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ASSESSMENT OF THE IMPACT OF SLUM ENVIRONMENT ON RESIDENTS OF OKPOKO SLUM

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Abstract

This study assessed the impact of slum environment on the residents of Okpoko and determined the standard slum deprivation index (SDI). The survey research design was adopted with questionnaire and interview serving as the instruments of data collection. 200 households were purposively selected and sampled while 40 community leaders in were interviewed. The study also utilized the WaSH (Water, Sanitation and Hygiene) and DPE (Dwelling and Physical Environment) as the measurement scale for the assessment (with the scale code of 0 = no access and 1 = access; 0 value for SDI meaning not deprived at all and 1 meaning 100 percent deprived). It was found that the three selected were all deprived in both the WaSH and DPE. The average SDI for Okpoko is 0.6481 and the test of hypothesis also established a relationship between the SDI and attitude of the residents to environmental issues and the relationship model is y = 0.390084 + 2.63825x, where x is SDI and y is the attitude of the respondents to the environment. It was established that the relationship is positive on the average and more deprivation will lead to bad attitude of residents towards environmental issues. The study recommended that academic development of the slum dwellers should be intensified to improve their understanding of the dangers of a filthy environment to their health and general wellbeing; there should be increased awareness campaign in these slum areas and collaboration with non-governmental bodies in project execution; Environmental Sanitation should be intensified and poverty alleviation projects encouraged to improve the socio-economic status of the residents of the area; also in undertaking of any developmental project(s) in the slum areas the residents should be made to participate and their opinion should count as they are major stakeholders.

Keywords: DPE, Slum Deprivation Index, Slum Environment, Slum Residents, WaSH

Introduction

Background to the study

One of the most enduring physical manifestations of social exclusion in African cities is the proliferation of slums and informal settlements. People living in these settlements experience the most deplorable living and environmental conditions, which are characterized by inadequate water supply, squalid conditions of environmental sanitation, breakdown or non-existence of waste disposal arrangements, overcrowded and dilapidated habitation, hazardous location and vulnerability to serious health risks. Consequently, slum dwellers, many who are poor are made poorer by the various forms of exclusion that they face. Most of them lack basic shelter while their inhabitants

generally live under circumstances that are hazardous to life and health (Garau, 2006).

The global assessment of slums undertaken by the UNHabitat (2010) shows that 828 million or 33% of the urban population of developing countries resides in slums. In sub-Saharan Africa, 62% of the urban population resides in slum settlements. Such large concentration of slums in which inhabitants live in, is in life-threatening conditions and it poses enormous burden on city authorities that are often cash-strapped and lack the institutional and technical capacity to provide even the most basic of urban services.

Slum proliferation is pronounced in all the geopolitical zones and sessions of Nigeria. There is barely a state without a slum area in Nigeria (Badmus, Rienow, Callo-concha, Greve and Jurgens, 2018), especially in the urban areas due to rapid urbanization with limited development.

The impacts of slum proliferation on the slum areas are numerous according to Adadeji and Eziyi (2010); Nduka (2012); Onweluzo (2017) among other early researchers include but not limited to filthy environment, environmental pollution, increase in water and air borne disease, overcrowding, environmental decay, poor social wellbeing, inadequate availability of facilities and increase in the rate of deterioration of the few available facilities amongst other negative impacts. For instance, in Okpoko, Onweluzo (2017), pointed out that buildings are erected anyhow, there are no signs of effective development control or regulation, poor water supply, constant traffic congestion and indescribable filth.

Many earlier researchers considered the causes and general effects of slum on the environment but the impact on the inhabitants and the slum deprivation index has been given little or no attention. It is against this background that this study was conceived to assess the impact of slum environment on the residents in Okpoko slum.

Statement of the problem

The development of slums is a common phenomenon in major cities in Nigeria as observed by Ajanlekoko (2001). According to him, "the phenomenal rise in population and the number and sizes of our cities over the past few years have manifested in the acute shortage of dwelling units which resulted in overcrowding, high rents, poor urban living conditions, and low infrastructural services and indeed high crime rates".

From the field observation, one can deduce that Okpoko is characterized by poor quality housing, unmaintained streets, poor drainage systems and the absence or lack of public services and facilities. It inhabits most of the urban poor in the city of Onitsha with some houses built on waterways and drainage channels and this makes water flow an almost impossible task. Slum dwellers in Okpoko suffer from scandalous living as filth has blocked almost all the gutters in the vicinity thus causing heavy flooding that affects the residents and road users. This overflowing dirt litters the streets and gutters, particularly when it rains. The blocked drainages and water channels which is as a result of improper disposal of waste and building on water ways, makes flooding a common disaster in Okpoko. The return of the rains brings tension and sleepless nights as water overflows into resident's houses, putting them into perpetual fear and causing loss of property and assets.

In Okpoko slum, the phenomenon of decay manifested more on the structures and characterized by acute shortages with demand always more than supply. For instance, the insufficient availability of quality housing and basic infrastructures such as waste disposal system, water supply, electricity amongst others has led to the

available ones being over stretched and over used by residents thus resulting in the decay of the available resource therefore causing degradation of the environment and environmental hazards. According to Okeke (2002), under such situation, available facilities deteriorate fast and decay sets in due to overuse, poor usage performance, lack of maintenance etc.

