Original Research Article

Mapping of Indices of Slum and Informal Housing Development in Akure, Ondo State, Nigeria

Abstracts: Slums and informal housing developments in Akure are growing at an unprecedented rate. It is on this basis that this work sets out to map out the indices of slum and informal housing development in Akure, Ondo State, Nigeria. High-resolution satellite data, as well as primary and secondary data, were used in the study. Based on collected data, ArcGIS 10.3.1 software was used to prepare a base map showing the existing land use, built up area in 1986, 2002, and 2018, and indices of slums, or informal housing in Akure. The indices were rated on a scale of 1–5 and the results obtained revealed that socio-economic indices [housing shortage, lack of affordable housing, high incidences of urban poverty, high incidences of rural or urban–urban migration and unemployment], institutional indices [poor enforcement of planning laws, unclear regulation and long procedures for building plan approvals, and lack of planning/development plans], political indices [inadequate provision of sites and services, tenure insecurity and eviction, and poor resettlement programme by the government] and environmental indices [high density of development and overcrowding, inadequate neighbourhood facilities and services, and inadequate sanitation] are most significant in the core and peripheral areas of Akure. The study recommends slum upgrading programmes oriented to the betterment of the current conditions of slum households and neighbourhoods and formal housing aimed at securing access to adequate housing for all, in particular the most vulnerable, promoting affordable and safe solutions and inclusive housing finance systems.

Keywords: Indices, Slum, Informal Housing, Development, Mapping , Akure

1. Introduction

The deplorable state of our cities is something that requires quick and severe attention. Since the Paleolithic age, humanity has been dedicated to maintaining an environment that is beneficial to his existence [12]. However, various activities and situations in his environment, such as the high rate of poverty among urban dwellers, uncontrolled growth in the residential environment, policymakers' lack of political will, and inadequate urban management and control policies, have contributed to a series of discomfort and unpleasant situations in the human environment. As a consequence, cities have degraded and the quality of the urban environment has deteriorated [12].

According to Owoeye and Omole [13], the housing problem manifests itself in a variety of ways, including the emergence of unsanitary housing, infrastructure failure, congestion and overcrowding, and the general deterioration of environmental quality, leading to the formation of slums. In our world today, one in eight people live in slums. Today, almost a billion people live in slum conditions [12]. Despite significant progress in improving the quality of slums and preventing their formation in developing countries, as evidenced by a drop from 39% to 30% of the urban population living in slums in developing countries between 2000 and 2014, according to the United Nations, Slum emergence has been on the rise in recent years.

Slums, according to the United Nations Human Settlement Program [21], are defined as large informal settlements that are swiftly becoming the most conspicuous representation of urban poverty in emerging cities, such as squatter settlements and unlawful subdivisions. These settlements usually provide house and homes for local migrants and urban poor people. Because, in comparison to planned communities, the level of life and cost of living, and cost of accommodation in these settlements are comparatively cheaper. In addition, such settlements have restricted access to essential services and infrastructures such as water, power, sewage, and other utilities.

Target number 7 of the Millennium Development Goals [MDGs] aims to substantially improve the lives of at least 100 million slum dwellers by 2020, in response to the problems presented by the growth of slums and informal settlements UN-HABITAT [17]. This target only addresses 12% of current slum dwellers in developing countries. A revision of the MDGs slum target has been proposed, in which efforts should be made to provide adequate alternatives to new slum formation by prioritizing proactive planning and slum prevention programmes, in addition to improving the quality of life of slum dwellers UN Millennium Project, 2005. In Akure, there are several indices of slum and informal housing development, including socio-economic indices [housing shortages, lack of affordable housing, high incidences of urban poverty, high incidences of rural or urban–urban migration, and unemployment], institutional indices [poor enforcement of planning law, unclear regulation, and long procedures for building plan approvals, and lack of planning/development plan], and environmental indices [high incidences of urban pollution, high incidences of urban poverty, high incidence In the core

and peripheral areas of Akure, political indices [inadequate provision of site and services, tenure insecurity and eviction, and a poor government resettlement programme] and environmental indices [high density of development and overcrowding, inadequate neighbourhood facilities and services, and inadequate sanitation] are the most significant.

