



MOBILITY CHALLENGES AND BORDER ROUTES: THE RISE OF REGIONAL CONFLICTS IN THE LAKE CHAD BASIN

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Abstract:

The main objective of this study is to identify impediments or information that affect problems associated with arrival time, which in the long run constitutes mobility challenges. Transport challenges exist in the Chad Basin due to the geography of transport, flow of immigrants which is always examined as a strong factor for the growth of conflicts (insurgency and other crisis). The Chad Basin encourages the growth of various groups for agriculture and commerce. The dynamism of Lake Chad had introduced conflicts which had changed individual transport behaviour and risks over the years, and reduction in logistic management – cross-border trade, an important factor for growth in trade for Lake Chad Basin Countries. Estimated predictors using the multinomial marginal change shows that there may be gains in access but the changing structure - the terrain of the region and current trends in security concerns has had effects on mobility challenges, especially due to unmaintained roads, high travel insecurity as a result of crisis and insurgency, high travel cost and longer travel time. We recommend that priorities of government in the Lake Chad Basin should gradually change from funding to end the insurgency and rehabilitation of victims to road rehabilitation, to remove all barriers to mobility challenges as a results of impassable roads and closed roads, high security travel risks and low level of cross-border trade in the region attributed to road conditions amongst others.

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1. Introduction

Accessing a desired location is the primary goal of any transport activity. Transport economists are interested in the economic problems of moving goods and people (Button, 2010), and the accessibility to a desired economic activity. The need for various forms of transport therefore exhibits dimensions of heterogeneity of individuals in the derived demand for transport. Most considerations in mobility challenges arise from value of miles travelled (VMT). The evaluation of a travel activity is the consideration of cost of travel in terms of value of distance covered. The extent of the evaluation is to determine various costs incurred in terms of accessibility considerations in transport economics, this defines the ability of an individual or a firm to move to the next point. The motivation is to achieve a desired economic activity. However, barriers, including the terrain measured by factors that defined the geography of transportation in distance covered may determine some of the physical challenges in accessing a given location. National Road Authority (NRA) (2012) examines what accessibility to a road network or routes for an economic benefit and defines what constitutes effective density of a desired area or destination as, all factors that examine this measure of economic activity in terms of accessibility between areas. However, a parameter identified as a “decay parameter (α)”, examines factors that affect travel time and cost. The decay factor constitutes mobility challenges for individuals or firms in achieving the desired goals for accessing a route or destination. High mobility challenges may be seen as factors that increase travel time or transport cost at the end of the journey.

Mobility essentially measures travel speed and distance covered. It primarily evaluates motor vehicle traffic speeds and vehicle mileages travelled. Accessibility is important because it defined travel decision and or behaviour of individuals for mobility. Accessibility is defined by Handy, (2005), as “easily approached or entered”. In most cases, measures of accessibility include the so called impedance factor, reflecting the time or cost of reaching a destination, and an attractiveness factor, reflecting the qualities of the possible destinations. Accessibility refers to the ease of arrival to destinations. People who are in places that are highly accessible may reach an activity or destination quickly; people in inaccessible places may reach fewer places in a given amount of time. Mobility challenges occur due to geography of transportation, which may include the topography, physical bottlenecks that may impede the structure of networks, the cost structure and proper working of transportation system – defined

in sum as the physical barriers. According to Achieves et al, (2007), it has been the main factors hindering accessibility in most of landlocked regions of Africa. Other factors may be the hydrographic – related to water that most times necessitates huge public investments in building bridges, canals and etc., which may impede land transport. On a broader perspective, these impediments culminate into evaluation of marginal social cost(MSC) for road users to determine factors like pollution, traffic volume resulting in congestion, and other aspects which produces extra units that has implications to society.

The primary objective of this study is to identify impediments or information that affect problems associated with arrival time, characteristics of the choice set which in the long run constitutes mobility challenges. This is important in transport choice over time for individuals or groups, especially the growing migrant population in the Lake Chad Basin region, who are mostly internally displaced people (IDPs). This migrant population must move throughout the Lake Chad Basin for survival and for commerce.

