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# An Assessment of Transportation Network in Kwaccham, Mubi South Local Government Area, Nigeria

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## Abstract

The study entitled "Assessment of transportation network in Kwaccham" is aimed at examining the existing road network in Kwaccham with the view to make plan proposal to improve the circulation system in the area. Survey research design was adopted to carry out the study. Systematic sampling technique was employed where the 375 compounds in Kwaccham were considered as the target population. Twenty percent (20%) comprising of 74 of the 375 houses covering 542 people were taken as the sample size. Structured Questionnaire consisting of 14 number questions were administered at interval of every five compound to cover the 375 houses. The data were analysed and presented in tabular form. The study revealed that most of the residence use Keke NAPEP (41.1%) for mobility, 54.8% of the residents have no direct link to access and 74.4% have enough space along their streets for road network construction. The researcher recommended that all the stakeholders should team up to contribute for road network construction and development in Kwaccham area.

Keywords: Transportation network, Assessment, circulation system

## 1. Introduction

The term transportation system is a means of conveying people and goods from one location to another by vehicles along roads, rails way and air (Adminda 2004).

It is also the conveyance of liquids like fuel and water through pipeline under pressure. Transportation network in Nigeria is one of the decaying infrastructures that needs serious attention. This is especially true when it comes to the road transport. The poor state of roads in Nigeria hasn't seen much change or improvement, if any, over the past few decades despite government efforts and promises. Transportation is one of the important keys to the economic development and growth of any country. This is because transportation connects people and places thereby enhancing cultural, economic, and social interactions. Transportation system available in Nigeria includes road transport, railway, air, and sea. Among the existing modes of transportation, the most used by Nigerians is road transport which is a fact in most countries. Road transportation in any society is meant to be easily accessible. People need road transportation for their day to day activities, to commute to their places of work or study, to transport their products, for inter-city and intra-city travel, among others. In Africa, Nigeria has the largest highway and road network. However, the state of road transportation in the country is very poor, (Olawale, 2019).

Transportation network or Circulation is the backbone and important land use in social, political, economic and cultural activity. Circulation is important in planning because functionality of land use, aesthetics and convenience can be achieved through a good transportation network, Roa (2011).

Road network is commonly considered as a valuable factor of development for public basic infrastructure and any kind of investment and harnessing of economic potential. The road network has special significance since it provides the only mode of trip and communication. Okonkwo, (1998). The objectives of this study are as follows:-

- To identify the existing road network system in Kwaccham area;
- To identify the problem areas on the road network system of Kwaccham;
- To assess the accessibility of road network by residence in Kwaccham; and
- To make a plan proposal to improve circulation system (road network) in the study area.

#### 2. Conceptual Clarification

Transportation planning is the art and science of preparing transportation plan for urban area, regions and countries. Additionally it is the science and art that seek to study the problems that arise in providing transportation facilities in our urban and regional setting and to prepare systematic basics for planning such facilities.

Okonkwo, (1998) as cited in Ilesanmi defined transportation planning simply as the art not science of repairing transportation for an urban area, or for a whole state as the case may be, in broad terms, it could mean the preparation of transportation network for the entire country.

#### 2.1. Types and Hierarchy of Roads

According to planning tank (2018), a good planned city/town requires an efficient transport network. This can only be achieved if the town planner knows the different hierarchy of roads. Thus a town planner and transport planner need to have a good knowledge of hierarchy of roads in both urban and rural areas. A productive urban transport system should be accompanied by relevant order. In essence, the hierarchy of road network largely depends on the functionality that the street is expected to perform, and the kind of circulation depicted by the users. The design speeds, lane widths and other geometric characteristics are adapted to suit the road functionality. These guidelines are dependent upon the features of the urban way.

#### 2.2. Arterial (Primary) Roads

This is usually owned and managed by Federal government primarily, this class of road usually cover 90m – 100m wide (right-of-ways (ROW), road shoulders and the lanes). It links the states and neighboring countries.

They are the primary roads & are on top in hierarchy of roads for guaranteeing versatility capacity. They convey the biggest volumes of movement and longest treks in a city. These are characterized by through movement with confined access from carriageway to the side. In such cases, unique provisions ought to be acquainted with decrease clash with the through movement. These roads have the most extreme right of way around the four classes and cater speed of 50-60 km/h and a ROW of 50-80 m.

