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To Speak Out Matters: Implication of Rural Road Network on Healthcare Accessibility among Residents in the Nzema East Municipality, Ghana

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Abstract

Road transport plays a significant role in rural healthcare accessibility and utilization. This study assessed the implication of poor rural road transport network on healthcare accessibility and utilization in Akango, Gbwira Eshiem and Ampanshie in the Nzema East Municipality of Ghana. The study employed mixed method approach using questionnaires and interviews to investigate the subject matter. A total of 253 respondents were randomly sampled for the survey and 13 were purposively selected for the interviews. Descriptive and regression analysis was used to analyze the questionnaire while thematic analysis was used to analyze the interviews. On the nature of road network linking the communities to healthcare facilities, the study found that, residents road network were muddy and slippery, had a lot of potholes, dusty during the dry season, eroded along hills, bridges randomly collapsed, and marshy areas easily got flooded. Importantly, the regression results revealed that complication of diseases, self-medication, difficulty in accessing referral services, challenge of transporting medical supplies to health facilities, difficulty of accessing maternity and childcare and the use of life-risking routes to access healthcare have a significant relationship with poor road network in the area. The study recommends the need for comprehensive and pragmatic measures to improve rural road transport network for improved healthcare.

Keywords

Rural Road, Road Network, Healthcare Accessibility, Healthcare, Nzema East, Ghana

1. Introduction

Roads are clearly a critical enabling condition for accessing healthcare in rural and remote areas [1-3]. Efforts over the years have been made to assess barriers to healthcare accessibility in rural areas. However, past studies on barriers to access healthcare in rural areas have narrowed their discussions to poverty, unavailability of health facilities and poor transportation system as factors that affect healthcare accessibility [4-5]. Again, few of the studies on the effect of transportation on health accessibility narrowed their discussions to lack of vehicles for rural residents to use to access healthcare in urban areas, neglecting the poor nature of road network in rural areas [4-5]. It is obvious that poor roads network delay the management of life threatening complications particularly medical specialty emergencies that are not easy to predict [6-7].

Poor road network has serious repercussions on basic healthcare delivery [8]. Rural areas in particular have few or no healthcare facilities, or the road to transport people for medical assistance which have implication for healthcare especially among children and pregnant women [9-10]. For instance, a research conducted by [11], in the Ahafo Ano

South District in the Ashanti region reported that, over 1,280 children were not immunized against polio and measles due to bad road network in 2013. The report further indicated that, over 32,000 residents in the district were also at risk of various diseases as drugs and medical supplies were unable to reach key locations due to deplorable roads. The repercussions of poor road network in the rural settings affect referral services of residents [12]. Referral service serves a link between lower level care and secondary and tertiary levels of care [13-14]. In Ghana, the policy of referring patients from primary care to the appropriate level for continuous provision of health care has been identified as an integral component of the health delivery system [15]. The Ministry of Health in its quest to ensure the attainment of its vision of creating a healthy population for national development, is committed to operating a referral system that will ensure safe and efficient transfer and care of patients within its health facilities. As a key component of quality health service delivery and collaboration and communication between health facilities, rural communities are unable to access the service due to poor road network. This therefore, contributes to the increase of challenges that affect smooth and responsive patient referrals.

Health is a prerequisite for every state and individual as its influences the economic, social and environmental conditions of everyone. Good health is a national asset as it brings about an increase in productivity. This therefore implies that good health cannot be compromised for anything if the general goal of a national economy is to progress [5]. Over the years, providing good health services to people has been the topmost priority among countries, development partners and international organizations [16]. For instance, reducing child mortality, improving maternal and child health and eradication of chronic diseases have received greater attention and investments all across the globe [4, 13, 15]. During the Post Millennium Development era, goal three and five were meant specifically to improve health of people for wellbeing and social dignity [17]. The current United Nations Sustainable Development Goal three has been devoted specifically to health, and is framed in deliberately broad terms that are relevant to all countries and populations: "Ensure healthy lives and promote well-being for all at all ages" [18]. It is thus needed, that the required facilities and services are provided to boost access to healthcare services so as to ensure that everyone in developing countries benefit, regardless of their location. The vision of the Ghana Health Service is to improve and promote health status and minimize health inequalities among its citizenry residing in the country. As a result, the Government of the Republic of Ghana has, over the years, have made efforts to attain 'Health for All' through varied programs such as the Village Physicians Initiative, Primary Health Care as well as the National Health Insurance Scheme [4].