Many studies have been conducted in this slum area like those of Izueke and Emene (2013), Onweluzo (2017), Okoye *et al* (2017) and Onwuzuligbo *et al*, (2017) amongst others. Amidst these numerous related literatures reviewed the following gaps were identified: little attention was given to the impact of slum on residents and the Slum Deprivation Index (SDI) was partially neglected with only few studies handling it briefly outside Okpoko. This is very important in exposing the social, economic and environmental deficiencies in the slum area to enable good policies on slum management and improvement. In the light of the foregoing, this work was conceived to assess the impact of slum on the residents of Okpoko Slum areas with a view to to establishing the slum deprivation index.

Aim and objectives

The aim of this study is to assess the impact of slum environment on the residents of Okpoko, with a view to determine the standard slum deprivation index. To achieve this aim, the following objectives were pursued:

1. To identify the impacts of slum environment on the health, social and economic life of residents of Okpoko slum;
2. To determine the impacts of the slum environment on the attitude of the residents of the slum area to environmental issues and
3. To develop the slum deprivation index for the study area.

Literature Review

Many early researchers worked on the impact of slum environment, Pawar and Mane (2013), found that slum environment affects elements like living standard of population, socio-economic status of population and their general development and progress. Prasad & Singh (2009) and Sufaira (2013) asserted that the slum environment affects the literacy level, family income and general social status of the slum dwellers as they have very poor and substandard living conditions. On the other hand, UN-Habitat (2003); Unger & Riley (2006) established that unhygienic water sources abound in slum locations. These, contaminated and inadequate water is a major characteristic of slums in developing countries which potentially brings about severe infectious diseases such as hepatitis and cholera.

Also inadequate domestic water supply causes irregular bathing of many slum dwellers which consequently brings about skin infections, part of which could result into severe glomerulonephritis (Unger and Riley, 2006). Inadequate provision of safe water and improper management of wastes are major factors leading to the widespread of diseases such as diarrhea, typhoid, cholera and malaria etc. (Nwaka, 2005).

Ola (2011) has it that very poor health conditions of the residents of slum areas are due to exposure to pollution of different forms. This is in line with the findings of Gurmit (2012), who noted that there is a significant positive relationship between housing conditions, health, safety and social support which provides empirical evidence of the relationship between housing condition and the quality of life. The poor conditions in slum environments has very negative health effects on the inhabitants of the area and poor health conditions affects the total wellbeing of the individuals.

The works of Funmilayo (2012); Owoeye and Adedeji (2013); and Yussuf, *et al.* (2014) were all in agreement that lack or inadequate access to basic public services like health care facilities; and unhealthy living conditions in hazardous locations characterize slum environments and this supports poor health conditions of the slum dwellers. Akinwale (2018) and Lawanson (2020); affirmed that Urban slum dwellers are at a high risk of non-communicable diseases such as asthma, heart disease, diabetes, mental health problems including anxiety, depression, insomnia and substance abuse as they adopt an urban lifestyle while lacking knowledge and information regarding health and health care. Quality of health care in the urban slum is sometimes worse than what obtains in some rural areas and the slum dwellers are particularly vulnerable during a health crisis (Akinyinka, 2020).

Ezenwa *et al.* (2013) and Izobo *et al.* (2014) confirmed that there are grave environmental effects of the slum area on the residents and their attitude towards the environment as there is lawlessness especially as regards indiscriminate waste disposal and negligence to environmental sanitation regulations. According to them, there is un-denied impact on the socio-economic lifestyles and the health of the residents, as well as the general outlook of the environment.

Study Area

Okpoko covers an area of 291.967 hectares and it is located between latitude 6°10’40” N, longitude 6°47’30” E bound in West is River Niger.

