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Research Article

Spatio-Temporal Analysis of Reported Trachoma Cases in Kano State, Nigeria (2013-2019)

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Abstract:
Trachoma is caused as a result of chronic infection of the conjunctiva by trachomatic chlamydia and is the leading cause of blindness infections in the world, especially in developing countries as poverty, overcrowding, poor sanitation, poor water supply, unrepaired latrines and unhygienic management of kept animals all cause the disease. The study aims to analyze reported cases of trachoma in Kano State. This study uses a survey research design and qualitative data is collected. A total of twenty (20) Focus Group Discussions (FGDs) were conducted with participants in ten (10) political wards in the study area, and in each neighborhood two settlements (communities) with the highest prevalence of bandit attacks, which were deliberately selected from each neighborhood. The results show that the high prevalence of the disease in non-metropolitan local government areas (LGA) which includes Gabasawa, Shanono, Kura, Tudun wada with a prevalence of 231,000 – 301,000 cases per 100,000 people per year. Trachoma trend analysis shows years of endemism in states with very high prevalence rates in 2017, and declining in 2018 and 2019.

Keywords: Blindness, Disease, Eye, Health, Trachoma.

1. INTRODUCTION

Trachoma is an eye disease caused by infection with the bacterium Chlamydia Trachomatis that can cause chronic inflammation of the eyelids. This infection is most common in children, around the age of 1-9 years. It is responsible for blindness or visual impairment of about 1.9 million people. About 158 million people live in trachoma endemic areas and are at risk of trachoma blindness. Without surgical intervention, this condition can progressively damage the cornea and lead to vision impairment and irreversible blindness later in life. Vision impairment or blindness results in a deterioration of the life experience of the affected individual and their families they in terms of education, future employment, personal and social well-being throughout one's life, and this is a major public health problem in middle-aged and elderly adults worldwide, associated with a decrease in quality of life and an increased risk of falls and death (Nasir et al., 2020). Estimates show that 36 million people are blind and 217 million people have moderate or severe visual impairment worldwide in 2015. Infectious diseases have been the most important contributor to human morbidity and mortality until relatively recent times and still account for a large proportion of deaths and disability worldwide. In certain regions, infectious diseases remain the most important cause of health and have been responsible for 22% of all deaths and 27% of disability-adjusted life years worldwide, which has burdened young people, especially in children under 5 years of age as cited by Mpyet et al., (2024).

However, eye problems are recognized as one of the major public health challenges in many developing countries. An international initiative called VISION 2020: The Right to Sight was launched by the WHO and the International Agency for the Prevention of Blindness (JAPB) in 1999 to eliminate the main cause of avoidable blindness by 2020. In 2013, the World Health Assembly (WHA) launched a new plan, towards universal eye health and a Global Action Plan 2014-2019 (GAP) which they believe

blindness is one of the world's major health problems. In addition, the burden of blindness in the sub-Saharan Africa region is some of the worst in the world, as seventy-five percent (75%) of all blindness in developing countries can be prevented or cured. Nevertheless, trachoma is highly endemic in many of the poorest and most rural areas of 37 countries in Africa, Central and South America, Asia, Australia and the Middle East. Thus the wide distribution of trachoma does not support the idea of climate boundaries, while geographic heterogeneity and disease persistence have traditionally been associated with socio-economic development and inequality at various scales. Since 1998 the international community has committed to eliminating trachoma as a public health problem by 2020, through the implementation of the SAFE Strategy (Mpyet et al., 2024).

In addition, a recent trachoma population-based survey in Kano state showed that the disease is a public health problem in the state, but the study did not provide an estimate of the prevalence of local government area (LGA) level for direct implementation of the elimination strategy. The minimum data required for LGA level planning are the prevalence of Trachomatous Inflammatory Follicule (TF), at 1-9 years of age (whose elimination target is <5%), and Trachomatous Trichiasis (TT) in adults aged 15 years and older (whose elimination target is <0.2%) (Mpyet et al., 2024). However, some studies on trachoma have been conducted in Nigeria but most of them are clinical-based studies such as Babalola, (1989); Mansur, Mohammad and Liman, (2007); Mpyet, Ogoshi, and Goyol, (2008); Jeep, King, Diallo and Ngondi, (2008); Caleb Mpyet, (2012) and Smith, *et al*, (2014). Therefore, there is a need to study the spatial and temporal properties of trachoma in the research area, as it is a major public health issue in several LGAs in Kano state. Therefore, it is necessary to examine more local government areas to know which LGAs have high cases that require more attention and find out where the disease has been eradicated and where there is a need for prevention.

1.1 Description of Study Area

The state of Kano is located between latitudes 110 N to 120 N and longitudes 80 E to 90 E, and has an elevation of 488 meters (1,601 feet) above sea level and covers a land area of about 20,760 square kilometers, consisting of 1,754,200 hectares of agricultural land and more than 9,225,081 hectares of forest vegetation and grazing land. However, the city is located in the North of the Jos Plateau, in the Sudanese Savanna region that stretches south of the Sahel. Kano State is bordered to the Northwest by Katsina state, to the Northeast by Jigawa state, to the Southeast by Bauchi state and to the Northwest by Kaduna state (Figure 1).