Notwithstanding the extensive investment in the provision of healthcare facilities, majority of the population, notably those in the rural areas and disadvantaged communities still lack access to health services [11] due to poor road network. In addition, bad or lack of road network do not only affect the client or the health seeker but also affects the ability of staff to deliver quality healthcare service [19]. Inaccessibility to good road network is a major issue for communities isolated by their remoteness. The Nzema East Municipality is one of the rural districts of the Western Region of the Republic of Ghana [20] where road network has been terribly bad. Lack of road maintenance coupled with heavy rainfall make these roads inaccessible, particularly during the rainy season, prompting the current study to investigate the implication of poor road network on health accessibility in rural communities in the Nzema East Municipality.

2. Review of Related Literature

2.1. Rural Transport and Healthcare Accessibility

The [21] defines access to healthcare as the timely use of personal health services to realize the most effective potential outcomes. Rural road infrastructure and means of transport are both crucial to overcome the possibly difficulty of accessing healthcare particularly, for those seeking pre-natal care and those travelling far to reach healthcare centers. A systematic review of studies from around the world highlighted how poor road network affected pre-natal mortality [22]. The review ascertained that an estimated 75% of mortality resulted from inadequate transport to access basic health facilities and/or transport for referrals to hospitals. Again, a review of case studies from many countries pointed out the significance of distance, transport infrastructure and transport means from outlying villages to health centers, and from health centers to hospitals [6]. The systematic review estimated 67% of mortality resulted from poor road network as a barrier to access health facilities.

Rural road transport plays a significant role in ensuring that medical staff and supplies are transported to rural areas. However, many of these medical equipment are unable to be transported to these areas due to the nature of roads especially during the raining seasons [22]. A study in Nepal identified rural transport as a major cause of pre-natal mortality in the hills of Nepal with the worst outcomes among the poorest ethnic groups [9]. A survey on the health advantages of linking up villages by all-season roads in Orissa, as a part of their rural road project found a statistically important effects of relating disease, morbidity and mortality to poor road [23].

There is clear evidence showing how better rural roads, bridges and trails would enhance public health [24]. For instance, systematic review of eight studies from around the globe, deduced that, reducing the cost and time to reach health centers through improved transport frequently leads to a rise in timely access of the poor to healthcare [24]. Many roads in rural areas of developing countries are unpaved, without drains, and often receive next to no maintenance. This condition invariably makes transport on feeder roads always draw to near closure especially during the wet

seasons [11]. Research into seasonal impassability in Tanzania found that complete road closure was rare, although closure on poorly engineered roads' seasonal trafficability (defined as wet season traffic) dropped to 35%. In addition, it was found that the movement of pedestrians and alternative non-motorized means of transport actually increase throughout the wet season presumably because of the poor availability of conventional motorized vehicles.

In fact, it is commonly observed in the southern and eastern parts of Ghana that during wet seasons, traffic congestion on main routes become markedly worse and usually hold up movement. In northern Ghana, during the dry season, the unmaintained minor roads are used by motor traffic as important connections between major routes. Once it rains, the roads become slippery with mud and deep potholes fill with water and the small roads become difficult for standard passenger cars [3]. In most part of the world especially, those found in the tropical environment, the rainy season is the most crucial time of the year, particularly for the poor folks, women and children in their transport journeys. Ordinarily at that time, disease and mortality peak; the costs of treating illness are at their highest; illness is most liable to make poor people permanently poorer; and health services are likely to be at their least effective because to lack of accessibility to social amenities. This implies that, improving and maintaining minor roads will have an important impact in both improving the walking environment and in increasing overall system capability in Ghana.