The Lake Chad Basin Commission (LCBC) was established on 22nd of May 1964 by the four countries that border Lake Chad, Cameroon, Niger, Nigeria and Chad (Figure 2, Appendix 1). The Republic of Central Africa joined the organization in 1996, Libya was admitted in 2008. Over the years, the dynamism of Lake Chad Basin had introduced various phases in its landscapes, from an economic activity point of view, structure of the lake to a safe haven for migrants. The location of the Lake Chad for various agricultural activities, high point of immigrants and recently, a war zone and an international domain for an international Joint Forces (JTF) fighting the Boko Haram insurgency in the region (Figure 1), had exhibited such changes.

The Lake Chad Basin is a high mobility point for people moving and responding to changing natural resources – the drying up of the lake, prohibition of agricultural activity due to war and insurgency and other vices that stood as barriers to movements around the region. As opined by Adepoju (2005), migrants have always considered this location as an economic unit within which trade in goods and services naturally flow. ECOWAS and other regional bodies had affirmed the right of citizens of the Community to entry; this had little effects due to increasing immigrant population – even the so called borderless ECOWAS territory of Abuja in March 2000. At its 4933rd meeting, on 25 March 2004, the Security Council adopted the item entitled “Cross border issues in West Africa” and included in its agenda the report of the Secretary-General dated 12 March 2004 on ways to combat sub regional and cross-border problems in West Africa’s (UN, 2007). Some of these cross border problems includes

growing location for hard core Islamists, manufacture of small arms and light weapons in the region.



Figure 1: Movements around the Lake Chad

Source: Lake Chad, UNEP, (2007)

(Author: map reorganized for the purpose of this study)

Worries of border porosity and fears of criminal activity spilling-over to Nigeria and other regions of the Lake Chad Basin are increasing. This is due to the potential spread of threats related to international terrorism and cross-border crime in the Sahel region to the coastal states, especially linked to the growing crisis propelled by Boko Haram in the Northern parts of Nigeria, Chad and Cameroun. Increased insurgency had resulted to collapse of road infrastructure – destruction of bridges (over 350 bridges), economics losses up to \$5.9 Billion (about N1.8 trillion) according to National Emergency Management Agency (NEMA) figures of 2016. These have been the main causes for increased poverty and ‘restlessness’ in the Lake Chad; with grave consequences on travel constraints and or mobility challenges over the nine years of conflicts in the region since 2009.

Hindrances to movements in the Lake Chad Basin has most recently been attributed to several factors ranging from neglected roads due to priorities of funds for fighting insurgency, increasing number of migrants for agriculture and commerce and related activities. Policies for free movements were ineffective amongst the countries, growing conflicts in the region, increased military activity all contributed to affect mobility challenges in the region. Existing factors that impede or increased mobility challenges already exist in the region. Effective transportation choice is the main concern of this study. Other sections will be devoted to literature and results.

2. Literature

2.1 Mobility Challenge, individual choice under risk and uncertainty

The Prospect theory (Kahneman and Tversky, 1979) provides a springboard for theoretical basis to understanding people's perception and their behaviour in risk assessments. Prospect theory is a [behavioural economic theory](#) that describes the way people choose between [probabilistic](#) alternatives that involve [risk](#). Thus, decisions are made without definite knowledge of outcomes, sometimes however, as in this case (Chad Basin), no adequate information to help in decision making.

In contemporary road choice in Nigeria, commuters may have a preconceived conclusion of roads. Road conditions are examined in these perspectives: its effects travel time and the associated risks resulting from vehicle conditions, crisis in areas (as it prevails in the Northeast of Nigeria), risks associated with public transport in Nigeria and generally, advantages of private cars over public transport preferences (Turcottes, 2006). However, uncertainties may exist due to two main conditions: (i). travel time consideration and (ii). Travel risks on roads. For travel time requirements, it is due mainly to increased bad segments on roads that require longer travel time. Travel risks create higher probabilities for occurrence of perceive hazards in some areas in Northeast regions roads. Such risks exist and higher uncertainty due to arm robbery attack and the fear of religious sects (Boko Haram) which had become a 'demon' of terror on specific locations in the region (Northeast region).

Augments around the prospect theory are based on issues presented in the awards winning works of Kahneman and Tversky; that 'decisions are probabilistic.' The seminal paper in behavioural economics is a pointer to the fact that for a choice under risk, the probability distribution of the potential outcomes is known, and when such decisions are done under uncertainty (or ambiguity), is unknown to the decision maker. Fields of applications are numerous and include accident prevention (de Palma et al., 2008). An aspect that defines both certainties and uncertainties on Nigerian roads abound. The highly likelihood of occurrence is mainly a familiar terrain on roads transport around Nigeria. However, uncertainties exist for transport routes in border town locations around the northeast region due to increased immigrants from Cameroon, Niger, Chad and entry-exit points on these border roads around the Northeast geopolitical zone of Nigeria. It is thought to harbour 'runaway' soldiers from Mali and Libya to Nigeria. The level of increases the log oddsⁱⁱ of an outcome per units in the value of an exposure due to the degree of uncertainties exists in many locations around the Lake Chad Basin.