It is for this reason that this research sought to Map out these indices of slum and informal settlement development in the study area in order to isolate the relative contributions of each so as to determine the most important ones that explain the formation and growth of slum and informal housing in Akure.

2. The Study Area

Akure is a traditional Nigerian city and, like other traditional Yoruba towns in the country, it existed long before the advent of British colonial rule in the country. The city is located within Ondo State in the south-western part of Nigeria. Ondo State is one of the 36 states of Nigeria, as shown in Figure 1. Akure is a medium-sized urban centre and became the provincial headquarter of Ondo province in 1939. In 1976, it also became the capital city of Ondo State and a local government headquarters. Ondo state is located approximately 700 kilometres south-west of Abuja, the Federal Capital of Nigeria, and about 350 kilometres from Lagos, the former capital of Nigeria. Akure is the capital of Ondo State and also the headquarters of Akure South Local Government Area. It is located approximately at the Greenwich Meridian coordinates 7°15′0″N 5°11′42″E/7.25000°N 5.19500°E/7.25000; 5.19500, as shown in Figures 1. The city is located 396 metres above sea level. According to the Nigeria population census [2006], Akure has a population of 360,268. Thus, the current estimated population is about 495,000, using a growth rate of 3%.

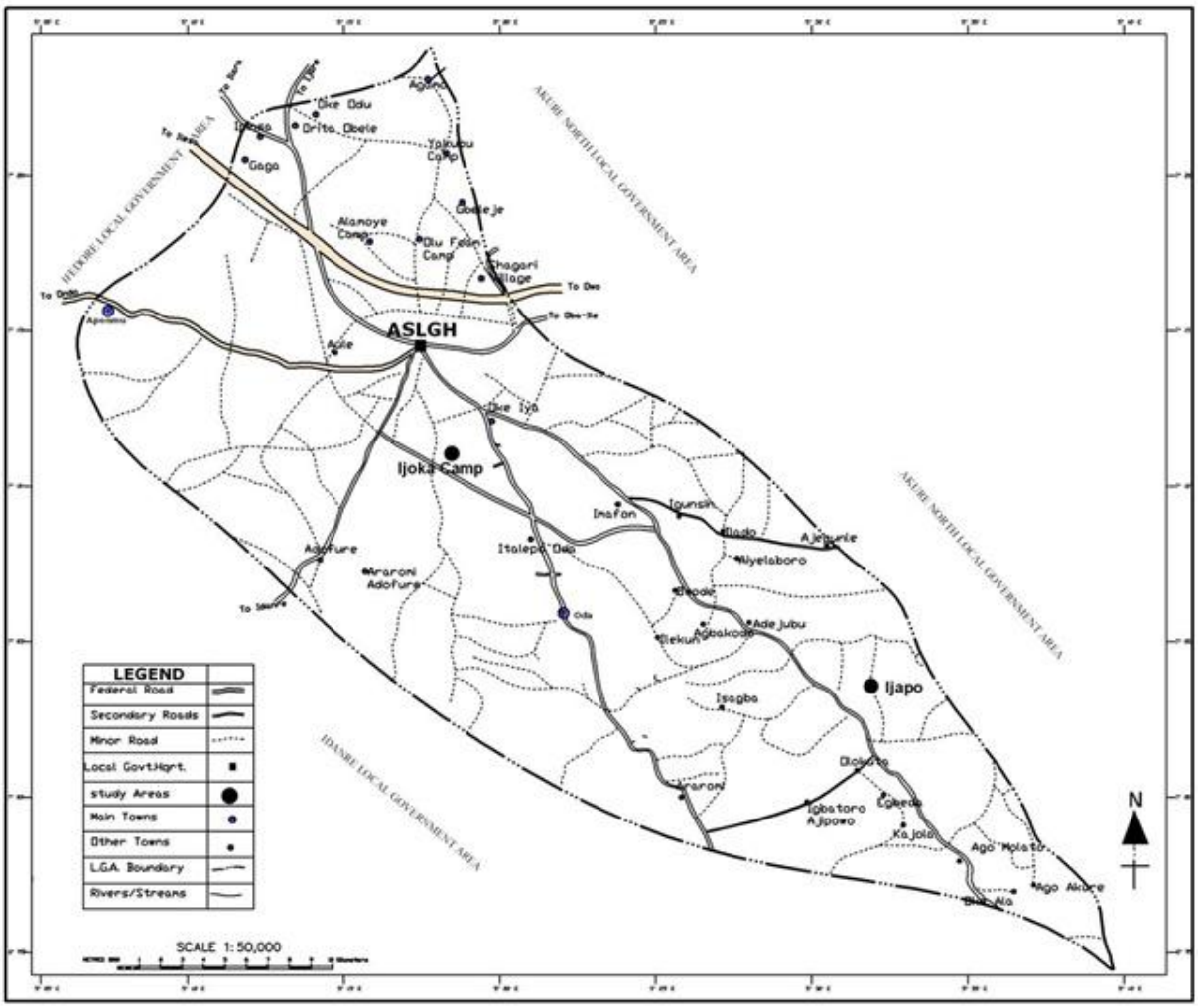


Figure 1. *Map of the study area.*

3. Literature Review

Majority of the prior academic research in countries like Ethiopia, Kenya, and Tanzania. Abebe [1], Agbola and Agunbiade [3], Ayuba [6], Eva-Maria [7], Felix, [8] and Paul [14] focused on themes which include informal settlement Addis Ababa, comparing spatial pattern of informal settlements, factors influencing growth of informal settlements, modeling informal urban growth under rapid urbanization, and modelling informal settlement growth. In the study of Abebe [1], on investigation of key driving forces of informal settlement growth in the city of Dar es Salam was made by coupling the potentials of Geo-information science with logistics regression modelling techniques which was used in predicting the trend of future expansion and densification in Dar es Salam. But in Nigeria, the prior research on slum and informal settlement development focused mainly on the effect of slum and informal settlement on their dwellers and regeneration