2.2. Impact of Inadequate Transport on Rural Healthcare

Transport is a vital resource and a significant tool for the delivery of health services [2]. Economic growth and development are dependent on road network. Thus, growth and development of every country and location can strongly be linked to the road network as improved transport system induces economic development [25]. The existence of sufficient road infrastructure is a prerequisite for mobility and accessibility of vital services by residents especially those located at the countryside such as health services, and markets. In the healthcare accesses in particular, road transport is a vital component in healthcare access, serving as a link between home and health facilities. While this is relevant to improve healthcare access by residents, a study in the third world countries found poor road network and absence of regular appropriate transport leave rural areas to access specialized healthcare, which is not provided in local health facilities [7]. The World Health Organization's collection of development indicators in 2015 reported that maternal mortality Ratio (MMR) in Ghana was 319 deaths per 100,000 births in 2015, many of which came from the rural Ghana [26]. The report attributed such alarming maternal mortality to poor road network and inadequate health facilities which are found to be a major challenge among rural residents in Ghana. This suggests that good road network is required to ensure mobility of rural residents, transport medical staff and supplies to rural health centers as constructing and maintaining village roads, paths and bridges has improved health outcomes and healthier rural communities [10].

2.3. Theoretical Framework

Access to healthcare in rural settings especially in developing countries is still a major concern. This particularly may be attributed to geographical isolation and the broader social structures and health systems [27]. To properly understand the implication of rural road network on health accessibility, the study employed the theory of structuration developed by Giddens. The theory is particularly relevant to this study as it seeks to explain the relationship between agency and structures. Giddens' theory of structuration is applied to rural health to explain the connection between agency (what people do) and structures (established rules and understandings that enable and constrain repetitive actions) [28]. Structuration theory overarches six key concepts of rural health (geographical isolation, broader social structures, broader health system, power, the rural locale, local health responses) and suggests that it is the actions of individuals which create, maintain or change existing structures, just as structures shape what individuals do, how they act and with whom they act [27]. This means that all aspects of rural and remote health are both structural and individual. Again, rural people have limited influence on how roads are constructed to benefit them and therefore allow those with the power as defined by the existing rules to determine whether to give rural people good road or not. Hence, road accessibility to health centers in rural communities are left in the hands of the established structures which may act accordingly or turn their back to needs and plight of the local people..

3. Method and Materials

3.1. Study Setting

The Nzema East Municipal Assembly, with Axim as its capital, is one of the twenty-two administrative authorities in the Western Region. The Nzema East Municipality is located on the southern end of the Western region of Ghana between longitudes 2˚ 05' and 2˚ 35' West and latitudes 4˚ 40' and 5˚ 20' North. It is bounded on the West by Ellembelle District, North by Wassa Amenfi West District, East by Tarkwa–Nsuaem Municipality, Prestea Huni Valley and Ahanta West and on the South by the Gulf of Guinea with about 9 kilometers stretch of sandy beaches [20]. The municipality was established by L I 1917 on 25th January 2008. It was formerly known as Nzema East District until it was split into Nzema East Municipal and Ellembelle District. The Municipality covers an area of 2,194 square kilometers which forms about 9.8 percent of the total land area of the Western Region. The Municipality is divided into five sub-districts for health administrative purpose; these are as follows: Axim/Nsien, Gwira Banso, Gwira Eshiem, Kutukro, Bamiankor and. There are not enough Health facilities in the Municipality to handle heath issues. Health Centers operate with inadequate logistics and Health Personnel. Also, inadequate residential accommodation for staff stands as a major hindrance. The Municipality has 2 Doctors, 56 Nurses and 22 traditional birth attendants (TBA's) which are inadequate for the municipality [29]. The total fertility for the Municipality is 3.7 per woman. The general fertility rate (GFR) for the Municipality

is 94.9% which is above the regional average 89.2%. The crude birth rate (CBR) for the Municipality is 28.7% and it is also above the regional figure of 27.2%. The Municipality recorded an infant death rate of 79 per 1,000 populations and under five death rate of 127 per 1,000 populations [20].

Figure 1 District Map of Nzema East with study communities.

Source: Ghana Statistical Service, (2010).

Figure 1. *District map of Nzema East.*

3.2. Study Design

The mixed method research procedure was used in the study. The reason for the adoption of the approach is its methodological pluralism which afforded the research flexibility and superiority over a mono-method research [30-31]. Health is complex issues as noted by the literature and the application of the mixed method approach provided the best strategy for the study as it allowed for the capturing of large number of respondents at the same time allowed the generation of in-depth information grounded in the residents' perspective. This helped understand the extent of impact of poor road transport on rural health accessibility and utilization in the Nzema East municipality.

