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The role of road transport in the spread of some diseases in northern Nigeria

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ABSTRACT

The aim of this study reported herein is to inform on how some diseases are spread via road transport, using some settlements along corridors of some major highways in northern Nigeria. The objectives of this study are to provide clues and evidences of the possible spread of diseases through different kinds of interrelationships between the drivers, travelers and people residing in the settlements along corridors of road, to determine the pattern of spread in settlements and explain the factors responsible. Data for this study was obtained through the administration of 800 questionnaires to respondents in their activity places and Oral interviews and individual discussions were also conducted, out of which 640 were returned. The Federal Road Safety Commission provided list of major stopping places in settlements/towns along corridors of major highways. The Health centers located in the settlements provided records of treated diseases, while, other information were obtained from secondary sources.

PALAVRAS-CHAVE:

Transporte
corredor
espalhar
Doença e na transmissão

RESUMO O PAPEL DO TRANSPORTE RODOVIÁRIO NA DISSEMINAÇÃO DE ALGUMAS DOENÇAS NO NORTE DA NIGÉRIA. O presente trabalho é de informar sobre como algumas doenças que são transmitidas via transporte rodoviário, o uso de alguns assentamentos ao longo dos corredores de algumas das principais rodovias do norte da Nigéria. Os objetivos deste estudo são de fornecer pistas e evidências da possível propagação de doenças através de

diferentes tipos de inter-relações entre os motoristas, viajantes e pessoas que residem nos assentamentos ao longo dos corredores de transporte rodoviário, para determinar o padrão de propagação em assentamentos e explicar os fatores responsável. Os dados para este trabalho foi obtido através da consulta de 800 questionários aos entrevistados em seus locais de atividade e entrevistas orais e discussões individuais também foram realizados, dos quais 640 foram devolvidos. A Comissão de Segurança Rodoviária Federal, desde lista dos principais locais de parada em assentamentos e vilas ao longo dos corredores de rodovias principais. Centros de saúde localizados nos assentamentos desde registros de doenças tratadas, enquanto, outras informações foram obtidas de fontes secundárias.

PALABRAS-CLAVE:

Transporte
corredor
difundir
Las enfermedades y la transmisión

RESUMEN El papel del transporte por carretera en la propagación de algunas enfermedades en el norte de Nigeria. El objetivo de este estudio presentados en este documento es informar sobre cómo algunas enfermedades se propagan a través del transporte por carretera, el uso de algunos asentamientos a lo largo de los corredores de algunas carreteras importantes en el norte de Nigeria. Los objetivos de este estudio es proporcionar pistas y evidencias de la posible propagación de enfermedades a través de diferentes tipos de interrelaciones entre los conductores, viajeros y personas que residen en los asentamientos a lo largo de los corredores de carretera, para determinar el patrón de propagación de los asentamientos y explicar los factores responsable. Los datos para este estudio se obtuvo a través de la administración de 800 cuestionarios a los encuestados en los lugares de actividad y las entrevistas orales y discusiones individuales se llevaron a cabo también, de los cuales 640 fueron devueltas. La Comisión Federal de Seguridad Vial proporcionó la lista de los principales lugares de parada en los asentamientos y poblados a lo largo de los corredores de las carreteras principales. Los centros de salud ubicados en los asentamientos siempre y registros de enfermedades tratadas, mientras que, otros datos fueron obtenidos de fuentes secundarias.

1 Introduction

Transport is a fundamental requirement for facilitating industrial, agricultural and other socio-economic developments. Its inadequacy in terms of availability, efficiency and safety entails problems of movements, distribution and exchange, Filani and Onakomaiya (1986) and Ikporukpo, (1995). In support of this, Gannon and Zhi (1997) confirmed that inadequacy of access and mobility is a signifying attribute of the poor penalizing them from economic and social opportunities.

Transport affects every sector of development and as such it exhibit both positive and negative effects. On these, scholars have been divided into schools of thoughts and they have written extensive literatures on both. The general consensus is that transport is a proximate factor and it is a catalyst to development of every sector in the economy. If that be, then, it is playing a role in health; as it affect spread and diffusion of diseases, transfer of health personnel and equipment, provides access, enhance patronage and utilization of hospitals and health facilities. Musa and Abbas (2009); Charles (2009); Balcan et al (2009) and Jean-Paul et al (2011).