ⁱⁱ An odds ratio (OR) is a measure of association between an exposure and an outcome (Szumiles, 2015)

Roads are the foundations on which economic activity takes place, and especially for the bulk of small businesses (Rioja, 2001). In rural Nigeria, mainly agro-allied businesses accounted for 60% of the population; roads are essential for their daily subsistence. The degree of uncertainties in roads in the study area increases by the day due to the conditions we have already explained above – war and conflicts. This has impacts on navigation around the region. Apart from the roads condition and terrain, transport infrastructures are inadequate (Figure 3 & 4; Appendix I). As opined by Teravaninthorn and Raballand, (2009), the main determinant in Africa’s transportation is the existence of a distorted transport market with several providers, stock of vehicles is low compared to the population, thus bulk of the population use other means of transportation – animals, on foot. That is why worries of border porosity and fears of criminal activity affect all activity in the region, including transport challenges.

Table 3.1: Entry Points and Cross-Border Activities

Nigerian Entry Point (State)	Routes from Nigerian Axis	Targeted Entry Point (Country)	Remote Locations from the Lake Chad Region	Economic Activity at Entry Point
Borno State	Damasak –Diffa	Niger Republic	To Mali from Chad, Cameroun and Nigeria	Jewellery, Hand crafts, food, cloths. Vehicles, Small arms from runaway soldiers
Borno State	Jilbe	Chad Republic		Agricultural goods.
Borno State	Baga	Chad Republic	Central Africa Republic	Fishing in Lake Chad, trade in agricultural goods.
Borno State	Banki	Cameroun		Foreign exchange Centre, manufactured goods from both countries.
Borno State	Mandara Mt. (from the North), Gwoza-Kerawa* (figure 3 & 4 in the appendix page)	Cameroun		Goods (including small fire arms), Base camp for Boko Haram exit routes from countries within the locations).
Adamawa State	Mandara Mt. (from the South), Madagali-Michika Figure 3 & 4	Cameroun (exit to Chad through bush paths) – Motorcycles and Animal trans- port	Central Africa From the Cameroons to Mali and other	Agricultural goods, manufactured goods (including small fire arms)

(appendix page) from the border locations towns.

Adamawa State	Gurin (from Yola Central axis) Fig. 3 & 4	Cameroun (Buses, cars)	Various goods (including medical consultations in Cameroun)
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Source: Suleiman Purokayo, G. (2015) and other compilations (Banki, Madagali (Dirif) - modified by the present author.

- More than 1497 illegal routes around the Lake Chad Basin.) see <http://www.puching.com/newsimmigration>

* This is Base Camp of the Boko Haram located in Borno State.

Mt. = Mountains

Source: Author's compilation and survey

3. Data and Methodology

Data used for this study was from primary sources - the use of questionnaires to a greater percentage. Responses were collected from the locations in the Chad Basin - Borno, Adamawa and borders towns in these two states. Most activities of immigrants and the level of inflows and outflows in the regions are mostly occurring in these states. For instance, Borno and Adamawa states and other states in the north (Gombe and Kano states etc) determine the flow of goods and services to the four countries – Nigeria, Niger, Chad and Cameroun. Specific locations around these states shows high traffic of both goods and people as shown in Table 3.1

Methodology used in analysing responses collected is multinomial Logit models. Multinomial Logit (MNL) shows relationships between more than one distinct categories. As opined by Long (1997), distinct choices as in transportation economics, is based on individual choice of outcomes that maximises the utility gained from such choices. The scenario of this study arises from the fact that there exist more roads and bush paths. Choices must be distinct either because an individual has a desired destination on the probability that the outcome maximises their utility.