#### 2.3. Sub - Arterial Roads

This road type is controlled and financed by the state government in their headquarters, it is usually measured 18-25 meters, speed limit is highly essential. It conveys same movement volumes as the arterial roads and due to its overlapping nature, Sub arterial roads can function as arterials. This is setting particular and is dependent upon the capacity and the area use. Advancement it passes through and caters to a velocity cutoff of 50 km/h (same as arterial roads) The ROW of this classification of streets changes from 30-50 m.

#### 2.4. Distributor/Collector Roads

This is overseen by local government and it connects neighborhood. As the name recommends, these are connector ways which circulate the activity from access lanes to arterial and sub arterial roads. They are portrayed by a speed limit of 30km/h and have a ROW halfway of access lanes and two sorts of arterials i.e. 12-30m. It conveys moderate movement volumes contrasted with the arterial roads hence, merchant streets can go about as a sub arterial roads and as access lanes, contingent on the capacity and the area utilization of the surroundings.

#### 2.5. Access Streets

This functions within a neighborhood, it is either managed by local government or the community concern and it range between 9 – 12 meters width. They are utilized for access capacities to bordering lands and regions. A greater part of excursions in urban regions normally begin or end on these streets. They cater to velocity of 15-30km /h and have a ROW of 15m-30m. They convey generally lower volumes of movement at low speeds. Design types include T-turning by whose wings should be at least a car length the deep on each side to enable emergency vehicle. Such as fire fighters and ambulance negotiate it problems can be identified and possibly solution suggested. (Jackiva, Nathanail, and Richter 2018).

#### 2.6. Functions of Road Network

#### 2.6.1. Social

Road network facilitates movement of peoplefor social interaction and connectivity of isolated local community with public transport. Roads connect remote communities with the areas where employment options are more concentrated and services and facilities more readily available. (Rodrique and Notteboom, 2013).

#### 2.6.2. Economic

In connecting geographic locations, road networks facilitate the transport and movement of people, goods, and services, thereby enhancing welfare of people.

#### 2.6.3. Mobility

The function of a road network is to facilitate movement from one area to another. As such, it has an important role to play in the urban environment to facilitate mobility. It furthermore determines the accessibility of an (urban) area (together with public transport options). The capacity of a road is the maximum number of vehicles that can pass a certain road section per hour. Therefore, one tries to prevent or reduce congestion with traffic management measures.

#### 2.6.4. Safety

Safety of road users is typically focused on road safety (prevention of accidents through speed control, seatbelt enforcement, etc. Proper planning is critical in ensuring road safety. In the case of national roads, where the speed limit can exceed 50-60 km per hour, the proliferation of roadside development should be avoided. The lay-out of the road should help to improve traffic safety, for example by providing separate bicycle lanes and physically separated driving directions for motorways and larger urban roads, (Sharpe, 2012).

#### 2.6.5. Security Issues

The presence or absence of routes from one place to another can influence the mobility of the public, but also of criminals. This can have a direct effect on the perceived attractiveness of a location to criminals. Security issues influence by the pervasiveness of the road network because an easy escape adds to the attractiveness of targets, are: Burglary, Robbery, Raid, and Vehicle theft, (Sharpe, 2012).

#### 2.7. The Challenges of Road Transportation Network in Nigeria

The following are some of the major problems of road transportation network in Nigeria according to Olawale (2019).

#### 2.7.1. Poor Road Infrastructure or Poor State of the Roads

Some of the recently constructed road infrastructures in Nigeria are poorly built with low-quality materials. This is mostly as a result of corruption from both the people awarding the road contracts and the construction companies. Travelling is very difficult and sometimes almost impossible especially during the raining season due to lots of uneven surfaces, potholes, and eroded areas. Some of the roads are covered by water during the raining season due to improper drainage system.

#### 2.7.2. Poorly Maintained Roads

Most of the major roads networks in Nigeria were constructed in the 80s and early 90s, so they are old and are already wearing out. There is poor maintenance and low-quality materials, used for repairs which over time the condition of such roads keeps getting worse. Sometimes, repairs are not started until a major damage occurred and then it becomes more difficult and expensive to maintain the road surface. When the repairs are eventually carried out, they are done poorly.