Scholars like Favara and Milton (1969); Good (1987) and Akhtar (1987) wrote on the positive role of transport to infrastructural development, increase in catchment areas and improvement in patronage and utilization of health care facilities. Howe

and Richard (1984:72) and Lienbeach and Sien (1987:85) reported on how farmers benefitted from the construction of new roads and how it improved connectivity, increased productivity and accessibility of rural periodic markets.

On other hand, studies on the role of transport in commoditization revealed that transport had negatively encouraged the spread of cash crops or the sale of local food stuff and how it indirectly undermined the nutritional status of rural communities, exposing vulnerable groups to nutritional disorder (Hughes, 1969). Others which are similar include that of Edward (1978) and Schofield (1979), who reported that improvement in road transportation brought about a shift from padi rice to watermelon cultivation in response to improved accessibility between rural areas in Decca, Bangladesh. This is a switch from highly nutritious to less nutritious crops.

Early attempts to explain the spread of diseases as spatial diffusion has been made by scholars like August Hirsch, Helmut Jusafz and Richard Gallagher (1883 -86) in Wolf et al (2007). The former explained the mechanism responsible for diffusion of diseases from a pathological point of view, as it is influenced by the environment. The later analyzed the spread of cerebro-spinal meningitis and influenza with strong reference to physical environment and transfer from human to human over time and space. While Richard (in same material) highlighted the relevance of history of communicable diseases to understanding of modern day health problems, he also defined the study of infectious diseases historically as “one of mans’ longest interrupted wars’. Another contribution of modern transport in the spread of disease came in 1918, when the Spanish Flu, considered the most severe made 30% of the world population to become ill and between 50 to 100 million people died and also that of Influenza in United State of America as is reported by Jean-Paul et al (2011) and Mills et al (2004). These studies revealed that the virus was spread round the world by infected crews and passengers of ship and trains and severe epidemics occurred in ship yards and among railway personnel. While the study of Brownstien et al (2006) and Marsden (2003) found out how influenza contact by air passengers spread in America. And Slater et al (1995) explained on outbreak of meseales through flight from New York – Tel Aviv

Other relevant studies on transport and diseases in developing countries include that of Moore (1979:10), where he explained how respiratory diseases and intestinal infections (notably cholera) along roads has reached areas from which it had previously disappeared in Thailand. Whereas Pirie (1982) and Hogbin (1985a: 937) also made their contributions. The former wrote on the decivilizing rail and the latter on how it acted as corridor for the movement of diseases in South Africa. Whereas Tony (1991:273-290), explained how constructed road influenced and improved health care behaviors of rural households in Meru district, Kenya. This study covered diseases like Diarrhoea, Vomiting, Cholera, HIV/AIDS, Tuberculosis and Sexual Transmitted Disease (STD).

2. Statement of the Problem

Before this, studies have been done on transport and disease elsewhere (Beaglehole, 2003, Brownstien and Thierfelder et al 2008). But most of these early works were on water and air transport in advanced countries. The common theme of these studies was on examination of the sources, expansion, relocation and history of diseases. While the few written on land transport were mainly on railway and transmission or diffusion of diseases (Moore, 1979; Pirie, 1982 and Hogbin, 1985)

Road transport and spread of diseases in northern Nigeria is an interesting case study because it is a dense populated far flung region, consisting of loosely integrated towns and cities that have different history of peculiar diseases that can be spread. Therefore just as the history of occurrence of diseases show that there are areas of origin and destination, so does the spread of diseases show pattern and factors responsible

The interest for this study is based on the authors' belief and observation that diseases are spread through different ways and means. More especially in developing countries where there are high population densities, high level of travel characteristics. The motivation for this study is further supported by the work of Gould (1969), who explained the expansion, relocation, contagiousness and hierarchical spatial diffusion of diseases. It has provided a conceptual approach to the understanding of the diffusion of communicable diseases. Others include the work of two Geographers, Brownlea (1967) on hepatitis in Australia and that of Stock (1976) on diffusion of cholera in Africa. They identified four main ways of spread, through the coast route, riverine pathway, the urban hierarchical route and through radial contact. It is pertinent to mention that all these four ways revolve around transport systems.