slum and informal settlement. The first group consists of studies which attempted to assess the effect of slum and informal settlement on slum dwellers in various states in Nigeria. And this studies includes, Global Report on Human Settlement [9, 2, 10-13, 16, 21]. The common themes on which they focused on are built environment decay and heath situation, housing condition, social economic attributes, the challenge of slums dweller. The following studies by Omole [12], on Effects of Slum formation on a Residential Core Area of Akure, Nigeria, Built Environment Decay and Health Situation of Slum Dwellers in Residential Cores of Akure by Paul [13], Slum Housing Conditions in Some Selected Nigerian Cities by Samuel and Choji [16], Socio-Economic Attributes of Residents of Slum and Shanty Areas of Lagos State, Nigeria by Yusuf *et al.*. Effect of informal settlement on urban land use, a case study of Orita-Obele, Akure, Ondo State by Ojewale [10]. All these studies followed the study of Omole in discovering the effect of slum and informal settlement development on slum dwellers. The second group of Nigerian studies on slum focused on slum regeneration. The study includes [2-4, 7, 15, 17-20] and The common themes on which they focused on are slum emergence, evictions, slum upgrading, slum eradication, slum renaissance, and slum clearance. Therefore, this research will fill the gap of the existing studies on slum and informal settlement/housing development in Akure. By mapping out the indices

responsible for slum and informal settlement development and suggest mitigation measures and programmes to address the menace of a slum.

4. Methodology

This research work was conducted in three phases: Data Acquisition, Analysis and Post analysis phases respectively. The first phase is the information and data gathering phase. Here, important data required to carrying out the research which are both primary and secondary data were collected. The success of using remotely sensed data for mapping out the indices depends on careful selection of the data source. The important attributes of remotely sensed data sources are spatial, temporal, spectral, and radiometric resolution. Remotely sensed Data; Secondary data that were used include: administrative map, Google map, and co-ordinates of point. The details and characteristics of the above listed data are shown in Table 1, Also 696 respondents were sampled and questionnaire was administered on the household head of the selected houses.