The study adopted purposive sampling and simple random sampling methods. The study adopted purposive sampling procedure [32] to select Gwira Eshiem, Ampansie and Akango. The following methods were employed in the selection procedure: (a) distance to the municipal and regional hospitals, (b) nature of road to healthcare centers, and (c) means of transport. Based on these criteria, the above communities were qualified and therefore considered for the study. For the selection of participants for the study, a reconnaissance survey was conducted in the three communities to determine the total number of households in each of the selected communities. A proportionate simple random sampling method was employed to allocate the sampled participants to each study community as indicated below. Yamane sample size calculation formula n =N/1+N $(e)^2$ was used.

Table 1. *Sample size.*

Name of community	Number of households	Sample size
Gwira Eshiem	157	113
Ampanshie	95	77
Akango	75	63
Total	325	253

Source: field survey, 2017.

Questionnaires were designed and personally administered to the household respondents. The use of questionnaires helped to capture divergent views, and experiences of respondents. For the purpose of clarity and accuracy in data, care was taken to translate every question to respondents in their native language to enable them respond to the questions appropriately. Questionnaires designed were pilot-tested by the researcher to make sure it was understandable and acceptable by the household respondents. Again, interviews were conducted on 13 community leaders (chiefs, women groups and youth groups) across the three selected communities to explore their experience with road and its implication on healthcare accessibility. The special interest in the interview was based on the depth of focus on the individual respondent which helped to obtain relevant information on the implication of poor rural road transport network on healthcare accessibility and utilization.

For quantitative data, descriptive and regression analysis was done using Statistical Package for Social Sciences (SPSS). The descriptive analysis was done to give a general overview of the responses of the respondents. The regression analysis was done to establish the effects of poor road network on healthcare accessibility. Variables such as complication of diseases, self-medication, referral services, transportation of medical supplies and maternity care were used as the explanatory variables as against poor road network. For the qualitative data collected from respondents, transcription was done and themes were identified from the excerpt. The reason for the adoption of the thematic method for the qualitative data analysis was to identify emerging themes and explanations within the data to further give vivid explanations to the figures and statistics in the quantitative data [33].

4. Data Analysis and Discussions

4.1. Demographic Characteristics of Respondents

The study revealed that, majority of the household heads (respondents) was within the 31-43 years' category which represented 47%. This was followed by the 44-60 years' age group which represented 26%. 17% of the respondents were within the age category of 18-30 and finally, 10% of the respondents were above 60 years. On the level of education of the respondents, 46% had no formal education which implies they did not go to school, 35% had basic education, 16% had secondary education, and three percent had tertiary education.

Again, out of the 253 respondents, the statistics reveal that 165 were males' household heads and 88 households were headed by females, which translate into 65% for males and 35% for females respectively. for occupational distribution, the study results revealed that 55% were found to be engaged in farming, 10% into mining, nine percent into trading, six percent being teachers, five percent practicing traditional/herbal medicine, five percent into carpentry and masonry, and (10%) were distributed among other economic activities.

4.2. The Nature of Road Network Linking the Study Communities

On the nature of road linking the communities to their healthcare centers, the results indicated that four of the statements had standard deviation of more than 1.0 which means that there were extremes in the scoring. The highest standard deviation for the statements was 1.416 which reveals there were extremes in the scoring. In the statement "marshy areas of the road easily get flooded", 52% and 31% of the residents scored for strongly agree and agree while three percent scored for disagree. This reveals that respondent spread their responses to both the positive and negative direction of the nature of their roads linking them to their health facilities, indicating a high standard deviation

experienced. In contrast, three of the statements had standard deviations less than 1.0 which reveals there were no extremes in respondents' allocation of scores to the statements, hence statements were good measures. The statement "muddy and slippery of road in the wet season" had the lowest standard deviation of 0.500. The percentages show that 77% and 22% of the students scored for strongly agree and agree while one percent of the students scored for disagree respectively. The results further revealed that overwhelming majority, 91% of the students strongly agreed that their roads are muddy and slippery in the wet season.

