
Research

Climate Variability and Changing Pattern of Nomadic Routes in Nigeria

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Abstract: This study examines the implications of the recent changes in the nomadic routes across Nigeria. A quasi-field survey design was used for investigation. Five states (Kwara, Ogun, Ondo, Osun and Oyo states) that served as traditional transits and destinations of migrating herdsman were purposely selected for the study. A Respondents Network Model (RNM) was used to locate 285 herders for semi structured questionnaire administration. Finding showed that majority of the herders were young (15-35 years), illiterate between the age of 15 and 35 years. Climate change, drought, and scarcity of water were the initial push factors while persistent resistance, hospitality fatigue, and urbanization led to the adoption of the current patterns of nomadic migration. The consequences of the creating new routes are frequent conflicts, security threat and violent clashes at new destinations. Statistically, there was a significant relationship ($r \geq 0.72$; $p\text{-value} = 0.001$) between arrival of herders and frequency of conflicts at the host communities. This study recommends mitigation to cushion the effects of climate change at the source regions through provision of wells and boreholes for portable water as well as provision of grazing lands and ranches along major drainage basins to reduce incessant nomadic migration.

Keywords: Climate change, migration, herdsman, conflict, Nigeria.

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1. Introduction

Globally, climate change has created a common crisis to humanity especially in Nigeria where climate variability, droughts, temperature and rainfall have significant implications for agriculture and water resources (Ahmed, Abubakar and Mohammed, 2020; Bhapa and Dave, 2020). The country's susceptibility to droughts is a concern due to irregular rainfall patterns, high evaporation rates and climate variability. Drought poses a substantial challenge to the environment particularly the Sudan and Sahel savanna zones of northern Nigeria where considerable number of people engage in animal husbandry (Gana & Oloke, 2021). Crop failures, reduced yields, livestock losses due to water scarcity and heat stress also adversely affect food security and rural livelihood in the region.

Farming, usually characterized by shifting cultivation, has been the traditional occupation of many Nigerians right from the pre-colonial period. This method allowed the farmlands to regain its fertility naturally and also checked erosion to some extent. During the period there was enough land to allow for long periods to fallow (Aweda, Akingbade and Ojo, 2024). These fallow lands served as adequate grazing land for the pastoralists without interference with the portion under cultivation. The relationship between pastoralists and farmers was not always so hostile. Local farmers would give herders land grants that facilitated coexistence in what was a symbiotic relationship where the cows helped fertilize fallow fields as they grazed on crop remnants (Ogunwale, 2016).

On a large and constant scale, migration is a way of life of the cattle herders of northern Nigeria, especially in the savanna region where there is a long dry season followed by a short wet season. Rather than being a sedentary race, the herdsman move constantly from their small make-shift communities to live with their cattle wherever there is availability of pastures to feed their animals (Aliyu, Kasim and Martin, 2018)). The duration of their stay in any settlement could be very brief or last for some months depending on the availability of pasture and absence of tsetse fly that could threaten the survival and healthy living of their cattle.

Traditionally, conflicts sometimes occurred between farmers and herders for control of grazing lands (Okpara, stringer andDonghill, 2016), a major source of economic livelihood for the herders, however, prior to the beginning of the 20th century, such clashes were largely limited to the Sahel regions. Recently however, there have been significant changes in the previous nomadic routes, duration of grazing at the transit communities, and the increased geographical distances covered southward to find enough pastures to feed the animals. During the last two decades therefore, violent conflicts between local farmers and cattle herders have evolved into a major national issue. Some of these clashes have resulted into loss of several lives and properties. IOM (2022), showed that over 800 deaths were recorded in 2015, while 3,641 deaths were equally reported form January 2016 t0 October 2018 Post 2018 is fragmented, but the conflict remains active with hundreds to thousands killed annually.

Conservative estimates put total deaths between 2015 and 2023 well above 6,000. In 2024 alone, 467 people were killed in 61 incidents, while 451 deaths were recorded in Benue, Plateau, Nasarawa and other states between January and August 2025. According to the Council on Foreign Relations suspected herdsmen have attacked 155 villages, destroyed 1,422 homes and killed at least 1,300 people, mostly farmers, across Nigeria since January 2016, exceeding the nearly 1,000 Nigerians who have been killed by Boko Haram (IOM, 2022). Clashes in Benue state in the north central zone and Enugu state in the southeast also left more than 340 people dead and displaced over 20,000. Farmers are the most affected by the incessant violence, many of who have been killed (Daji, 2024), injured or forced to abandon their farmland for security and safety of their lives. These conflicts have severely undermined the social fabric and further destroyed the declining agricultural sector. The wanton destructions of farm settlements, villages, infrastructures and interruption of planting season could severely constrain agricultural development (Babajide and Orji, 2024).