Figure 1. Map of the Study Area

The climate in Kano state is of the tropical wet and dry type, coded as Aw according to the Koppen classification, although climate change is believed to have occurred in the past. The climatic characteristics of Kano as a whole are typical of the West African savannah. Temperatures in this region are generally

high throughout the year. In Kano there is a change of seasons, which shows a gradual increase from January to April where the maximum values reach as high as 43°C. The city sees an average of about 980 mm (38.6 in) of rainfall per year, most of which falls from June to September. Canoeing is usually very hot all year round, although from December to February, the city feels colder. Nighttime temperatures are cool during December, January and February, with lows averaging 11°C to 15°C (52 to 59°F). Temperatures usually range between a maximum of 33°C and a minimum of 15.8°C, although sometimes during the harmattan it drops to as low as 10°C. Canoeing has two seasonal periods, consisting of four to five months of the rainy season and a long dry season that lasts from October to April. The movement of the Southwest maritime air mass originating from the Atlantic Ocean affects the rainy season that begins in May and ends in September. The onset and duration of the rainy season varies between the northern and southern parts of Kano State. The length of the season in Riruwai, which is the southern part of Kano State, is six months from the beginning of May to the end of September, the amount of annual rainfall can reach around 1000 mm. While, in the north it is from June to early September, and the annual rainfall is lower than 800mm as you approach the desert.

Based on population estimates in 2010, the state has a total population of 13,379,945 with a density of 441 people per square kilometer. A large population is concentrated in the Kano metropolitan area government area. The population is projected in 2011 from several rural areas in the state which includes Dala 493,880; Fagge 235,990; Gwale 422,020; Kumbotso 347,200 and Ungoggo 431,350 (Eweka & Olusegun, 2016). This shows that the population is growing rapidly in both rural and urban areas of Kano State. Both the city center of Kano and the major cities of Kano State are densely populated. The urban shift from rural areas in Kano and from other states in Nigeria as well as North and West Africa, has provided a steady flow of migrants adding to Kano's growing population.

The purpose of this study is to improve understanding of the specific variability of disease burden at the local government level and may be useful for policymakers. Public health officials can use the information to classify areas with high disease prevalence and organize, to talk about health about environmental sanitation, hand and face washing, and latrine-use.

2. MATERIAL AND METHOD

This study uses a survey research design and qualitative data is collected. A total of twenty (20) Focus Group Discussions (FGDs) were conducted with participants in ten (10) political wards in the study area, and in each neighborhood two settlements (communities) with the highest prevalence of bandit attacks, which were deliberately selected from each neighborhood (Table 1). Two FGDs were conducted in each community, one with men and one with women's groups. Focus group discussions were used to obtain information on the causes and impacts of bandit activities on sustainable development in the research area. In each FGD carried out, 6-10 people are involved. The moderator asked for consent from the participants to record their voices. Each participant must belong to the category he or she belongs to. Each FGD session lasts an average of one hour and thirty minutes.

Table 1. Political Wards and Sample Locations in the Study Area

S/N	Ward	Location
1.	Isa North	Kwandawa Kantamawa
2.	Isa South	Kwanar Isa Kurar Mota
3.	Turba	Turba Shalla
4.	Tsabren Sarki Darai	Gidan Dikko Girnashe
5.	Tidibale	Tidibale Gidan Sale
6.	Bargaja	Madachi Gazau
7.	Yanfako	Yanfako Dogon Hano
8.	Tozai	Tozai Satiru

S/N	Ward	Location
9.	Gabe A	Kamarawa Garin Fadama
10.	Gabe B	Bafarawa Surudubu

Qualitative data analysis including transcription and synthesis was carried out. Transcription entails transforming the respondent's handwritten responses or voice recordings into organized text that must be written in its entirety as cited by Vanella et al., (2020). Each voice recording is transcribed by experts and notes are collected and synthesized by several moderators who provide further clarification of the issue that is not clearly understood. Therefore, the findings here are given in a narrative.

3. RESULT AND DISCUSSION

Secondary data were collected on cases of trachoma reported from 2013-2019 from the ophthalmic unit records department in the Neglected Tropical Diseases (NTD) Unit, Department of Public Health and Disease Control of the Ministry of Health (Tables 1 and 2), some data could not be obtained due to poor recording in the unit. Case addresses that do not have coordinates are grouped to the area closest to the coordinates, the names of areas in states that are not spelled correctly, corrected correctly to match E-health, to improve easy analysis in Excel and GIS environments. In addition, quantitative data was fed into the Statistical Package for Social Science (SPSS) version 20 software and trend analysis was carried out. In addition, the Microsoft Excel application is used to create a simple database. Columns are used as fields to store information about trachoma cases and their coordinates are generated from the E-health database. Arc GIS 10.2 is used to perform spatial analysis. The created database is imported into the ArcGIS 10.2 Arc map environment, the data is converted in a form file to be used for analysis. Maps of the local government area of Kano state sourced from the GIS unit of the Department of Geography of Bayero University, Kano, are scanned geo-referenced and digitized in the GIS environment. The chloropleth map was created to provide a spatial distribution of trachoma by using the number of cases at each level of the local government area.

Table 1. Trachoma Cases of Six Years for Five Local Government Areas

Year	Gabasawa	Kura	Minjibir	Shanono	Tudun Wada
2013	19,539	14,424	2,899	13,338	15,457
2015	89,271	75,981	1,203	64,850	76,628
2016	94,686	69,203	565	89,184	73,385
2017	95,156	70,981	111	85,033	83,951
2018	1,601	0	1,025	475	901
2019	403	39	1,085	0	37
Total	**300,656**	**230,628**	**6,888**	**252,880**	**250,359**

Table 2. Trachoma Cases of Five Years for Others Local Government Areas

Year	Ajingi	Albasu	Bagwai	Bichi	G/Mallam	Gezawa	Ungoggo
2013	12,096	10,792	3,121	7,466	6,167	9,842	2,047
2015	861	823	122	596	204	549	441
2017	67,697	70,050	4	79,296	82,974	58,619	6
2018	1,952	1,045	15	813	340	388	178
2019	145	322	189	204	40	193	375
Total	**82,751**	**83,032**	**3,451**	**88,375**	**89,725**	**69,591**	3,047

