



IMPACT OF CULTURAL CARNIVAL FESTIVALS ON TOURIST ARRIVALS AND DISEASE INCIDENCE IN CALABAR, NIGERIA

Agbor, Cassidy Etta¹

¹Department of Hospitality and Tourism Management, University of Calabar, Calabar, Nigeria

Email: cassidyagbor@gmail.com

Orchid: <https://orcid.org/0000-0002-5309-2733>

Okey Kingsley Inyang²

²Department of Languages Education, University of Education and Entrepreneurship Akampka,

Cross River State, Nigeria

Email: kingsokey56@gmail.com

Orchid: <https://orcid.org/0009-0005-1707-9063>

Lilian Anwulika Okoro³

³Department of Theatre and Media Studies, University of Calabar-Calabar, Nigeria

Email: lilianokoro@unical.edu.ng

Orchid: <https://orcid.org/0000-0002-3434-8385>

Anthony Okon Ben⁴

⁴Department of Religious and Cultural Studies, University of Calabar-Calabar, Nigeria

Email: anthonyokonben7@gmail.com

Orchid: <https://orcid.org/0000-0002-9086-8094>

Edem Ebong⁵

⁵Institute of Public Policy and Administration, University of Calabar, Calabar, Nigeria

Email: edemebong@gmail.com

Orchid: <https://orcid.org/0000-0003-2260-5724>

Inyang, Jenny Benjamin⁶

⁶Department of Modern Languages and Translation Studies, University of Calabar-Calabar, Nigeria

Email: jenibyang@yahoo.com.co.uk

Orchid: <https://orcid.org/0009-0007-2357-7274>

Ibok Bassey Ekpenyong⁷

⁷Department of Theatre and Media Studies, University of Calabar-Calabar, Nigeria

Email: ekpenyongibok72@gmail.com

Orchid: <https://orcid.org/0009-0003-8429-5845>



Ellah, Timothy Ogbang⁸

⁸Department of History and International Studies, University of Calabar, Calabar, Nigeria

Email: timwork4real@yahoo.co.uk

Orchid: <https://orcid.org/0000-0002-8382-2493>

Osmond Otoara Agbor⁹

⁹Department of History and International Studies, University of Calabar-Calabar, Nigeria

Email: agbor02@gmail.com

Orchid: <https://orcid.org/0000-0001-5886-3798>

Gabriel Etim Ben Inyang¹⁰

¹⁰Department of Faculty of law, University of Calabar-Calabar, Nigeria

Email: gabinyang63@gmail.com

Orchid: <https://orcid.org/0000-0002-6515-1315>

Theresa Azin Mbu¹¹

¹¹Department of Hospitality and Tourism Management, University of Calabar, Calabar, Nigeria

Email: tessymbu@gmail.com

Orchid: <https://orcid.org/0009-0008-8479-8916>

Ndem Blessing Emmanuel¹²

¹²Department of Educational Management, University of Calabar, Calabar, Nigeria

Email: blessingemmy62@yahoo.com

Orchid: <https://orcid.org/0009-0000-0939-0234>

Dijeh Ann Emani¹³

¹³Department of Vocational Education, University of Calabar-Calabar, Nigeria

Email: emanideijeh@gmail.com

Orchid: <https://orcid.org/0000-0001-8065-8192>

Edet Emmanuel Eteng¹⁴

¹⁴Department of Geography and Environmental Sciences, University of Calabar-Calabar, Nigeria

Email: eddyeteng05@gmail.com

Orchid: <https://orcid.org/0009-0001-2758-0450>

Eja, Eja Iwara¹⁵

¹⁵Department of Hospitality and Tourism Management, University of Calabar- Calabar, Nigeria

** Corresponding Author's

Email: ejaiwara43@gmail.com

Orchid: <https://orcid.org/0000-0001-8310-9500>



Abstract

This study examined the impact of cultural carnival festivals on tourist arrivals and disease incidence in Calabar, Nigeria. Data were collected from hotel management records and healthcare facilities using a checklist. Geographic Positioning System (GPS) technology was employed to map healthcare facilities, with ArcGIS 10.3 software analyzing spatial distribution using the Average Nearest Neighbour Algorithm. The findings revealed that socio-cultural activities during the carnival attracted tourists from various regions to Calabar. However, there was also an increase in disease incidence linked to the festival. The hypothesis testing indicated a significant clustering of primary healthcare facilities in the city center, with fewer facilities in the outskirts. These results underscore the importance of enhancing disease control and hygiene measures during the festival. This study provides valuable insights into the relationship between cultural events and health trends, offering a basis for future comparisons of disease incidence before and after similar events in the area.

Keywords: Carnival festival, disease incidence, healthcare facilitates, tourist arrivals, spatial distribution

INTRODUCTION

Globally, Cultural carnival festivals worldwide are dynamic celebrations of cultural heritage, each uniquely showcasing traditions, art forms, and community cohesion. These events attract both local residents and global tourists, highlighting the rich diversity and cultural vitality of different regions. Characterized by vibrant parades, elaborate costumes, music, dance performances, and culinary delights, these festivals vividly portray the distinct identities and customs of participating communities (Venkat Raman, 2024; Teixeira, 2023). In West Africa, cultural carnival festivals prominently feature elaborate costumes, masks, and historical props, integrating traditional music genres like Highlife, Juju, Afrobeat, and folk songs, accompanied by live band performances that enhance the festive ambiance (Orji, 2019; Samuel, 2022). Artistic expressions extend to intricate beadwork, weaving, pottery, and sculpture, showcasing local craftsmanship and traditional skills passed down through generations (Bankole-Race, 2024; Jalil et al., 2024). These festivals promote cultural exchange and mutual understanding, fostering unity and appreciation among diverse audiences (Snowball & Antrobus, 2021).



