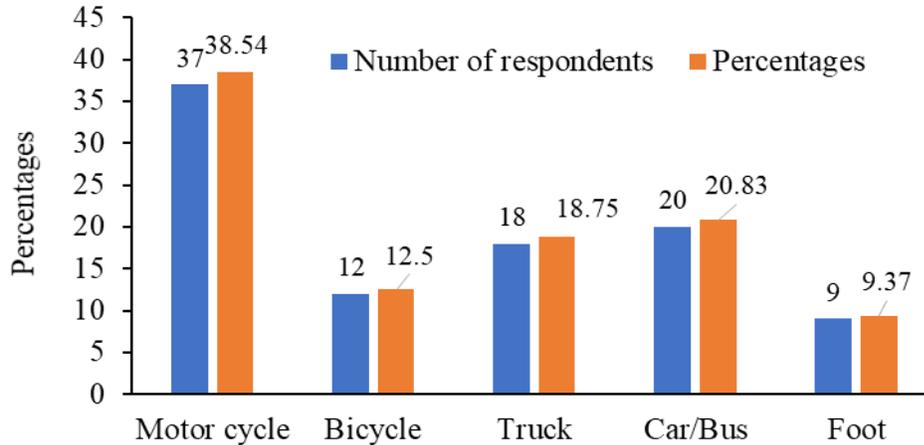


Fig. 6: Means of Transportation of Respondents

Information on the obstacles to accessibility of the study area is collected and presented in Fig. 7. This shows that 47 (48.96%) respondents are in the view that poor motorable roads prevent them from accessing markets and neighboring towns /villages. 23 (23.96%) respondents stated that high cost of transport limits market accessibility, 19 (19.79%) respondents reported that distance is the factor affecting the accessibility of the study area which

also affects distribution of goods while 7 (7.29%) respondents are of other opinion that other reasons apart from the mentioned pose obstacles to efficient transportation in the area. The result has revealed that transport system in the study area has limited market for agricultural produce, affecting the interaction among geographical and economic regions thereby limiting the opening up of new areas, which brings economic development.

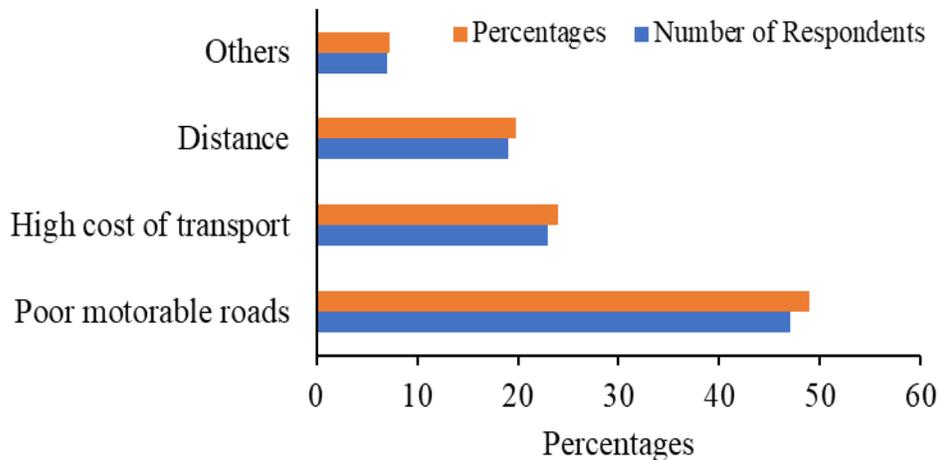


Fig. 7: Obstacle to Accessibility

Most of the roads available in the study area are untarred road with a few surface dressed roads, of which most parts are dilapidated. Some of the hamlets are only accessible through foot-paths; indicating that access to means of transportation is very difficult in most parts of the study area. This has shown that the transport system in the study area is very poor which tend to limit the space of transformation and integration of the society.