Table 1. *Data used in this work include.*

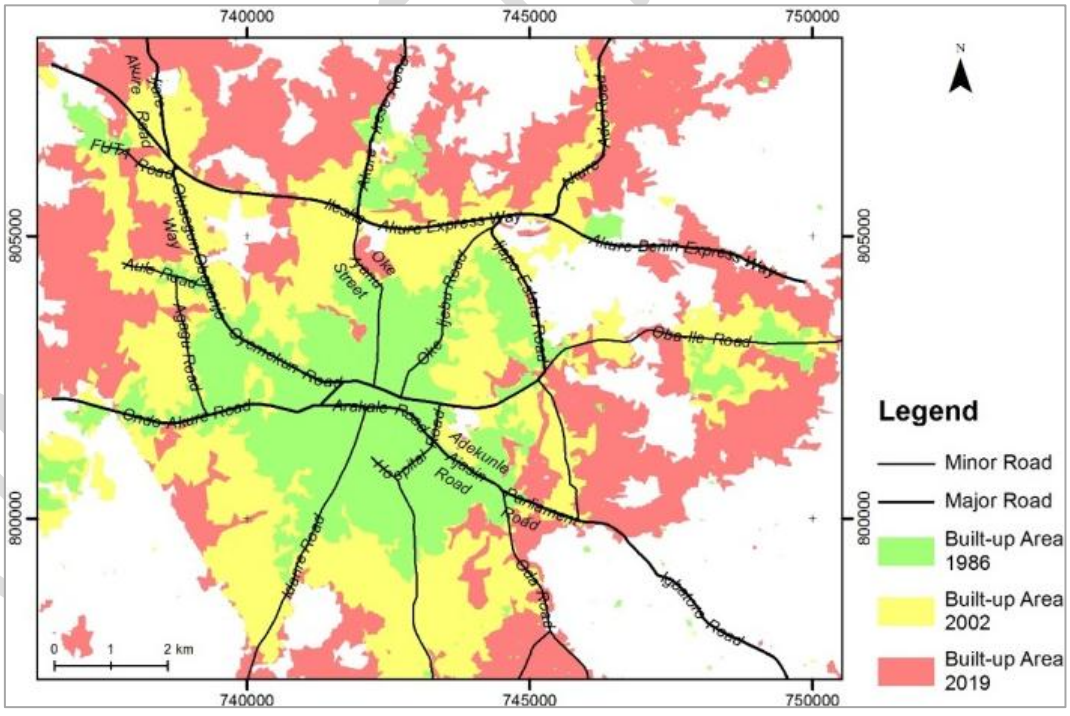
S/N	Data type	Acquisition Date	Actual Spatial Resolution/Scale	Acquisition Source
1.	Google Map	2019	-	,,
2.	Administrative map	-	ESRI Shapefiles	Office of the Surveyor General of the Federation [OSGOF]
3.	Co-ordinates of points	2019	+ 5m	Field Survey/GPS Receiver

Source: authors field work, 2019.

5. Result and Discussion

Built Area Map [1986, 2002, and 2019]

GIS Overlay operations was used to join up built-up area in the study years using the reclassification and combine tool, which computes a geometric intersection of the built up area of the study years. Figure 2, below show the result of the overlay built– up area for 1986, 2002, and 2019. The map shows continued and rapid growth in settlement which could be associated with urbanization. This corroborate with the result from the National Population Commission Census of 2006 which recorded increased population which eventually led to the loss of agricultural land to settlement. This growth can be attributed to the influx of people [migration] from rural areas into the state capital for commercial activities and which has resulted into emergence of slum and informal housing development in Akure.



Source: Authors Field Work, [2019].