Cultural carnival festivals in West Africa are vibrant celebrations deeply rooted in local traditions, showcasing a rich tapestry of cultural activities that highlight the region's diverse heritage. According to (Kanaujiya & Tiwari, 2022), the gathering of large populations during these festivals can facilitate the spread of respiratory infections, gastrointestinal diseases, and vector-borne illnesses. Furthermore, mass gatherings, including cultural festivals, have been linked to increased transmission of infectious diseases, often necessitating healthcare facility admissions for treatment (Walsh et al., 2022; Olsen, 2020; Hopkins & Reicher, 2021). Adewoyin et al. (2018) examined the spatial distribution of healthcare facilities and the phenomenon of inverse care in Ibadan, Nigeria. Their study explored urbanization trends and the uneven distribution of healthcare resources, highlighting disparities in healthcare access based on residential location within the city. Egbunu & Yunusa (2022), Okoli (2022), and Adewoyin et al. (2018) argue that these geographical inequities in healthcare provision significantly impact healthcare utilization, particularly between urban and rural areas.

In Nigeria, cultural carnival festivals feature elaborate parades and processions that highlight participants' attire, traditional costumes, and masks representing historical figures, deities, or cultural symbols (Orji, 2019). Additionally, educational activities and workshops have become integral parts of Nigerian carnival festivals, aimed at promoting cultural awareness and facilitating knowledge exchange. These sessions cover traditional crafts, dance, music, and storytelling, offering locals and tourists deeper insights into Nigerian culture (Eyisi et al., 2024). Through these engagements, participants develop a heightened appreciation for the cultural significance and historical context embedded in festival practices (Bakare, 2018). According to (Afolaranmi & Afolaranmi, 2024), music and dance performances during these carnivals serve as platforms for cultural expression and identity, enabling artists to showcase their talents and connect with their heritage. In cities like Ogun, Osun, and Ibadan, Nigeria, carnival festivals are vibrant cultural events blending traditional and contemporary elements, showcasing the city's rich cultural heritage through a diverse array of activities that engage both participants and spectators (Balogun, 2023; Adams, 2023).

Furthermore, in other states of Nigeria such as Rivers, Edo, and Delta, cultural festivals feature elaborate parades with colorful floats, traditional masquerades, and costumed performers representing diverse ethnic groups and cultural motifs (Orji, 2019). According to BabátúndéYussuf & OladipoOlúbòmẹhìn (2018), these parades serve not only as entertainment but also as a vital means of preserving and promoting the rich cultural traditions of Lagos.



Alongside parades and performances, cultural carnival festivals in Lagos encompass various competitions and games. These range from traditional wrestling matches to modern talent contests, providing participants with opportunities to showcase their abilities and vie for prizes. Such activities foster both entertainment and healthy competition, enhancing camaraderie among participants (Temerak & Winklhofer, 2023).

Similarly, Cross River State and Calabar in particular, the Calabar Carnival, known as "Africa's Biggest Street Party," is a pivotal cultural event in Nigeria, featuring a vibrant fusion of traditional and modern celebrations (Orji, 2023; Hackett, 2022; Fenton, 2019). Over time, it has become a significant draw for tourists and a cornerstone of the region's cultural heritage. The cultural festival showcases a variety of socio-cultural activities, with performances highlighting Nigerian music and dance styles to a global audience, promoting cultural exchange and mutual appreciation (Ololo & Dieke, 2022; Obijuru, 2023; Adora, 2024). These significant cultural carnival festival offer more than just economic benefits; they also provide crucial social and community advantages (Akhundova, 2024; Lopez, 2021).

They serve as platforms for local artists, performers, and cultural custodians to showcase their talents and safeguard intangible cultural heritage (Ost & Saleh, 2021; Eyisi et al., 2024). Participation in these festivals cultivates pride in cultural identity and fosters intercultural dialogue, thereby enhancing the social cohesion of communities. However, research underscores the potential health risks associated with mass gatherings, including cultural festivals. The global experience during COVID-19 highlighted how such events can contribute to the rapid spread of infectious diseases if not properly managed (MohdHanafiah et al., 2021). Factors such as overcrowding, inadequate sanitation facilities, and limited access to healthcare services at festival venues exacerbate the vulnerability to diseases (Gurushankara, 2021; Tiwari & Chowdhary, 2022).

Research suggests that healthcare facilities in host cities often face a surge in patient admissions, potentially overwhelming their capacity (Bhowmik & Eluru, 2021; Winkelmann et al., 2022). However, while numerous studies globally have explored the intersection of cultural festival events and disease incidence in healthcare settings, none have specifically focused on the impact of cultural carnival festivals on tourist arrivals and disease incidence in Calabar, Nigeria, with specific emphasis on assessing socio-cultural carnival festival activities that influence tourist arrivals, the spatial distribution of healthcare facilities, and the health challenges of



residents before and after the festival (Otu & Princess Bassey, 2024; Aborisade, 2020; Przezbórska-Skobiej & Eyang, 2024; Castillo-Benancio et al., 2023; Ezenagu et al., 2021).