However, five levels of categorization were used: Very High, High, Medium, Low and Very Low, according to the number of disease cases, the prevalence rate per 100,000 people per year, namely Very Low (< 500), Low (500-3000), Medium (3001-6000), High (6001-10,000), and Very High (> 10,000). The reason behind this is to indicate areas with higher prevalence and risk in the state. The categorization range for each year and for the 7-year combined data is determined by the total number of cases per year and for the entire year. This explains the reason for the variation in the range of cases over the years. Moreover, hot spot analysis is used to identify statistically significant spatial group

locations from high values (hot spots) and low values (cold spots). Hot spot analysis aids in identifying areas of high significant risk, which will aid in the planning of interventions (Adamu et al., 2022).

3.1 Temporal Trends of Reported Trachoma Cases in Study Areas

Analysis of the trend of inflammatory follicles of trachoma (TF) and trachoma trichiasis (TT) in the Kano state is presented in Figure 2. There are only five local government areas that have a complete result for six years and the other for four years as shown in Tables 1 and 2 above respectively.

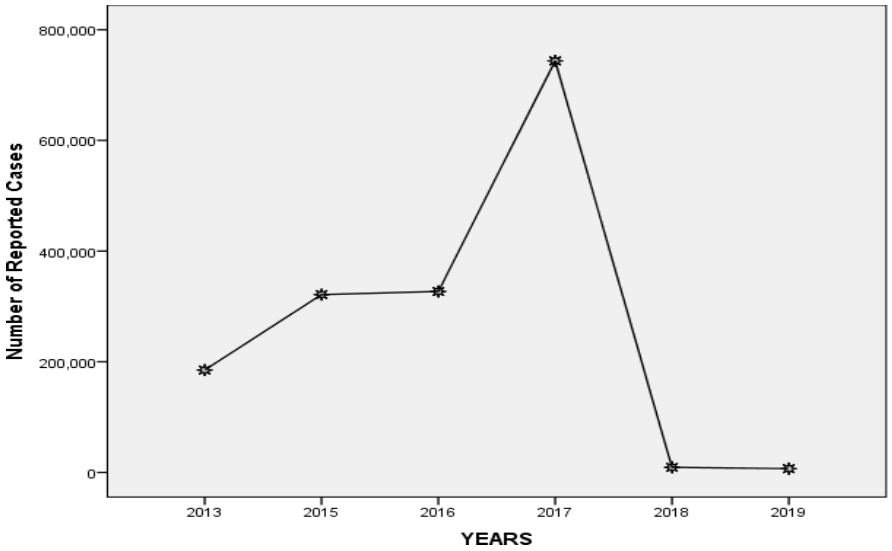

Figure 2. Temporal Trends in Reported Trachoma Cases (2013-2019)

Regarding the year, the highest prevalence rate occurred in 2017 with around 743,732 cases reported then in 2016 and 2015 with around 327,023 and 321,454 cases reported, respectively. In 2018 and 2019, the cases have drastically reduced as interventions from Non-Governmental Organizations (NGOs) supporting people with drugs and Trichiasis surgery have been carried out in LGAs. The annual distribution of Trachoma recorded in the state shows five LGAs with six years with a peak of disease in 2017 and 2016, this implies that Gabasawa had the highest peak in 2017 with 95,156/100000, followed by Shanono with 85,033/100000, Tudun Wada has 83,951, while Kura has 70,981/100000 and the least is Minjibir with 111/100000. Gabasawa still topped the list in 2016 with 94,686/100000, Shanono with 89,184, Tudun Wada with 73,385 while Kura has 69,203 and Minjibir with 565/100000. In 2015 the disease was still high but in 2018 and 2019 there were low cases. In 2019 there were no cases in Shanono and Kura but we have Gabasawa with 403, Tudun Wada with 39, and Minjibir slightly high with 1.025/100000 people.

Therefore, there is a high prevalence of trachoma in the state. This is in line with the WHO's findings explaining that the prevalence of state TF in children 1-9 years exceeds the 10% threshold for mass distribution of the antibiotic azithromycin for trachoma control. In all areas of local government, the high prevalence comes from non-metropolitan areas, which lack many social facilities such as latrines, water, landfills and among others. Due to all these factors and the presence of flies on the faces of children, it makes it a high factor for active trachoma in the area.

3.2 Spatial Distribution of Reported Trachoma Cases in the Study Region

The spatial distribution of trachomas in Kano state is categorized into five different levels, according to the prevalence rate of the disease, the prevalence rate per 100,000 people per year. They are categorized into very low (<500), low (500-3000), medium (3,001-6,000), high (6,001-10,000), and very high (>10,000). The annual distribution of trachomas is presented in a chloroplast map, which is generated from a database using a prevalence rate per 100,000 per year, in each local government area. They are in Figures 3, 4, 5, 6, 7, 8, and 9.