The probability that an individual may choose an alternative j is given by

$$\Pr (y_1/x_1) = \frac{\exp(x_1 \beta_1)}{\exp(1 + \sum_{y=2}^j \exp(x_1 \beta_1))} \tag{1}$$

$$= \Pr (y_i = j | x_i) = \frac{\exp(\beta_{0j} + \beta_{1j} x_i)}{\sum_{j=1}^4 \exp(\beta_{0j} + \beta_{1j} x_i)} \tag{2}$$

Where x_i is a $1 \times (k_x+1)$ matrix of explanatory variables, the parameters are shown by β_i etc. When the logistic regression is computed, the regression coefficient is the estimated increase in the log odds of the outcome per unit increase in the value of the exposure (Szumilas, 2010). Interpreting logit regression, we exponentiate the coefficient which will give us the odds ratio (Bierens, 2008: Buis, 2010). We show the multinomial logit in Table 3.2

The main focus is Transport Choice (TC), four predictors, Location Choice (1), the point where an individual finds a vehicle to his desired destination, Road networks (2), the type of road networks available in the Lake Chad Basin, Terrain Roads (3), the environment (including the existing security challenges), Transport cost (4), the cost of transport in the midst of these Mobility challenges. A simple model for this study is $TC = \text{Location Choice} + \text{Road networks} + \text{Terrain roads} + \text{Transport Cost}$ then, then the Error Term.

Table 3.2: Multinomial Logit Estimates of Transport/Route Choice around the Lake Chad Basin

Predictors	Highways (A). (Base Outcome)	Probability Value	State Roads (B) Adamawa & Borno States	Probability Value	Local Routes (C).	Probability Value
Location Choice	152 (.129)	0.305	-.212 (.132)	0.164	-.101 (.124)	0.312
Road Networks	.171*** (.062)	0.006	-.564 (.272)	0.496	-.881*** (.276)	0.001
Terrain Roads	-.424** (.123)	0.048	-.415 (.131)	0.001	-.0514 (.013)	0.881
Transport Cost	-.0262 (.0731)	0.720	.0618 (.056)	0.269	0.068 (.053)	0.197
Constant	.1480 (.3835)	0.700	1005 (.468)	0.032	.730 (.450)	0.105

Source: Survey of locations around lake Chad Basin, 2013

Standard Error in brackets

A, B, C Road types definition in Nigeria (including pathways, bush roads around the borders)

In this study, our interest is to observe changes in conditions of the various routes in the Chad Basin. In what way(s) does a change in the environment, Terrain, Prices of Transport modes, Road networks, either an increase or decrease the level of security which affects mobility? Table 3.2 shows the effect of various choices of roads types. To fully observe the changes, we compute marginal (ME), computed after the multinomial logit (Table 3.2) and is defined as:

$$\frac{\partial p_{ij}}{\partial x_i} = p_{ij}(\beta_j - \hat{\beta}_i) \tag{3}$$

The Estimated $\hat{\beta}_i = \sum_i p_{it} \beta_t$ is the probability of weighted average of β_t and the marginal effects changes with the point of computation of any one predictor because P_{ij} varies with the predictor (x_i), the marginal effect is positive if $\beta_j > \hat{\beta}_i$. Thus, β_j is the marginal change in log odds with respect to X_i . We formulate a simple linear equation of our model: $Y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + U$, $Y = \text{transport choice}$, while $x_1 - x_4$ define the predictors (*location choice, Network roads, terrain, and transport price* respectively). Efficient transport choice is defined by initial choice of a location and other variables (predictors). Predictors detect travel time and cost which creates price differentials in the Lake Chad Basin.

The researcher grouped routes according entry points, taken into considerations that these are major entries to countries in the Lake Chad Basin, and the source of increased conflict in the region.

4. Results and Discussion

Table 4.1: Marginal Effects of Outcome Probabilities for Choice of Routes

Explanatory Variables	Borno State Routes ($\Delta y/\Delta x$)	P-Value	Adamawa State Routes ($\Delta y/\Delta x$)	P-Value
Location Choice	.0367 (.0258)	0.155	-.0329 (.0236)	0.164
Network roads	.1783*** (.539)	0.001	-.0346 (.0508)	0.496
Terrain roads	.0476** (.0229)	0.038	-.0800*** (.235)	0.001
Transport price	-.0158 (.0110)	0.150	.0062 (.0100)	0.538

Standard Error in parentheses

p<0.1, ** p<0.05, *** p<0.001

Sources: Survey

Table 4.1 Show the results of marginal effects of outcome probabilities for the four variables estimated based on the responses collected from locations in the Lake Chad Basin region.