### 4.3 Benefits of Transportation in the Study Area

This section pinpoints the unique functions and associated benefits of road transportation in the economic development of Fufore L.G.A and the issues of road conditions in the study area. This indicates the need to provide and improve other

means of transportation in the study area so as to alleviate the problems of transportation cost and make it easier for residents to transport their produce.

Fig. 8 revealed that 11.46% of the respondents earn less than or 5000 as their income, 20.83% of the respondents earn less than Or 10000 as their income, 17.71% of the respondents earn less than or 15000,

40.63% earn less than or just 20000 and just 9.38% respondents of the population earn more than 20000. This shows that the level of poverty is high in the study area which is due to poor transport system, as stated by Lucas et. al. [29-35] that in order to reduce poverty level, there is the need for the supply of adequate transportation infrastructure and services

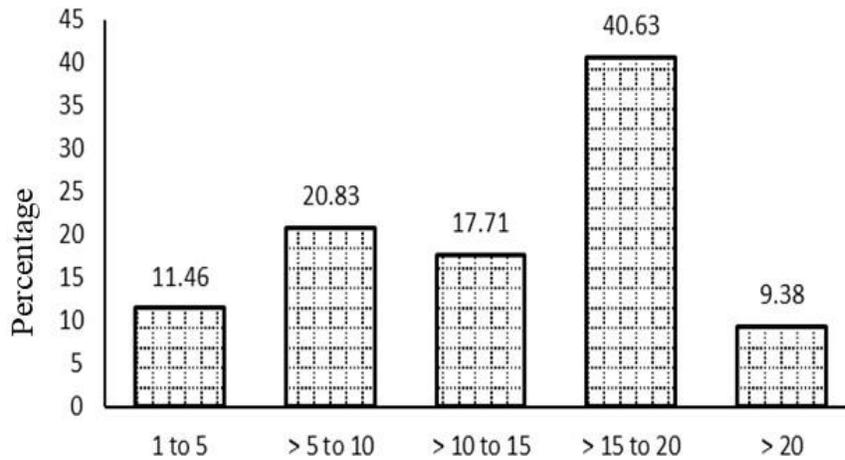


Fig. 8: Income Level of Respondents in Thousands

#### 4.4 Types of Goods Transported

Data collected on the types of goods transported from the study area to neighboring

towns/villages is being analyzed and presented in the Fig. 9

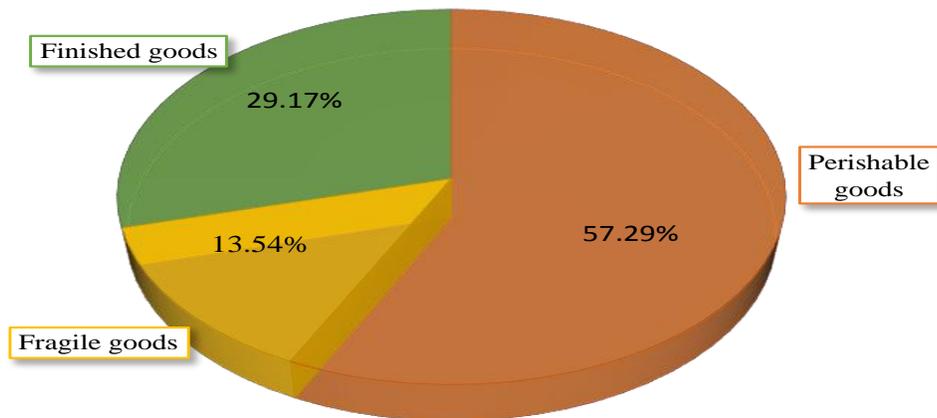


Fig. 9: Types of Goods Transported

The information 9 revealed that majority of the respondents (57.29%) are involved in transporting perishable goods such as agricultural produce from the farm to the markets, 13 (13.57%) respondents are involved in transporting fragile goods (i.e. breakable goods) and 28 (29.17%) respondents transport finished goods from the study area to other places or from neighboring towns to the study area. Thus, with

the condition of the road in the study area, this makes it very difficult as this affects the consumption of resources including land, energy, time and human lives as stated. The respondents also indicated that the condition of the roads and the cost of transportation limit the frequency of their travels. This has affected the connection chain in business (i.e. from suppliers to consumers) and is a major

influence on consumer’s satisfaction. The number of times the respondents transport their goods is

indicated in Fig. 10.

