Imprints of security challenges on vernacular architecture of northern Nigeria: a study on Borno State

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Abstract. Security challenges are known to have diverse negative impacts on all facets of human endeavours across the world. However, in a country like Nigeria that is faced with myriads of security challenges ranging from armed bandits to insurgences by terrorist groups, the impacts of security challenges on architecture have not been adequately explored. This research examined how security challenges have influenced the architectural forms and spatial morphology of vernacular architecture in Northern Nigeria using three Local Government Areas: Maiduguri, Nganzai and Monguno of Borno State a case study. The primary data were gathered through observations, photographic materials and oral interviews with randomly selected residents in the study area. These were complemented with the review of published literature. The results of content analysis reveal a gradual change in Northern Nigeria vernacular architecture to accommodate the myriads of security challenges confronting the region. Specifically, it was observed that changes in traditional circular houses with thatch roofs to rectangular houses and the use of modern building materials as well as emergence of gated communities abound in the study area. The study also found a decline in traditional decorations and paintings on domestic building due to the relocation of practitioners from the study area. The study concludes that in spite of the daunting security challenges, Nigerians should not abandon their rich heritage in vernacular architecture, rather, indigenous and modern architectural principles should be integrated in evolving secured human settlements in this country.

Keywords: Architectural forms; Case study; Nigeria; Security challenges; Vernacular architecture

1. Introduction
Throughout history, man has made conscientious efforts to gain increasing control over his physical environment and to gain freedom from its limitation [1]. One of the strategies human has employed to achieve this is architecture, which among other things provides shelter, one of the three basic necessities of life after food and clothing. Basically, shelter gives protection from both natural and man-made elements such as wild animals, natural disaster, harsh weather conditions, terror attacks and other unwholesome activities that seek to threaten the wellbeing and existence of man. These factors, no doubt, influence the building form, choice of materials and method of construction leading to a unique architectural theory peculiar to localities.

Architectural theory can be said to be the concept used to explain components that influence the design style and forms of buildings and structures in a particular geographical setting. Nigeria as a nation possess several traditional architectural forms in line with her different sub-geographic regions, socio-economic background, cultural settings and weather conditions. Globally and locally, traditional architecture reflects the cultural values of the people and represents the common heritage of the people; and thus the need for it to respond to the material, spiritual, and social attributes of the society cannot be over-emphasized [2].
The Islamic religion of the northern Nigerian has a strong influence on the predominant architectural theory of this region, which is known for its courtyard system, circular plan shape, monolithic walls, domed roof and appropriate construction technology. However, today, the architectural form of this region is characterized by the post-modern buildings of the 1990’s [3] with sprawling new design concept incorporating foreign building materials and borrowed methods of construction. As a result, the contemporary architecture in Northern Nigeria is devoid of the design features that portray the characteristics of indigenous Nigerian architecture regardless of the established significant sociocultural, economic and environmental benefits associated with it.

Notably, very little efforts have been given to exploring the inherent characteristics of the merging architectural form in this part of Nigeria [4], while government policies and architects have continued to frivolously jettison the traditional architecture for modern architecture in recent times. The northern vernacular architecture has from time immemorial a thing of pride to Nigeria with tremendous benefits in tourism. The current situation has compelled the authors to inquire the extent to which the current security issues play role in changing architectural form and spatial morphology of Hausa settlements in northern Nigeria.

This research sought to examine how security affects the architectural forms of contemporary Northern Nigeria using Hausa house forms and architecture as a case study. The following specific objectives were pursued in the study:

• To highlight the architectural form of northern Nigerian traditional architecture
• To examine the spatial morphology of traditional Hausa pattern, and
• To explore how security issues have affected the architectural form and spatial morphology of traditional settlement pattern in the study area.

This study was informed by the observed changing effect of security issues in all facets of human activities locally and globally. Based on this, the study makes contribution to knowledge by identifying the specific areas the current security challenges are impacting on vernacular architecture of Hausa land in northeast Nigeria. This information is very vital in the search for strategies for achieving sustainable human settlements in the face of various social and environmental challenges confronting Nigeria and other developing countries.