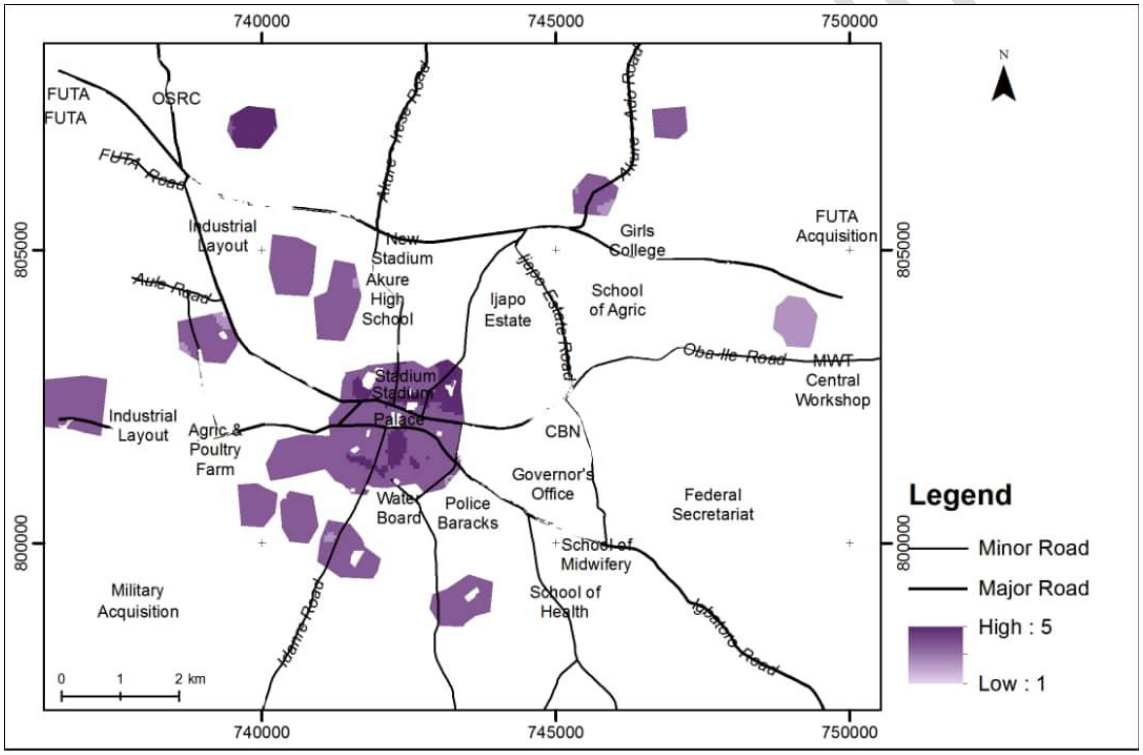
Figure 2. *Overlay Built-up area map [1986, 2002, and 2019].*

Indices of Slum and Informal Housing Development in the Study Area

5.1. Socio-economic Indices

This section presents the results of analysis carried out in pursuance of objective three. The indices of slum and informal housing development in the study area were gauged through the use of Mean Score Analysis [MIS]. Table 2 shows the most significant socio-economic indices responsible for slum and informal housing development in the study area are: high incidences of urban poverty [MIS = 4.24]; lack of affordable housing [MIS = 4.22]; and housing shortage [MIS = 4.20]. Other socio-economic indices for slum and informal housing development are also significant. These range from unemployment [MIS = 4.16] to economic recession [3.05]. Except for low access or non-availability of mortgage finance [MIS = 2.86], which is insignificant. The probability map of socio-economic indices for slum and informal housing in Figure 3 is a 1–5 color classification of socio-economic indices' probability values. The darker tones indicate the location where the socio-economic indices are more prevalent, which are: Odo Ijoka, Oja Oshodi, Odo Ikoyi, and Orita Obele.

The study of Njoku and Okoro [2014] on urban renewal in Nigeria: a case study of Lagos state, confirms the finding of this study which states by stating that poverty, coupled with an acute housing deficit, plays a crucial role in the emergence of slums in developing nations. Thus, the housing crisis, manifested in insufficient affordable housing, is behind the formation and growth of slums in urban centres. In addition, the studies of Olusola [11] on an assessment of the housing conditions and socio-economic lifestyles of slum dwellers in Akure, Nigeria; on slum prevalence in Nigeria equally supported the view that poverty contributes to slum formation in Nigeria.