Cultural carnival festivals are a significant tourist attraction in Calabar, Nigeria, drawing thousands of visitors annually. Events such as the renowned Calabar Carnival are celebrated for their vibrant displays of culture, music, and dance, positioning them as key drivers of tourism and economic development in the region (Ololo & Dieke, 2022; James et al., 2025). However, the influx of tourists during these festivals raises public health concerns, particularly regarding the potential spread of infectious diseases caused by increased population density and limited healthcare resources. Large gatherings of this nature often result in overcrowding, which can strain sanitation infrastructure and facilitate disease transmission, as seen in similar mass events globally (Winkelmann et al., 2022).

Despite their economic advantages, the relationship between tourist arrivals during cultural festivals and the incidence of diseases in Calabar remains inadequately studied. There is a noticeable gap in epidemiological research addressing the health implications of these events, hindering a comprehensive understanding of their broader impact. Moreover, the effectiveness of preventive health measures, including disease surveillance and sanitation protocols, in mitigating these risks has not been extensively explored. This study aims to address this gap by investigating the impact of cultural carnival festivals on tourist arrivals and disease incidence in Calabar, Nigeria. Socio-cultural carnival festival activities that influences tourist arrivals in Calabar, Tourist arrivals in cultural carnival festival event, Spatial distribution of healthcare facilities in Calabar, Distribution of Health challenges and status in of residents Calabar and Health challenges before festive and after-festive cultural carnival festival activities. However, this study will help government agencies to shape public health policies and resource allocation during festivals, while tourism stakeholders can develop safer practices for enhancing visitor experiences. Furthermore, local residents will benefit from increased awareness of health risks associated with large gatherings, fostering community involvement in health initiatives. More so, the study will deepen the understanding of the relationship between cultural festival events and visitor arrivals in popular tourist destinations. The findings will further contribute to the development of sustainable festival tourism practices that promote economic growth while ensuring public health safety in Calabar.



Conceptual framework

Epidemiological transition theory

The Epidemiological Transition Theory, introduced by Omran in 1971, extends the concepts of the demographic transition model by emphasizing factors influencing mortality rates (van Doren, 2023). Epidemiology, which studies disease patterns within expanding human populations, focuses on understanding the determinants, occurrences, and distribution of health and disease within specific populations. This theoretical framework aids in comprehending how shifts in human behaviors and lifestyles can lead to significant changes in disease patterns over time.

In recent times the world has embarked on industrial revolution and diversification into tourism, with special interest in the development of potential destinations to cater for mass participation of tourist, which incorporate transportation, mining, communication; consumable manufacturing and agriculture among others, the by product from these industries constitute waste with high risk to the destination with breeding grounds for mosquitoes growing continuously.

These activities have had a detrimental impact on the health of both tourists and host communities, underscoring the relevance of the epidemiological transition concept. The "Epidemiological Transition" theory, which uses population theory within an epidemiological framework to explain patterns of disease and mortality, was developed by Krenz & Strulik (2023), Yurkovich et al. (2024), Mendoza & Miranda (2017). Long-term changes in morbidity patterns and causes of death are observed in populations undergoing demographic, economic, social, and physiological transformations (Krenz & Strulik, 2023; Moreno-Agostino et al., 2023; Su et al., 2023; Chaturvedi et al., 2024). The Epidemiological Transition Theory, proposed by Abdel Omran in 1971, outlines the evolution of disease patterns as societies develop (van Doren, 2023). It identifies several stages, transitioning from high mortality due to infectious diseases (like cholera and tuberculosis) to lower mortality with chronic diseases (such as heart disease and diabetes) as primary health concerns. Key factors influencing this transition include improvements in sanitation, nutrition, and healthcare access. The theory emphasizes the role of public health interventions, such as vaccination and health education, in managing health outcomes. Additionally, local cultural practices and demographic shifts significantly affect disease incidence and intervention effectiveness, indicating that transitions may vary regionally.



The Epidemiological Transition Theory offers a valuable framework for examining the impact of cultural carnival festivals on tourist arrivals and disease incidence in Calabar, Nigeria. As the city experiences increased tourism during these festivals, the theory illustrates how large gatherings can influence disease prevalence. Specifically, the influx of attendees can lead to a rise in infectious diseases, such as typhoid, cholera, and sexually transmitted infections, aligning with the initial stages of the epidemiological transition, where infectious diseases are predominant. This research can inform local health policies aimed at managing the health risks associated with mass gatherings, enabling stakeholders to develop effective health strategies and allocate resources efficiently during the carnival period. Moreover, the theory emphasizes the role of socioeconomic improvements in health outcomes. Increased tourist arrivals can drive economic growth, enhancing healthcare infrastructure and sanitation practices, which may help reduce disease incidence during festivals. The demographic shifts caused by the surge of tourists reflect broader epidemiological trends, impacting local health dynamics and disease incidence. Understanding these shifts can enhance community awareness regarding health challenges during peak tourist seasons. Ultimately, applying the Epidemiological Transition Theory to this research can lead to informed policy decisions, promoting public health and improving the overall wellbeing of the Calabar community.

Methodology

The research adopted both descriptive and inferential survey methods. The descriptive survey would help in recording, analyzing and interpretation of result that was collected from the field.

Population of study

The population of the studies was drawn from the 2006 population census of the study area estimated to the present year of research. Administrators of clinics and hospitals in Calabar, population of registered cases of health challenges in healthcare facilities in Calabar. Staff of the Cross River State Tourism Bureau also constitutes the population of the study.