In addition, in 2013 there were very high case records ranging from >10,000/100,000, in most non-metropolitan areas (Figure 3) with the highest prevalence in the six LGAs of Gabasawa, Tudun Wada, Kura, Shanono, Ajingi, and Albasu respectively. Areas with a high prevalence of 6,001-10,000/100,000 where they are still found in non-metropolitan areas of the state; they are Bichi, Gezawa and Garun Mallam. In the moderate category, there are ten (10) local government areas with the exception of (two) Gwale and Dala which

are in the metropolitan area. The remaining eight (8) are from non-metropolitan LGAs, with a moderate range of 3001-6,000/100,000. Local government areas with low levels both from metropolitan and non-metropolitan areas have a prevalence rate of 500 -3,000/100,000 including Bunkure, Dawakin Kudu, Dawak Tofa, Doguwa, Garo, Gwarzo, Kabo, Karaye, Kunchi, Madobe, Makoda, Minjibir, Rano, Rogo, Tofa, Tsanyawa, Warawa and Wudil all from non-metropolitan areas. Meanwhile, six areas from the metropolitan area are included in the low category, namely Fagge, Kano Municipal, Kumbotso, Nasarawa, Tarauni and Ungoggo. Nevertheless, in 2013 most of the local government areas affected by this disease came from non-metropolitan areas. Most of these areas have poor living conditions, poor sanitation and irregular water supply (for face washing). This allows the bacteria to infect and reinfect the eyes of individuals living in trachoma-endemic areas. The prevalence rate of Trachoma is a combination of Folicular Inflammatory Trachoma (TF) and Trachoma Trichiasis.

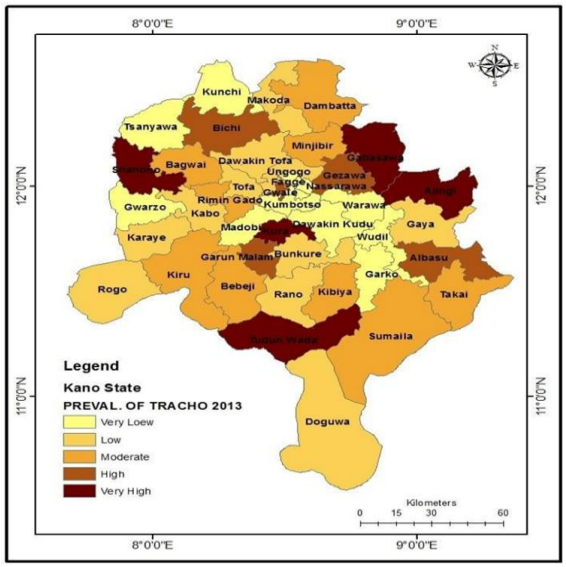

Figure 3. Prevalence of Trachoma Cases in Kano State (2013)

In 2015 Figure 4, four local government areas recorded very high cases of Trachoma in the state with >10,000/100,000 people all from the non-metropolitan areas of Kano state (Gabasawa, Tudun Wada, Kura and Shanono). There are no local government areas with high and moderate cases, but there are 10 LGAs with prevalence rates between 500-3,000/100,000 in the state's non-metropolitan areas (Minjibir, Takai, Ajingi, Albasu and Dambatta, Dawakin Kudu, Bichi, Garko, Gezawa, and Warawa).

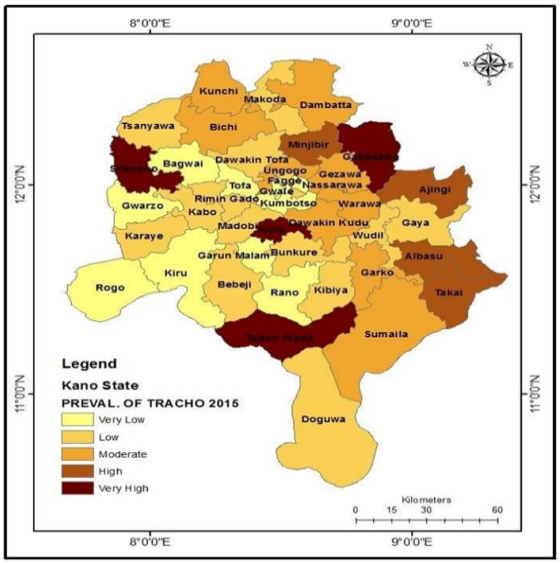

Figure 4. Prevalence of Trachoma Cases in Kano State (2015)

Local governments in a very low category (>500/100,000 per year), numbering thirty. With eight local governments from the metropolitan area (Dala, Fagge, Gwale, KMC, Kumbotso, Nasarawa, Tarauni, and Ungoggo) and the remaining twenty from non-metropolitan areas. It also shows this year that non-metropolitan areas record the most cases of disease than metropolitan areas. The very high prevalence in these non-metropolitan areas is in line with the WHO statement (2010), which says that trachoma is hyperendemic in many of the poorest and most rural areas in Africa, Central and South America, Asia, Australia and the Middle East. Also the percentage of Trachopathic Inflammatory Follicles in children aged 1-9 years which should < 5% (according to the WHO assessment criteria), persisted for at least two years in the absence of ongoing mass treatment of antibiotics, around 88.40% in Gabasawa, 75.70% in Kura, 64.82% in Shanono and 75.79% in Tudun Wada which are all very high. Likewise, Trachomatous Trichiasis which should also be 0.2% in adults, has higher cases in all local government areas in the state but several, Bagwai with 0.12%; Dala 0.10%; Gwarzo 0.16%; Kano City 0%; Kiru 0.19%; Kumbotso 0.19%; Nasarawa 0.13%; Rano 0.10%; Rogo 0.11%; and Shanono 0.03%, these are from four LGAs from metropolitan areas and six from non-metropolitan areas.

In 2016 Figure 5, data from only five local government areas, four of the local governments had a very high prevalence of trachomatous inflammatory follicles, namely Gabasawa with 252377 (94.69%); Kura has a prevalence of 147469 (71.94%); Shanono 174534 (86.37%); and Tudun wada with 233214 (70.43%); while Minjibir had 1710 (0.58%) trachomatous Trichisiasis; Shanono has 5685 (2.81%); and Tudun wada had 9775 (2.95%) cases, all of which were found in the non-metropolitan areas of the State. If we compare it with the WHO (2021) definition of public health problems, all local governments have very high cases, both TF in children and TT in adults. All local government areas are within non-metropolitan areas where there is a shortage of enough water for sanitation, indiscriminate defecation, animal feces around the house, all factors that cause active trachoma in children 1-9 years old.