In a technology deficient Third World country like Nigeria, the most basic resource is the land and the plants that grow, or are cultivated on the land. The effects of climate change and variability has however, impacted significant consequences on the living conditions at the sources, the routes, transits and the destination regions cattle herders within the country and beyond. This situation has led to massive waves of nomadic migration towards different direction hitherto avoided.

The aim of this study therefore is to examine the implications of the current nomadic routes in Nigeria. To achieve this, appropriate answers were provided to the following questions: (i) Where are the major origins of the herders (ii) What are the major push factors necessitating nomadic migration in Nigeria? (iii) Why are the herders abandoning the former routes? (iv) What are the effects of the current nomadic routes on farming and communal security?

The challenges posed by the recent changes in nomadic migration patterns cannot be underestimated as the consequences remain undesirable either by the local peasant farmers or the nation at large. The sole hypothesis for this study therefore is stated thus : There is no significant relationship between periods of arrival of nomadic migrants and outbreak of violent clashes in the host communities.

2. Literature Review

Several studies (Aliyu, Kasim and Martin, 2018; Ahmed, Abubakar and Mohammed, 2022; Babajide and Orji, 2023, among others), have shown a connection between unusual climate patterns and how it influences the life of man, the occurrence of deaths caused by drought, considering various geographical and time related factors. Temperature and rainfall are the major climate elements that have profound influences on human livelihood in the Nigerian context.

The amount and seasonal distribution of rainfall have a much more influence upon population distribution and land use. In places with 500-700mm per annum, crop production tends to be marginal. Where annual rainfall is less than 500mm crop growing is very difficult without irrigation, and such areas are mainly used for animal rearing and tend to be extremely sparsely populated. Ogunwale, (2018) also noted that the seasonal distribution of rainfall across the country influences the types of occupation and sources of livelihood of people. The recent unreliable nature of rainfall resulting from climate change causes problems for both the cultivators and the livestock farmers, especially nomadic pastoralists, whose movements are closely influenced by climate and vegetation.

Kehinde, Lawal and Umar, (2021) and Amare, (2023) observed that the scale of out-migration of able-bodied young men from the rural areas across the country has increased tremendously recently due to the severity of the consequences of climate change. Nomadic herders are the most affected because they have to travel farther southward before they could get enough fodder for their animals. This increase in distance covered leads the

herders to new grazing lands, leading to competition for resources with the indigenes (Okpara, *et al*, 2016).

Living things, including human beings impact upon or modify the environments where they live (or/and work), just as the environment impacts on living things. There is no problem in this relationship for as long as the total ecosystem made up of a great variety of species remains balanced, such that no organism is able to cause excessive damage on the environment. According to Amare, (2023), trouble will start when nature's balance is upset by rapid increase in particular specie that leads to domination. Kabo-Bah, *et al*, (2021) provide a socio-structural explanation for the emergence of violent social conflicts and factors that lead to changes in peoples' material comfort. These factors include environmental degradation that reduces access to sources of livelihood, uncontrolled population growth and movement, resource scarcity leading to competition and the domination of the minority groups by the majority (UNESCO, 2021; Aweda, *et al*, 2024).

Carr, Owusu and Sallu, (2024), identified persistent desertification and lack of water in the far north, herdsmen, specifically the able bodied young ones, have currently resorted frequent migration southward in large numbers all year round, leaving their wives and other family members at the source regions. Rather than the usual north-south and south-north movements during the dry and wet seasons respectively the nomads nowadays extend their periods of stay in the south and sometimes becoming permanent migrants. Due to constant resistance by the local farmers, the pastoralists have embarked on the extension of their journey to new locations across the country (Aweda, *et al*, 2024).

Migration offers many opportunities, but it also involves many complex challenges in Nigeria where a non-regulatory internal migration system is practiced. Families and communities, most times, are often forced to adjust grudgingly to unforeseen human addition. Its impact has been economic, social, cultural, political and environmental. These movements raise new issues, and could ultimately have consequences, implications and challenges for the development of agriculture and food production (Ogunwale, 2017). Despite various contribution by the scholar, there is limited or no empirical study on the reasons for the change of routes by nomadic herdsmen as well as the consequences of such development in Nigeria.

3. Materials and Methods

A quasi- field survey research design was adopted for the study. A quasi-field survey method is adopted because it was very difficult to get a coordinated set of

population for interview. The field survey was carried out in five pilot areas of Kwara, Oyo, Ogun, Osun and Ondo states, where a substantial amount of data used for this report was collected between 2023 and 2024. These states were selected because they serve as both transits as well as destinations for nomadic pastoralists. Three major grazing zones were selected in each state and a total of 45 informal grazing fields were visited. A total of 285 herdsmen were interviewed during questionnaire administration.