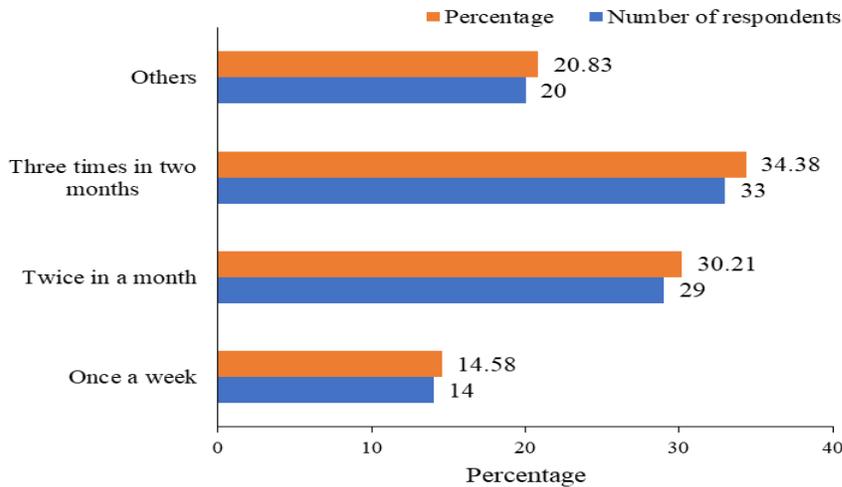


Fig. 10: Number of Times Goods are Transported by Respondents

#### 4.5 Distance Covered by Respondents

Responses presented in Fig. 11 revealed that 19.79% of the respondents cover less than 5km to the market from their farms/houses, 26.04% of the

respondents cover 6km to 10km to the market, 40.63% of respondents cover about 11km to 15km to the market from their houses/farms while 13.54% cover more than 16km to the market.

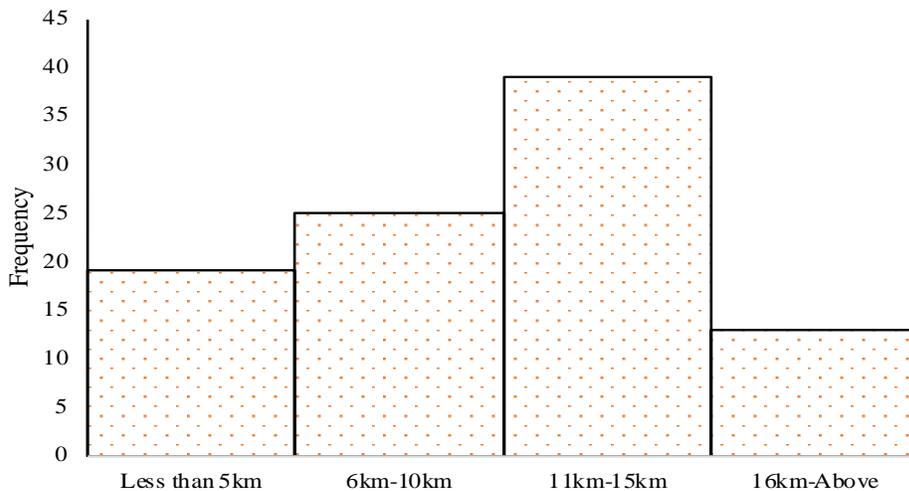


Fig. 11: Distance covered by Respondents from Houses/Farms to the Markets

#### 4.6 Cost of Transport

Responses on the cost of transporting goods are presented in Fig. 12. 11.46% of the respondents stated that it cost 5000 or less for them to transport their goods, 43.75% of the respondents revealed that it cost about 10000 to transport their goods from/to

the study area, 36.46% of the respondents stated that it cost 11000 to 15000 for them to transport their goods while 8.33% of the respondents stated that it cost more than 15000 to transport their goods to the market. The cost of transportation as compared to their income is very high and could affect the distribution of goods to other place thereby

decreasing business profit, increasing retail prices and also affecting service quality (more frequent deliveries).

