SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

2nd INTERNATIONAL ENGINEERING CONFERENCE IEC 2017

VOLUME 2

BOOK of PROCEEDINGS

Theme

GREEN RESEARCH, INNOVATION & SUSTAINABLE DEVELOPMENT: A MEANS TO DIVERSIFICATION OF MONO-CULTURAL ECONOMIES

17th - 19th October, 2017

Edited By:

Engr. Dr. A. Nasir, Engr. Dr. S.M. Dauda, Engr. Dr. A. Onumanyi, Engr. Dr. A.S. Abdulkareem, Engr. Dr. A.G. Isah
Engr. Dr. A. Muriana, Engr. Dr. C. Alenoghena, Engr. H. Bello-Salau, Engr. Dr. H. Ohize, Engr. Dr. L. Olatomiwa,
Engr. Dr. M. Masin, Engr. Musa Umar, Engr. M. Abubakar, Engr. F. Talha, Engr. H.O. Aminulai, Engr. A. Yusuf

SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

2nd INTERNATIONAL ENGINEERING CONFERENCE IEC 2017

Theme

GREEN RESEARCH, INNOVATION AND SUSTAINABLE DEVELOPMENT: A MEANS TO DIVERSIFICATION OF MONO-CULTURAL ECONOMIES

17th - 19th October, 2017

MEMBERS OF THE CONFERENCE ORGANISING COMMITTEE (COC)

Dr. A. Nasir	-	Chairman
Dr. A.S. Kovo	-	Member
Dr. M.A. Olutoye	-	Member
Dr. Mrs B.A. Adejumo	-	Member
Dr. A.S. Abdulrahman	-	Member
Dr. S.M. Dauda	-	Member
Dr. J. Tsado	-	Member
Dr. A.B. Hassan	-	Member
Prof. A.M. Aibinu	-	Member
Dr. O.M. Olaniyi	-	Member
Dr. M. Abdullahi	-	Member
Dr. M. Saidu	-	Member
Dr. A.S. Abdulkareem	-	Member/Secretary

CONTENTS

Content	Page
Title Page	i
Table of Content	ii
Forward	vi
Acknowledgement	viii
Design and Fabrication of Sugarcane Juice Extractor Machine for Small Scale Industries *Dauda, S. M., Balami, A. A., Mohammed, I. S. Aliyu, M., Ahmed A. K., Abdulkarim, A., Faith, A. B. & Uthmon, S. N.*	1 – 5
Development of a Conceptual Decision Support System for Drinking Water Treatment Process Animashaun, I. M, Ibibie, C.E, Otache, M.Y, Mohammed, A. S. & Jeje, I. A	6 – 10
Development and Performance Evaluation of a Fish Feed Processing Machine *Dauda, S. M., Balami, A. A., Aliyu, M., Mohammed, I. S., Francis A. A., Kadiri M., Egbunu G. O. & Ahmad D.*	11 - 15
A Case for Biogas as the Viable Substitute Fuel in Spark Ignition Engines *T.O. Kukoyi, E.Muzenda, C.Mbohwa*	16 -26
Comparative Evaluation of the Performance of a Bi-Fuel Vehicle on Biogas and Natural Gas *T.O. Kukoyi, E.Muzenda, C.Mbohwa*	27 -34
Synthesis and Characterization of Monometallic Nickel Catalyst Supported on Calcium Carbonate for the Production of Carbon Nanotubes *Medupin, R. O, Abdulkareem, A. S, Suleiman, B, Tabat, M. E, Bankole, M. T, Abubakre, O. K*	35 -43
People's Perception and Health Challenges Associated with Residential Building Proximity to Refuse Dumpsites in Bida, Nigeria *Bolanle A. U, Nsofor G. N and Muhammed M.*	44 -48
Polishing of Secondary Treated Refinery Wastewater for Irrigation Purposes and Safe Discharge into the Environment *Mustapha, H. I, Lens, P. N. L*	49 -56
Protein and Fat Content of Tiger Nut-Soy Milk Blends as Influenced by Pasteurization Orhevba, B. A, Bankole, O.S & Olorunsogo, S	57 -65
Comparing Formal and Informal Housing Neighborhoods of Minna Nigeria *Mambo, A. D, Isa, H. Y, Shehu, I. U, & Kurfi, S*	66 -74
Development and Testing of a Tappered Screw Mecahanism for Groundnut Oil Extraction *Agidi G, Andrew, N. F, Gana, I. M, & Dauda, S. M*	75 -80
Appraisal of Causes, Consequences and Remedies of Human Induced Deforestation in Osun State Nigeria *Kareem, W. B, Okwori R. O, Hassan A. M, Mohammed B. M. and Agboola, J. O.*	81 -86
Tolerance Levels of Cowpea (*Vigna unguiculata* L. Walp) Cultivars to Cucumber Mosaic Disease in Minna, Northern Nigeria *Abdulrahman, A., Salaudeen, M. T. and Gana, A. S.*	87 -92
The Quality of Seeds of Different Cultivars of Pepper *(Capsicum Annuum Linn.)* Processed by Different Methods *Ibrahim H., Kadiri F. R., Yusuf S.T., Tolorunshe K.D and Oladiran J.A.*	93 -100