Due to frequent mobility of herdsmen and their cattle, and extreme difficulty in locating nomadic *Fulani* and their grazing fields especially during the day, a Respondents Network Model (RNM), a modified snowballing approach, was used to locate the nomads at selected grazing zones. The RNM is a technique for data collection that is appropriate for de-jure or hard-to-reach population such as nomadic pastoralists, scattered population, displaced persons, return migrants and locally integrated or reintegrated refugees. Mathematically the model is constructed thus:

$$R = \sum_r^n [n_1 = n_2 = n_3 = n_4 \dots \dots n_{th}(r = 0)]$$

Where :

R = Sample (expected respondents)

\sum = respondent catchment area

n = node (grazing field)

r = respondent

$n_1 \dots n^{th}$ = no of available grazing fields

(r=0) = repeated referrals.

With RNM, a respondent catchment area (\sum) was delineated and a starting point (n_1 = origin) was selected from where the subsequent nodes ($n_2 \dots n_x$) are located. The description of route(s) leading to the subsequent nearest node was imposed in the questionnaire while answer to such question gives direction to the nearest grazing field. The process continues until the delineated catchment area is covered and $r = 0$, hence recurrent referrals were encountered. Depending on the scope of a study, the respondent catchment area (\sum) may be few hectares wide or it could cover several kilometers. Subsequent nodes were visited following the described paths until recurrent referrals (RR) are encountered. Note, once the existing nodes were exhausted, researcher encountered frequent or repeated references to nodes already visited until no new nodes were observed.

Both primary and secondary data were used. The primary data included the socio-demographic characteristics of the herders, source regions of the herders, reasons for

migration, challenges and problems encountered along the routes, reasons for the current patterns of migration, among others. Local farmers were also interviewed to elicit information about their experience and perception of the current changes in the nomadic migration routes. Secondary data were collected from village heads and security personnel at different locations for records of conflicts or crises resulting from coexistence of the herders and local communities.

4. Results

It was extremely difficult to interview the nomads on their grazing fields for a long period, the researchers sometimes have to disguise as friendly potential customers before information could be elicited. Majority (68%) of the herdsman are young, between the ages of 15-35 years while just about 5.6% were reported to be above 50 years. This finding supports the assertion by Amare, (2023) that rural out-migration affected more able-bodied young men than other groups in the population. Over 70% of the herders were married but left their households behind at their various source regions. A very high rate (75.4%) of illiteracy (in western education) was reported but majority (83.8%) of the nomads could read and write in Arabic language, substantial number (69.5%) could speak French language even though they could neither read nor write. This is an indication that some of the herders originated from neighbouring countries such as Niger, Chad, Burkina Faso and Mali where French is the official language spoken among the nationals. Notwithstanding the high rate of illiteracy among the nomads, majority (87.2%) of them possessed at least one ICT gadget either mobile phone or transistor radio.

The origins of the nomads were mainly the rural areas of Sudan and Sahel savannas around Sokoto (13.5%) Gusau (6.2%), Katsina (12.4%), Daura (3.4%), Damaturu (12.7%), Biu (7.3%), Gashua (3.2%), and desert areas of the neighbouring countries: Niger (15.5%), Chad (4.3%) and Mali (1.2%) among others. Several reasons were adduced for their recent migration patterns. Prominent among these are drought (88.7%), lack of water (86.7%), inadequate pasture as a result of desertification (82.3%), unreliable rainfall (77.2%) as a result of climate change and adventure for new lands. The most widely reported factor among the respondents for the current pattern of migration is climate change which has altered the amount and intensity of rainfall received in the north. Both the patterns of rainfall and evapo-transpiration across the country have changed overtime as a result of climate change and global warming. This led to alterations in the seasonal locations of the Inter-Tropical Convergent Zone (ITCZ) and rainfall regimes across the country. This has

serious effects on the availability of surface water available for the pastoralists during the year.

There were reported cases of conflicts between herders and local communities. The various local security outfits including the neighbourhood watch, vigilante groups, Nigerian Police outposts and community heads provided various data on the occurrence of disputes in the surveyed areas. Statistically, there was a significant relationship between the periods of arrival of herders and outbreak of violent clashes with the local inhabitants in any particular new grazing field. This is a reflection of the ignorance of some of the new herders who could not differentiate between left over farm crops and fodder. The test of the sole hypothesis with PPMC showed a correlation coefficient (r): 0.72; p-value = 0.001 with a sample size (n) = 285. The correlation is positive and strong, indicating that the arrival of coincided with the outbreak of conflicts and violent clashes at transits and new destinations. herders graze in a particular rural area, the more the conflicts with the inhabitants. This a clear reflection of hospitality fatigue among the host communities towards the continuous grazing on their farmlands.