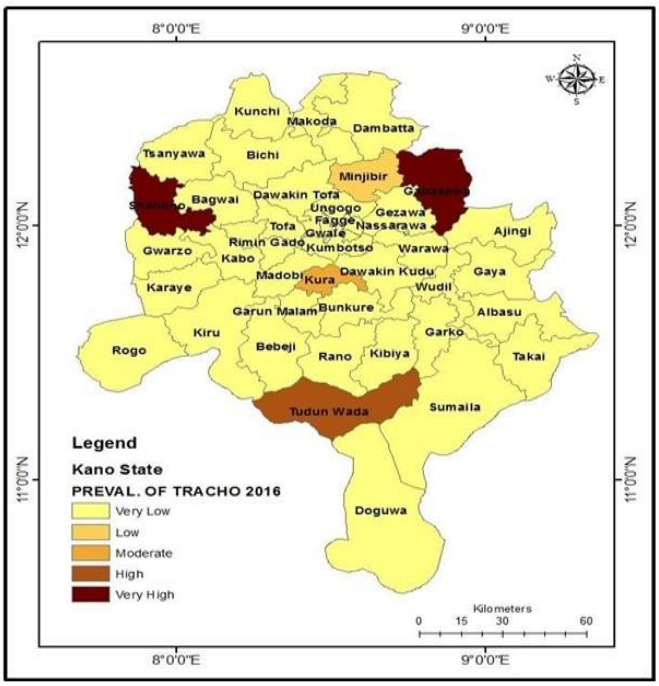

Figure 5. Prevalence of Trachoma Cases in Kano State (2016)

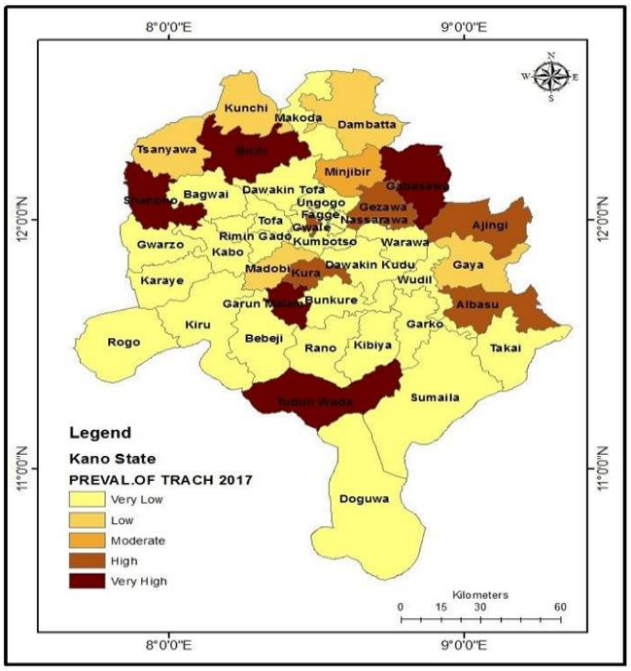

Figure 6. Prevalence of Trachoma Cases in Kano State (2017)

In 2017 Figure 6, there were ten local governments with a very high prevalence rate of >10,000/100,000, all from non-metropolitan areas except for the Gwale local government which is in the metropolitan area. There are also eighteen LGAs with very low prevalence rates of metropolitan areas with the exception of three areas from the metropolitan; Kano, Nasarawa and Ungoggo Cities. All of these high prevalence have passed the WHO standard of <5% and they are in dire need of a SAFE strategy and mass distribution of antibiotics. Meanwhile, the number of people with TT has decreased in the local government that has been recorded. Reduce to the WHO standard of 0.20%. There are only two local government areas; Ajingi with 0.39% and Gabaawa with 0.59% of non-metropolitan areas are very high.

In 2018 Figure 7, cases of trachoma decreased due to intervention from non-governmental organizations. There is one local government area from the Metropolitan Region (Ungoggo) and six LGAs from the Non-metropolitan area (Ajingi, Gabasawa, Albasu, Minjibir, Tudun Wada, and Bichi) all with a prevalence ranging from 500-3000/100000. Also, in the very low category there is Gwale with 38/100000 from metropolitan areas and nine local government areas from non-metropolitan areas (Bagwai, Dawakin kudu, Garin Malam, Gezawa, Gwarzo, Kabo, Rimin Gado, Shanono and Takai). A 2018 analysis showed that the prevalence rate of Trachoma has decreased in almost all LGAs. The prevalence of TF in children 1-9 is less than 5%, which is recommended by the WHO to eliminate blinding trachoma. All of this was achieved due to interventions such as Zithromax AR distribution (mass distribution of antibiotics) and health education lectures. TT cases this year are slightly high in some areas. There are seven local government areas of non-metropolitan areas with a high level. These are Ajingi 0.69%; Albasu 0.94%; Dawakin Kudu 0.41%; Gabasawa 0.72%; Gezawa 0.39%; Minjibir 1.02% and Tudun wada with 0.67% have all passed the WHO recommendation of 0.20%.