Agricultural Fadama Soils in Maikunkele-Minna, Southern Guinea Savanna Ecological Zone of Nigeria 101 -107
Musa, J. J, Aliyu, B. G, Dada, P. O. O, Mohammed, S. A. & Omale, M. E.

Establishment and Testing of Indigenous Small Scale Moringa Leaves Powder Processing Plant in Nigeria 108 -115
Gana, I. M, Agidi G, Shehu A. A, & Mohammed M. K.

Booster Mode Analysis for a Designed Ultrasound Pest Control Booster System 116 -120
Ibrahim A.G

Effective Coverage Area Enhancement of a Pest Specific Ultrasound Pest Device through Ultrasound Booster Design 121 -129
Ibrahim A.G

Biodiesel Production from Waste Frying Oil Via Heterogeneous Transesterification: Optimization Study 130 -142
Yusuff, A.S, Adeniyi, O.D, Azeez, O.S, Olutoye, M.A, & Akpan, U.G

A Review on the Green Technology and Innovative Techniques for the Extraction of Essential Oil and Active Constituents in Herbs and Spices 143 -152
Mohammed, S. A, Isah, A. G, Kovo, A. S, & Olutoye, M. A

Evaluation of Distortion in Vegetable Oil Quenched Medium Carbon Steel 153 -158
Agboola, J.B. & Ibeh, S.C.

On the Morphological Dependency of CNTs on Catalyst Support in a CVD Reactor 159 -163
**Kariim, I., Abdulkareem, A. S., Abubakre, O. K, Aliyu, A, Isa, R. O.*

Optimization of Used Motor Oil Contaminated Soil Biostimulation Process 164 -171
Saidat Olanipekun Giwa, Kabir Abogunde Abdulyekeen, Abdulwahab Giwa and Idris Misau Muhammad

A Case for Biogas as the Viable Substitute Fuel in Spark Ignition Engines 172 -182
T.O. Kukoyi1, E.Muzenda, C.Mbohwa

Energy Potential of Food Waste Generated by a Middle Class Neighbourhood in Nigeria through Anaerobic Digestion 183 -187
T.O. Kukoyi1, E.Muzenda and C.Mbohwa

Comparative Evaluation of the Performance of a Bi-Fuel Vehicle on Biogas and Natural Gas 188 -195
T.O. Kukoyi, E.Muzenda, C.Mbohwa

Evaiuation of Polymeric Membranes Efficacy for the Water Filtration System Prototype 196 -200
Jonathan Bambokela Empompo, Edison Muzenda, Mohammed Belaid and Anthony Njuguna Matheri

Optimization of Biomethane Production by Anaerobic Co-Digestion of Food Waste With Cow Dung 201 -206
Jonathan Bambokela Empompo, Glodi Niangi Mayala, Anthony Njuguna Matheri, Edison Muzenda and Mohammed Belaid

Impact of Co-digesting Food Waste with Cow Dung 207 -210
Jonathan Bambokela Empompo, Glodi Mayala Niangi, Anthony Njuguna Matheri, Edison Muzenda and Mohammed Belaid

Preparation and Characterization of Cellulosic Nanoparticles Isolated from Selected Green Biomass 211 -220
J.O. Oboh, J.O. Okafor, A.S. Kovo and A.S. Abdulrahman

Reusing Polymeric Scrap Tire Fibers in Cement Composites: A Novel Material Sustainability Approach 221 -225
Onuaguluchi, O, & Banthia, N

GOR Effect on the Production Data Analysis and Well Performance 226 -230
Arzika, A. T, Adili, A. T, Muhammadu, B, Sani, G, & Abdulhameed, S.