Source: Author's Analysis, 2019

Figure 3. *Socio-economic indices.*

Table 2. *Socio-economic indices.*

Socio-economic indices	Mean Score	Rank
High incidences of urban poverty	4.24	1
Lack of affordable housing	4.22	2
Housing shortage	4.20	3
Unemployment	4.16	4
High incidences of Rural or Urban– Urban Migration	4.13	5
Low income per capital	4.07	6
Unaffordable and high price of land	3.54	7
Economic recession	3.05	8
Low access or non-availability of mortgage finance	2.86	9

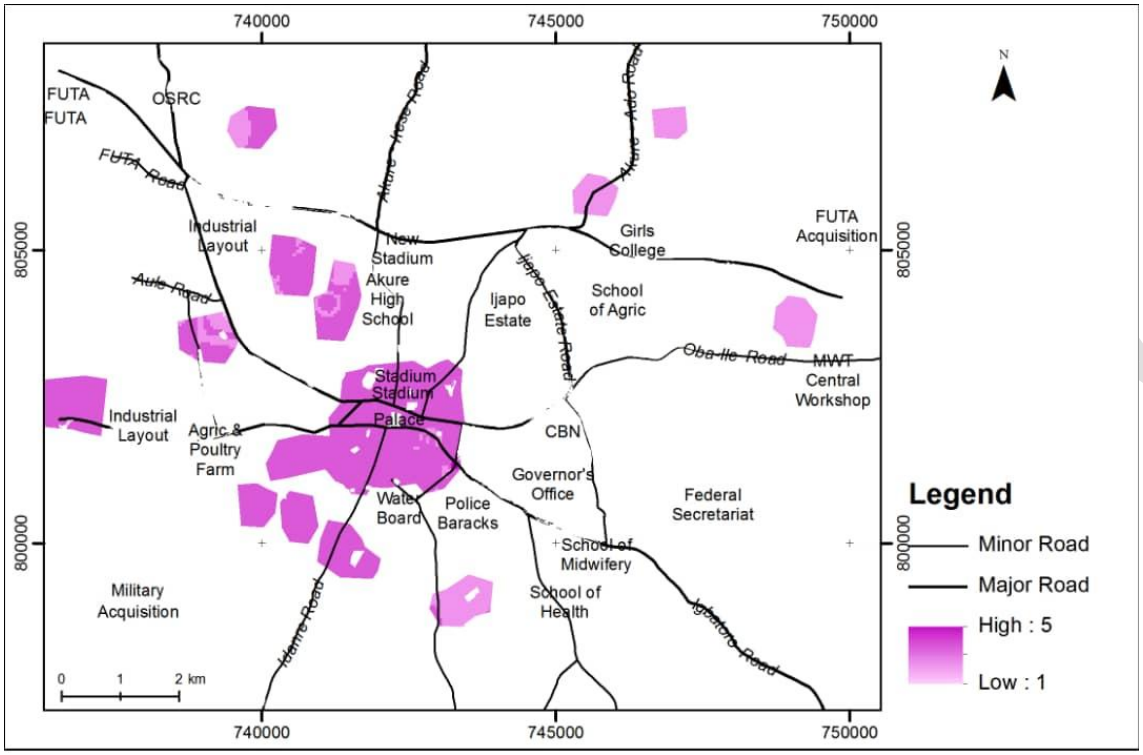
Source: Field Survey, 2019

Note: 5= Most Significant, 4= Very Significant, 3=Significant, 2= Insignificant and 1= Very Insignificant.

5.2. Institutional Indices

Table 3 indicates that inadequate development control by planning agencies is the most significant institutional index [MIS = 4.24]. This is followed by lack of planning/development planning and low capacity [human and technical], which also have a high level of significance [MIS = 4.14]. Other institutional indices for slum and informal housing development are also significant. These range from low capacity [human and technical] [MIS = 3.98] to unclear regulations and long procedures for building plan approvals [3.00]. The probability map of institutional indices for slum and informal housing in Figure 4 is a 1–5 colour classification of institutional indices' probability values. Odo

Ijoka, Oja Oshodi, Ijomu, Alakure, Ikemo, Eyinke, Arakale, and Orita Obele are the locations where the institutional indices are more prevalent.