#### 2.7.3. Road Congestion Due to Rapid Urbanization and Overpopulation

This is a serious challenge in Nigeria today, especially in the major cities like Mubi. In Nigeria, road transport accounts for ninety percent of both passenger and freight transport. Due to rapid urbanization and overpopulation in major cities, the transport demand has exceeded the supply and capacity of the road networks available. Rapid urbanization and overpopulation mean more vehicles on the road. The heavy use of these roads is also part of the problems causing damage to many of the networks.

#### 2.8. Accidents

Most vehicular accidents in Nigeria are caused by two main factors; road and human. Road factors include things like bad roads, abandoned sites or ongoing sites of repairs, traffic jam or road congestion. The human factors include reckless driving, disobeying of traffic light and signs, ill-tempered and impatience drivers. The rate of accidents on Nigerian roads is a major problem which the government needs to tackle heads on.

#### 2.9. Poor State or Inadequacy of Other Means of Transport Especially Railway Transport

This is both a cause and also one of the problems of poor road infrastructure in Nigeria. In most developing countries, rail transport is one of the major intercity transport system used. Also, underground rail transport known as subways are common in major cities in developed countries. This reduces the demand for road transport. In addition, heavy loads are transported using railway transports in all developed countries. This also reduces the load on the roads and the danger posed by lots of heavy trucks and Lorries that can be seen on most Nigerian roads.

#### 2.10. Environmental Pollution

The two main environmental pollution problem of road transport in Nigeria are air and noise pollutions. Air pollution is caused by carbon monoxide, hydrocarbons, lead, and nitrogen emission from the exhausted pipes of automobiles. These pose a serious threat to the health and quality of life of motorist and people living in the area. Also, noise from automobiles and their horns is a major problem of road transportation in Nigeria.

#### 2.11. Solution to the Stated Problems

In order to achieve proper efficiency in transportation network planning, the existing identified problems should be solved through the following: proper management of the road, public campaign on the use of the roads, adequate manpower training weather and climate record and forecasting spare part of vehicles provision, government. Intervention and subsidy in all aspect of transportation, public and private partnership, proper signage (Sign Board) along major roads. (Okonkwo, M. M.1998).

#### 3. Methodology

The data for the study were gathered through both primary and secondary sources.

According to 2006 population census, the population of Kwaccham ward in Mubi town is (2,347) people (two thousand three hundred and forty seven), projected to 2019 thus.

October, 2020

Pn = p1 (1+R)n	<u>1</u> (	00	2012 = 2,347 (1 + 3.5)
100	=		2,747 people

Systematic sampling technique was adopted where 375 compounds in Kwaccham were considered as the target population. Twenty (20%) percent comprising of 74 of the 375 houses covering 542 people were taken as the sample. Structured Questionnaire consisting of 14 number questions were administered at interval of every five compound to cover the 375 houses.

## 4. Results and Discussion

The data collected from the field were analyzed, tabulated and presented below based on the issues raised in the questionnaire. Major streets in the area include Kwaccham – Vaatita road, Kwaccham – Kasuwan Borkono road, Kwaccham – Wuro Patuji road and Kwaccham – Seborei road. These roads that linked Kwaccham with other four surrounding neighborhoods within Mubi metropolitan area are in bad condition and not tarred. This is depicted in the plates (Plates (a) – (e)) below.



Figure 1: Earth Road with Inadequate Sides Drain along Kwaccham – Vaatita Road



Figure 2: Wears and Tears of Road Materials with Deep Gullies along Kwaccham – Vaatita Road by Former SDP Secretariat



Figure 3: No Sides Drainage and Worn Out Road Materials along Kwaccham - Wuro Patuji Road



Figure 4: Earth Road without Side Drainage and Worn Out Road Material with Potholes Along Kwaccham – Seborei Road



Figure 5: Earth Road without Sides Drainage along Kwaccham - Kasuwan Borkono by Gidan Ridi Warehouse

Sex	Frequency	Percentage (%)
Male	55	75.3
Female	18	24.7
Total	73	100

Table 1: Sex Composition Source: Field Survey, 2019

Based on the information obtained from table 1, the result revealed that 24.7% of the respondents are female while 75.3% are male. Therefore male has the highest percentage being the representative of the householders.