Exergy Analysis as a Tool in the Selection of Distillation Column Type for Bioethanol Refining 231 -237
B. Suleiman, A.S Olawale and S.M. Waziri

Synthesis and Characterization ofTiO2Nanorod Supported on Stainless Steel Mesh Prepared Via Sol-Gel Method 238 -245
Tijani, J.O, Mustapha, S.I., Bankole, M.T. & Amigun, A.T

Synthesis of LTA Zeolite from Ahoko Kaolin: Application of Statistical Analysis 246 -253
Salako, Oluwafemi., Kovo, A. S., Abdulkareem, A.S., Yusuf, S. T.

Optimization and Modeling of Chitin Synthesis from Fish Scale using Response Surface Methodology (RSM) 254 -261
Ibrahim Abubakar Abubakar, Abdulfatai Jimoh, Manase Auta, Muibat Diekola Yahya

Application of Response Surface Methodology for Preparation of Activated Carbon from Melon Husk 262 -271
Bernard, E, Jimoh, A, Yahya, D. M, & Auta, M.

Bioenergy; A Substitute and Cleaner Energy Option 272 -276
Agbenyeku Emem-Obong Emmanuel, Muzenda Edison, Msibi Mandla Innocent

Energy Efficiency as a Drive towards Sustainable Development 277 -280
Agbenyeku Emem-Obong Emmanuel, Muzenda Edison, Msibi Mandla Innocent

Municipal Solid Waste Data Quality on Artificial Neural Network Performance 281 -289
S. O. Masebinu, E. T. Akinlabi, E. Muzenda, A. O. Aboyade, C. Mbohwa, M. Manyuchi, and P. Naidoo

Optimization of Lead (ll) ion Adsorption unto HCL Activated Aloji Clay using Response Surface Methodology 290 -298
Obayomi K. O, Balogun E. J, Ebili, P. E, Auta, M, Kovo A. S.

A Review of Biodiesel Production from Non-Edible Seed Oils using Calcium Oxide Derived from Renewabie Sources 299 -306
Omale, F. D, Eterigho, E.J, Musa U.

Sustainable Minerals Exploitation as a Panacea for Rapid Economic Growth in Nigeria 307 -313
Ogwu, E.A, Abdulrahman, A.S, Adedipe, O, Adimula, M.G, Mohammed, M. S, Yavala, I. T, & Oyinloye, A

Appraisal of the Product Quality Control of Dozik Foundry 314 -319
Badamasi Haruna and Ibrahim Abdullahi

Tracking Performances of Position Control of LDC Servo Motor 320 -324
Ladan M., Jiya, J.D, Ahmad, Y.M. J, Gadam, M. A., Anene, E.C

An Investigation on Ventilation and Air Conditioning (VAC) Installation, Design and Performances of Selected Buildings in Ilorin, Kwara State, Nigeria 325 -332
Yusuf, A. W, Bori, I, Nasir, A

Energy and Exergy of Steam Power Plant: Case study of Ajaokuta Steel Power Plant. 333 -339
O. R. Malik, A. Nasir, J. Y. Jiya, A. El-Suleiman

Effect of Garlic on Jatropha Seed Oil Used as Metal Cutting Fluid. 340 -345
Ademoh N. A, Omole O. B

Assessment of Competitiveness of Geothermal Energy in Nigeria 346 -349
Musa, A. K, Bashir, I.S, & Abdulkadir, M.S

Electrolytic Deposition of Manganese Dioxide from Nigerian Manganese Ore Using Graphite Electrodes 350 – 355
Muriana, R. A, Omeye, L. U, Abubakre, O. K, Muzenda, E, Ndlovu, S & Abdulkareem, A. S.

Influence of Electroplating on Corrosion Rate of Mild Steel 356 – 364
Idris M. K, Abdulkareem A. S., Kovo A. S., Abdulrahman A. S.