Source: Author's Analysis, 2019

Figure 4. *Institutional Indices Map.*

Table 3. *Institutional indices.*

Institutional indices	Mean Score	Rank
Inadequate development control by planning agencies	4.24	1
Lack of planning /development plan	4.14	2
Low capacity [human and technical]	3.98	3
Poor enforcement of planning law	3.82	4
Lackadaisical attitude of government towards the development of acquired public land	3.14	5
Unclear regulation and long procedures for building plan approvals	3.00	6

Source: Author's Analysis, 2019

5.3. Political Indices

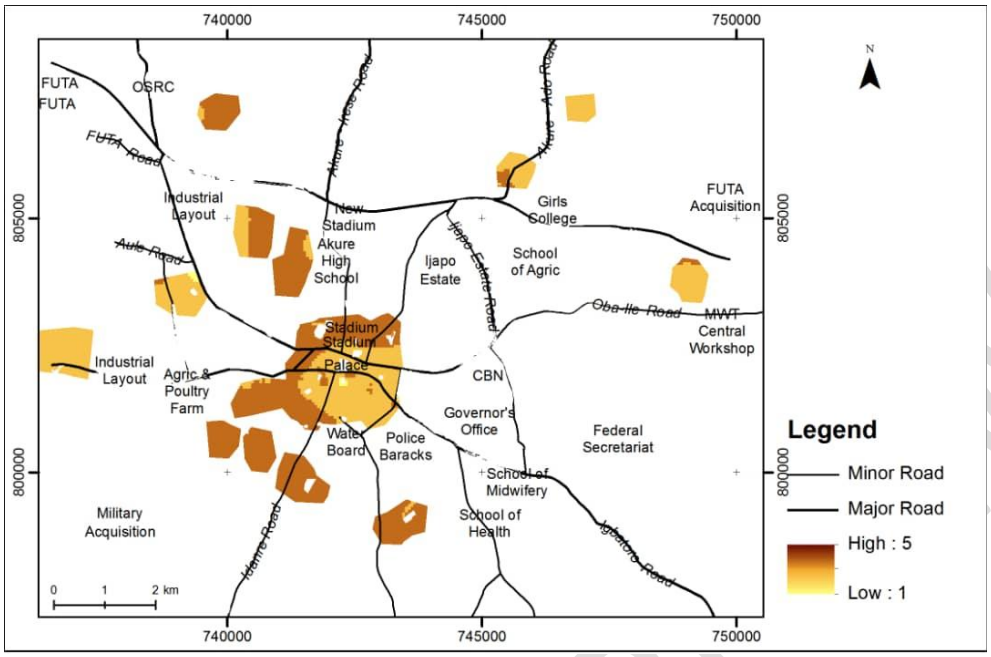
Table 4 reveals the results of MIS for the four [4] identified political indices for slum and informal housing development in the study area. It was shown that the most significant political indices for slum and informal housing development are: inadequate provision of sites and services; and tenure insecurity, with MIS values of 4.14 and 3.50, respectively. While political indices such as evictions and poor resettlement programmes by the government were insignificant with MIS values of 2.83 and 2.71 respectively.

The probability map of political indices for slum and informal housing in Figure 5 is a 1–5 colour classification of political indices' probability values. The darker tones indicate the locations where the political indices are more prevalent, which are: Orita Obele, Alakure, and some parts of Oba Ile. Findings from the study of Ojewale [10] on slum prevalence in Nigeria support the finding of this study by establishing that scarcity of land and security of tenure are factors responsible for the formation of slums.

Table 4. *Political Indices.*

Political Indices	Mean Score	Rank
Inadequate provision of site and services	4.14	1
Tenure insecurity	3.50	2
Eviction and poor resettlement programme by the government	2.83	3
Social conflicts and population displacement	2.71	4