2 Study area
Borno is a state in north-eastern Nigeria with its capital in Maiduguri (see Figure 1). It was created in 1976 from the splitting of the now defunct North-Eastern State. With a total of 57,799 km² (22,316 sq mi), it is ranked 2nd in terms of land mass in Nigeria and a population of 4,171,104 inhabitants based on the 2006 Nigerian population census figures [5]. The motto or slogan of the State is "Home of Peace". Although previously known to be a peaceful State, Borno has been the epicenter of Islamist Boko Haram extremist in the last one decade [6]. Considered to be the homeland of Hausa- Kanuri people in Nigeria and several other ethnic groups [7], Borno State has 27 Local Government Areas and three Senatorial Districts, namely, Borno South, Central and North. This State is the most affected by the insurgency of Boko Haram in Nigeria and Islam continues to thrive as predominate faith practiced in the State.
Figure 1: Map of Nigeria Showing the Location of Borno State and map of Borno State

Source: Google Maps

3. Review of related literature

3.1 Nigeria in the Context of Global Terrorism index
Nigeria has been affected greatly by terror attacks from different sect of religious beliefs [8]. She remains the third most terrorist affected country in the world, a position she has retained since 2015, as shown in the 2019 Global Terrorism Index (GTI) report (see Figure 2). Nigeria appears to be in the group with countries like Afghanistan and Iraq, both of which have been experiencing war in the last one decade. With jihadists such as the Islamic State in West Africa Province (ISWAP) and Boko Haram sects gaining power and dominance, Nigeria has undergone 10 years of regionalized armed conflicts, while acts of terrorism and violent extremism and kidnapping have been on the increase unabated. Resulting from these, are loss of human lives and property worth billions of Naira. Amongst the most affect aspects are housing and livelihoods of the people. Consequently, this region accounts for the largest number of internally displaced people (IDPs) in the African continent.
Figure 2: Ten countries most impacted by terrorism ranked by number of death. 

Source: START GTD, IEP calculations

Figure 3 is a summary of data extracted from the United Nation’s database on terrorism in Nigeria. The Statistics of global terrorism index indicate that Nigeria is among the first ten countries most impacted by terrorism and these ten countries alone accounted for around 87% of deaths from terrorism in 2018, with Nigeria contributing about 13% of these deaths and a total of 562 incidents [9].

Figure 3: Summary of terror attacks in Nigeria. 
Source: United Nations Global Terrorism index
Currently the security situation in Nigeria is deteriorating significantly, the level of human rights violations and mass killings are alarming, in the North-East region of the country, with vast majority of Muslims (Hausa) as victims. This poses a serious threat to economic development and international security. According to Okeke et al [8], the increasing rate of terrorism especially in Africa in general and Nigeria in particular, requires adequate attention by government and professionals involved in counter terrorism to devise measures to adequately deal with issues relating to terror and prevent this from escalating further in this country.

3.2 Spatial Settlement Pattern in Hausa land

The religion of Islam, combined with trade across the Sahara are considered to have had the greatest impact on Hausa settlement patterns and the local building and construction practice associated with this ethnic group in northern Nigeria. It should be noted that there is only a thin line between the urban and rural settlements in Hausa land [10]. Scholars see the urban settlement as part and parcel of the rural surrounding areas and rural lifestyle, called "Anguwani," much like the rural community. Popoola [11] also reported that the rural landscape of Hausa settlement was and is still dominated by nucleated villages, with the possibility of some expansion of compounds. Their architectural language demonstrates a simple form of hierarchical arrangement of dwellings. Starting from the Gida (compound) basically made up of extended family and usually sub-divided into units and each containing family houses to the Kauaye (village) which is essentially a collection of matrilineal family groups in a nucleated homestead planned for agriculture, and followed by the farmland (Gona), which most often is the adjoining space separated from the other "Kwauyika" (villages) by "Daji" (forest). At the apex of the Hausa settlement is the Gari (town). This shows that there is a clear hierarchy in spatial planning in a typical Hausa settlement resulting in a distinct space morphology and architectural form

The historic towns in Hausa land are reflective of a compact nucleated settlement surrounded with the defensive walls [4]. The towns are organically and conceptually categorized into three fragments: ‘Cikin Gari’ (inner core), ‘Tsakiyar Gari’ (central core) and ‘Wajen Gari’ (outer core), surrounded by a thick mud wall called ‘Ganuwa’ (city wall) and accessed through a gate known as the city wall and gate called ‘Kofa’ [10]. The key concept underpinning the spatial settlement pattern in Hausa land is the triple core or spaces in traditional compounds and it synonymously translates to the concept of the town surrounded by a compound wall entrance and the city wall with an entrance gate [12]. This pattern as described has evolved over the years as a result of interplay of religious and socio-cultural values of the people.