The gap identified and that is filled by this study addresses the spread of diseases through continuous movements of people using different modes of road transport. It is important to mention that there is a great increase in the levels of travels by people to meet up with various activities in cities and towns in northern Nigeria. This mobility of people is supported and encouraged by upsurge in ownership of various grades of automobiles, improved road infrastructures, increased road connectivity in the country. These movements and or trips are undertaken by all kinds of people including the sick; as there are no designed measures, tests or checks to identify or to deny them entry into motor packs or using any mode of road transport. Consequently, the role of tanker drivers, their boys and other travelers, the side by side or face to face congested seating arrangement, especially in public transport, as well as the sexual interactions between commuters who may have different sickness and commercial sex workers/people in stopping places; also the use of poor common/public conveniences along the corridors of road and refusal to observe simple hygiene, provides opportunities for the transmission and spread of diseases like Cholera, Malaria, HIV/AIDS, Tuberculosis, Diarrhea, STD and Flu to mention only some. Justifiably, the existing level for understanding the relationship between road transport (human movement), spread of diseases, and factors involved is very low and limited. Also the methods for addressing the problems are poor and seriously inadequate in Nigeria generally.

3. Methodology

This section describes the methods used to study how diseases are spread via road transport. Considering the size of northern Nigeria and the length of the roads, the continuous type of data and the rigorous nature of data collection, the scope of this study is designed to cover some settlements along five major high ways or trunk A roads, with Kaduna state as the base or starting point. Administrative and Road Map of Nigeria (1992) and the Federal Road Safety Commission assisted in selecting these highways and the settlements where questionnaires were administered to respondents, see fig 1. The selection of Kaduna state as the base is justified by the fact that it is performing administrative, commercial and transport functions, from where vehicles move to towns and cities in different parts of northern Nigeria. Other factors that influenced selection of the five roads includes the volume of human and traffic vehicles moving by day and night along these roads, how they form grid routes linking places, are also, the most busy roads that passed through major towns, and settlements in northern Nigeria. They are as follows as shown in figure 1:

- a. Kaduna- Tafa-Abuja-Lokoja-
- b. Kaduna-Birnin gwari-Tegina- Mokwa- Jebba- Ilorin-
- c. Kaduna- Mararraban Jos- Zaria-Funtua- Malunfashi-Gusau-Sokoto
- d. Kaduna- Samunaka-Jos- Bauchi –Gombe-Maiduguri
- e. Kaduna- Zaira- Kwanar Dan-gora-Kano(wudil)