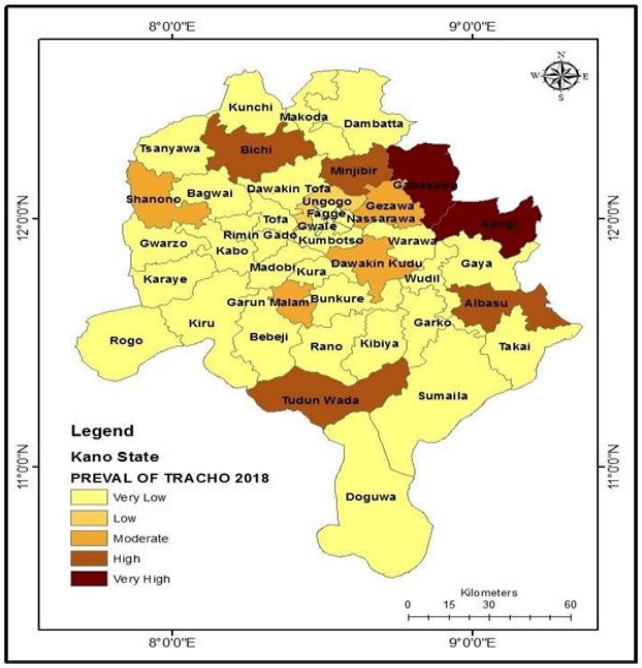

Figure 7. Prevalence of Trachoma Cases in Kano State (2018)

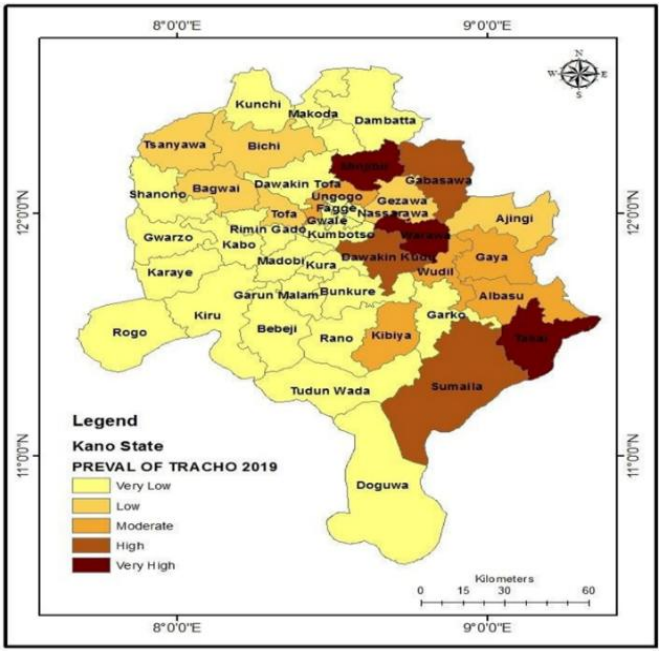

Figure 8. Prevalence of Trachoma Cases in Kano State (2019)

As of 2019 Figure 8, it has drastically reduced with most local government areas having no cases. There are four local governments in the low category. These are Minjibir, Takai, Warawa and Dawakin Kudu with 1084/10000, 801/100000, 717/100000 and 502/100000 respectively. All from the non-metropolitan parts of the state. Sixteen local government areas are included in the very low category <500/100000. All of these come from non-metropolitan areas except Ungoggo which is in the metropolitan area. All LGAs with this disease are Trachoma Trichiasis, Folicular Trachoma has been greatly reduced in the area where cases have been recorded.

The cumulative distribution of trachomas from 2013 to 2019 is shown in Figure 9, with variation across the state, with a very high prevalence in four local government areas that are all non-metropolitan parts of the state. They are Tudun wada, Gabasawa, Shanono, and Kura, with about 230,628 to 300,656 cases. The areas with high prevalence are about five non-metropolitan

areas, cases ranging from 55,711 to 89,725, except for the Gwale local government area which is a metropolitan area. The other four are Ajing, Albasu, Bichi and Garun mallam. In the moderate-level category there are LGAs with cases from 4,653 to 6,887, all from non-metropolitan parts of the state (Rimin Gado, Sumaila, Takai, and Minjibi). In the low-level category there are twelve LGAs, two local government areas from the metropolitan area, Gwale and Ungoggo while the remaining ten are from non-metropolitan areas. Cases ranged from 2,546 to 3,802. All remaining local government areas from both metropolitan and non-metropolitan areas have very low case rates. The study showed that trachomas were more active in non-metropolitan areas than in metropolitan areas. This can be explained by poor access to health services and the existence of poor hygiene in rural households. It could also be due to the availability and utilization of latrines in metropolitan households which is much higher than in non-metropolitan households. This can also be explained by the absence of separate houses for cows, the use of cow dung and the presence of garbage and manure around the house in non-metropolitan households.

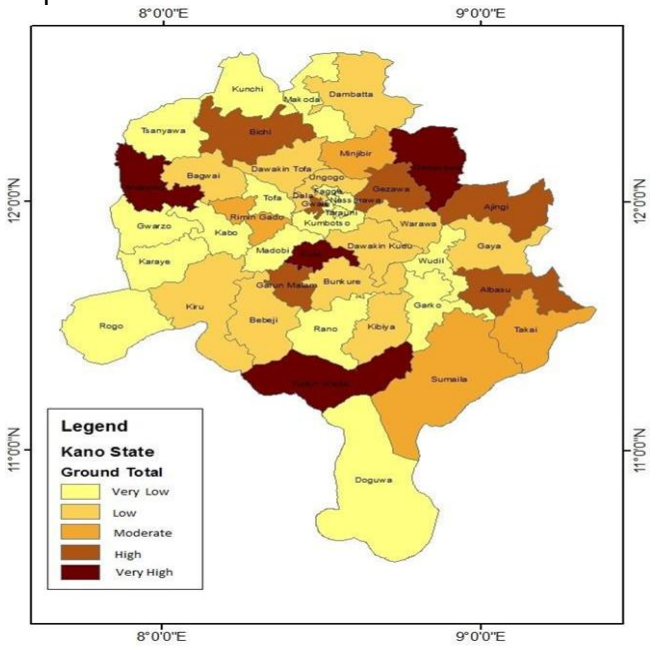

Figure 9. Cumulative Distribution of Trachoma Cases in Kano State (2013-2019)