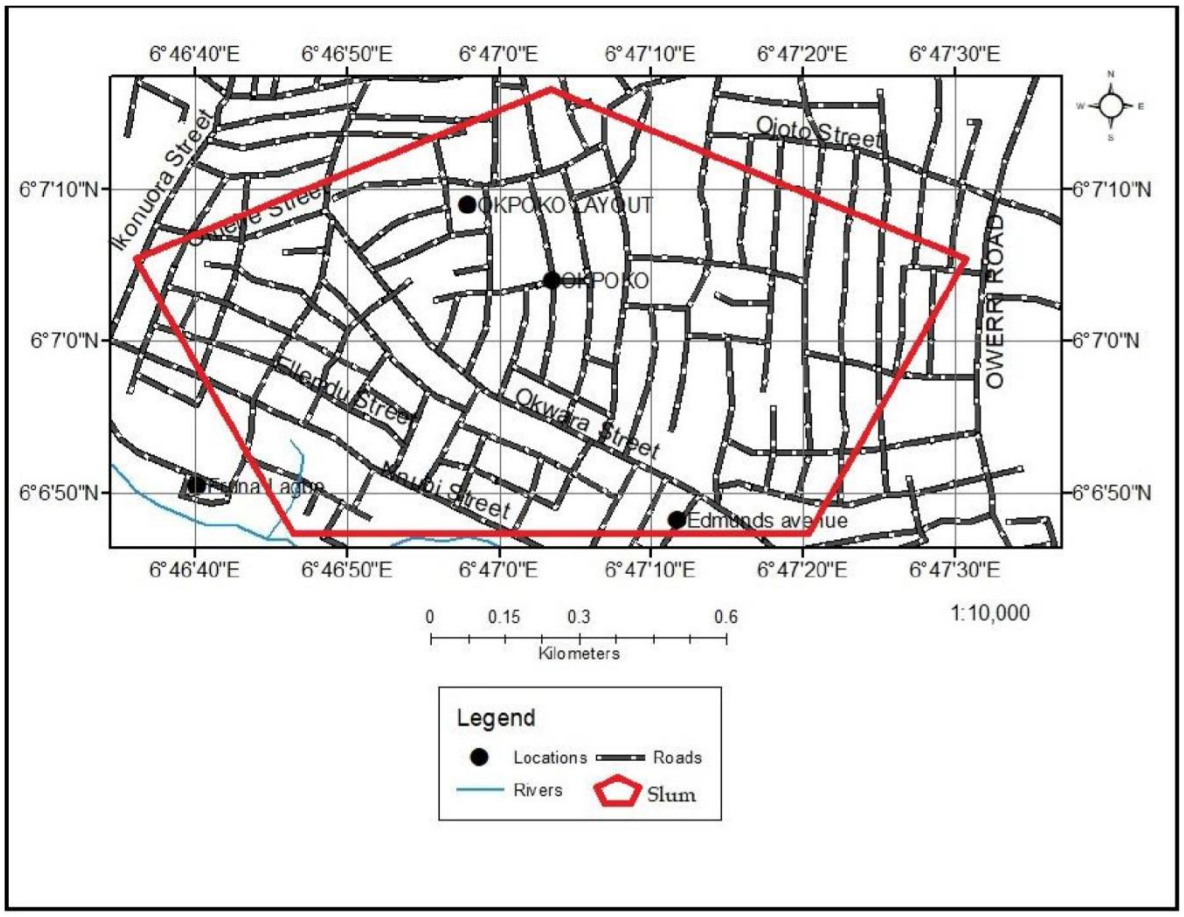


Figure 1: Map of Okpoko slum (National Geohazards, 2022).

Geologically, Okpoko and its neighbouring towns are situated within the vast sedimentary basin of the Niger-Benin trough of the upper middle Eocene known as the Bende-Ameki group. Within this area, there are large areas of alluvium from the quaternary period. The area is traversed and drained mainly by River Niger and its many tributaries, notably rivers Anambra (which lends the State its name), Nkissi and Idemili Rivers, all draining into the Niger. The Anambra River is the largest of all the tributaries to the Niger south of Lokoja, the confluence of River Benue with the Niger. The geology of the area is of the Orlu ceusta formation which terminates at the River Niger bank. This upland area, which varies between 150 and 240m in height, is dissected by a number of small streams draining into River Niger. The soils around Okpoko on the bank of River Niger are characterized by a wide plain of alluvium with exposures of sandy and loamy soils covering the rest of the parts of Okpoko.

Okpoko is located in the transition area between the sub-equatorial climatic and the tropical hinterland climatic belts of Nigeria. The climate here is influenced by two major trade winds: the warm moist Southwest Trade Winds during the rainy season (April – October) and the North East Trade Winds during the dry and dusty harmattan (November- March). In Okpoko, temperature is generally high (Maximum monthly temperatures varying from 78^0F and 81^0F. Mean temperatures are relatively constant throughout the year at about 77^0F with maximum temperatures experienced in the December – March period and minimum in June – September period. Annual rainfall averages about 1,850mm (74 inches) per annum, which is reasonably high. Most of the rains fall between mid-March and mid - November although infrequently, there could be rains during the dry season. This is generally high for Okpoko throughout the year, with figures between 70% and 80%. Highest figures for relative humidity are experienced during the wet season and the lowest during the dry.

The vegetation within this region is light forest. The trees include both hardwood and softwood. The trees are economic trees such as the mango, palm tree, guava, orange, almond etc. Many of the trees of the natural vegetation have been felled and the land utilized for development. Most of the roads found in the area are in a very bad and deplorable situation. Some of the roads that are fairly good but covered with refuse while others have been eaten up almost entirely by erosion.

The population of Okpoko grew very fast from 31,000 in 1978 to 105,127 in 1991, 121,343 in 1996 and to 128,417 in 1998 (UN Habitat 2009). The population in Okpoko has been on the increase and it is one of the most densely populated slums in the country, attracting as much as 44,000 people per ha in 1998. Growing by the same trend, Okpoko had an estimated population of 177,608 in 2006 (National Population Commission 2006). Since the last population census was carried out in 2006, the 2006 population which is 177,608 will be projected to 2021 using the T.R Malthus exponential projection model which is an arithmetic method of population projection. With the formula as

$Pt + n = pt\ (1+r)^n$

Where pt is the Population of 2006 = 177608
r = 1.8% (growth rate) 1 = Constant
n (Number of years) = 15 years
Therefore, $pt = 177608\ (1+1.8/100)^{15}$

Based on the above figure, the estimated population of Okpoko in 2021 is 238,102 people. More so, the gross population density for Okpoko will be:

$$\text{Population density} = \frac{\text{Total Population}}{\text{Total area of land (hectares)}}$$

Therefore:

Population density = 238,102
291.967 = 815.51

From the above calculation, the population density for Okpoko in 2021 is 816 persons per hectare.

Most of the undeveloped properties and incomplete buildings within Okpoko are occupied by squatters in temporary structures. The roads are majorly un-tarred, there is no pipe borne water in the area. Save for the privately owned boreholes, the only source of water in the area is water vendors who sell water off their tankers. Their major economic activities are street trading and hawking. Okpoko has a huge number of inhabitants who are mostly squatters, batcher dwellers, overpopulated public yards and a few decent apartment houses inhabited by tenants. Access to land ownership is difficult in the area owing to the tussle between Onitsha and Obosi communities. UNHABITAT (2012) shows that there is no master plan for Okpoko which makes it difficult to actually model the area, nor manage the influx of people into the slum. Furthermore, the average number of individuals per household in Anambra State according to National Population Commission (2006) is approximately 5 but the average for Okpoko is 6 (Onwuzuligbo, Nnam, Alozie and Ejezie, 2017). The closeness to Onitsha Main market, Ogboefele, Ogbo rubber and Relief Markets in Onitsha makes economic activities in Okpoko a little lively. From field observation, the existence of numerous street markets operating till late evening hours, shops, kiosks and attachments here and there for sale of goods to inhabitants defines the backward nature of the market system of the area. There are 40 major streets in Okpoko (https://geographic.org/streetview/nigeria/anambra_state/ogbaru/okpoko.html).