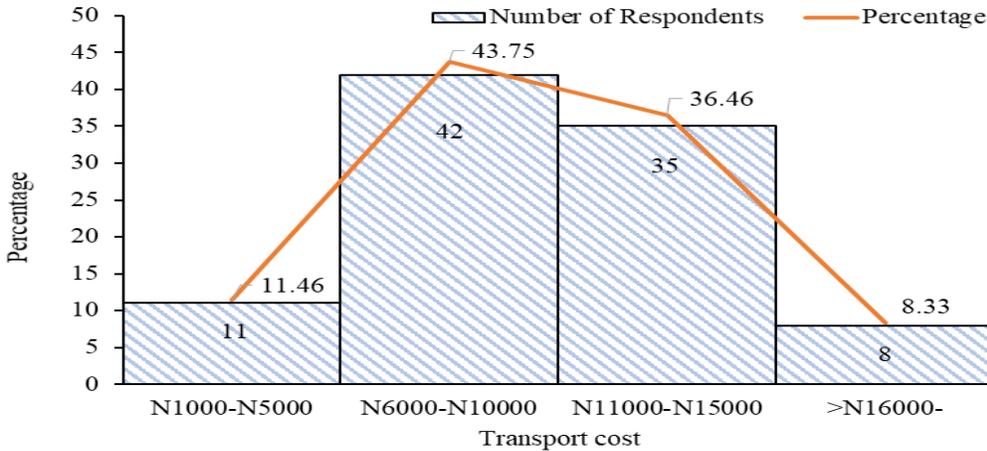


Fig. 12: Cost of Transporting Goods by the Respondents

#### 4.7 Effect of Road Condition on Transport Cost

Data collected on the opinion of respondents on whether the conditions of roads affect the cost of transportation (Fig. 13) revealed that 94 (97.92%) respondents agreed that the conditions of the roads

affect the cost of transportation in the study area while 2 (2.08%) respondents are in the view of the fact that the conditions of the roads have no effects on cost of transportation. The reason of those that responded in the affirmative being that the

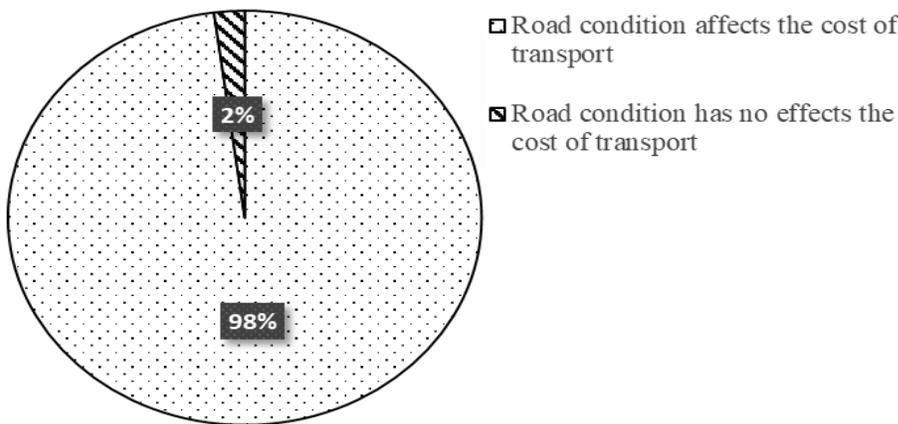


Fig. 13: Effects of Road Condition on Transportation Cost

cost of transport for those areas with better road are less expensive as compared to the dilapidated roads. The higher cost of transportation increases the cost of goods supplied to the study area and affects the cost of transporting farm produce to neighboring markets. This also leads to an increase in domestic production cost thereby delaying delivery of raw materials, affecting production process and affecting the competition advantage of the economy.