3.3 Architectural form of northern Nigeria

Generally speaking, Hausa communities in northern Nigeria are usually united by common language and religion. Some scholars [13,14,15,16] have argued that to the Hausa, Islam is not only a religion but a way of life. Hence, its introduction into Hausa land had a mammoth impact on their architecture and building construction, which directly influenced the use of conical curvilinear and mud-dome roof structures as seen from Figure 7c and Figure 8c. Also traceable to the religion is the ideology of privacy, security, seclusion of women (Purdah) and the segregation between male and female. This has given rise to the traditional courtyard design of family compound as shown in Figure 6. The associated building form is also prevalent and paramount also in the West African savannah areas of the Niger and Chad River basin [17]. But in Nigeria, the Northern vernacular architecture incorporates a courtyard encircled by several rooms that enable future expansion to house more occupants including wives, children and slaves as the family size increases. As Islamic architectural design principle insists on seclusion and privacy for the girl child and women, a traditional Hausa residence is conceptually subdivided into three parts or layout: inner core (private area), a central core (semi-private area), and an outer core (public areas) [10]; as shown in Figure 4
The inner core consists of women area, ward and servant area with space at the backyard for animal husbandry and refuse disposals. Further to this, is open air space for injunction, which is a court mainly in the central core, for domestic and other family activities as well as fulfilling other building services functions of lighting and ventilation. The outer core is the “Zaure,” and it is the seat of the Master (man) of the house. As explained by Adamu [18] its major functions include security, reception, privacy, moral, protection, ethnic ideas, decorations and administration. Historically, this concept is believed to have originated in 500 CE from the Egyptian domestic architecture. Hence, Hausa traditional village layouts of shelter and settlements have also manifested in urban spatial morphology [12].

As regards the compound setting, the Hausa domestic architecture is influenced by “PURDAH” (exclusion of women) described as Haremlik and Selamlik areas (see figure 5) meaning accessible and non-accessible zones [12]. Whereas Selamlik is that part of the house kept for men, the Haremlik is the private part traditionally forbidden to male strangers meant for women. The idea behind the design concept is that visitors are not permitted beyond Selamlik as long as you are not a member of the immediate household. This amounts to having large compound and consume fairly large area of land to accommodate the various spaces required to fulfil daily activities.
4. Research methods
The research design adopted for this study is case study and it followed qualitative research approach involving non-participant observations and oral interview of randomly selected 18 locals in the study area. However, the scope was limited to Borno State in northern Nigeria based on purposive sampling technique. This is because among other locations, Borno has been the most affected State in term of terrorist attacks; and thus considered the most appropriate for sourcing the data to address stated research objectives. Furthermore, a simple random sampling technique was used to select three Local Government Areas in this State with copious evidence of severe terrorist attacks. The three LGAs purposively selected for investigation were Maiduguri Local Government Area which is the state capital with a land mass of 137.36km$^2$ and having the highest population of 540,016 in the State; Nganzai Local Government Area with a land mass of 2,572.35km$^2$ and a population of 99,074 people and Monguno Local Government Area with a land mass of 1,993.20km$^2$ and a population of 109,834 inhabitants. Notably, these three LGAs had witnessed some level of destruction in human lives and properties resulting from terrorist attacks in Nigeria in most recent times and was considered fairly secured at the time of the research hence its selection.

The primary data collection process involved authors’ observations captured using sketches and photographic materials. The observations were centered on buildings and structures existing in the localities and interviews. In addition, oral interviews were conducted with residents of the study area. The focus of the interviews was on the impact of terrorists’ activities on houses in particular and entire settlements in generally, based on their experience in their respective settlements. The interviews were recorded electronically and later transcribed into word document for the analysis. These sources were complemented with anecdotal evidence on security and sustainable architecture. The secondary data were obtained from the review of published literature relevant to the research area, identified from various sources including, journals, workshops and conference papers. Papers reviewed were identified via searchers on online databases such as Google scholar, United Nations database, and Science Direct among others. The data were subjected to thematic content analysis. The results are presented using sketches, pictures and text. Based on the results, inferences were made regarding the contribution of insecurity challenges to rapid abandonment and change in vernacular architecture of Northern Nigeria.