Methodology

This study adopted the survey research design using questionnaire as the main instrument of data collection.

To effectively conduct this study, the following data were of essence.

1. Information on how far earlier researchers have worked on issues under study were obtained from secondary sources through literature review.
2. Maps and information about the study areas were obtained from National Geo-hazards Centre Anambra State office, Department of Survey and Geoinformatics, Nnamdi Azikiwe University, Awka, Excel research centre and other online sources.
3. The Population of the study areas were obtained from the National Population Commission, Anambra State Office, Awka and various online sources.
4. The data on the impact of slum environment on the residents, the slum deprivation index (SDI) and the attitude of residents of the selected slum areas to environmental issues were obtained through the use of questionnaire instruments, in depth interview and field observation.

The two major sources of data for this study are the Primary and the Secondary sources. The primary data sources adopted the use of questionnaire instrument and physical observation to obtain firsthand data from the study areas. the estimated population of Okpoko from 2006 census to 2021 is 238,102. Household population of the study area is = Total Population/Average Household Size. Average Household Size = 6. Total Population for Okpoko = 238,102. Therefore, the number of households in Okpoko slum is =238,102/6 =39,684.

The sample size of this study was determined using the Taro Yamaine formula, which is stated as below:

Where n = Sample size; N = Population of the study; e = Limit of the tolerable error (5%).

$$n = \frac{N}{1+N(e)^2}$$

Therefore, for Okpoko $n = 39684/1+39684(0.05)^2$

$= 39684/1+39684(0.0025)$

$= 39684/100.21 = 396.0084$

Therefore, approximately 400 households as sample size for Okpoko. Considering the feasibility of this study after reconnaissance field observation, the researcher purposively limited the sample size to 200 households for each study area that is 50% of the calculated sample size. The researcher also purposively decided to sample 40 community leaders in Okpoko this was taken from the forty (40) streets in Okpoko, that is one per street for a uniform spread.

WaSH (Water, Sanitation and Hygiene) and DPE (Dwelling and Physical Environment) were utilized in this work. A two-point scale measure was used to code WaSH variables (0 = no access and 1 = access). The DPE variables were measured on a scale of five points as 1 = Single room, 2 = room and parlour, 3 = flat, 4 = Self compound bungalow and 5 = duplex for dwelling type. The total number of residents per dwelling was measured as a continuous scale. The physical environment (presence of stagnant water and waste pile) and place for hand-washing was measured as no = 0, yes= 1. This was achieved by converting all strongly agreed plus agreed to yes, strongly disagreed plus disagreed to no.

The waste disposal method was measured on a scale of eight point as none = 0, burning = 1, burying = 2, dumping in the river/drain= 3, dumping along the road side/nearby bushes = 4, through accredited garbage truck vendor = 5, dumping in State Waste Management Agency depot = 6 and through Private Sector Partnership (PSP) = 7. Sources of water supply were measured on a scale of 10 points as borehole= 1, public standpipe= 2, piped public tap= 3, protected dug well= 4, open dug well= 5, harvested rainwater = 6, water vendor= 7, bottled water= 8, sachet water= 9 and stream= 10. Sources of sanitation facility were measured on a scale of 11 points as connection to a public sewer= 1, connection to septic system= 2, pour-flush latrine= 3, simple pit latrine= 4, ventilated improved pit latrine= 5, public or shared latrine= 6, open-pit latrine= 7, bucket latrine = 8, pour-flush latrine without connection= 9, surface water = 10, and open space= 11. The material(s) for hand washing was measured on a scale of four points as water only= 1, soap with water= 2, use of sanitizer= 3, and disinfectant= 4.

Waste disposal methods, sources of water/sanitation facilities, and material for hand washing will all be transformed into binary measures as no access = 0, access = 1. For example, options, 0–4 will be regarded as no access while options 5–7 represents access for waste disposal method. For water and sanitation, all unimproved sources of water and sanitation facilities will be considered as no access while the improved source indicates access to those amenities. Regarding materials for hand washing, option 1 represents no access while options 2–4 indicate access based on the WHO & UNICEF (2014) benchmark for the definitions of access to improved water, sanitation, and hygiene. All the DPE and WaSH variables were used to compute the SDI in the study area as was applied by Akoteyon *et a.l* (2021).

Results and Discussion

To achieve the set objective of identifying the negative impacts of slum environment on the health, social and economic life of residents of the slum area; respondents were asked carefully structured relevant questions on the

subject matter. Their responses are contained in Tables 1-3.

Table 1: Impacts of Okpoko slum environment on health of residents

S/N	Item	Okpoko	
		Mean	**Remark**
1	Outbreak of diseases due to filth	2.52	Agree
2	Increase in Health hazards (illnesses and diseases)	2.26	Agree
3	Increase in Heat stress, air pollution or carbon emission.	2.38	Agree
4	Rise in Eviction / demolition causing depression and health issues	2.12	Agree
5	Water contamination causes dysentery, diarrhoea, malaria, typhoid	2.22	Agree
6	High mortality rate as a result of inadequate health facilities.	2.30	Agree
7	Short life span	3.16	Disagree
8	Overall poor living conditions	2.04	Agree
9	High degree of breeding and spread of pathogens	2.24	Agree
10	Frequent illness due to exposure to filth and poor environment	2.18	Agree

Source: Researcher's Field Survey, 2023

Table1 contains the impacts of the Okpko slum environments on health of the residents.