#### 4.8 Effects of Road Condition on Productivity

Regarding whether the condition of roads affects the rate of the respondents' productivity is displayed in Fig. 14. Seventy-two (75%) respondents agreed that the nature of roads in the study area affects the rate of production of goods and services while 24

(25%) respondents stated that the nature of roads in the study area has no effects on the rate of production.

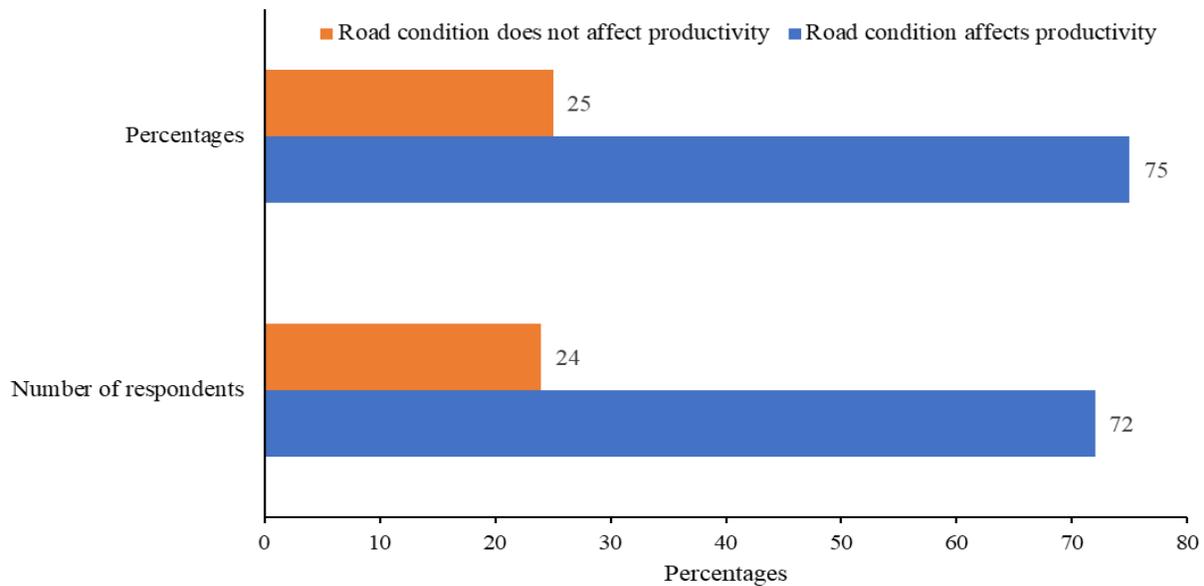


Fig. 14: Effects of Road condition on Rate of Productivity in the Study Area

Economic productivity could be limited due to inadequate basic mobility by people and workers particularly. Improving transport system will increase the productivity of people particularly workers and also improving the roads and providing more transport low incomes will increase productivity of goods and services.

#### 4.9 Enhancing Economic Development

All the respondents agreed that provision of access roads and the rehabilitation of the existing roads could aid in improving the standard of living of the people in the study area. The responses displayed in Fig. 15 revealed that 54.17% of the respondents

were of the opinion that construction and maintenance of roads will provide job opportunities for people in Fufore L.G.A, 17.71% of the respondents were of the opinion that provision and proper maintenance of roads in the study area will reduce the cost of transportation, 20.83% of the respondents are in view availability of good roads could enable easy movements of goods to the markets thereby improving economic activities of the people in the study area while 7.29% of the respondents were of the opinion provision and maintenance of assist in bringing social amenities to the study area.