5. Findings
5.1 Features of Hausa traditional compound in northern Nigeria
The study found that there is a separation between the exterior and interior spaces and this was pronounced and emphasized in Hausa architecture. The built-up areas within the interior spaces have a living and sleeping room, a kitchen, an entrance point, stores and conveniences. Compound wall height is raised high enough to ensure privacy and prevent passers-by from seeing what is going on inside the interior space. As seen in Figure 6, the courtyard is well accentuated, and there are usually three common denominators of space (i.e. the system of the courtyard for household and social activities, the kitchen and dining areas where the kitchen is located far away in the compound, and the dining area, individually or collectively in the parlour or open area). Subsequently, for health concerns and other reasons, their privy or latrines are located away from or at the end of the compound.
In addition, providing relatively large space in the vicinity of the neighbourhood is necessary for congregational assembly to celebrate social functions such as appointments, weddings and naming ceremony, and a children's playground and others. Open spaces are meant also to breed little livestock and reserved for future developments as the need arises.

5.2 Security induced-changes in architectural form and spatial morphology of settlements in Northern Nigeria

The findings of this study as presented in this section of the paper are in form of photographs showing the existing housing architectural form, spatial morphology of settlement and building materials as concrete evidences to support the discussion in the subsequent section. Figures 7(a, b and c) are pictures taken from Gajiram Nganzai Local Government Area of Borno State, showing the existing local architecture with few modifications in construction materials. Figures 8(a, b and c) are pictures from Mairari Mungono Local Government Area of the same Borno State revealing the spatial morphology of settlement built with locally sourced material and available methods of construction. While Figures 9(a, b and c) are pictures taken from Damboa road Maiduguri Local Government Area of Borno State depicting the changes observable in the architectural theory of the study area.
**Figure 7a:** The typical fence and walling materials constructed of thatch and mud

**Figure 7b:** The replacement of circular huts with rectangular plan shaped houses.

**Figure 7c:** An abandon settlement and rebuilt block wall fenced residence inside.
Figure 8a: A typical nuclear family dwelling fenced with traditional thatch material for privacy and security.

Figure 8b: A typical Kauaye (village) settlement found in Mairari Mungono LGA.

Figure 8c: A typical earth constructed circular thatch house within a family compound.
Figure 9a and 9b: show the metamorphosed Residential dwellings along Damboa road in Maiduguri Borno State surrounded with high fences of masonry wall, Concertina wire and gate to restrict unwanted access

Figure 9c: shows a typical street view of gated community and residents with block wall fences.
6. Discussion

Available evidence from this study indicates that terrorism and insurgency have had tremendous negative impacts on the Housing forms in Hausa land of Northern Nigeria. Notable among these impacts is the destruction of lives and buildings especially in the North Eastern part of Nigeria. This scenario has actively affected the architectural form of Northern Nigeria in two major areas namely, preference for modern building materials over traditional materials; and the emergence of more fenced houses with strong iron gates in what is popularly referred to gated communities. Some of the footprints of insecurity on the architectural form of the northern Nigeria are discussed in the following paragraphs.

The indigenous materials for building construction in Hausa land consist majorly of materials such as earth, timber, reeds (grasses) and stones [19, 20] and with a dynamic building process. Adobe or earth (mud) has been the most common and readily available materials, while the largely employed method of construction is wattle-and-daub, which helps to create a notable built environment with the attendant architectural merits. However, currently, their walling system as shown in Figures 7(a, b and c) is considered to be deficient in the aspect of tensile strength, which renders it vulnerable to the impacts from potential attacks or threats. As a result, there is massive use of masonry and concrete walling system with greater potential to resist the impacts resulting from explosives and bombs as shown in Figures 9(a, b, c).