Development of a Horizontal Shaft Hammer Mill 365 – 369
Sulaiman, I., Egbe, E. A. P, Alkali, B, Kolo, Y. B & Enock, O. I.

Development of an Extruder for the Extraction of Fish Oil From Fish BasedStock 370 – 377
Ayuba A. B, Olugboji A.O, Adedipe O. & Babawuya A.

Non-Dimensionalized Parameter Development for Class 2B-Ipl Compliant Constant-Force Compression Slider Mechanism 378 – 382
Ugwuoke, I. C., & Abolarin, M. S.

The Impact of Referral Marketing Strategy on Micro, Small and Medium Scale Motor Vehicle Mechanic 383 – 388
Mustapha, A., Idris, A. M., Musa, A. E., Ajah, A. O., Gabriel, G. A. and Kolo, A. A.

Development of Screw-Type Briquetting Machine for Municipal Solid Waste 389 – 393
Okegbile, O. J, Bori, I, Danlami, S. M

Analysis of Variance for Surface Roughness and Material Removal Rate in Orthogonal Turning of AISI 304L Alloy Steel 394 – 398
Emengo, A, Mokwa J.B., Ogundimu O, Awode E.I; Olaiya K.A. and Lawal S.A.

Flotation of Maru Copper Ore Using Locally Formulated Collector From Palm Kernel Oil 399 – 404
M.N.S. Usaini, O.K. Abubakre and R.A. Muriana

Casting Simulation and Effect of Gating System of an Automotive Wheel Rim 405 – 411
Bala, K. C, Omoren, N. E, Lawal, S. S, & Hassan, A. B

Renewable Energy Management Solution for Economic Development 412 - 419
Mohammed O. Aliyu, Sanda Damboama, Joel P. Iliya, Anderson E. Agbonoga, Ahmed Y. Awalu, Simoh R. Ayinla, Sani John, Kenneth A. Idoko, Ibrahim Saidu, Sani M. Musa, Felix Ajiere, Abdulrahaman Hamisu, Agustine Okure, Nasir O. Abduqudus, Nnamdi W. Okafor, Precious O. Okuofu, Daniel Udoh, Michael Asiegbu, Ahmed B. Yakubu, Nathaniel C. Ajah, Oyewale Adedipe and Salawu Abdulrahaman.

Prospect of Wind Energy in Africa as A Sustainable Energy Source 420 - 428
Isamotu, O .F, Abdulrahman, A. S, Adedipe, O, Umugbai, J. A, Abubakar, A .J, Egli, I.S, Ogunlari, O, Kaura, K.D, Adedokun, B.A, Shuaibu, A.K, Anthony, J.O, Joseph, O.J, Dalero, M.S, Ilo, C. Mohammed, A.J, Olasunkanmi, A.V, Igbo, B. E

2nd International Engineering Conference (IEC 2017)
Federal University of Technology, Minna, Nigeria

People's Perception and Health Challenges Associated with Residential Building Proximity to Refuse Dumpsites in Bida, Nigeria

* Bolanle A. U, Nsofor G. N and Muhammed M.
Department of Geography, Federal University of Technology Minna, Niger state, Nigeria
*Corresponding author :ummubahiyya@futminna.edu.ng, +2348028604153

ABSTRACT

The problems associated with refuse dumps and their effects on residents in the developing countries like Nigeria and municipals like Bida have become pronounced recently as a result of urbanization and inadequate waste disposal practices. This study focused on the oldest dumpsites in Bida located in four wards and assessed their perception, attitude and health of residents. Data used for the study were collected through questionnaire administration, observation, health facility records of cases and works of other researchers. A sample of 430 residents were surveyed and based on result of the contrasts and correlations made, it was observed that both nearby and far away residents were affected by location of the dumpsites in their vicinity. The study found out that the common illnesses which were prevalent among residents living around the dumpsites were malaria, respiratory illness, diarrhea and typhoid fever among others. However the most common illness recorded among residents and also the most frequent necessitating hospitalization among them is malaria. Results showed that a strongly preponderant part of the residents (91.6%) had knowledge of the health risks posed by residential proximity to dumpsites. This study is also a clear demonstration that accumulation of solid waste in immediate vicinity of residential areas constitutes a pathway for many chronic adult and childhood diseases including malaria among others and that low socioeconomic conditions, poor literacy, lack of education on proper waste disposal and management are major contributing factors. Government's promotion and sponsoring of public environmental programs that can convert waste to wealth as well as the private sector involvement are thus, recommended.