The negative impacts of slum on the health of residents of Okpoko as can be seen from the table based on the responses of the respondents are:

i. Outbreak of diseases due to filth
ii. Increase in Health hazards (illnesses and diseases)
iii. Increase in Heat stress, air pollution or carbon emission.
iv. Rise in Eviction / demolition causing depression and health issues
v. Water contamination causes dysentery, diarrhoea, malaria, typhoid
vi. High mortality rate as a result of inadequate health facilities.
vii. Overall poor living conditions
viii. High degree of breeding and spread of pathogens
ix. Frequent illness due to exposure to filth and poor environment.

Table 2: Impacts of the Okpoko slum environment on social lives of the residents

S/N	Item	Okpoko	
		Mean	**Remark**
1	There is high degree of restlessness	2.08	Agree
2	High level of insecurity	1.82	Agree
3	It is hard to bring children under control	3.28	Disagree
4	Possibility of recreational activity is limited	1.72	Agree
5	There is high level of moral decadence	2.26	Agree
6	Frequent threat of eviction / ejection	1.98	Agree
7	There is high level of Crimes and Social vices	1.94	Agree
8	Social hazards, Prostitution and anti-social activities are on the increase	2.02	Agree
9	Increased fear and tension due to violence	3.26	Disagree
10	High level of apathy to government programmes	2.54	Agree

Source: Researcher's Field Survey, 2023

In Okpoko, the following were agreed to be the impacts of Okpoko slum environment on the social lives of the residents:

i. There is high degree of restlessness
ii. High level of insecurity
iii. Possibility of recreational activity is limited

iv. There is high level of moral decadence
v. Frequent threat of eviction / ejection
vi. There is high level of Crimes and Social vices
vii. Social hazards, Prostitution and anti-social activities are on the increase
viii. High level of apathy to government programmes

Table 3: Impacts of Okpoko slum environment on the economic lives of residents

S/ N	Item	Okpoko	
		Mean	**Remark**
1	Poor feeding and inadequate housing maintenance as a result of low household income	2.16	Agree
2	High cost of environmental management due to high degree of deterioration of the environment	2.50	Agree
3	Poor environmental conditions lead to low economic productivity.	1.96	Agree
4	Lack of good health facilities gives rise to high infant and child mortality rates	2.02	Agree
5	Low influx of tourist industries which in turn impact negatively on the residents.	3.06	Disagree
6	Inadequate financial power as a result of high level of environmental degradation.	2.40	Agree
7	There is Economic stagnation	1.98	Agree
8	Inadequate housing maintenance	1.72	Agree
9	Increasing poverty due to unemployment	1.72	Agree
10	Low property values due to the nature of the slum environment	2.62	Agree

Source: Researcher's Field Survey, 2023

The negative impacts of the Okpoko slum environment on the economic lives of her residents are as follows:

i. Poor feeding and inadequate housing maintenance as a result of low household income
ii. High cost of environmental management due to high degree of deterioration of the environment
iii. Poor environmental conditions lead to low economic productivity
iv. Lack of good health facilities gives rise to high infant and child mortality rates
v. Inadequate financial power as a result of high level of environmental degradation.
vi. There is Economic stagnation
vii. Inadequate housing maintenance
viii. Increasing poverty due to unemployment
ix. Low property values due to the nature of the slum environment

To determine the impacts of the slum environment on the attitude of the residents of the selected slum area to environmental issues the responses of the respondents was analysed in Table 4.

The respondents in Okpoko agreed with the following as the impacts according to Table 4:

i. Poor waste disposal attitude due to inadequate waste disposal facilities
ii. Poor personal and general hygiene
iii. There is high level of non-compliance to sanitation rules
iv. Depression, low self-esteem, anxiety as a result inadequate infrastructural amenities
v. Increased degradation of waste disposal facilities due to inadequacy
vi. The environment is most times littered with wastes
vii. There is indiscriminate dumping of waste
viii. Sewage facilities are readily filled up
ix. Drainage facilities are blocked with wastes

The Tables 5 and 6 present the mean scores for the responses of respondents on the general questions on WaSH and DPE and the Five-Point Scale of the general questions on WaSH and DPE respectively.

Table 4: Impacts of Okpoko slum environment on attitude of the residents to environmental issues

S/N	Item	Okpoko	
		Mean	**Remark**
1	Poor waste disposal attitude due to inadequate waste disposal facilities	2.12	Agree
2	Poor personal and general hygiene	2.20	Agree
3	There is high level of noncompliance to sanitation rules	2.14	Agree
4	Increased litigation because of avoidable errors	3.08	Disagree
5	Depression, low self-esteem, anxiety as a result inadequate infrastructural amenities.	2.96	Agree
6	Increased degradation of waste disposal facilities due to inadequacy	1.80	Agree
7	The environment is most times littered with wastes	1.82	Agree
8	There is unplanned deforestation and devegetation occasioned by uncontrolled exploitation of environmental resources	3.12	Disagree
9	There is indiscriminate dumping of waste	1.92	Agree
10	Sewage facilities are readily filled up	2.32	Agree
11	Drainage facilities are blocked with wastes	1.84	Agree

Source: Researcher's Field Survey, 2023

Table 5: General questions on WaSh and DPE

S/N	Item	Okpoko	
		Mean	**Remark**
1	What is your main source of portable water supply?	5.44	
2	The main sanitation facilities available in your area is?	5.28	
3	What type of dwelling place is your household occupying?	2.30	
4	What is your main waste disposal method?	4.62	
5	What are the available hand washing measures you adopt?	1.80	