Method of data collection

Data on visitors' arrivals were obtained from the hotel industry, specifically from Azari Hotel, Jorany Indian Hotel, Channel View Hotel, and Transcorp Hotel, using hotel management records and disease incidence during cultural carnival festival period and none cultural carnival festival period in the healthcare facilities records were obtained with the aid of a checklist. Additionally, the three months before and after the cultural carnival festive period were selected based on the disease's incubation period, which does not exceed this stipulated timeframe for



manifestation in affected individuals. To determine the spatial location pattern of healthcare facilities, the Geographical Positioning System (GPS) was used for location attributes, and ArcGIS measured the mean Nearest Neighbor distance among the facilities.

More so, three categories of healthcare facilities such as primary secondary, and tertiary health facilities were used for the analysis. The analysis was carried out in ArcGIS 10.3 using Average Nearest Neighbour Algorithm and Euclidean distance method. The figure produced in the analysis were (expressed as R_n), this measures the degree to which a particular pattern is clustered (nucleated), random or regular (uniform).

Nearest Neighbour Analysis is given as:

$$R = 2D\sqrt{(N/A)} \dots\dots\dots \text{Eqn. 1}$$

R_n is the nearest neighbour index.

D = the average distance between each point and its nearest neighbour

N = the number of healthcare facilities under study

A = the size of the area under study (Calabar South and Municipality)

$$D = \sum d/n \dots\dots\dots \text{Eqn. 2}$$

Where D is the distance between each healthcare facility and its nearest neighbor.

The nearest neighbor value was based on the range of feature pattern given as:

Clustered: $R_n = 0$ All the healthcare facilities are close to the same point.

Sample Size

A total of ninety two healthcare facilities were used for this study and disease incidence over ten years period were considered for this study. More so, the sample size was derived from the population of Calabar, which was recorded as 529,362 according to the 1991 population census, projected to the year 2019. Based on the guidelines presented by (Ragab & Arisha, 2018), a sample size of 1066 residents from Calabar was used for the study.

Sampling technique

The random sampling technique was used in administering the questionnaire while purposive sampling technique was used to select the healthcare facilities from the various healthcare facilities identified in each of the group used for the study. The rationale for adopting random sampling technique is to allow every resident in the study area equal opportunity of being selected. The purposive sampling technique was adopted in selecting the healthcare facilities due to the type of data and information needed for the study.



Hypotheses

Hypothesis One: “The spatial location distribution pattern of healthcare facilities does not exhibit features of randomness spread in the study area”.

Technique for data analysis

Hypothesis one shall be tested using the Average Nearest Neighbour (ANN) spatial statistical tool using the ArcMap GIS software thus;

$$Y_{ij} = Y_{ij} - Y_i$$

S_i

Where; Y_{ij} = observation

Y_i = mean of the variance

S_i = standard deviation

Where- $S_n = \frac{1}{n} \sum Y_1 Y_2 \dots Y_n - Y_1 Y_2 \dots Y_n$ -----eqn 2

Whereas, correlation coefficient of $Y_1 Y_2 \dots Y_n$ is

$$r_n = S_n / S_1 S_2 \dots S_n$$

Covariance of Y_1 and $Y_2 \dots Y_n$

$$S_n = \frac{1}{n} \sum Y_1 Y_2 \dots Y_n - Y_1 Y_2 \dots Y_n$$
-----eqn3

Results and findings

Socio-cultural carnival festival activities that influences tourist arrivals in Calabar

The socio-cultural carnival festival activities that influence tourist arrivals in Calabar reveal that the city experiences large gatherings due to the distribution of various cultural tourism activities. Notably, the Carnival Calabar festival, celebrated every December in Cross River State, has emerged as the most attended cultural carnival festival in the region. It was officially introduced by the former state governor, Mr. Donald Duke, in 2004, with the aim of attracting people from different regions to celebrate the year's end. This festival consistently draws a large number of tourists from various countries worldwide, as well as different states within Nigeria, who come to partake in and witness this grand event. Another highlight is the Boat Regatta festival, typically held during high tide, which occurs between May and June, at the peak of the rainy season when the rivers swell. The beautifully adorned boats, set against the backdrop of lush greenery, create a mesmerizing spectacle. This tradition celebrates the Efik tribe's historical conquests in tribal wars and annually attracts a substantial number of guests to the state during this period. The Ekpe masquerade, a sacred society originating from the Ekoi tribe in Cross River State. It is particularly popular in Calabar and other regions of Nigeria, as well as in



western Cameroon. This masquerade tradition plays a significant role in local culture, with its senior members serving as protectors of societal order. They use a communication method called Nsibidi, a two-thousand-year-old writing system featuring symbols found on leadership attire. Nsibidi also includes specific gestures and vocalizations understood by senior members of the cult.

Historically, the Ekpe cult served as law enforcement, judiciary, and spiritual consultation. Although its influence has waned in recent times, it remains integral to preserving Efik cultural heritage. The Ekpe masquerade dance festival, held annually in December, attracts visitors from far and wide. Similarly, the Calabar Annual International Jazz Festival, which takes place during Easter in March, draws thousands of attendees. The study also highlights the Calabar Fattening Festival, an ancient tradition that is becoming less common. This festival marks the transition of young maidens into womanhood. In the past, gaining weight symbolized prosperity, fertility, and beauty. Admission to the fattening room was a privilege, signifying virtue and purity. This festival attracts cultural tourists who come to witness the ceremony when the maidens leave the fattening room.