Keywords: *Perception, health problems, dumpsites*

1 INTRODUCTION

The predicament of solid waste is age-old because waste is indissoluble from man. As long as man lives, he will generate waste. The types of waste generated and the management techniques employed vary with the level of civilization, industrialization and socio-economic wellbeing of the nation involved (Herbert, 2007). While cities in the developed countries have generally overcome the problem of waste accumulation and now contend with finding appropriate methods of treatment and disposal, cities in the developing countries are still struggling with the basic problem of waste accumulation. In open dumps, refuse is simply deposited in open low lying or bare lands which are left unused for a while and is has been shown to be the preferred method of disposing solid wastes in most African countries, including Nigeria (Remigios, 2010).

Despite a host of policies and regulations, solid waste management in the country is assuming alarming proportions and has become more pronounced in recent years in Bida LGA because of rapid population growth, increased urbanization, illiteracy, unemployment, high poverty rates and also government under-funding. Bida residents still resort to the crude open dump practice and the metropolis is littered quite literally with mountains of rubbish dumps. The current environmental sanitation status of Bida leaves much to be desired, posing serious risks to human health and the environment. In a recent similar study by Uba et al. (2013), that assessed the direct impact of dumpsites on the immediate environment and on the residents living nearby, variables were collected all year round in wet and dry seasons while solid waste from the dumpsites were fed to young chickens for three months. Blood, hair, urine and nail samples of the animals, the residents nearby and water quality were evaluated. They inferred from results that the dumpsites pose serious risks to human health and the environment.

In another related study, soil samples from four dumpsites were collected after the surface debris was removed, the subsurface soil to a depth of 15cm was scooped. The samples were examined for temperature, pH, heterotrophic bacterial and fungal counts and compared with a control. The microbial activity was significantly higher in the experimental sites and the pH significantly more acidic (Williams and Hakam, 2016).

It is therefore, the proliferation of several open dumps in many wards of the Bida metropolis, some of which have existed for over three decades that has spurred the need to examine the health implications of such dumps to the nearby residents, coupled with the paucity of such studies for this locality. This study aimed to determine peoples' perception and health problems associated with residential building proximity to refuse dumpsites in Bida with the objectives of:

i. Assessing the perception of residents living in close proximity to these sites on the health implications they are exposed to.

ii. To analyze the most rampant diseases the residents are exposed to.

2 METHODOLOGY

2.1 STUDY AREA

Bida is an urban local government area in Niger State

Figure 1: Study Area (Sampled Dumpsites, Bida, Niger State.

it is bounded to the south by the Niger river with a geographical coordinate of Lat. 9°01" and 6°1 and Long. 5°57"and 6°4" (Google Earth, 2015).
The study covered four dumpsite areas, aimed at determining peoples' perception and health implications associated with residential proximity to these sites. The study area is Bida town, the second largest town in Niger state. This study focused on four oldest dumpsites in the town. They are the Gudu Ndasa, Ganiyagi, Sarkin Gona and Gudu Babamba dumpsites all from four different wards.

The study population comprised people who reside within a 200m radius for each of the sites within the metropolis. Data were collected by Questionnaire administration, field survey, observation, record of cases from health center. Sampling methods used was the stratified method for categorization of distances and the sample size was 430 which were shared among the four sites. Preliminary mapping activities were carried out to delineate the survey areas. Precise coordinates of the dumpsites were obtained using a high V50 differential GPS with a 0.04m precision Descriptive statistics like pie chart, bar charts and tables were used as well as chi square to test for significant differences between variables of diseases and distances from dumpsites .The scientific package for social sciences (SPSS) in its 21st version was used to analyze the primary data sources..

3 RESULTS AND DISCUSSION

Structured questionnaires were administered to 430 people out of which 427 were returned and 424 were analyzed. Socio-demographic parameters of the participants were similar (Table 1). The majority of the respondents were between ages 20 to 29 years. Most residents (71.3%) self reportedly live within an average monthly earning of less than NGN 10,000 only 45.5% had some formal employment. Majority (89.9%) of the respondents were indigenes with high population of males (76.2%). Family house factor was the major reason given for living close to dumpsites with a total of 79.6% and only 9.1% of the respondents owned the house they lived in. A total of 38% of the respondents lived within the environment of a compound setting compared to 33% who lived in bungalows while more than half population of respondents had lived there for more than a decade as shown in Table 1.