Source: Researcher's Field Survey, 2023

Table 6: Five–point scale general questions on WaSH and DPE

S/N	Item	Okpoko	
		Mean	**Remark**
1	There is Unimproved sanitation facilities (public or shared latrine, open-pit latrine, bucket latrine, pourflush latrine without connection, surface water, and open space)	2.52	Inadequate
2	There is Improved sanitation facilities (connection to a public sewer, connection to a septic system, pourflush latrine, simple pit latrine, and ventilated improved pit latrine)	3.66	Inadequate
3	There is Unimproved facility for hygiene : inadequacy of place for hand-washing and Material for washing hand in households	1.94	Inadequate
4	There is Improved facility for hygiene : adequacy of place for hand-washing and Material for washing hand in households	3.46	Inadequate
5	There is Adequacy of availability of waste bin/disposal facilities in household	2.32	Inadequate
6	There is Availability of adequate housing for residents (number of persons per room per household)	3.68	Inadequate
7	There is Presence of stagnant or sewage water near dwelling or near water sources	2.60	Inadequate
8	There is Presence of good drainages facilities	3.90	Inadequate
9	There is Access to good water portable supply	3.76	Inadequate
10	There is Adequate Health facilities	3.80	Inadequate

Source: Researcher's Field Survey, 2023

Table 7: Rating the Level of Deprivation of various amenities in the slum area

S/N	Item	Okpoko	
		Mean	**Remark**
1	Power supply	2.82	Inadequate
2	Supply of portable water	2.78	Inadequate
3	Health facilities	2.82	Inadequate
4	Educational facilities	2.92	Inadequate
5	Waste disposal facilities	3.04	Inadequate
6	Drainage facilities	2.92	Inadequate
7	Recreational facilities	3.04	Inadequate
8	Open spaces	3.00	Inadequate

Source: Researcher's Field Survey, 2023

Computation of Slum Deprivation Index (SDI)

From the literature, the first step begins with the estimation of the absolute variation in performance (AVP) which indicates the difference between the highest and the lowest proportion of residents that lack a service variable on each of the DPE and WaSH components across a settlement, as indicated in Equation (1):AVP = max Xijk –Xijk (1).

Where AVP = Absolute Variation in Performance; Xijk = score on a variable (1, 2, 3…) in different locations; Max Xijk = maximum variable score in a location (Akoteyon *et a.l*, 2021).

The total variation in performance(TVP) is therefore represented by Equation (2):

TVP = max Xijk –min Xijk (2)

From Equations 1 and 2, SDI can be computed using the expression;

$$SDI = \frac{\sum_{ijk=1}^{n} \bar{x}_{ijk} - \min\left(\bar{x}_{ijk}\right)}{\left(Max\left(\sum_{ijk=1}^{n} \bar{x}_{ijk}\right) - \min\left(\bar{x}_{ijk}\right)\right)} \quad (3)$$

and the aggregate of the SDI can be computed using the expression;

$$SDI_{Aggregate} = \frac{\sum_{ijk=1}^{n} SDI_{ijk}}{n} \quad (4)$$

where n is the number of SDIs computed.

Table 8: presents the rating of the Slum Deprivation Index for the three selected slums under study and the aggregate Slum Deprivation Index for all put together.

Table 8: Rating of SDI for Okpoko slum area

SDI	Okpoko
Power supply	0.52
Portable water supply	0.725
Health Facilities	0.71
Educational Facilities	0.52
Waste Disposal	0.94
Drainage Facilities	0.62
Recreational facilities	0.58
Open Space	0.57
Aggregate SDI	0.6481

Pearson correlation of SDI rating of Okpoko and Mean rating of response from Okpoko = 0.937 P-Value = 0.030.

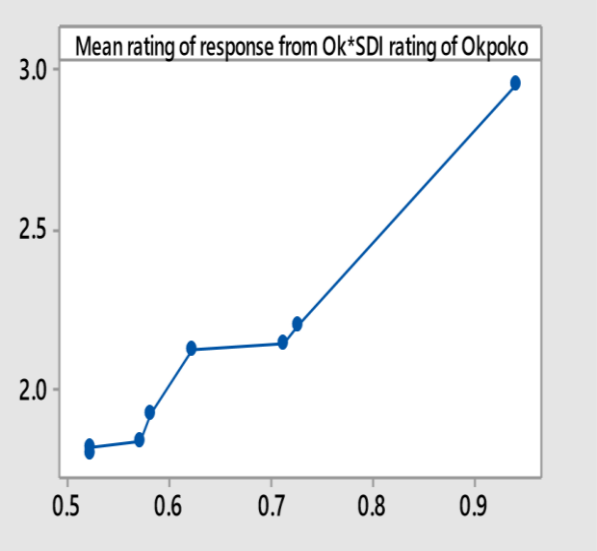


Figure 3: Scatter Plot of the relationship between the variables

Interpretation: The correlation value is 0.937. This correlation value is positive and greater than 0.5. Therefore, high deprivation is leading or has led to poor attitude of the people of Okpoko in terms of attitude to environment. The correlation is significant since its P-value is less than 0.05.

Interpretation: From the scatter plot, it can be deduced that the observations increase from left hand side to right hand side which is an indication of positive relationship between the variables.

Regression model of relationship between SDI and attitude of residents to environmental issues for the slum area

Table 9: Regression Model for Okpoko

Regression Statistics	
Multiple R	0.974959
R Square	0.950546
Adjusted R Square	0.942304
Standard Error	0.091691
Observations	8

In the model summary, the coefficient of determination is 95.1 percent which indicates that the independent variable can adequately explain the dependent variable.