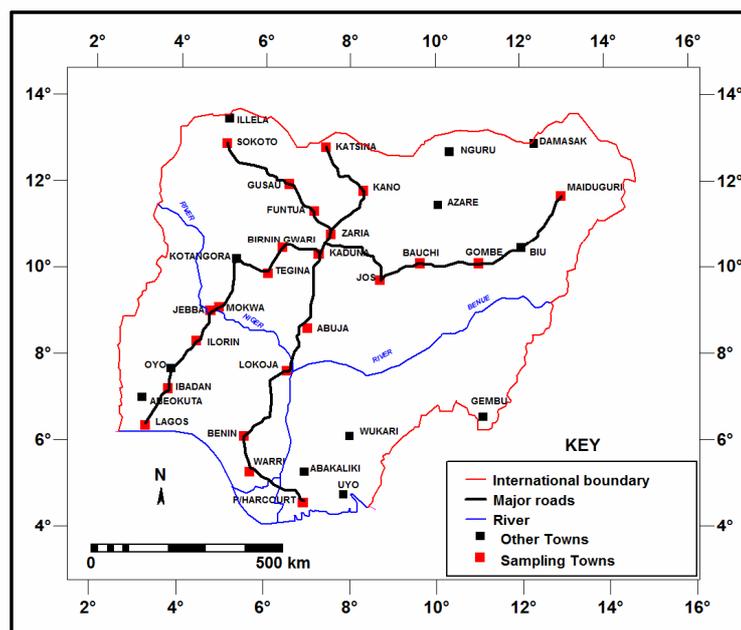


FIG.1 : NIGERIA SHOWING THE SAMPLING TOWNS

Based on these twenty three towns/settlements were selected and used as study areas were questionnaires were administered to elicit information purposively from respondents. Examples of the questions asked include common types of diseases in the town, purpose of trip, number of trips weekly or monthly, type of sickness, do you travel with your drugs, eating habits and observation of simple hygiene, sleep over or relaxation place and types of extra activities or engagements along the routes. The questionnaires were administered to respondents in their activity places, in identified health centers, commercial spots, food canteen, restaurants and social activity spots. Eight hundred questionnaires were disproportionately applied directly to respondent in three stages by the authors and three trained assistants under proper supervision. The analysis was based on 640 questionnaires returned.

The information collected was subjected to both inferential and non inferential statistics. The Nearest neighbor analysis was performed to determine the pattern of settlements along the corridors of road, which is believed to have influence on the pattern of spread of the diseases. The percentage analysis was used to determine the influence of contributing factors to the spread of diseases. The record of patient's admission and clinic for these diseases was obtained from the health centers to show the level of spread from 1999 – 2011.

The Nearest neighbor analysis after Clark and Evans (1954); King (1962), Dacey (1962) and Witherick and Pinder (1972), who used it in different studies to describe distribution patterns, to analyze spatial distribution of settlements in a given area, to investigate the size distance relationship between settlements in a region and to study spatial distribution of population density using the formula $R_n = 2D / N/A$ where:

R_n = represents the description of the distribution or spread pattern

D = represents the mean distance of the Nearest neighbor, which in this study are the

Selected settlements

A = represents sizes of the settlements under study as obtained from secondary sources

N = represents the points (total number of settlements along road corridor) in the study

Area

In this study, the value of R_n appears in a range of 0 to 1, 1 to 2 and above 2 (after, Peter and Peter, 1971), where:

R_n = zero to one depict a cluster settlement and spread pattern

R_n = one to two depict a dispersed settlement and spread pattern

R_n = above two depict a linear settlement and spread pattern

Steps:

- a. Administrative Road Map sheet was obtained
- b. Distance between each selected settlement and its Nearest neighbor is determined
- c. Mean distance between pair of Nearest neighbors is determined
- d. Size or total area covered by settlement was obtained from secondary sources
- e. Calculation of Nearest neighbor statistics is performed using the formula and the result discussed.

4. Discussion

In Nigeria, road is responsible for the greatest percentage of travels of persons from one location to another. As a result of this, travellers experience some environmental changes due to climatic differences (temperature, humidity, rainfall and wind) and food types when passing through and on arriving at their destination. These plus other reasons may be responsible for the contact, spread and transmission of diseases.

The reasons for preference of road transport are its speed and efficiency when compared to rail and cheapness when compared to air transport. These qualities also make it more efficient means of spread of disease over long distances in northern Nigeria, because passengers are not screened with disease detection equipment before entry of motor parks and or commercial vehicles. Passengers were asked about how they contacted these diseases, Diarrhoea, Vomiting, Cholera, HIV/AIDS, Tuberculosis and STD. Forty one percent of them ticked the first three, having the highest scores. While the very few who ticked the other three diseases complained of the fear of being isolated or stigmatized. It was also found out that 27% had or are suffering from one of these sickness before travelling, 14.2% responded that illness occur during travel and 17% reported that the illness surfaced at their destination. The result also revealed that eating poorly prepared food or sitting near someone sick make travellers' sick, which manifested after one to two days on reaching their destination. This is in agreement with other findings that influenza generation period between some settlements took three days, small pox took seven days, gastroenteritis took five days and in year 2005 imported malaria among 1,528 travellers tested positive in three days. (Jeanne-Yu and Ben, (2009; 5-11); Balca et al (2009. P21484-89) and Brownstein et al, (2006.p401)