TABLE 1: SOCIO DEMOGRAPHIC CHARACTERISTICS

	Age (20-29) Freq	Sex (Male) Freq	Education Freq	Year lived >10yrs Freq	Employment Freq	Monthly Earning <10000(Freq)
S/ Gona	48	78	87	67	49	45
G/Ndas	56	84	76	68	29	84
G/Bam	61	74	102	90	41	100
Ganiya	59	86	88	53	38	69
Total	55.6%	76.2%	91.0%	65.9%	45.5	71.3%

Health risk perception, expressed as heightened fear, was manifested by the statistically significant proportion of the respondents who stated in the affirmative that living beside the study area dumpsite could have detrimental human and environmental effects (Figure 2). While 95% of the participants perceived themselves to be susceptible and vulnerable to becoming unhealthy as a result of living contiguous to dumpsites, 5% view themselves as not at risk ($p<0.01$). The number of respondents indicating that they are aware of the effects of dumpsite in their environment could also be a clear indication of the existence of such problems.

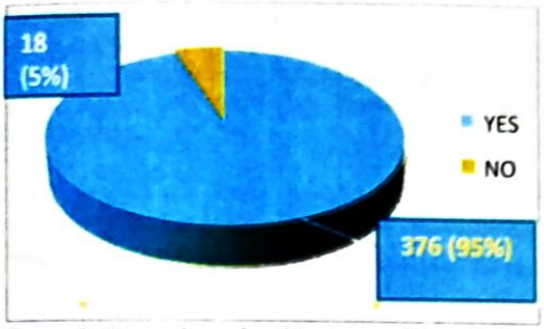


Figure 2: Perception of residents on effect of close residential proximity to dumpsite on their health.
Source: Authors field work.

TABLE 2: PERCEPTION OF RESIDENTS LIVING NEAR DUMPSITE ON ITS MANAGEMENT.

Involved in waste management	Frequency (yes)	Frequency (No)
Sarkin Gona Dumpsite	59	36
Gudu Ndasa Dumpsite	75	27
Gudu Babamba Dumpsite	84	33
Ganiyagi Dumpsite	61	38
Total	67.6%	32.4%

Source: Authors Field work.

About 67.6% admit to being involved in the management of the refuse dump (Table 2). Most of the respondents (65.9 %) %) had lived in the study area for more than 10 years. Their duration of stay in the area is an important measure because the longer an individual is exposed to a dumpsite and its associated effects, the higher the likelihood of impact of health problems and challenges (Fig 2).

It can be deducted from their responses that majority of the respondents exposure has been from birth. The participant's awareness of the duration of the existence of the dumpsites was assessed. This is important, as it influences the participant's knowledge, attitude and perceptions of the health risks and other challenges it poses. Based on reports from elders, all four dumpsites were more than 25 years old. It is in conformity with the publication of Olaniran (1995) that the link between environment and health is fairly understood by the average person in most developed and developing nations of the world.

The ages of participants, their level of education and the number of years they had lived near the dumpsites were assessed. These factors were treated as proxy measures for knowledge and perception because it was their ancestral home. There were 9.0% of respondents who had only basic education while 42.8% and 38.9% had secondary and tertiary levels of education respectively.

Education is expected to have a positive and significant effect on waste management and therefore, the longer an individual spends in the formal school system, the more likely that individual is to be informed about the negative impact that open dump has on health and wellbeing of people, the more likely also the individual is expected to develop a positive attitude and perception towards waste management. The number of years lived in the dumpsite area in this research had a statistically significant influence on the perception of the participants on the health risks posed by the dumpsite because, among residents who had lived there longer than 10 years, the rate of hospitalization for ill health was higher than for those who had lived for less than 5years.

The study also revealed that 45.2% of residents had their drinking water sourced from boreholes from individual houses as well as neighboring houses, while some had wells within. Also, 65.5% of respondents associated the possibility of its pollution to dumpsite proximity as most wells didn't have lid as well as some of the tanks outside (plate 1).