From the vernacular architectural forms identified with this region, the walling system involves a pear-shaped sun desiccated mud (adobe) bricks that are prepared from earth (the red laterite soil) harvested from the locality and popularly referred to as Jankasa. This soil is rich in fiber and therefore produces excellent materials for walls and roofs when skillfully handled by experienced craftsmen. Also non-load bearing walls as seen in figures 7(a, b & c) are made of grasses, thatch or raffia palm knitted together called Zana fence. According to one of the informants interviewed, this can easily be set ablaze by bandits or pulled down by potential terrorist attackers, and thus there was a need to jettison these types of construction materials in contemporary times in the study area.

The traditional need to meet structural requirements of stability has led to increase in wall thickness in the study area. This is firstly, in response to safety requirements, and secondly, due to the advantage of the thick walls in creating cooler indoor environment as well as the availability of cheap labour to handle it. However, in present situation the reverse is the case as security has become a major factor considered in the development of residential buildings and their surroundings in the study area. Among others, this has resulted to the gradual replacement of the traditional building materials with Portland cement, steel bars, aluminum and concreted components as seen in Figures 9(a, b and c). It is believed that based on the Islamic injunction, women in purdah are secluded from the outer male reception area and these new found (foreign) building materials will strengthen the security of homes and help in achieving privacy better than the traditional earth-based building materials. Furthermore, the prevailing security challenges experienced in the study area plays a major role in deciding whether a settlement would be nucleated or dispersed, as revealed by our informants interviewed. According to them, the more compacted dwellings are, the better they can resist and withstand terror attacks. This submission appears to be consistent with the assertion of Agboola and Zango [4] on spatial settlement pattern of Hausa land in noting that security plays a major role in deciding why settlement would be nucleated or dispersed. Arguably, the concentration of leaders and members of their families living in close proximity to the marketplace seems to suggest that this spatial morphology is a product of defensive instincts of the people. This might help to explain the emergence and dominance of nucleated settlement pattern in Hausa communities as alluded by those interviewed.

For the local craftsmen and builders, the roof is seen as the most gratifying part of the building and also the most challenging aspect of construction. The justification for this can be seen in the decorations and efforts applied to achieve this building element. With the rising incidence of global warming and climate change, there is increasing search for adaptive measures and strategies in mitigating the effects of these challenges, locally and globally. Nigeria is in the tropics where there are extreme weather conditions of dry and rainy seasons. The study area is marked by diminutive rainfall and significant difference of day to night temperature. Daytime is dominated by bright sunshine and hot, dry air, while the night is associated with extreme cold. The traditional roof system made of thatch and or mud as shown in Figures 7(a-c) obviously cannot withstand the extremes of these weather conditions and require constant maintenance. To cater for this deficiency, the traditional roofing materials are being replaced with corrugated roofing sheets as shown in Figures 8(a-c). As observed in the study area, the construction of mud roofs involves
split palm frond pieces that are laid on palm frond beams in herringbone fashion and on both sides it is plastered with mud. The use of flat or vaulted mud roofs in Hausa architecture indicates method of averting the risk of fire outbreaks [4], which has informed the proscription of the use of thatched roofs within the urban areas. This proscription was as a response to security threats and is the off-shoot of the disparity between buildings in rural and urban areas. While structures in rural areas are characterized by circular plans with simple thatch roofs, their counterparts in urban areas are made of rectangular walls having mud roofs. The building morphology has aided in the use of corrugated iron sheets and has helped its diffusion among the people. Resulting from this, is the abandonment of erstwhile traditional thatch roofs which are considered to be highly combustible and engender the spread of fire in the event of terrorist attacks as constantly being witnessed in the study area.