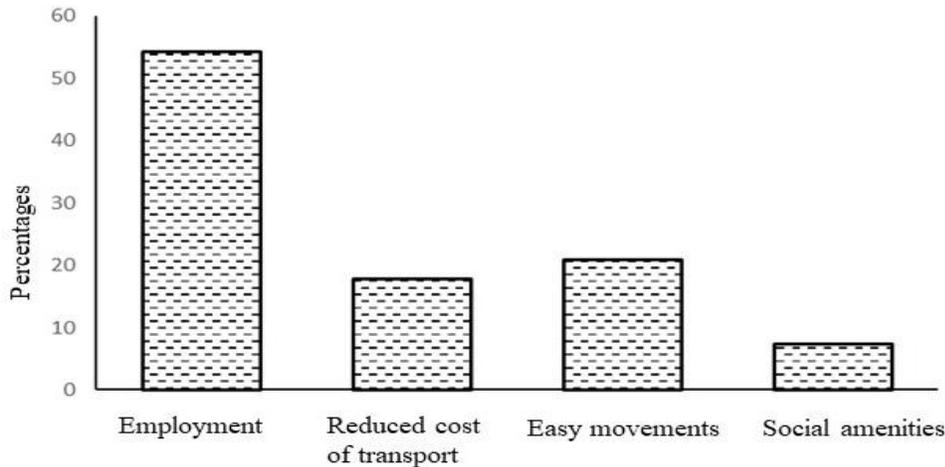


Fig. 15: Positive Impact of Transportation on Economic Development by Respondents

## 5 Conclusion and Recommendations

The study was centered on the impact of transportation on the economic development of Fufore L.G.A. of Adamawa State in Nigeria. The results show that poor road constitutes the major obstacle to accessibility of the study area. The research revealed that the poor road condition affects the rate of productivity and the distribution of farm produce. It also affects the income level of the people, thereby lowering individual personal income, hence reducing the gross regional product of Fufore L.G.A. The nature of roads has negatively affected the cost of transporting goods to the market in the study area and other regions. Hence, there is the need for improvement in transport system in order to provide adequate accessibility to markets and local communities, which in turn is necessary condition for the efficient operation of manufacturing, retail, labor and housing markets. It is therefore safe to conclude that road transportation has impact on the economic development of the study area. Improvements to the primary village paths, tracks, culverts and access routes could reduce the burden of basic household and productive tasks. The availability of intermediate means of transport with larger carrying capacity is likely to have a greater initial impact on the well-being of the poor in the study area.

The following recommendations were drawn from the results;

- i. Government in all sectors should try to construct and maintain all roads leading to various settlements in order to improve the socio-economic activities in the study area.
- ii. Government should make sure that all awarded contracts are adequately

implemented to ensure development of economic activities

- iii. Market roads should be designed to follow the Christaller's traffic principle and accordingly pass through the largest possible number of villages. Each coming vicinity to market road ought to have a complement of dendritic branching out into various villages.
- iv. Commercial trucks should be supplied to enable peasant farmers who cannot afford to own vehicles to hire at a subsidized rate to transport their farm produce.
- v. Access to good markets for rural communities to dispose of their farm produce should be considered a matter of urgency by the government. This will no doubt enhance the income level of the people thereby reducing the level of poverty in the rural areas especially in the study area.
- vi. A similar study should be conducted on an area that has good access road to ascertain the impact on the standard of living of the people.

## References

- [1] Skorobogatova Skorobogatova, O. and Kuzmina-Merlino, I. Transport infrastructure development performance. *Procedia Engineering*, volume 178, (2017), pp. 319-329
- [2] Emmanuel, A., A., and Olamigoke, E. A. The role of road transportation in local economic development: A focus on Nigeria transportation system. *Dev. Ctry. Study*. ISSN, 2224607X, (2013).