Plate1: Water Boreholes in close proximity to decades-old Gudu Bababamba dumpsite.
Source: Author's Fieldwork.

The self-reported illnesses among respondents as demonstrated in Figure 3, recounted fever as the most frequent illness, followed by cough and skin rashes. Chest pain, headache and diarrhea had a similar frequency of occurrence. When stratified into the different mapped out zones near the dumpsite, the frequency of occurrence of these illnesses were consistently higher for the residents nearer the

dumpsite. This study found that the commonest illnesses and challenges which were prevalent among residents living around the four dumpsite areas studied are malaria, respiratory illness, diarrhea and typhoid fever.

The most common illness recorded among residents and also the most frequent illness necessitating hospitalization among them is malaria.

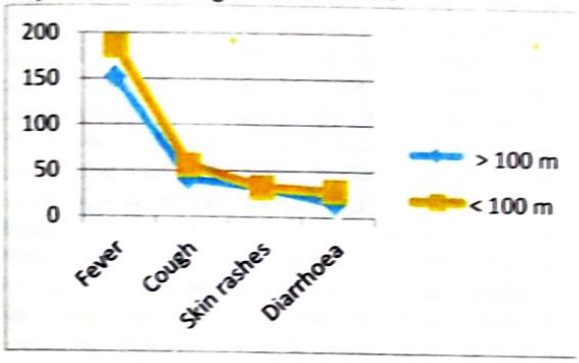


Figure 3: Reported Health diseases with the highest percentage among residents.
Source: Authors field work.

TABLE 3: REPORTED ILLNESSES AMONG RESIDENTS LIVING CLOSE TO DUMPSITES.

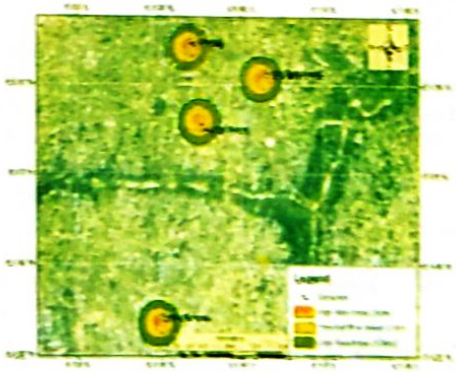
Most common cause of Hospitalization	<100m	>100m		
Malaria	206	176	90.9%	
Typhoid		19	7	6.2 %
Diarrhoea		2	4	1.4 %
Respiratory Infection		2	2	0.9 %
Skin Infection		1	1	0.5 %

Source: Author's Field work

This is a finding that reflects the results of other researchers in Nigeria. (Emeribe, Muhammad, Nasir *et al.*, 2015 and Egejuru, Nkwocha, Pat-Mbano *et al.*, 2011). This deduction can furthermore be validated in the light of the significant finding of mosquitoes as the most common insect challenge itemized by the respondents. Other less prevalent health challenges disclosed by the respondents were infant and childhood-related illnesses such as low birth weight, still birth and diarrhoeal illness of which, only diarrhoeal disease among under-5 year olds showed a significant association with distance from the dumpsite.

Calculated period prevalence rates of the reported and hospital record frequencies of the various illnesses were computed for different zones with an incremental 50 m perimeter around the dumpsites. The calculation was based on the epidemiological formula for disease prevalence and the total population of the individuals in the respective wards (at-risk population) obtained from the National Population Commission, Bida Office. These figures were used to generate a geo-spatial (buffer zone) analysis around each of the four dumpsites, creating a visual interpretation of data acquired. (Figure 4)

Figure 4: Buffer zone analysis for disease prevalence around the Four Dumpsites.



Source: Remote sensing and GIS Laboratory, FUT Minna, 2017.

The analysis of disease prevalence stratified by increasing distance by a successive 50 m margin away from the dumpsites showed an inverse relationship as shown in Table 4.
There is little doubt therefore, that given the diversity of material accommodated under the blanket of waste, there is considerable potential for perilous health exposure to occur through close, constant proximity to dumpsites. These findings are similar to the World Health Organization (2006) conclusions that infectious diseases such as diarrhea, respiratory illnesses and malaria are associated with poor environmental conditions such as living in close proximity to landfills.