Table 2. *Nature of road network in the study communities.*

SATEMENT	SA	A	N	D	SD	M	ST. D
Road has potholes	80%	15%	3%	2%	-	1.36	.847
Muddy and slippery of road in the wet season	77%	22%	-	1%	-	1.25	.500
Road is poorly drained due to bad drainage system	44%	36%	13%	5%	2%	1.85	.968
Road is badly eroded along the hill	57%	24%	11%	3%	5%	1.99	1.176
Road is very dusty during the dry season	47%	39%	12%	2%	-	2.19	1.261
Marshy areas of the road easily get flooded	52%	31%	14%	3%	-	2.34	1.416
Bridges across the streams randomly collapsed	51%	34%	9%	6%	-	1.97	1.193

Second, the results of the study revealed that 95% of the residents agreed that their road network has a lot of potholes. The findings too revealed that 80% of the residents agreed that their roads are poorly drained due to bad drainage system. Additionally, 81% of the residents agreed that their roads are badly eroded along the hills. Moreover, majority of the respondents, 86% agreed that their roads are always dusty during the dry season. Last but second, 83% of the respondents agreed that their marshy marshy areas of their roads easily get flooded and finally, 85% of the respondents agreed that bridges of across their streams randomly collapsed.

The highest mean was 2.34 with the lowest mean being 1.25. This shows the residents took a positive position (above 1.0). All the statements had a mean of 1.85. This indicates that the general position was that the residents agreed with the prepositions presented on the nature of their road network. On overage, the scores of the responses of the respondents on the nature of their road network, 87% of them agreed to the nature of their road network.

In conformity with the interviews conducted, the respondents on the nature of their roads revealed that:

"We do not have a road; what we are currently using is a loggers' trail, we are tired of maintaining this road, we do not know whether to interfere again or to let it be. Since I became chief of this community we have been buying gravels to fill up potholes and usually use logs to construct our two bridges across the stream. We have almost exhausted all the hardwoods in the forest and our predicament has seen no lasting solution yet. Whenever there is heavy rain the water carries away all the wood thereby blocking accessibility……now I think government interference will bring the best solution to our plight" (Respondent 1)

"Our road is very bad, very muddy, we do not travel to our district capital especially in the raining season. It is also risky passing through the river Ankobra to the district capital, the road has affected everything of ours" (Respondent 2)

Also, to capture the perspectives of women who are mostly the victims of bad road network, a 64 years old woman with the deepest regrets about the nature of their road has this to say:

"Years back this community was living in panic driven because when there was a critical case, strong men use to carry sick people in 'folded cloths' as far as the main road before they could get a means of transport; the situation is somehow improved, but usually goes back to square one in the rainy season during which flood waters from River Ankobra block accessibility. At the time if you do not get a boatman on time, then you are definitely going to die"

4.3. Self-Reported Time Used by Respondents in Waiting for a Vehicle to Access Healthcare

The influence of time on health services accessibility and utilization can be examined in three perspectives namely; travel time, time spent at the health facility to access healthcare and waiting time with respect to appointments. When respondents were asked how long they waited for a vehicle in their communities anytime they needed to visit the health facility, 19% of them revealed they spent 1 hour waiting for a vehicle, 41% indicated they spent averagely 2-4 hours and 40% reported they used 5 hours to wait for a vehicle. On the time spent in voyaging to the nearest health center, nine percent of the respondents indicated they used 1 hour, 49% reported they spent 2-4 hours and 42% revealed they used 5 hours. Again, when respondents were asked how long the waited before booking appointment with health officials, 22% mentioned 1 hour, 45% indicated 2-4 hours and 33% reported 33%. The standard deviation of the responses of the respondents indicated there was an even dispersion of responses. Also, the mean shows that the respondents took a positive position (above 1.0), which implies that the respondents were right with their responses to the prepositions presented on the time used in accessing healthcare. The responses of the time used in accessing healthcare by respondents agreed with results from the interview granted to them. In the interview section, respondents mentioned that due to the nature of their roads, they have only two vehicles that ply on this road and therefore accessibility to these vehicles are extremely difficult. For instance, one of the respondents indicated that:

"Agyapong and Kofi cars are the only ones we have here, sometimes they do not come, anytime we were sick they were not

around, we struggled a lot, and sometimes we join cocoa tractor which spent the whole day on road, just appealing to the government to work on our road"

Respondents also indicated that at the facility, because they usually arrived late at the health facilities due to the nature of the road they were met with long queue which usually took them more hours before they had access to the healthcare. For instance, a 45 year nursing mother reported that:

"the distance from here to the district hospital is too far a distance, the road too is terribly bad, before you get to Axim (District capital), you will need like 2-4 hours and by the time you get to the hospital, there are already people in a queue and you can jump it, you have to follow it and by the time you get back home is very late. Sometimes you may have to sleep and continue the next time due to absence of vehicles".