Age	Frequency	Percentage (%)
18 – 25	10	13.7
26 - 35	20	27.4
36 - 45	10	13.7
46 – 55	23	31.5
56 AND	10	13.7
ABOVE		
Total	73	100

*Table 2: Age Composition Source: Field Survey, 2019* 

Table 2 above shows the classification of the population into different age groups which help in determining development and provision of necessary facilities based on age groups. The grouping are 18 - 25, 26 - 35, 36 - 45, 46 - 55, 56 and above. The age group with the highest percentage of 31.5% is 46-55. This implies that majority of the people are within the active age group and may be willing to contribute physically or otherwise to the development of circulation system in the area.

Variables	Frequency	Percentage (%)
Single	13	17.8
Married	40	54.8
Divorced	10	13.7
Widow	10	13.7
Total	73	100

Table 3: Marital Status Source: Field Survey, 2019

Based on the table 3 above it can be seen that majority of the respondents are classified into productive age group which ranges from single, widows and the married with the highest percentage of 54.8%.

Variables	Frequency	Percentage (%)
Farmer	20	27.4
Trader	13	17.8
Civil Servants	30	41.1
Others	10	13.3
Total	73	100

Table 4: Occupation Distribution Source: Field Survey, 2019 The predominant population based on occupational distribution is civil service with 30 people out of 73 (41.1%). Farming is second in the distribution even though it has been observed that most of the respondents engaged in other trade other than farm combine farming with their main occupation.

Variables	Frequency	Percentage (%)
Primary School	8	11
Secondary School	15	20.5
Tertiary Institution	32	43.9
Non Formal	3	4.1
Non-Schooling	15	20.5
Total	73	100

Table 5: Educational Qualification Source: Field Survey, 2019

The table 5 above shows that, the majority of the people living in the community have acquired tertiary institutional qualification, as indicated 32 of the respondents or 43.9%. Those with secondary qualification as well non-schooling are 15 respondents each or 20.5%.

Variables	Frequency	Percentage (%)
Since Birth	30	41.2
1 – 5 Years	15	20.5
6 – 10 Years	8	11
11 – 20 Years	8	11
21 – 35 Years	10	13.6
36 And Above	2	2.7
Total	73	100

Table 6: Duration of Stay in Kwaccham Source: Field Survey, 2019

From table 6 above, it is clear that 30 or 41.2% of the respondents were born in the study area. Fifteen (20.5%) of them stayed for 1-5 years, 8 stayed 6-10 and 11-20 years respectively while 10 respondents stayed up to 21-31 years.

Variables	Frequency	Percentage (%)
Keke NAPEP	30	41
Taxi Bus	8	11
Private Car	15	20.5
Motor Cycle/Bicycle	15	20.5
Animal	2	2.0
Others	3	5
Total	73	100

Table 7: Mode of Transportation Source: Field Survey, 2019

The table 7 above shows that the major mode of transportation in the community is Keke NAPEP which constitute 41% followed by private car and motorcycle/bicycle 20.5%, taxi 11%, and other means of transportation 5%.

Response	Frequency	Percentage (%)
Yes	33	45.2
No	40	54.8
Total	73	100

Table 8: Direct Link to Access Road in the Community Source: Field Survey, 2019

From the above table 8, 45.2% of the respondents has access road and 54.8% don't have access road in the community. The information depicts serious challenges of transportation network in the study area.

Response	Frequency	Percentage (%)
Tarred and Good	27	37
Tarred but Fear	15	20.5
Tarred but Bad	3	4.1
Untarred but accessible	10	13.7
Untarred and Bad	7	9.6
Untarred but Not accessible	3	4.1
Total	73	100
Untarred but Not accessible Total	3 73	4.1 100

Table 9: Description of Exiting Road Condition Source: Field Survey, 2019

The data above shows almost about 37% of the respondents opined that existing road in the area is tarred and good, tarred but fear 20.5% (20.5), tarred and bad 3 (4.1), untarred but accessible 13.7% (10), untarred and bad 9.6% (7) while 3 (4.1%) said untarred and not accessible

Response	Frequency	Percentage (%)
Yes	55	75.4
No	18	24.6
Total	73	100

Table 10: Possibility of Construction of Access Road Wide Enough Along the StreetSource: Field Survey, 2019

The data above shows that 75.4% of the respondents said yes while 24.6% said no to the possibility of construction of access road wide enough along the street. This implies that lack of space is not a does not constitute a serious challenge to construction of good access road in Kwaccham.