4 CONCLUSION

This study assessed the perceptions, awareness health effects, common diseases of residents who live in close proximity to dumpsites in Bida metropolis where the presence of heaps of waste in the residential areas has become a common feature with potential serious effect on the health and environment. The residents living near the Gudundasa, Gudubabamba, Ganiyagi and Sarkin Gona dumpsites in the Bida metropolis are not ignorant of the health effects of indiscriminate open waste dumping. However, based on inferential circumstantial factors such as the complete deficiency of even a single landfill, and absence of residential waste collection centers, the residents are compelled to dump waste in their immediate vicinity which they know to be wrong. This study is also a clear demonstration that accumulation of solid waste in proximity to residential areas constitutes a pathway for many chronic adult and childhood diseases including malaria among others and that low socioeconomic conditions, illiteracy, and lack of education on proper waste disposal and management are major contributing factors. These findings are similar to the World Health Organizations (2006) conclusions the infectious diseases such as diarrhea, respiratory illness and malaria are associated with poor environmental conditions such as living in close proximity to landfills.

5 ACKNOWLEDGEMENTS.

i. Niger State Environmental Protection Agency Bida office. (NISEPA).
ii. Federal Medical Centre Bida, (FMCB).
iii. Department of Geography, FUT Minna.
iv. National Population Commission, Bida Office.

Table 4: Calculated disease period prevalence rates stratified according to distance from dumpsites.

	<50 m	50-100m	100-150m	
	Number (prev rate)	Number (prev rate)	Number (prev rate)	
Malaria	133(0.39)	43(0.13)	41(0.12)	
Typhoid fever		14(0.04)	7(0.02)	2(0.00)
Childhood diarrhoea		5(0.01)	1 (0.01)	0(0.00)
Respiratory disease		59(0.17)	36(0.11)	20(0.06)
Skin rashes		4(0.01)	2(0.00)	0(0.00)
Still births		60(0.17)	35(0.10)	40(0.11)

Source: Authors field work.

REFERENCES

Nkwocha, E. E., Egejuru, R. O., Pat Mbano, E. C., & Njoku- Tony, R. F. (2008). Proximity of Municipal Waste Dumpsites to Residential Neighbourhood and the Rate of Hospitalization for Malaria. *Journal of research in National Development* Vol 6 No 2, December 2008.

Herbert, L. (2007). Centenary History of Waste and Waste Managers in London and South East England".Chartered Institution of Wastes Management. Available online athttp://www.ciwm.co.uk/web/files/about_ciwm/100_yrs_london_and_se_centre.pd

Remigious, M. V. (2010). An overview of the management practices at solid waste disposal sites in African cities and towns. *Journal of Sustainable Development in Africa*.12(7): (233 – 239).

Olaniran, N. S. (1995). "Environment and Health :An Introduction", in Olaniran , N. S. etal(Ed) Environment and Health. Lagos . Macmillian Nig. Pub.co for NCF, (34-151).

UNEP (2007). Environmental pollution and impacts on public Health: Implications for the Dandora municipal dumping site.

World Health organization (2006): Emerging infectious diseases. *Vol 12, Number 12- December 2006.*

Parameswari, K.. & Karunakaran, K. (2010). Ground Water Issues and community Awareness in Perungudi Dumpsite, Chennai India.Centre for Water Resources, Anna University; Chennai India

Nasil, I., Muhammed, M.A., Emeribe, A.L., Babayo, A., Shehu, M.S. (2015). Prevalence of Malaria Parasitaemia among Residents Proximal to Environmental Waste Dumpsites in Gwagwalada Metropolis Abuja, Nigeria. *Journal of Medicine in the tropics -2015, Vol 17.*

Google earth, (2015). Location of Bida Town .Williams, J.O., & Hakum, K. (2016). Microorganisms associated with dumpsites in Port Harcourt Metropolis, Nigeria. *Journal of Ecology and the Natural Environment.* Vol 8, Issue 2:9-12.

Uba, S., Uzairu, A., Sallau, M. S., Abba, H., Joshua, O. O (2013). Metals bioavailability in the leachates from Dumpsites in Zaria Metroplis, Nigeria. *Jornal of toxicology and Environmental Health Sciences.* Vol 5(7), pp. 131-141.