Finally, the Utomo Obong ceremony, one of the most attended cultural events among the Calabar people, is a grand occasion held in December. During this event, the Efik people gather to honor and express their love for their king, the Obong of Calabar. This celebration draws participants from 58 Efik clans, 270 villages in the Efik Eburutu kingdom, and tourists from across the globe, making it a highly attended and colorful event. The Tinkoriko Calabar Carnival, introduced 25 years ago, aims to unify young people but has occasionally led to fractionalization and rivalry among groups. Despite these challenges, the carnival continues to captivate and attract tourists from around the world (Table 1) (Plate 1 & 2).

Table 1: Socio-cultural activities that influence visitor arrivals during cultural carnival festival in Calabar (Source: Cross River State Tourism Bureau, 2024)

S/N	Types of activities	Period of activities	Location	Status
1	Carnival Calabar	December	Calabar	Active
2	Boat Regatta festival	December	Calabar	Active
3	Ekpe masquerade festival	December	Calabar	Active
4	Calabar annual international jazz	March	Calabar	Active



	festival			
5	Fattening Festivals	All year round	Calabar	Active
6	Tinkoriko Calabar Carnival	January	Calabar	Active
7	UtomoObong Ceremony	December	Calabar	Active



Plate 1. Carnival Calabar



Plate 2. Boat Regatta festival activity

Tourist arrivals in cultural carnival festival event

The tourist arrivals for the 2023-2024 Cultural Carnival Festival in Calabar show that the highest number of tourists was from Nigeria, accounting for 28.05 percent of the total. This was followed by tourists from Cuba and Cameroon, with 11 percent and 10 percent, respectively. Additionally, data indicate that tourists from India and Ghana made up 8.74 percent and 7.92 percent of the arrivals, respectively. Furthermore, 7.50 percent and 7.42 percent of the tourist arrivals came from Brazil and China, while 5.80 percent, 5.70 percent, and 5.40 percent were from the United States, South Africa, and Trinidad and Tobago, respectively. Only 2.60 percent of tourists came from Canada during the 2023-2024 Cultural Carnival Festival in Calabar. Additionally, it was observed that 24.98 percent and 33.99 percent of the tourists stayed at Jorany Indian Hotel and Transcorp Hotel, respectively, while 16.33 percent and 14.68 percent lodged at Azari Hotel and Channel View Hotel in the study area. These results demonstrate that the Cultural Carnival Festival significantly influences tourist arrivals in the region (see Table 2).



Table 2: Tourist arrivals in cultural carnival festival event 2023-2024 (Source: Field Survey, 2024)

S/n	Origin of tourist	Azari hotel	Jorany Indian Hotel	Transcorp hotel	Channel view	Total	Percentages Arrivals
1	Caba	11	45	56	21	133	11.00
2	South Africa	12	29	19	9	69	5.70
3	Brazil	18	23	35	15	91	7.50
4	Cameroon	23	47	29	22	129	10.00
5	Ghana	20	28	31	17	96	7.92
6	India	14	41	23	28	106	8.74
7	China	7	51	20	12	90	7.42
8	USA	10	36	18	6	70	5.80
9	Nigeria	56	96	152	36	340	28.05
10	Canada	8	12	7	4	31	2.60
11	Trinida Tobago	19	16	22	8	65	5.40
12	Total	198	4242	412	178	1212	100
		16.33	34.98	33.99	14.68		

Spatial distribution of healthcare facilities in Calabar

The spatial distribution of healthcare facilities in Calabar, as shown in Figure 1, indicates that primary healthcare facilities dominate the clustering, followed by secondary healthcare facilities distributed throughout the study area. The study further reveals the location pattern of healthcare facilities using longitude and latitude coordinates. Of the 92 healthcare facilities mapped, 55 are primary healthcare facilities, and 33 are secondary healthcare facilities. The spatial pattern was analyzed using the Average Nearest Neighbor (ANN) analysis tool, which measures distances to assess the location of each feature's centroid and its nearest neighbor. The study also suggests that the distribution of healthcare facilities reflects a high quality of life for residents in the area. Additionally, Figure 1 shows that the distribution is clustered around the metropolis, with fewer facilities located on the outskirts of the study area.