They also revealed that active trachomas were found higher among non-metropolitan children than metropolitan children. Facial discharge, children's facial hygiene and feces around the main house are independent predictors of active trachoma among non-metropolitan children. The presence of facial discharge, the availability of latrines and the presence of liquid waste around the main house were significantly linked to the active trachoma of the metropolitan area in Dera Woreda, Northwest Ethiopia.

3.3 Hotspot Analysis of Reported Trachoma Cases in the Study Region (2013-2019)

The study showed that Trachoma was endemic in Kano state during the study period, and it infected and reinfected all age groups with most of the infections in the younger age group. Trachoma has increased from 2013 to 2017 in both metropolitan areas of the state. Only in 2018 and 2019 did the prevalence be low, due to the formation of GET 2020. The state government has been working closely with non-governmental organizations and pharmaceutical companies to provide health care to those suffering from and at risk of Trachoma. However, despite great strides in reducing the prevalence of Trachoma, they were unable to achieve eradication by 2020. Surgical efforts have shown that the prevalence of Trachomatous Trichiasis is decreasing significantly in some LGAs in the state but there are still some LGAs that require surgery. But it is clear that future interventions must be intensified to meet the upcoming targets. The current approach is based on the SAFE strategy with a particular focus on improving water access and sanitation through the International Trachoma Initiative, which looks at large-scale antibiotics that supplied by Pfizer. Each strategy has helped Trachom prevention in the state.

3.4 Factors Perceived by Participants Responsible for Bandit Activities in the Study Area

In this segment, research findings were presented on the main factors causing bandit activity in the area, and the majority of participants in all FGDs mentioned that some of the factors responsible for these incidents include illiteracy, poor governance, unemployment and poverty. Some people involved in the activity said that we are lagging behind in all aspects of development. In addition, other factors such as perpetual corruption, the proliferation of weapons and ammunition in the country, politics sponsored by corrupt politicians, poor conditions of the services of security agents, the product of some socio-economic and political imbalances in the existing social system of society and among others contribute significantly to the disaster as stated by the participants of the FGD. However, all the participants of the FGD are of the view that out of the factors recounted above, they consider the five factors to be the most important factors that trigger the bandit attacks and these are illiteracy, unemployment, poverty, poor governance, and the proliferation of weapons and ammunition in the country, which will continue to escalate the situation if not careful. In addition, all FGD participants emphasized illiteracy as the most serious factor that**:**

"Jahilci shine kashin bayan wannan ta'addaci a wannnan yaki, ayi garkuwa da mutun daneman kudin fansa, asace dukiyar mutane, akashe mutane, arabasu da muhalinsu, to inba jahilci ba mezaisa ka aikata wannan? Toh, muna neman sauki wurin Ubangijinmu".

Translation: illiteracy is the bedrock of this calamity in the area that makes bandits to kidnapp people and demand payment of ransom, stealing people properties, and killing people and some people to migrate to other place. If not because of illiteracy why should someone do this? Oh God we need your intervention.

This study collaborates with a study (Elija, 2021) that identifies that all the factors narrated by the participants or some that they consider to be the cause of bandit activity and they note that the problem requires serious intervention by individuals, non-governmental organizations (NGOs) and governments at all levels, otherwise it will continue to negatively impact the well-being of any society.

3.5 The Influence of Bandit Activities on Sustainable Development in the Study Area

This section presents the various effects of bandit activity felt by the community in the study area during the focus group discussion and these are**:**

3.5.1 Threats to Citizen Safety

As highlighted by many participants during the FGD, the incessant attacks by bandits in the study area have had an impact on the safety of people with adverse effects in the area. In addition, almost all participants stated that the situation was more pronounced on all roads connecting villages and local government headquarters in the study area. Thus, there is no road that is free from bandit attacks and kidnappers, especially the Isa to Sokoto road, Isa road, Turba to Sabon Birni, Isa road, Modachi to Bafarawa, Isa road, Kwanar Isa to Shinkafi and among others. Therefore, the deteriorating safety conditions due to these attacks have caused people to be kidnapped, some injured and some killed and made people feel no longer safe and protected in the community. These findings are in line with the findings of insecurity (Olaniyan & Yahaya, 2016) that pose threats to life, death, property, and among others.

3.5.2 Welfare of Citizen Threats

The bandits' attacks have a huge negative impact on the welfare of the people in the area, especially on socio-economic activities. This leads to the locals with the accompanying effects on the emotional and physical status of people (rape) and with serious challenges to their commercial activities due to the closure of rural businesses and markets, people fleeing to other places, with increasing poverty and so on, which are the main drivers of economic growth that bring sustainable development to the area, the country and the nation in general as narrated by the majority of FGD participants. This study is similar to the study (Adegoke, 2020) that examines a new wave of crises that are emerging in Nigeria especially the northwest region with the activities of bandits and kidnappers ongoing, their attacks include shootings and murders, cattle rustling, kidnappings, rapes, burning of entire villages, and looting of valuables, and the number of fatalities and refugees continues to rise.