The results showed that estimated coefficients are not significant in most location in Borno and Adamawa locations. But this can be argued in the prevailing condition in

the region – crisis region, military activities and high migrant population crowding on the Lake for various activities. For most migrants, finding escape routes provides the opportunity for safe haven. The case in point is the similarities between refugee escaping through boats to Europe and the immigrants at the Lake Chad Basin. Porous borders provide pathways to the countries within the region. For Network of roads, these are essentially available highways from Borno to other countries and to further North of Nigeria. It means that a one unit change in kilometres gained in travel access increase by (18 percent) 0.1783 results, means that the probability of individuals to access networks in a preferred (defined by degree of risks) location increased. Higher probability of access allows individuals to make decisions that allow them to change their travel behaviour mainly due to road networks available mostly in Borno axis to Chad, Niger and Cameroon. Access roads and types of roads are the factors that increased the number of immigrants and runaway soldiers that resulted in the growth of insurgency. In the Long run it had introduced mobility challenges due to war.

Terrain roads (constraints due to long unmaintained roads, increasing desert conditions and increased insecurity) has affected travel time and cost. Estimates show that a unit changes in the terrain, interns of difficult access increases by (5 percent) 0.0476 the probability that longer travel time will occur as a results road conditions or risks, which will culminate into longer travel time because journeys are not straight or continuous. Increase in the probability for longer travel time required that the likelihood or chances of accessing routes becomes lower with each increase. Changes may be small, due to long tracts of unmaintained roads and the fact that part of their budgets (Northeast) is used for security maintenance since 2009 due to the state of emergency. These changes are significant (5 percent), it may be because vital road connection (damage bridges) that links location collapsed due to high rainfall, insurgents trying to take over towns and villages, a supply route that goes a location that is crises-ridden or goes through insurgents' location. This had affected transportation in this region, and affects security. However, in Adamawa (Table 4.1), that a unit change in the terrain, decrease by (80 percent) 0.8000***, significant, which is a significant decrease. This means that a decrease in the terrain means travel conditions are getting better in Adamawa state axis. It means that the porosity of routes in Adamawa seems to translate into better conditions for travel. This means that improvement in the terrain has improved access; this is because insurgency was milder in Adamawa when compared to other locations. The perception of respondents is overwhelmed by the increased in crises which had meant that most routes are unsafe for mobility. For instance, the only route to Maiduguri from Yola axis (Adamawa State) is Gombe – Yobe; instead of a straight journey from Yola through Michika to Bama and

to Maiduguri (see Map Appendix I). This route (the straight route, goes through the captured territory of the Boko Haram). For transport price, the result is not significant because most respondents notice that in the height of crisis, commercial transports are not available due to the increased level of insecurity in the Lake Chad Basin, footpaths are safer than roadways. These are factors that affected transportation of goods and economic activities in this region.

In a regional Conference organised by the Moddibo Adamawa University; participants from the region shared experiences/stories of the effects of the conflict and peace building in the Lake Chad Basin from September 24-28, 2016. Final communiqué was lent on regional efforts in poverty alleviation, international donor assistance for the region. Most efforts are in surmounting Challenges for safe mobility, road building and proving support for economic activities in region.

5. Conclusion and Policy Recommendations

The Lake Chad Basin had provided great potentials for movements and economic activity over the years. The Dynamism of the region has shown the present state of the region ranging from a place of high immigrants and conflicts, a haven for runaway soldiers and small arms, which has increased cross-border crisis. The region has turned into a battle field with insurgency and the movement of international joint forces to fight the crisis. This state of affairs has had impact on movements of people and economic activities. The terrain and environment had created mobility challenges – damaged roadways and high travel risks over time.

We recommend regional conferences for peace for the region aimed at international cooperation in rebuilding the region, infrastructure provision, regional policies for boosting agricultural productivity in the region. Enforcing ECOWAS protocol of free movements may increase cross-border trade in the lake Chad Basin and a reduction in the present mobility challenges in the Lake Chad Basin Countries.

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Appendix I



Figure 2: Map of Nigeria and Border Roads
(Source: Urhobo Historical Society, 2010)



Figure 3: Border routes in Adamawa in Madagali (Dirif) to Cameroon
(Source: Authors Photos)



Figure 4: Border routes Madagali (Dirif): Part of Mandara Mountains in Nigeria
(Source: Authors' Photos, 2013)

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