Furthermore, to the relocation of people from their natural place of abode to other areas due to the insecurity challenges has created a void in the continuity of their architectural form and local construction methods as supported by the comments of those interviewed in the research. For instance, it was pointed out by those interviewed that as result of the growing insecurity in the study area, family sizes have started to shrink, the courtyard system of family dwellings as illustrated in Figure 4 is gradually going into extinction. With smaller family size, the erstwhile compound family houses are now fragmented and being modified to accommodate the newly formed nuclear family structure. The original architectural form that reflects the culture values of the people is being changed to fit the prevailing situation leading to dramatic change in building character and spatial morphology of traditional settlements. In fact, evidence from this study as shown in Figures 9(a-c) indicates that today, buildings are constructed to meet the needs of nuclear family without the usual courtyard as the three core areas of houses have been reduce to two in line with contemporary building design. This depicts a change in architectural form due to security challenges associated with terrorism; and thus there is the emergence of what has been described as “architecture of fear” which ultimately promotes progressive fragmentation of public space and a breakdown of social cohesion due to spatial segregation and social discrimination [21]. Similarly, as the demand for agricultural space or compound farm (Gona) found in the traditional Hausa dwelling continue to wane due to fear of insecurity, spatial morphology is also rapidly changing without the erstwhile Gona (farmland). Consequently, compound space is consequently shrinking or becoming underutilized and this is considered a major change in the vernacular architecture of the study area.

Also from the review of the existing studies, ornamentation of building façade in northern traditional architecture was before now a thing to behold. In fact, Umar, et al. [12] asserted that Hausaland astounds visitors with its pleasing building forms full of colourful motifs, decorations and the quality of the interior space. Adamu[18] also categorized decorations in Hausa traditional architecture into three groups namely, surface design, calligraphy and ornamental and these three categories could be displayed on a single facade of the “Zaure,” but the choice depends on the status and preference of the users. However, with the recent development, the craft and practice of ornamentation has been eroded in contemporary northern Nigeria traditional architecture. This is mainly because as earlier noted in this paper, there are no longer mud walls and roof to decorate as walling materials have changed to concreted components, sandscrete blocks with concertina wire. Consequently, the craftsmen who have the technical know-how to achieve these wall and surface ornamentation have fled for safety and the construction practice is heading to extinction in the study area. The style of surface finish and wall decorations are presently executed with paint and Plaster of Paris (P.O.P) screed mostly in Maiduguri and these have been made possible by the process of westernization of culture and architecture as traditional techniques have been abandoned partly due to security challenges confronting people in the study area.

7. Conclusion and Recommendation
The study examined the imprints of security changes on the architectural landscape of northern Nigeria using Borno State as a case study. The study found that the vernacular architecture of Hausa land of northern-east Nigeria, which was based on the concept of the triple space in city concepts as well as compound family house layout is gradually witnessing tremendous changes. Specifically, the findings of this study reveal that security challenges have a greatly influenced vernacular architecture of northern Nigeria as houses initially built with indigenous /traditional building materials are being changed to modern building materials, which the residents considered to offer more protection in the face of incessant
terrorist attacks. In addition, there is a change in building forms from circular houses with thatch roofs to rectangular houses with corrugated iron sheets roofs, burglary proof doors, windows and verandas together with increasing emergence of gated communities having more restricted access across and round compounds were observed as major reactions to the increasing need for secured residential environment. Furthermore, the study found a decline in traditional decoration and painting of house, such practice as “Graffito” in the study area.

From this study are lessons that will help policy makers and professionals in the built environment in evolving strategies that can help this country preserve its architectural heritage in the face of security, environmental and economic challenges. The fact that a significant proportion of the population in Hausa land northern Nigeria still holds on to their traditional building materials in spite of the growing security challenges, due to financial and religious/ cultural reasons, suggests that we can still preserve our architectural heritage in the midst of daunting security challenges. Therefore, security challenges should not be the reason for Nigerians to abandon their rich heritage in traditional/ vernacular architecture for the western style. In the of light this, coupled with the issues of climatic change, there is a need for policy makers and built environment professions to look inward in devising strategies that will engender the integration of indigenous skill and construction techniques and modern architectural and urban planning principles and practices in evolving human settlement that enhance the security of live and property in Northern Nigeria or any other part of the country experiencing mass security challenges. To achieve this, it is recommended that concerted efforts should be in the documentation and propagation indigenous architectural ideas and skills, with current research on how best to improve local building materials to meet the requirements of contemporary times in terms of security and other needs of contemporary Nigerian society.

This study is not without some limitations. Notably, the findings of this study is limited to the three local Government Areas of Borno State studied. The study is also limited to the biases of those interviewed in the study. In view of these limitations, it is recommended that further studies but extended to other locations in Northern Nigeria were there are armed conflict and violence; and such study should consider using different research design.

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