Source: Author's Analysis, 2019



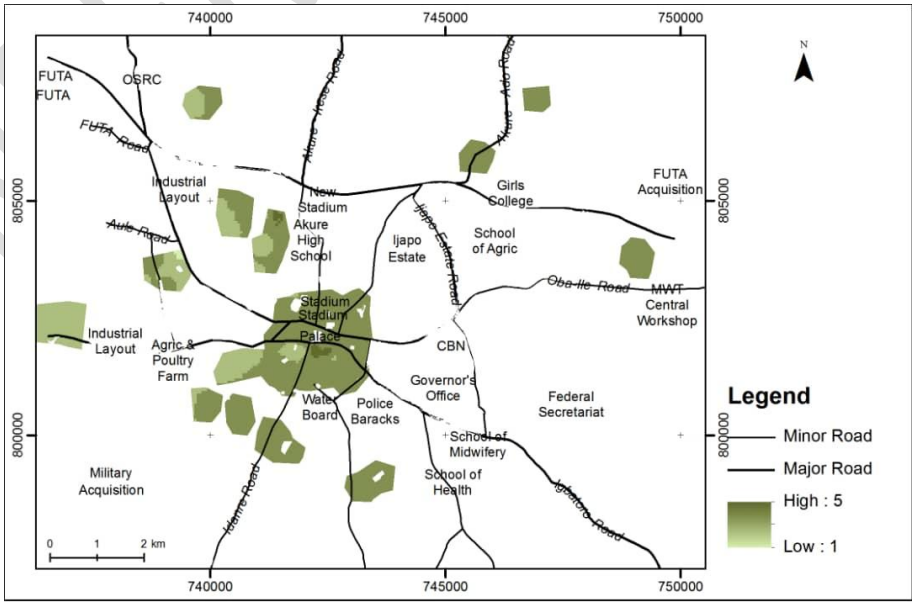
Source: Author's Analysis, 2019

Figure 5. *Political Indices Map.*

5.4. Environmental Indices

It was revealed from Table 5 that of the five [5] environmental indices responsible for slum and informal housing development in Akure, inadequate neighbourhood facilities and services [MIS = 4.17], and inadequate sanitation [MIS = 4.52] are the most significant environmental indices. While disaster and population displacement were identified to be insignificant in the study [MIS = 2.57], the probability map of environmental indices for slum and informal housing in Figure 6 is a 1–5 colour classification of environmental indices' probability values. The darker tones indicate the location where the political indices are more prevalent, which are: Odo Ijoka, Oja Oshodi, Odo Ikoyi, Alakure, Idiagba, Ilemo, Eyinke, Arakale, Igoba, Obaile, and Orita Obele.

In line with this finding, Eva [7] on housing the urban poor in Nigeria, and Paul [14] on issues and challenges of urban renewal in Jos, Plateau State, Nigeria, agree. It was revealed that slum and informal housing evolve as a result of inadequate or absence of infrastructure in terms of light, water, roads, hospitals, schools, recreational gardens, and sanitary provisions.



Source: Author's Analysis, 2019

Figure 5. *Environmental Indices Map.*

Table 5. *Environmental indices.*

Environmental indices	Mean Score	Rank
Inadequate neighbourhood facilities and services	4.17	1
Inadequate sanitation	4.10	2
High density of development and overcrowding	3.86	3
Poor physical location [hill slope, water legged area, etc]	3.20	4
Disaster and population displacement	2.57	5

Source: Author's Analysis, 2019

6. Conclusion and Recommendation

The research mapped out the built-up areas in Akure metropolis between the years 1986, 2002 and 2019 and found out that there has been significant growth in Akure town over these years. Also, the indices of slum and informal settlement development in the study area were dimensioned and mapped out, which was used to isolate the relative contributions of each and also determine the most important ones that explain the formation and growth of slum and informal housing in Akure. This study demonstrates that GIS and remote sensing coupled with statistical reporting is an efficient tool to map out built-up areas and identify the most significant indices responsible for the emergence of slums and informal housing in an area. In the last 10 years, an urban renewal process has been carried out in the core area of Akure, which includes the construction and upgrading of roads and their infrastructure, the provision of parking spaces, the reconstruction and relocation of markets, and the provision of market support. The renewal focused on the major roads and the facilities along them, while the inner streets were left untouched. Therefore, there is a need for an urban renewal programme that will cover the entire core area, and the focus should be more on housing and its supporting facilities, while Igoba, Orita-obele, and Oba lle need construction and upgrading of roads and their infrastructure. Key infrastructural provisions should be made in liaising with beneficiaries and the community to capture their specific needs. That way, the infrastructure provided can be better secured and safe-guarded against vandalism and there is the possibility of community maintenance options or inclinations.

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