- [3] Seedhouse, A., Johnson, R., and Newbery, R. Potholes and pitfalls: the impact of rural transportation on female entrepreneurs in Nigeria. *Journal of transport geography*, volume 54, (2016). pp. 140- 147.
- [4] Daud, Z., Abubakar, M.H., Kadir, A.A., Latiff, A.A.A., Awang, H., Halim, A.A., Marto, A., Adsorption studies of leachate on cockle shells. *International Journal of GEOMATE*, Volume 12 (29), (2017), pp. 2186-2990.
- [5] Abba, H.A., Sani, L., Hijab, A.M., Daud, Z., Novel admixture for improvement of foundations on tropical expansive soils. *International Journal of Integrated Engineering*, Volume 9(1), (2017), pp. 44-49.
- [6] Ogunleye, O. S. Towards performance measures of transportation networks in Nigeria. Lessons from developed countries. Kuwait chapter of Arabian journal of business and management review, volume 2(10), (2013), pp. 63-70.
- [7] Faridi, M. Z., Malik, M. S., and Bashir, F. Transportation, telecommunication and economic development in Pakistan. *Interdisciplinary journal of research in business*, volume 1(7), (2011). pp. 45-52.
- [8] Johansson, F., Tornberg, P., and Fernstorm, A. A function- orientated approach to transport planning in sweden: limits and possibilities from a policy perspective. *Transport policy*, volume 63, (2018). pp. 30- 38.
- [9] Michael, F. L., Noor, Z. Z., & Figueroa, M. J. Review of urban sustainability indicators assessment–case study between Asian countries. *Habitat International*, volume 44, (2014). pp. 491-500.
- [10] Ubogu, A. E., Ariyo, J. A., & Mamman, M. Port-hinterland trucking constraints in Nigeria. *Journal of Transport Geography*, volume 19(1), (2011). pp. 106-114.
- [11] Duranton, G., Henderson, V., and Stange, W. (Eds). *Handbook of regional and urban economics*, vol. 5B. Elsevier. (2015).
- [12] Maparu, T. S., and Mazumder, T. N. Transport infrastructure, economic development and urbanization in India (1990- 2011). Is there any casual relationship?. *Transportation research part A: policy and practice*, volume 100, (2017), pp. 319- 336.
- [13] Lakshmana, T. R. The broader economic consequences of transport infrastructure investments. *Journal of transport geography*, volume 19(1), (2011), pp. 1-12.
- [14] Leigh, N. G., and Blakely, E. J. *Planning local economic development: theory and practice*. Sage publications (2016).
- [15] Sciara, G. C. Metropolitan transportation planning: Lessons from the past, institutions for the future. *Journal of the American Planning Association*, volume 83(3), (2017), pp. 262-276.
- [16] Pradhan, R. P., and Bagchi T. P. Effect of transportation infrastructure on economic growth in India: the VECM approach. *Research in transportation in economics*, volume 38(1), (2013), pp. 139- 148.
- [17] Daud, Z., Abubakar, M.H., Kadir, A.A., Latiff, A.A., Awang, H., Halim, A.A., Marto, A., Optimization of leachate treatment with granular biomedica: Feldspar and Zeolite. *Indian Journal of Science and Technology*, Volume 9(37), (2016), 91845.
- [18] Abdulrahman, A., Latiff, A.A.A., Daud. Z., Ridzuan, M.B. & Jagaba, A.H., Preparation and Characterization of Activated Cow Bone Powder for the Adsorption of Cadmium from Palm Oil Mill Effluent. *IOP Conference Series: Materials Science and Engineering*. Volume 136(1), (2016), 012045.
- [19] Latiff, A. A. A., Adeleke Abdul Rahman, O., Daud, Z., Ridzuan, M. B., & Mat Daud, N. F., Batch Adsorption of Manganese from Palm Oil Mill Effluent Onto Activated Cow Bone Powder. *ARPN Journal of Engineering and Applied Sciences*, Volume 11(4), (2016), pp. 2627-2631.
- [20] Daud, Z., Nasir, N., Aziz Abdul Latiff, A., Ridzuan, M. B., & Awang, H., Treatment of Biodiesel Wastewater by Coagulation-flocculation Process Using Polyaluminium Chloride (PAC) and Polyelectrolyte Anionic. *ARPN Journal of Engineering and Applied Sciences*, Volume 11(20), (2016), pp. 11855-11859.
- [21] Adeleke, A. R. O., Abdul Latiff, A. A., Daud, Z., Ridzuan, B., and Mat Daud, N. F., Remediation of Raw Wastewater of Palm Oil Mill Using Activated Cow Bone Powder through Batch Adsorption. *Key Engineering Materials*, 705, (2016), pp. 380-384.
- [22] Daud, Z., Awang, H., Kassim, A.S.M., Hatta, M.Z.M. & Aripin, A.M., Comparison of pineapple leaf and cassava peel by chemical properties and morphology characterization. *Advanced Materials Research*. Volume 974, (2014), pp. 384-388.
- [23] Habeeb, S.A., Latiff, A.A.A., Daud, Z. & Ahmad, Z. The start-up of hybrid, anaerobic up-flow sludge blanket (HUASB) under a range of mesophilic and thermophilic temperatures. *EnvironmentAsia*, Volume 4(2), (2011), pp. 63-68.
- [24] Daud, Z., Aziz, H.A., Adlan, M.N., Hung, Y.-T., Application of combined filtration and