4.4. Effects of Poor Road Network on Health Services Accessibility

When respondents were asked about the effects of poor road network using the statements in table 3, the results indicated that all the statements had standard deviation of more than 1.0 which presage that there were extremes in the scoring. The highest standard deviation for the statements was 1.559 which reveals there were extremes in the scoring. In the statement "poor road network results to complications of diseases ", 47% and 27% of the respondents scored for strongly agree and agree while 7% and 3% scored for strongly disagree and disagree respectively. This reveals that respondents spread their responses to both the positive and negative direction on the effect of poor road network on healthcare accessibility and hence the high standard deviation experienced. The statement "poor road network results to self-medication" had a standard deviation of 1.510. The percentages show that 67% and 19% of the respondents scored for agree and disagree while 14% of the respondents scored for either disagree or agree. The results further revealed that, 77% of the respondents agreed that poor road network results to travelling of residents through life-risking routes to access healthcare while 11% had a contrary position.

Table 3. *Self-Reported time used by respondents in accessing healthcare due to nature of roads.*

Statement	Variable	Number of respondents	% of respondents	Mean	St. deviation
How long do you have to wait for a vehicle in your community anytime you need to visit the health facility?	1 hours	47	19	2.63	2.244
	2-4 hours	104	41		
	5 hours	102	40		
Total		253	100		
How long do you have to take to travel to nearest health center to access healthcare due to the nature of the road	1 hour	23	9	2.52	1.826
	2-4 hours	125	49		
	5 hours	105	42		
Total		253	100		
How long do you have to wait before you are attended to by the health officers (appointment)	1hour	55	22	2.61	2.121
	2-4 hours	113	45		
	5 hours	85	33		
Total		253	100		

Source: Field survey, 2017.

Table 4. *Effects of poor road network on healthcare accessibility.*

SATEMENT	SA	A	N	D	SD	M	ST. D
Complication of diseases	47%	27%	15%	7%	3%	2.35	1.559
Self-medication	37%	30%	14%	8%	11%	2.33	1.510
Travelling through life-risking routes to access healthcare	41%	36%	11%	11%	-	2.26	1.320
Effect on transportation of medical supplies	29%	27%	23%	14%	7%	2.30	1.353
Pregnant women and children are unable to do regular check ups	41%	37%	19%	3%	-	2.59	1.322
Effect on referral services	44%	37%	10%	9%	-	2.31	1.187
Persistent upsurge of transport fare	39%	41%	13%	5%	2%	2.44	1.225

NB: SA (strongly agree), A (agree), N (neutral), D (disagree), SD (strongly disagree), M (mean), and ST.D (standard deviation).

Again, the results of the study revealed that 56% and 21% of the respondents agreed and disagreed respectively, on the preposition that poor road network has an effect on transporting medical supplies to the various health centers with the district. The findings too revealed that 78% of the respondents agreed that pregnant women and children are able to do regular checkups due to poor road network in the area. Additionally, 81% of the respondents agreed that poor road network has a tremendous effect on referral services while 80% agreed that persistent upsurge of transport fare in the area which has implication for healthcare accessibility and utilization is due to the nature of their roads. The highest mean was 2.44 with the lowest mean being 2.26. This shows that respondents took a positive position (above 1.0). All the statements had a mean of 2.37. This indicates that the general position was that the respondents agreed with the prepositions presented on the effects of poor road transport on health services accessibility.

The responses of the respondents confirmed the interview results with community group leaders on the effects of poor road network on their health service accessibility. The interview results indicated that residents were solemn about the implication of their poor road nature on their health services accessibility. The leaders who were interviewed indicated that the nature of their road network over the years has affected pre-

natal, ante-natal and maternity care. "At Akango, a woman leader reported that women trek over miles to reach health facilities when they were pregnant and had to seek maternity care. In her own words, she put:

"Our community road is not in good shape. Our next home to access healthcare is at Nzema (pointed her figures at the sky indicating that the place is far) which is miles away from us. Last three months (was referring to Novermber), I lost my baby boy on my way to the health centre due to both distance and nature of road. We the women are suffering too much. We really need help from our authority"

Again, the interviewees mentioned that due to the nature of their road network, it affects referral services. They noted that due the bad nature of their roads, ambulances cannot ply on them prompting many sick people to either trek, use canoe if required journeying through the river Ankobra, and use of donkey card. At Ampeshie, a respondent cited an instance where he was referred from Kutukrom health center to go to Axim main hospital to seek medical assistance. He reported that he used three days to get to the facility at Axim and by the time he got to the facility, his condition became complicated which resulted to surgery. He was so thankful to God he did not die on his struggled journey to the district hospital".