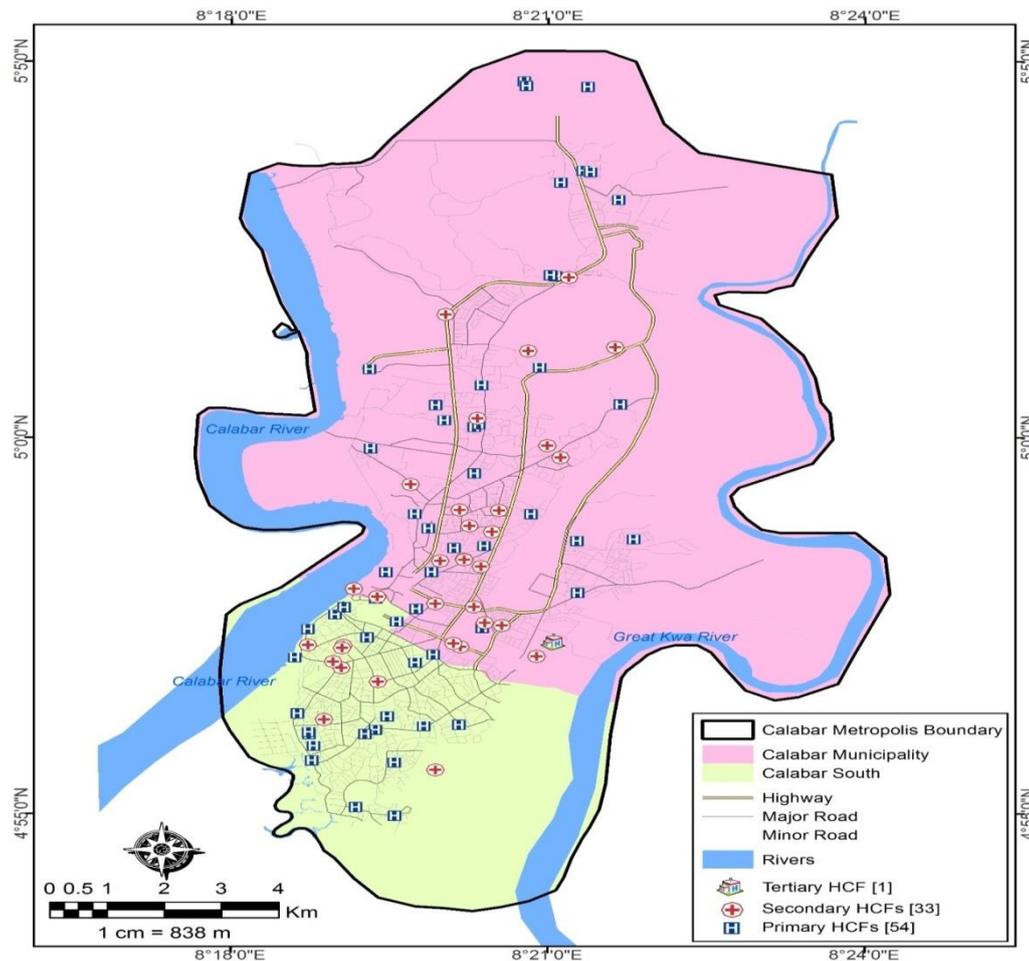


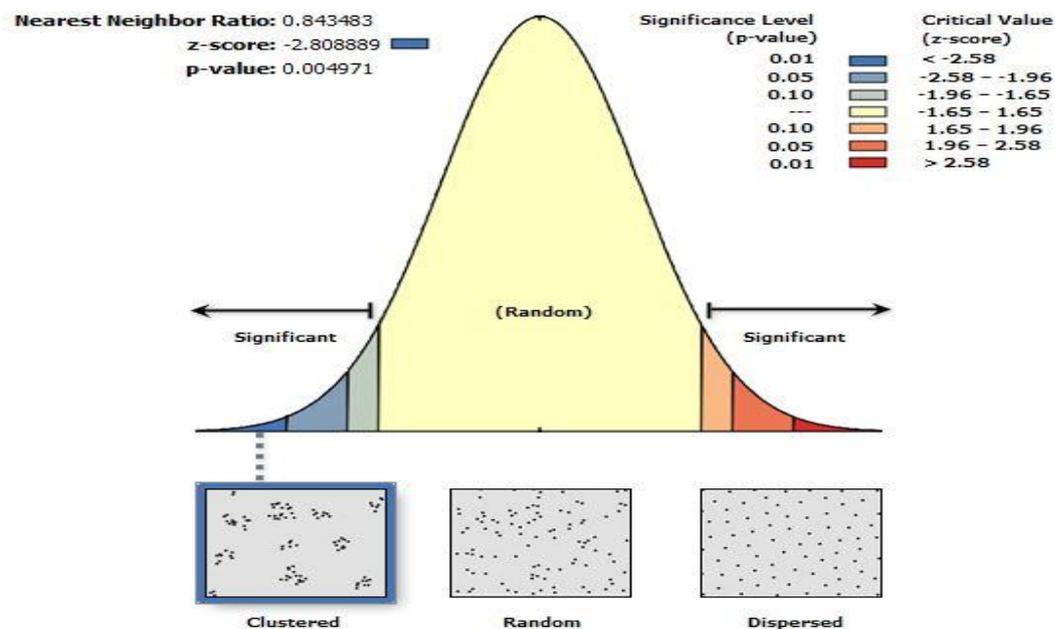
Figure 1: Spatial distribution of healthcare facilities in Calabar Metropolis

Source: (Cross River Geographic Information System, Cross River State (2024))

The result obtained in Hypothesis 1 posited that there is no statistically significant clustering in the location of healthcare facilities (HCFs) within Calabar Metropolis. The analysis utilized point data consisting of longitude and latitude coordinates for the HCF locations in Calabar Metropolis. This dataset encompassed all types of HCFs, including primary, secondary, and tertiary facilities, totaling 99 data points. The output of the Nearest Neighbor (NN) analysis, as illustrated in Figure 2, revealed an index known as the nearest neighbor ratio, which was found to be less than 1 (0.843). This ratio indicates a clustered pattern within the data. Additionally, considering the derived p-value (0.00497) and the NN ratio, there is substantial evidence to support the alternative hypothesis that the location of HCFs in Calabar Metropolis exhibits statistically significant clustering. This finding aligns with the convergence theory proposed by Clark Kerr in 1960, which suggests that a country's economic growth leads to



changes in social organization similar to those of industrialized societies. The clustering of healthcare facilities in the study area can be seen as an indicator of developmental progress (Figure 2).