3.5.3 Threats to Education

The majority of primary and secondary schools were closed and some were moved to the city due to fear of bandit attacks such as Government High School, Isa, Olusegun Obasanjo Technical Collecge Bafarawa, and while the children of the average rural population were denied access to education in the area and education became a worse sector that went down every day as told by almost all the FGD participants. In short, there are no communities in the research area that are free from bandit and kidnapper attacks. In addition, they state that**:**

"Ba'abunda zamu'iya! Amma Allah kaine Masini, muna neman agajinka domin bamu dakarfi bamuda iko, ga mahunta duk sun kyallemu, Allah agajemu kafitar damu wannnan matsalar tsaro".

Translation: we have nothing to do, but God is seeing us and know everything. Hence, we sick for his intervention since we are powerless, because we are receiving attacks in all angle. May Allah guide and show us the end of this calamity.

They also highlighted that some local government areas in Sokoto state especially southern and northern Sokoto are heads of them in terms of education. With the current disaster and if it continues, it will still widen the gap between us educationally, thus decreasing progress and development in the regions, which will definitely affect current and future sustainable development. Because, education serves as the basis of any sustainable development in any society. These findings are in line with many (Stella Adesina & Lecturer, 2017) and (Adegoke, 2020) findings related to insecurity, which in recent times, especially in the northern Nigerian school system has been subjected to violent attacks, as bandits target schools to kidnap children and teachers at will. The effects of these attacks have further exacerbated fragile school systems, which are at odds with sustainable and national development.

3.5.4 Threats to Food Security

Participants noted that agriculture currently employs 70% to 75% of the labor force in the area, which serves as the main socio-economic activity of the community. But, bandit attacks have forced farmers to abandon their farms and rural markets because of the risk to their lives. Several people were killed every day, kidnappings for ransom became our morning news. Many people are exposed to too many dangers and rural farmers move to the streets to beg with their family members and engage in other related activities that are possible to make a living, thus posing a great threat to food security and the sustainable development of socio-economic activities in the area. The study agreed upon by the study (Ladan & Matawalli, 2021) explains that bandits have had a negative impact on food security in Katsina state, as bandditry is characterized by murder, kidnapping, threats, robbery, theft, arson, robbery and blocking of local trade routes that are most vulnerable to farmers and cause serious threats to food security in the area.

3.5.5 Poor Macroeconomic Indices

During the FGD, participants explained that since 2015 when this incident stated, the macro-economic index has remained low in the area due to the identified security threats. They believe that the number of people involved in this threat is always increasing due to the increasing unemployment and the people involved in it. They also think that bandits are a profitable business (an easy way to make money) and that these criminals don't care about the risks involved. However, they stated that there is an increase in inflation especially local commodities that leads to scarcity and increasing poverty among individuals which creates low socio-economic and other aspects of human development and in turn leads to poor sustainable development in the area. Similarly, the majority of participants in all FGDs highlighted that these activities are planted to destroy us educationally, socially, economically and in the poverty of large populations that the western world has criticized. Why are we stating this, because it causes most of the farmers to be unable to go to farms, people are unable to go to markets and other places for their socio-economic activities, cows, sheep and goats are reduced in numbers due to stealing bandits in the area. They also, note that we cannot understand that this is not a conspiracy to destroy our area and in general eastern Kokoto, because for many years our area has been safe with abundant resources both in terms of people and materials. But, today we are making low progress in every aspect that will bring sustainable development in our area. The findings of this study are in accordance with (Ahmadu, 2019) and (Epron, 2019) noting that bandits and kidnappings are now a major factor in threatening Nigeria's socio-economic development by posing threats to life and property, crippling local businesses, and scaring away foreign investors.

3.5.6 Threats to Political Rights

Many participants noted that the poor political leaders of the ruling and opposition parties in the area, especially during the 2019 general election, sponsored bandits to protect their political interests in areas where they thought they did not have a majority. This is because, hopefully, people where the right was denied to vote in the area, and some people were kidnapped (ransom demanded from them), some were injured and others were killed during the 2019 general elections. In short, we believe almost all of our political leaders that they do not need to stop this activity, because they see it as a weapon to be used in their respective political parties. Why do we say that the opposition says those in power have failed in security issues and those in power force the opposition to introduce it to get power from them. Nevertheless, the FGD participants noted that our political and even traditional leaders showed little concern for the

problem of bandits and kidnappings, which the study area has experienced since 2015 to date. Therefore, we seek God's intervention, because our leaders cannot help us. This study coincides with studies (Anka, 2018) and (Uche & Iwuamad, 2018) that bandit and kidnapping activities have become business, with whispers of politicians' involvement for their political interests.

4 CONCLUSION

The security threats arising from bandit activities have a negative impact on all sectors of human development, which in turn hinders sustainable development in the research area. The study revealed that certain factors are behind the unexpected increase of these security threats in the study area, which include, among others, illiteracy, poor governance, unemployment, poverty and the proliferation of weapons and ammunition in the country. These factors have been recorded to affect people directly and indirectly, which always results in a negative response. Negative responses then have implications for sustainable development in regions, states, and countries in general. These criminal activities, if not immediately restricted as a priority, pose a great threat not only to the social, economic, political, educational and even other aspects of development, but also to the whole country. Therefore, the study recommends that governments at all levels must show a serious commitment to educating citizens at various levels of education. There is a need for re-orientation to instill ethical values, respect for life and human rights in the people, as well as the need to coexist, regardless of religious or ethnic leanings by traditional and religious leaders. Governments at all levels must redouble their efforts to eradicate this serious security challenge and arrest and prosecute bandits and kidnappers to serve as a deterrent for others for sustainable community development. In addition, the government should start a program that will eradicate poverty and unemployment in the area.

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