4.5. Regression Analysis

The results of the logit model revealed that all the measurement have significant relationship with poor road network. From the assessment, complication of diseases due to poor road network was significant at 1% while difficulty in accessing referral services as a result of poor road network was also significant at 5%. Again, the results indicated that self-medication was significant at 1% while effect of poor road network on medical supplies was significant at 5%. Effect of poor road network on maternity care (regular check of pregnant women and children in health facilities) was significant at 1%. The results suggest that to overcome complication of diseases, self-medication, difficulty in referrals, challenge of transporting medical supplies to rural health centers, and difficulty of providing maternity care, road network in the study communities be improved.

Table 5. *Regression analysis of the effects of poor road network on healthcare accessibility.*

Variable Complication of diseases	Unstandardized coefficient		Standardized coefficient	t-value	Sign. level
	B	Std. error	β		
	.008	.003	.232	2.684	0.008
Self-medication	-.694	.199	-.206	-3.492	0.001
Referral services	3.916	1.538	.210	2.546	0.012
Medical supplies	.416	.175	.166	2.373	0.019
Maternity care	.322	.031	.312	2.561	0.003

4.6. Discussion

Road transport network has significant effects in the effective and efficient access to healthcare especially those far distant from health facilities. [6] noted road network as an important social determinant of health in rural communities. As a determinant of health accessibility and utilization, it is important for authorities in the transportation sector to assist rural communities with at least feeder roads to enable them access healthcare [2]. Good feeder roads are crucial in ensuring access and movement of people from one community to the other. Bad road network on the other hand has a series of negative implications on all aspects of human life including healthcare [3]

The discussion of the results looked at five major themes emanate from the study as represented by the figure below.

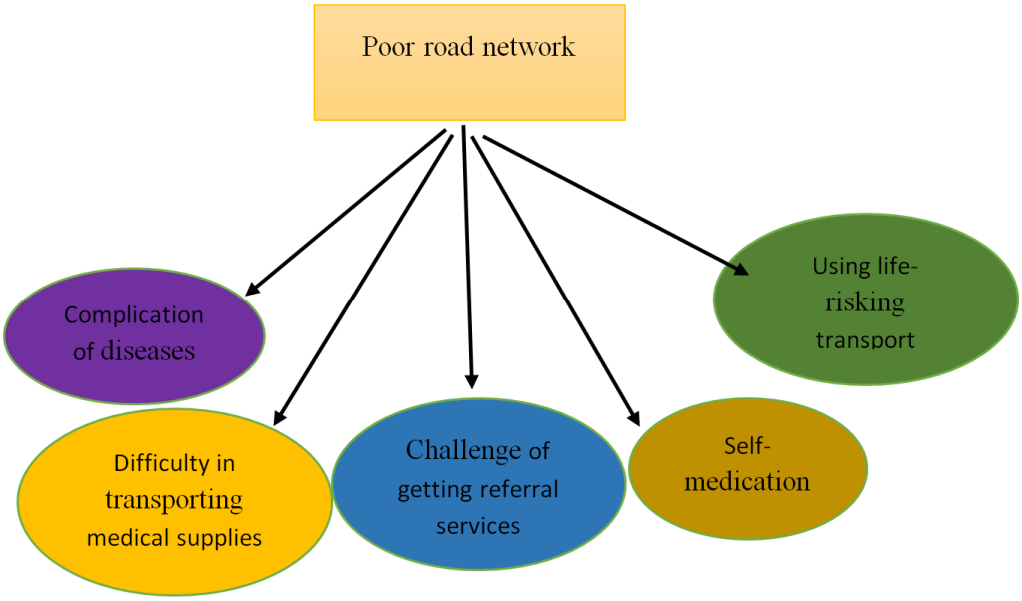

Figure 2. *Themes that emanate from the study.*

i. Complication of diseases

The study revealed that respondents had their ailments complicated due to near absence of vehicles all year in the study areas. According to the respondents, where they were fortunate to access vehicle to seek healthcare, most at times, their vehicles easily breakdown compelling passengers including the sick to trek over long distances when such instances occurred. Residents were quick to add that the near absence of vehicles and easily breakdown of vehicles is due to the nature of their road. The study noted pregnant women as the most victims to these setbacks and cited the rainy season as the worst period where the road network becomes very deplorable to it extreme [4]. This according to the respondents affects the pregnant women and children who need special healthcare including regular check-ups.