Given the z-score of -2.8088889952, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

Figure 2: Arrange Nearest Neighbour analysis output

Distribution of Health challenges and status in of residents Calabar

The health challenges and status of residents in the study area shows prevalence of various health issues and diseases affecting the population in Calabar from 2011 to 2019. This table provides key insights into health trends during this period. Typhoid disease accounted for a total of 7,475 cases, constituting 27.1 percent of all cases over the ten-year period. The peak of typhoid cases was in 2010, with 824 cases, and the lowest was in 2011, with 584 cases. Malaria, on the other hand, had a cumulative total of 9,496 cases, representing 34.4 percent of the total cases. The highest number of malaria cases was recorded in 2023, with 1,281 cases, while the lowest was in 2011, with 821 cases. Cholera showed 1,306 total incident cases over the decade, comprising 4.7 percent of the total cases. The peak of cholera cases occurred in 2016, with 200 cases, and the lowest was in 2018, with 84 cases.



Sexually transmitted diseases (STDs) were also prevalent, with a total of 3,619 cases over the decade, accounting for 13.1 percent of all cases. The highest number of STD cases occurred in 2010, with 505 cases, while the lowest was in 2017, with 255 cases. HIV/AIDS showed a similar trend, with 277 cases reported in 2017 and a lower count of 218 cases in 2013. Hepatitis had a total of 3,214 cases from 2010 to 2019. The highest annual cases were 404 in 2017, followed by 390 in 2023, while the lowest were 146 in 2010 (Table 3).

Table 3. Distribution of health challenges between 2010-2023
(Source: Healthcare facilities record department in Calabar, 2024)

DIZZ YEAR	Typhoid	Malaria	Cholera	STD	HIV/AIDS	Hepatitis	Total	Percentages
2019	820	1281	115	394	234	390	3234	11.7
2018	739	1013	84	392	219	344	2791	10.1
2017	834	981	143	255	277	404	2894	10.5
2016	779	890	200	327	262	360	2818	10.2
2015	802	885	128	448	271	358	2892	10.5
2014	715	840	114	340	272	344	2625	9.5
2013	732	940	121	352	218	294	2657	9.6
2012	646	1065	104	313	259	280	2667	9.7
2011	584	821	148	293	226	294	2366	8.6
2010	824	780	149	505	247	146	2651	9.6
Total	7475	9496	1306	3619	2485	3214	27595	
%	27.1	34.4	4.7	13.1	9.0	11.7		100

Health challenges before festive and after-festive cultural carnival festival activities

The health challenges before and after the cultural carnival festival, demonstrate a clear distinction between the festive period (cultural carnival activities) and the post-festive period (off-season of cultural carnival activities). The data in Table 3 show that typhoid infections were more prevalent in the years following the festive period of tourism over a ten-year span: 2010 (291 cases), 2011 (235 cases), 2012 (244 cases), 2013 (241 cases), 2014 (240 cases), 2015 (243 cases), 2016 (207 cases), 2017 (220 cases), 2018 (240 cases), and 2019 (221 cases). The



incidence of health challenges increased with the rise in mass tourism activities over the years. Notably, the incubation period for typhoid ranges from a minimum of 7 to 18 days to a maximum of 3 to 60 days, which coincides with the timing of the cultural carnival activities. Again, before the festive period, the total number of health challenges amounted to 4,014 cases, while the post-festive period witnessed a much higher incident rate of 9,084 cases. The findings in Table 3 reveal that cultural carnival activities exacerbate health challenges in the study area. The significant increase in post-festive period cases, totaling 9,084, provides strong evidence to support the claim that cultural carnival activities play a substantial role in the rise of health issues in the region (Table 4).

Table 4: Health challenges before festive and after-festive cultural carnival festival activities

(Source: Information from Records and Laboratory department of Healthcare facilities in Calabar, 2023)

Before festive period								After festive period							
Typhoid	Malaria	Cholera	STD	HIV/AIDS	Hepatitis	Total	%	Typhoid	Malaria	Cholera	STD	HIV/AIDS	Hepatitis	Total	%
142	276	19	19	21	50	527	13.0	221	335	25	172	87	129	989	11.9
118	155	10	19	21	22	345	8.6	240	280	32	243	97	138	1030	11.3
167	95	33	9	37	24	465	11.3	220	265	61	97	115	187	945	10.4
139	160	36	14	23	38	410	10.2	207	240	53	123	95	136	854	9.4
158	115	18	25	30	24	370	9.2	243	215	38	179	100	150	925	10.2
125	120	15	22	26	34	347	8.7	340	190	45	164	99	140	878	9.7



145	185	12	18	26	35	421	10.5	241	155	62	148	104	102	812	8.9
109	192	14	43	22	37	417	10.4	244	300	34	120	125	100	923	10.2
94	161	20	11	22	32	340	8.5	235	210	35	121	100	91	792	8.7
142	145	21	42	13	9	372	9.3	291	210	57	224	114	40	936	10.3
1339	1704	198	222	241	310	4014		2382	2420	442	1591	1036	1213	9084	
33.4	42.5	4.9	5.5	6.0	7.7		100	26.2	26.6	4.9	17.5	11.4	13.4		100

Discussion of findings

The research findings on Impact of Cultural Carnival Festivals on tourist arrivals and Disease Incidence in Calabar identified seven key aspects of cultural carnival festival activities that influence visitor arrivals gatherings in Calabar which include which Carnival Calabar, Boat Regatta Festival, Ekpe Masquerade, Calabar Christmas Festival, Calabar International Jazz Festival, Fattening Festival, Tinkoriko Calabar Carnival, and Utomobong Ceremony. This assertion agrees with the observation that several socio-cultural festivals influence mass gatherings in any given destination (Adewoyin et al., 2018). More so, the research further indicates that the cultural carnival activities attracted several international and domestic tourist all over the world. This collaborates with the analyses that cultural festivals are catalysts for tourist and visitor arrivals in a tourism destination, as shown in the works of Walsh et al. (2022) and Hopkins & Reicher (2021), and further supported by the empirical findings of Olsen (2020). Furthermore, the Carnival and Boat Regatta are major cultural festivals that have attracted large gatherings and increased visitor arrivals in the study area. This finding aligns with the works emphasizing that cultural festivals are significant catalysts for attracting people and encouraging visitors to destinations rich in cultural resources (Aborisade, 2020; Przebórska-Skobiej & Eyang, 2024). It is also supported by the empirical studies of Ezenagu et al. (2021), Okoli (2022), and Otu & Princess Basse (2024).