- coagulation for semi-aerobic leachate treatment. *International Journal of Environment and Waste Management*, Volume 4 (3-4), (2009), pp. 457-469.
- [25] Daud, Z., Suhani, N., Mohamed, R.M.S.R., Awang, H., Feasibility of banana (*Musa sapientum*) trunk biofibres for treating kitchen wastewater. *Nature Environment and Pollution Technology*, Volume 16 (4), (2017), pp. 1205-1210.
- [26] Spieser, K., Treleaven, K., Zhang, R., Frazzoli, E., Morton, D., & Pavone, M. Toward a systematic approach to the design and evaluation of automated mobility-on-demand systems: A case study in Singapore. In *Road vehicle automation*. Springer, Cham. (2014), pp. 229-245.
- [27] Lee, J., Cho, S. I., Chun, H., Jung-Choi, K., Kang, M., & Jang, S. N. Life course indices for social determinants of self-rated health trajectory in Korean elderly. *Archives of gerontology and geriatrics*, volume 70, (2017), pp. 186-194.
- [28] Girei, A. A., Usman, I. S., & Onuk, E. G. Profitability Investigation of Rice Production in Fufore Local Government Area of Adamawa State, Nigeria. *European Journal of Academic Essays*, volume 3(3), (2016), pp. 137-140.
- [29] Lucas, K., Mattioli, G., Verlinghieri, E., & Guzman, A. Transport poverty and its adverse social consequences. In *Proceedings of the institution of civil engineers-transport* Volume 169, No. 6, (2016), pp. 353-365. Thomas Telford (ICE Publishing).
- [30] Sanni-Anibire, M. O., Mahmoud, A. S., Hassanain, M. A., & Almutairi, F. Health and safety perception of construction workers in Saudi Arabia. *Architecture Civil Engineering Environment*, volume 11(3). (2018).
- [31] Mahmoud, A. S., Sanni-Anibire, M. O., Hassanain, M. A., & Ahmed, W. (2018). Key performance indicators for the evaluation of academic and research laboratory facilities. *International Journal of Building Pathology and Adaptation*.
- [32] Antonyová, A., Antony, P., Abdullah, A.H., Nagapan, S., Daud, Z., Abubakar, M.H. Certain building materials with respect to their thermal properties as well as to their impact to environment. *International Journal of Integrated Engineering*, Volume 10 (4), (2018), pp. 126-130.
- [33] Aminudin, E., Md Din, M.F., Hussin, M.W., Abdullah, A.H., Iwao, K., Ichikawa, Y. Properties of agro-industrial aerated concrete as potential thermal insulation for building. *MATEC Web of Conferences*, Volume 47, (2016) art. no. 04020.
- [34] Yunus, R., Abdullah, A.H., Yasin, M.N., Masrom, M.A.N., Hanipah, M.H. Examining performance of Industrialized Building System (IBS) implementation based on contractor satisfaction assessment. *ARPN Journal of Engineering and Applied Sciences*, Volume 11 (6), (2016), pp. 3776-3782.
- [35] Bakar, S.K.A., Abdullah, A.H. Simulation of thermal performance in an office building. BEIAC 2012 - 2012 IEEE Business, *Engineering and Industrial Applications Colloquium*, art. no. 6226074, (2012), pp. 318-323.