The nearest neighbour analysis result revealed a linear pattern of spread of these diseases along the first highway route in Tafa and in the second route Tegna and Mokwa settlements, because the result of the R_n was 3.21. This may due to low level of education and poor level of awareness. Lokoja depicted clustered spread pattern because it is a major junction town characterised by high level of social functions, while in the 2nd, 3rd, 4th and 5th highway routes Birnin- gwari, Marrabban- Jos, Funtua, Saminaka and Wudil towns depicted clustered pattern of spread because the

result of the Rn is 1.82. This is due to the fact that they are major stop, resting and relaxation places for tanker and other drivers, high influx of migrants who have low level of education and poor level of awareness. These junction towns also exhibited high level of sex commercial workers activities. Whereas dispersal spread is witnessed in villages not along corridor of road. While urban areas like Kano, Zaria, Sokoto, Kaduna, Maiduguri, katsina, Bauchi, Jos and Gombe show evidence of dispersal spread. This could be attributed to poor response by respondents, high utilization of hospital services, availability of drugs and good doctors.

It was observed that settlements or towns along corridor of these selected highways or routes exhibit discrete arrangement pattern. The result revealed that population size, low level of education, poor level of awareness play significant role in the spread of diseases and the volume of vehicles/people movement through settlements or towns have sufficient influx of people susceptible to infections. The findings are as presented in table 1.

Table 1: Factors that Influence the Spread of Disease by Road Transport in Northern Nigeria

Factors	Frequency	Percentage
Population size of settlement and or towns	64	8.7%
Low level of education	63	8.6%
Poor awareness level of risk of spread	87	11.8%
Continuous and rapid movement of vehicles and passengers	124	16.8
Sitting with the sick in same vehicle	71	9.6
Refusal to observe simple hygiene	41	5.5%
Contact with sex-commercial workers	104	14.1%
Poor use of common convenience places	66	8.9%
Eating contaminated or poorly prepared food	47	6.4%
Continuous hand shaking	28	3.8%
Others	39	5.3%
Total	734	99.6%

Sources; Field Work, 2008-2009.

The total is higher because respondents ticked more than once

The result of percentage calculation as presented in table 2 shows that continuous, rapid movement (16.8%), contacts with sex commercial workers (14.1%) and poor awareness level of risk (11.8%) have high scores, meaning that they relate very well with road transport in the spread of diseases (Diarrhoea, Vomiting, Cholera, HIV/AIDS, Tuberculosis and STD) in settlements along corridors of highways in northern Nigeria. Others factors found out to be good contributors include sitting arrangement which may include the sick (9.6%), population size, use of unclean common convenience and low level of education (8.9%, 8.7% and 8.6% respectively).

These settlements and towns have small to medium population, findings show that the number of infected persons is increasing from 1999 to 2010, because there is increase in the number of people attending and receiving treatment/drugs, as obtained from the record books of health centres.

5. Summary and Conclusion

Road transport has an effect similar to that of any other system of transport or human movements, by connecting geographical regions and isolated population. This study revealed that diseases are spread in settlements along corridors of roads by

infected persons on journey to fellow passengers during travels, through consumption of contaminated or poorly prepared food and water, from contact between sex commercial workers who may be carriers and others, as result of the use of unclean common convenience place and Lack of observation of simple hygiene rules by passengers during travels. The factors responsible are Increase in volume of traffic/human movements, travel habits and characteristics, population size and influx of migrants, high level of commercial sex workers activities and Low level of education/poor level of awareness,

Conclusively, the velocity of road transport system and volume of human movement is very significant at regional level in northern Nigeria, which explains why virus is spread faster in either big or small settlements or towns along corridors of these roads. It was recommended that a strong awareness campaign through seminars, workshops, visual and audiovisual method should be conducted for drivers and settlers in settlements along corridors of roads. Also the construction of standard rest places for drivers and standard health Care Centers in settlements along corridors of these highways is very necessary and immediate in northern Nigeria.

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