Response	Frequency	Percentage (%)
The Terrain is Difficult	25	34.3
Narrowness of The Street	30	42.0
Others	18	23.7
Total	73	100

Table 11: Reasons for Difficulty in Road Construction Source: Field Survey, 2019

The data above present reason for difficulty in road construction in Kaccham, where 30 of the respondents (42%) indicated narrowness of the street. Twenty five or 34.3% depicts difficult terrain while 23.7% are other challenges. This data revealed that few of the streets are too narrow to construct standard access and the reasons are insignificant.

Response	Frequency	Percentage (%)
NGOS	5	6.85
State Government	35	47.95
Mobilization Of People	23	31.5
Donation Of Materials	6	6.85
Others	4	5.85
Total	73	100

Table 12: Major Contributor to Developing Road Network in Kwaccham Source: Field Survey, 2019

From the data in table 12 above, the main contribution for road development in the area is by the state government consisting 47.95% of the respondent's opinions. Hence, 31.5% shows mobilization of people, 6.85% said donation of material and 5.85% are other means.

Response	Frequency	Percentage (%)
Labour	45	61.7
Finance	12	16.4
Mobilization of People	10	13.7
Donation of Materials	6	8.2
Total	73	100

Table 13: Willingness to Contribute for Access Road ImprovementSource: Field Survey, 2019

Table 13 above shows that majority of the respondents in the community are willing to contribute labour for the construction and development of road network in the area which account for 61.7% of the respondents, 13.7% shows mobilization of people, 16.4% said finance, while 8.2% shows donation of materials.

An open question was put to the respondents to please advise more (if any) for the development of road/circulation system in Kwaccham. The information recorded shows that:

- Government should come to their aid as they are ever ready to work and cooperate to develop access road in their community.
- Government needs to take care of the road circulation challenges.
- Government should help them without delay.

Source: Research Field Survey, 2019.

#### 5. Discussion of Findings

From the finding of the study road is one of the current infrastructure problem of Kwaccham community. The absence of portable road network in any community or society has an adverse effect on that area or their socio-economic being of the community. Olawale (2019) observed that the availability of portable road circulation in any community plays a vital role in the realization of good plan of an urban area. It reduce occurring of accident and bring about healthy environmental improvement.

Although the existing road in the area is good, there is need to connect the remaining majority or the residences that have no direct access to road. Spaces constrains exist in some other streets for construction of standard access road. Local government council and organisation seems to have weak support for road construction as depicted by the finding of the research where 47% of the respondents attested the facts. Road network planning and development is a collective responsibility of the stakeholders which include government, community and non-governmental agencies both at home and outside the state or the country. It is worth noting that, individual members of the community are ever ready and willing to contribute their own quota to the development and construction of road network in their area.

#### 6. Conclusion

In conclusion, this research revealed that most of householders are male and within an active age group that are supportive of road network construction. Their marital status, educational status and occupation depicts responsibility and willing to develop and stay within the community. Most of the respondents has Kwaccham as their place of birth and mostly use KEKENAPEP as the major mode of transportation but about 55% claim to have no access road network. The existing road in the area is tarred and good but it did satisfy the required transportation network in the area. There is enough space along the various street for road construction and the state government is the major contributor to road construction and development as claimed by the most of the respondents.

Therefore it is worth noting that, Road network is inadequate in Kwaccham ward there by making vehicular movement difficult leading to socio-economic, safety and security challenges in the area. Erosion has affected some of the street due to poor planning and maintenance by the residents. Stakeholder's team participation is a strong stool that can be used and develop and sustain road network in Kwaccham.

#### 7. Recommendations

Based on the findings of this study, the following recommendations were made for improving the living standard of Kwaccham community through providing sustainable road infrastructure.

- There is a need for government to intensify efforts to rehabilitate the existing road network system by providing fund, monitor and make adequate supervision of road projects.
- Proper maintenance and repair of existing road network and drainages should be done on regular basis and at appropriate time intervals.
- Drainage facilities should be provided along road networks to curtail erosion problems.
- All the stakeholders should team up to contribute for road network construction and development.
- All the three tiers of government need to invest in other forms of transport systems to reduce over dependency on the road network facilities.

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