ii. Self-medication

Again, due to the deplorable nature of the roads linking residents of the study communities to the municipal health center, some of the residents have resorted to self-medication especially in the rainy season where they could not access the road. Studies of reported that self-medication in rural areas is a results of non-existence of healthcare facilities [12, 34]. It is also observed that due to poor nature of rural transport system, residents in rural areas turn to traditional medicines and traditional birth attendants for maternal healthcare services [12]. This therefore agree with the Giddens's theory of structuration that there is a relationship between agency and structure as both have the function to providing rural areas with good roads and health facilities.

iii. Use of life-risking means to access health

Also, the respondents reported that due to poor nature of roads and vehicles absence especially in the rainy season, some of the residents have resorted to the use of life-risking means to access health care. Respondents cited alternative means to include the use of canoe along the river Akombra, tricycles, and motorbikes and in most extreme case the use of folded cloth for carrying sick persons to the nearest hospital. A study on "Can she make it? Transport barriers to accessing maternal and child healthcare services in rural Ghana" found that vehicular transport and road infrastructural development makes access to healthcare difficult [12]. In their study, pregnant women were found to use risky methods such as bicycles or tricycles or motorbikes to access obstetric healthcare services.

iv. Transportation of medical supplies

Respondents complained that the nature of road network affects the transportation of health care logistics to communities/target people on time. For instance, literature reported that health workers in the Sekyere Afram Plains District of the Ashanti Region were unable to reach deprived and isolated areas with medical services due to poor road conditions [35]. The report added that, the inability of the Sekyere Afram Plains District Health Directorate to access remote communities of the district caused a suspension of immunization of some 1,280 children against polio and measles and over 32,000 residents are also at risk of various diseases as drugs and medical supplies are unable to reach key locations. What is important at the moment is to improve the maintenance of few available but deplorable roads to enhance healthcare accessibility and utilization. Literature on "Rural Road Maintenance; Sustaining the Benefits of Improved Access highlighted the effects of deplorable rural road network to health accessibility and utilization" found that Standards of health care are low because clinics are hard to reach and health workers cannot travel easily [36].

v. Difficulty in accessing referral services

Referral plays is a key component in health care accessibility in rural areas across the globe. In Ghana, the policy of referring patients from primary care levels to appropriate level for continuous provision of health care in the country has been identified as an integral part of health delivery system [37]. This is because effective referral system will ensure a close relationship between all levels of healthcare system and health receive the possible best care closest to home. However, in this study, residents reported that access to referral services is very difficult. Residents mentioned the nature of their roads as one of their major challenges of accessing referral services prompting many residents to use other available but risky means to access healthcare at the next point of healthcare. It is undeniable fact that most of health services in rural areas are preventive health and basic healthcare and better road and referral systems could enhance access to health services in urban [12].

5. Conclusion and Implication of the Study for Sustainable Development

Everyone everywhere deserves to have access to healthcare irrespective of location and residence. Nevertheless, rural communities are still experiencing a multitude of health problems in comparison with those residing in the urban areas. Poor road network has a part to play in rural areas inability to access healthcare. The survey results revealed that poor road network in Akango, Ampanshie and Gbwira Eshiem has hard implications on residents accessibility to healthcare including complication of diseases, self-medication, difficulty in accessing referral services, challenge of transporting medical supplies, difficulty in accessing maternal and child care and travelling through life-risking routes to access healthcare. With the concentration of poverty, low health status and high burden of diseases in rural areas, there is the need to focus on improving the health of people in rural and remote areas. The study therefore, recommends that to achieve the Sustainable Development Goal especially Sustainable Development Goals 3, 8,10 and 11, there is the need for comprehensive and pragmatic measures to improve rural road transport network for improved healthcare in the northern corridor of the Nzema East Municipality of the western region of Ghana.

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Conflict of Interest

The authors wish to declare no conflict of interest.

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