Table 10: ANOVA for Okpoko

ANOVA

	df	***SS***	***MS***	***F***	***Significance F***
Regression	1	0.969557	0.969557	115.3249	0.0000385
Residual	6	0.050443	0.008407		
Total	7	1.02			

In the output, the P-value of the ANOVA is 0.0000385 which is less than 0.05. This implies the model is adequate and can be used for decision making.

Table 11: Intercept Rating for Okpoko

	Coefficients	***Standard Error***	***t Stat***	***P-value***
Intercept	0.390084	0.162492	2.400632	0.033249
SDI rating of Okpoko	2.63825	0.245671	10.73894	3.85E-05

The P-values of the t-test are less than 0.05 which implies the parameters in the model are significant. The model for Okpoko as slum location is y= 0.390084 + 2.63825*x*.

Where x is SDI and y is the attitude of the respondents to the environment. From the model, it can be observed that the relationship is positive as more deprivation will lead to bad attitude towards environment.

Summary of the Interview Report

In response to the inquiry regarding the primary toilet facilities accessible within the vicinity, it was found that in Okpoko community, a total of 11 individuals, accounting for approximately 27.5% of the respondents, reported the presence of a basic public pit latrine that was shared among the community members. Additionally, 5 individuals, representing approximately 12.5% of the respondents, indicated the availability of a simple pit latrine. Furthermore, 7 individuals, constituting approximately 17.5% of the respondents, stated that open space defecation was practiced in the community. Lastly, 10 individuals, equivalent to approximately 25% of the respondents, reported the presence of an improved ventilated latrine. The findings

indicate that the predominant toilet facility in Okpoko was an upgraded ventilated latrine.

Regarding the inquiry on the adequacy and improvement of sanitation facilities, the findings from interviews conducted in Okpoko community, a majority of 31 individuals, accounting for around 77.5% of the respondents, reported that their sanitation facilities are insufficient and of substandard quality. A smaller proportion of 4 individuals, representing 10% of the sample, indicated that their sanitation facilities were moderately satisfactory. Additionally, 5 individuals, constituting around 12.5% of the respondents, reported having access to improved and appropriate sanitation facilities. This finding indicates that, on average, sanitation facilities are substandard and insufficient.

The primary waste disposal infrastructure within one's household and its adequacy for proper waste management, the findings shows that a total of 14 individuals, constituting 35% of the respondents from Okpoko, reported lacking a primary household facility for waste disposal. Conversely, 26 individuals, representing 65% of the respondents, expressed dissatisfaction with the existing household waste disposal facilities, deeming them insufficient.

On the issue of residential accommodations of your household and the prevailing style of dwelling observed in Okpoko, a significant proportion of individuals (40%) indicated that their primary kind of residence was a single room, with a total of sixteen respondents.

Considering their primary way of home waste disposal, a total of 12 individuals, accounting for around 30% of the respondents, indicated that bush, drains, and open spaces are the primary means of household waste disposal in Okpoko. Also on the inquiry on the hand washing measures employed, it was found that a total of 13 individuals, accounting for about 32.5% of the sample, reported using water only for hand hygiene. Additionally, 15 participants, constituting 37.5% of the sample, indicated the use of both water and soap. A small proportion of 2 individuals, approximately 5% of the sample, reported employing disinfectants in conjunction with water. Furthermore, 4 participants, representing 10% of the sample, reported utilizing hand sanitizers. Lastly, 6 individuals, accounting for approximately 15% of the sample, reported not employing any of the aforementioned hand hygiene practices.

Regarding the adequacy and improvement of household hygiene facilities in Okpoko, a total of 40 individuals were surveyed. Among these respondents, 27 individuals, accounting for about 67.5% of the sample, expressed dissatisfaction with the current state of conditions, describing them as unimproved and inadequate. On the other hand, 5 individuals, representing 12.5% of the sample, reported that the conditions were fair. Lastly, 8 individuals, constituting approximately 20% of the sample, expressed contentment with the conditions, describing them as improved and acceptable. Also on the inquest about the availability and affordability of water supply, 28 individuals, accounting for about 70% of the sample, responded affirmatively. Conversely, 12 individuals, constituting 30% of the respondents, expressed a negative viewpoint. Furthermore, 33 individuals, representing approximately 82.5% of the participants, indicated that the current situation was insufficient. Lastly, 2 individuals, corresponding to 5% of the sample, expressed uncertainty regarding their stance.

Discussion of Findings

Overcrowding is a common issue in slums worldwide, leading to poor living conditions, increased health risks, and limited access to basic services (Owoeye and Adedeji, 2013).

Chandramouli (2003) in his study of the demographic characteristics of Chennai slum supported large family sizes in slums, this was affirmed by the data of the slum residents across the three selected slum areas of Okpoko, Ajegunle and Bulbula. It also agrees with the findings by some earlier researchers with related interest of study like Prasad & Singh (2009). The negative impacts of slum environment on the health of residents of all the three selected slum areas are significantly the same and include: Outbreak of diseases due to filth; Increase in Health hazards (illnesses and diseases); Increase in Heat stress, air pollution or carbon emission; Rise in Eviction / demolition causing depression and health issues; Water contamination causes dysentery, diarrhoea, malaria, typhoid; High mortality rate as a result of inadequate health facilities; Overall poor living conditions; High degree of breeding and spread of pathogens; and Frequent illness due to exposure to filth and poor environment. This affirms the findings Nwaka (2005) and Unger and Riley (2006) who indicated that inadequate provision of safe water and improper management of wastes are major factors leading to the widespread of diseases. Also Ola (2011) found that poverty result in the very poor health conditions of the residents of slum areas due to exposure to pollution of different forms.