5. Discussions

Activity of grazing in Nigeria is a rough blend of nomadism and trans-humane. During the early years of the colonial regime, movement of herdsmen and their cattle in large number was limited to the northern region. Depending on origin of the herdsmen, two major traditional nomadic routes were identified: the northwestern and northeastern routes. Nomads in the northwest usually travelled for about 300 kilometers through well recognized routes across villages to the valley of River Niger that served as the terminus for herders in the west.

The eastern migratory routes had nomads from the Sahel dry lands that focused mainly on trans-humane around the numerous highlands around Jos Plateau and Adamawa Mountains. At the onset of the dry season, the pastoralists would drive their cattle from the arid pastures up north to wetter areas further south within the region where grassland, fallow fields and surface water provide suitable grazing for their stock. They usually kept far distance from the dampened riverine forests along rivers Niger-Benue trough which purportedly harboured tsetse flies, the carriers of the deadly *trypanosomiasis*, a parasitic disease caused by protozoans of genus *Trypanosoma*, that caused sleeping sickness in cattle. (Ogunwale, 2016).

Both the periods of arrival and departure of the pastoralists were clearly defined and as a result their brief stay at the rural fringes of the villages or towns caused little or no damages to the host environments. In fact, the cow dung often replenished the previously cultivated land and added manure which improve crop yield for some farmers. This pattern of migration therefore continued for almost a century without notable records of violent conflicts between the herdsmen and the peasant farmers. The return of the Fulani nomads to their northern base camps during the beginning of the raining season in the south usually posed no difficulty since the migrants have good knowledge of the routes. They even tried as much as possible to avoid swollen rivers and water logged swamps which were hitherto dry lands during their journey southward (Ogunwale, 2016).

The recent rapid urban development coupled with improved agricultural practices have put severe restrictions to grazing on the former fallowed lands. There is now stiff resistance to cattle herders who usually grazed their cattle on those abandoned farmlands, during the dry season. Having encountered obstacles in the forest regions of the southwest, the nomads have recently resorted to a *circular migration pattern*, rather than the traditional linear - north-south movements during the dry season followed by south-north homeward journey through the same routes at the onset of rainfall (Figure 1).



— Pre colonial — Post independence — Recent
Figure 1: Nomadic routes overtime

Source: Author’ fieldwork, 2024.

The recent concentration is at the northcentral region, where erstwhile forest woodlands have been replaced with open grasslands. The cattle herders along the eastern routes, have also abandoned the transhumant practice to converge in large number around north-central states where they join their colleagues from the western nomadic routes.

(Unah, 2017). The novelty of the arrival of the herdsmen and the concentration of large herds create more anxiety to the farmers than actual damage at their new destinations. Attempts by land owners to protest the illegal occupation of their land have sometimes resulted into violent clashes between the cattle Fulani and the host communities. At this point, hospitality fatigue rapidly sets in and the nomads were no longer regarded as welcome migrants but trespassers.

6. Conclusion

The recent farmers-herders' crises stem from severe effects of climate change which forced herders to embark on a traditional migratory practice but towards new directions where the lives of their animals could be forcefully sustained. Herdsmen nowadays embarked on diversified and prolonged grazing periods at new host communities and as a result encroached into subsistence agricultural lands creating concerns to the peaceful co-existence in the affected regions. Government efforts at redressing the menace of the herdsmen are usually characterized by a multitude of contradictory opinions working against one another, often in an uncoordinated manner. True impact will only be achieved if governments at various levels coordinate their inputs towards reducing the effects of climate change which has increased the rate of desert encroachment as well as shortage of water at the source regions of the migrating nomads.

7. Recommendations

The greatest threats to the herders, linked to climatic variability are the disappearance of fodder grasses and scarcity of water at the source regions. The spate of water scarcity in northern Nigeria is alarming despite several rivers that flow within the region. Dams, artificial lakes and ponds should be constructed to store water during rainy season. Wells and boreholes should also be drilled to facilitate underground water supply. This will improve the quantity of water available for use by the herdsmen and their stock during the dry season.

One of the most durable solutions is that the federal government should provide conducive environment for cultivation and management of legume and grasses around the origins of the nomadic pastoralists. An improved management of sustainable grasslands will reduce the urge to migrate in search of grasses. Also, land should be allocated for ranches especially along the river banks where water could easily be made available.

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