Similarly, the study reveals that the spatial distribution of Health Care Facilities (HCFs) in Calabar Metropolis demonstrates significant clustering. It further reveals that indicate that healthcare facilities are strategically located within populated areas of the study region (Krenz & Strulik, 2023; Yurkovich et al., 2024). This observation aligns with the exploration of urbanization trends and the spatial distribution of healthcare facilities (Adewoyin et al., 2018). The study further shows that the clustering of HCFs is characteristic of well-organized urban centers, driven by economic activities and typically favored by wealthier segments of the population (Mendoza & Miranda, 2017; Adogu et al., 2015). In contrast, rural areas with fewer healthcare centers tend to provide limited healthcare access, particularly for basic care, as noted by Taymaz et al. (2020). The spatial location pattern of HCFs in the study also aligns with the works of Veldhuizen et al. (2020) and Kok et al. (2017), a perspective further supported by Thayer et al. (2021). This observation aligns with Bauer's findings (2008), which highlight the various direct and indirect health implications of tourism that can be propagated during cultural carnival festivals (Özdipçiner et al., 2020). The findings also correspond with the suggestion that a continuous influx of tourists can stimulate city development, thereby encouraging both residents and visitors to utilize healthcare facilities in the study area (Shen et al., 2020). The results from the statistical output reveal variability in the analysis output, using regression tests to demonstrate a significant difference between variables (Adewoyin et al. (2018).

The result from the statistical output further shows that the spatial distribution of healthcare facilities in Calabar exhibits statistically significant clustering. This finding aligns with Clark Kerr's convergence theory (1960), which suggests that a country's economic growth leads to changes in social organization similar to those in industrialized societies. More so, the study also revealed a significant variation in the diseases incidence during the cultural carnival festival event and none festival event. This assertion conformed with the empirical works of Yilmaz (2020) and Cheng (2024), indicating that cultural carnival festival activities impact residents' health in various ways, creating discomfort, especially for those who are heavily exposed to the festivities (Dertadian & Rance, 2023; Abbasian, 2022). This finding aligns with Pizarro et al. (2022), who propose that positive feelings can foster closer contact through approach behavior, thereby reinforcing social interactions and positive emotions. This view is supported by the emphasis that tourism arrivals can have a short-term negative influence on resident health (Godovykh & Ridderstaat, 2020).

Conclusion



The cultural carnival festival is one of the most renowned traditional festivals in Cross River State, particularly in Calabar, the state capital. This study has demonstrated that various socio-cultural activities significantly impact visitor arrivals in the area. The findings identified seven key cultural events Carnival Calabar, the Boat Regatta Festival, Ekpe Masquerade, the Calabar Christmas Festival, the Calabar International Jazz Festival, the Fattening Festival, Tinkoriko Calabar Carnival, and the Utomobong Ceremony that attract both international and domestic tourists. These cultural festivals serve as catalysts for increased tourist numbers in the region, with Carnival Calabar and the Boat Regatta emerging as major drivers of large crowds. The study also examined the spatial distribution of healthcare facilities (HCFs) in Calabar Metropolis, revealing that healthcare access is clustered in populated areas, leaving rural areas with limited access. The influx of tourists during cultural events exerts additional pressure on these healthcare facilities, especially in densely populated urban areas. The research further showed a notable variation in disease incidence during and after cultural carnival festivals, suggesting that the increased influx of tourists contributes to higher disease transmission rates, particularly among residents exposed to the festivities. However, while cultural festivals bring positive social and economic benefits, the government should establish mobile health clinics during festivals, enforce mandatory screenings, and invest in rural healthcare infrastructure to manage disease risks from increased tourist influxes effectively.

Author Contributions:

Conceptualization, M.A.A. and A.E. and O.N.N. and E.I.E and L.A.O.; methodology, E.I.E and D.A.E. and D.D.J. and U.A.U.; software, O.J.S. and A.G.I. and E.E.E. and A.O.B.; validation, A.E. and A.G.I. and E.I.E. and E.E.E. and D.D. J.; formal analysis, M.A.A and O.J.S. and E.I.E. and A.O.B.; investigation, O.N.N. and E.I.E. and E.O.I. and A.O.B. and R.D.J.; data curation, E.I.E. and E.E.E. and D.A.E. and M.A.A and R.D.J. and M.E.; writing - original draft preparation, U.A.U. and A.G.I. and O.N.N. and E.I.E. and A.O.B. and D.D.J.; writing - review and editing, E.I.E. and R.D.J. and E.E. and E.E.E. and K.J.L. and A.O.B.; visualization, K.J.L. and E.E.E. and E.I.E. and L.A.O. and D.D. J.; supervision, I.J.B. and O.W.E. and A.O.B. and E.I.E. and R.D.J. and I.J.B.; project administration, O.J.S. and R.D.J. and E.O.I. and D.D. J. All authors have read and agreed to the published version of the manuscript.

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The data presented in this study may be obtained on request from the corresponding author.

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