From the analyses of the SDI for water supply, health facilities, educational facilities, waste disposal facilities, drainage facilities, recreational facilities and open spaces it was found that all the three slum areas being studied are deprived of all these facilities, though at various degrees. Authors like Gurmit (2012); Funmilayo (2012); Owoeye and Adedeji (2013) and Yussuf *et al*, (2014) who studied slums earlier supported this finding.

The slum environment has various negative health impacts, including disease outbreaks, health hazards, and water contamination. These health risks are prevalent in slums globally due to inadequate sanitation and healthcare facilities. Akinwale (2018), opined that the health effects of slum environments on the slum dwellers are numerous and increasing with increased neglect of the slum areas. According to him, they usually lack basic infrastructural facilities and are characterized by very poor environmental conditions.

Ezenwa *et al.* (2013), affirmed that a significant relationship exists between slum characteristics and crime rates this was also supported by Izobo *et al.*, (2014). Slum environments contribute to social challenges such as insecurity, moral decay, and high crime rates. These social issues are often observed in slums worldwide, where lack of proper infrastructure and services can lead to social instability (Akinyinka, 2020). Slum living environment results in economic challenges like poor income, unemployment, and inadequate housing maintenance. Economic hardships in slums are a global concern, as residents often lack access to formal employment and face barriers to economic mobility (Madhusoodhanan, 2008; Sen, 2007). Economic impacts of the slum environment vary among residents of the selected slum areas. This variation mirrors the diverse economic challenges faced by slum dwellers worldwide.

Conclusion and Recommendation

Conclusion

In line with the findings of this research work, the following conclusions were made:

The main negative impacts of slum environment on the health of residents of the three selected slum areas are: outbreak of diseases due to filth; increase in health hazards (illnesses and diseases); increase in heat stress, air pollution or carbon emission; rise in eviction / demolition causing depression and health issues; water contamination causes dysentery, diarrhoea,

malaria, typhoid; high mortality rate as a result of inadequate health facilities; general poor living conditions; high degree of breeding and spread of pathogens; and Frequent illness due to exposure to filth and poor environmental sanitation.

The major impacts of slum environment on the social lives of the residents of the three selected slum areas (Ajegunle, Bulbula and Okpoko) are: high degree of restlessness; high level of insecurity; it is hard to bring children under control; limited possibility of recreational activities; high level of moral decadence; frequent threat of eviction / ejection; high level of crimes and social vices; social hazards, prostitution and anti-social activities are on the increase; increased fear and tension due to violence; and high level of apathy to government programmes.

Similarly, the major negative impacts of that slum environment on the economic lives of residents of the three selected slum areas includes: poor feeding and inadequate housing maintenance as a result of low household income; high cost of environmental management due to high degree of deterioration of the environment; poor environmental conditions leading to low economic productivity; lack of good health facilities which gave rise to high infant and child mortality rates; inadequate financial power as a result of high level of environmental degradation; economic stagnation; inadequate housing maintenance; increasing poverty due to unemployment; and low property values due to the nature of the slum environment.

The major impacts of the slum environment on the attitude of the residents of the selected slum areas to environmental issues are as follows: poor waste disposal attitude due to inadequate waste disposal facilities; poor personal and general hygiene; high level of noncompliance to sanitation rules; depression, low self-esteem, anxiety as a result inadequate infrastructural amenities; increased degradation of waste disposal facilities due to inadequacy; littering of the environment with wastes; unplanned deforestation and devegetation occasioned by uncontrolled exploitation of environmental resources; indiscriminate dumping of waste; and blocking of drainage facilities with wastes.

The general computation of the SDIs considering all the facilities being investigated is 0.6481 this confirms that all the three selected slum areas are deprived of the various facilities.

The Slum Deprivation Index (SDI), is directly proportional to poor attitude of residents to environmental issues. The increase in deprivation is leading or has significantly led to poor attitude of the people of all the three selected slums to environmental issues like: environmental.

Recommendations

Based on the research findings and literature considerations, the following recommendations have been put forward:

i. There is great need to intensify academic development of the slum dwellers as this will improve their understanding of the dangers of a filthy environment to their health and general well-being, hence they will become proactive and not always wait on the government to spoon feed them in the area of environmental sanitation.
ii. There is need for increased awareness campaign in these slum areas and collaboration with nongovernmental bodies in project execution in these areas to give them a better live.
iii. The government and non-governmental agencies including international donors should be involved in improving the environmental condition of these slum areas by providing the necessary amenities as this will go a long way in changing their orientation about the

environment and also improve their attitude towards environmental sanitation.

iv. The role of environmental sanitation in prevention of diseases cannot be over emphasized. Hence, Environmental Sanitation should be intensified in these slum areas to mitigate the negative impacts of the dirty environments on the health of the residents.

v. Family planning programmes should be encouraged to educate the inhabitants on the importance of having a manageable family size and through this population growth will be controlled, social vices will be limited and overuse/over stretching of available facilities in the future will be taken care of.

vi. Programmes and or project to alleviate poverty and improve the socio-economic status of the residents of the area should be adopted to enhance the economic and social life of these slum dwellers.

vii. As was observed during the interview, where some respondents opined that sometimes government initiate projects that are not in any way of pressing importance to them without their consent, it is recommended that the government and other agencies who may wish to invest in the development of these slum areas should try to get the inhabitants involved as their opinion should be critically absorbed.

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