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Sanitation and Personal Hygiene: Antidote to Cholera Epidemic Outbreak in Challenging Environment in Nigeria

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Abstract- This study sought to determine the solution to cholera outbreak in the challenging environment in Nigeria. More than 100,000 people die from the disease every year, with the majority of cases in Sub-Saharan Africa.[1] It is estimated that cholera affects 3-5 million people worldwide[1], and causes 100,000-130,000 deaths a year as of 2010.[2] This occurs mainly in the developing world and Nigeria happens to be one of such developing countries.[2] More than 100,000 people die from the disease every year, with the majority of cases in Sub-Saharan Africa.[1] Although cholera may be life-threatening, prevention of the disease is normally straightforward if proper sanitation practices are followed. Effective sanitation practices, if instituted and adhered to.

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Sanitation and Personal Hygiene: Antidote to Cholera Epidemic Outbreak in Challenging Environment in Nigeria

Abogan Olutayo Samson

Abstract- This study sought to determine the solution to cholera outbreak in the challenging environment in Nigeria. More than 100,000 people die from the disease every year, with the majority of cases in Sub-Saharan Africa.^[1] It is estimated that cholera affects 3-5 million people worldwide^[1], and causes 100,000-130,000 deaths a year as of 2010.^[2] This occurs mainly in the developing world and Nigeria happens to be one of such developing countries.^[2] More than 100,000 people die from the disease every year, with the majority of cases in Sub-Saharan Africa.^[1] Although cholera may be life-threatening, prevention of the disease is normally straightforward if proper sanitation practices are followed. Effective sanitation practices, if instituted and adhered to.

In- Depth Interview (IDI) guide was developed. This instrument is in four sections which captured the following topics; excreta disposal facilities preference for safe excreta facility and excreta disposal and sanitation challenging. The team paid a visit to, two states namely Sokoto and Kebbi States due to the peculiarity of these environments. In each state, 2 L.G.A were visited in both urban and rural areas which 4 communities were selected based on the socio-economic status of the residents. 10 respondents were interviewed per community being carefully selected among the stakeholders at local level.

The study discovered that, the rocky topographical structure, loose soil texture, heavy rainfall and poor drainage which causes flooding and pollution of water surfaces like Rivers and Lake which also, serves as their source of drinking water. The study reveals the correlation between cholera and contaminated drinking water. Further findings, in this study shows that most of the mass hospitalization and disease outbreak that occurred in recent time, in the area visited; were as a result of poor sanitation, pollution of the environments, water surfaces with excreta, open defecation and flooding of soak away.

In conclusion, proper sanitation is the only way out; in preventing cholera outbreak. Therefore the issue of sanitation is highly paramount, although cholera may be life-threatening prevention of the disease is normally straightforward if proper sanitation practices are followed.

I. INTRODUCTION

Sanitation is a long-standing, public health issue. When early peoples settled in communities and started to cultivate crops and raise animals, sanitation became a primary concern for society.

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Inadequate sanitation is a major cause of disease worldwide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. Good basic personal hygiene and hand washing are critical to help prevent the spread of illness and disease. Keeping hands clean helps prevent the spread of germs. Hand washing with soap is the best way to reduce the number of germs on them.

Bad sanitation and poor hygiene have to coincide with people carrying the *Vibrio Cholerae* before cholera outbreak could occur.

Cholera is one of the most widespread and deadly diseases of the 19th century, killing an estimated tens of millions of people. It is estimated that cholera affects 3-5 million people worldwide, and causes 100,000-130,000 deaths a year as of 2010. ^[2] This occurs mainly in the developing world. More than 100,000 people die from the disease every year, with the majority of cases in Sub-Saharan Africa. ^[1]Cholera remains both epidemic and endemic in many areas of the world.

One of the major contributions to fighting cholera was made by the physician and pioneer medical scientist John Snow in his epidemiological field studies, found a link between cholera and contaminated drinking water. ^[1] He was able to demonstrate, that human sewage contamination was the most probable disease vector in cholera epidemics outbreak. ^[1] Worldwide, 40 percent of the population does not have ready access to clean, safe drinking water, and approximately 60 percent does not have satisfactory facilities for the safe disposal of human waste. Infectious agents in drinking water and food cause the diarrheal deaths of several million children annually. Whereas, waterborne agents are the cause of many diseases in the world. (Diarrhoea, Guinea worm, Typhoid Fever, Dysentery, Malaria, Ring worm and Cholera). Therefore the issue of water sanitation is highly paramount. Water sanitation is directly related to water quality and water pollution. Water quality usually describes the level of certain compounds that could present a health risk.

Generally, the climate of Nigeria does not pose serious problem for sanitation as such. Except for recent times, when high variability and extremes particularly with rainfall have been attributed to climate

change. As such, only the littoral states (i.e. Lagos, Edo, Delta, Bayelsa, Rivers, Akwa Ibom, Cross River, Ogun and Ondo) which receive the most of rainfall all year round and perhaps the least of temperature may be prone to being water bound which may constitute some challenge for sanitation. Another impinging factors are topographical nature of an area couple with the soil texture in some part of the country. (Sokoto and Kebbi states)

Sanitation: is the hygienic means of promoting health through prevention of human contact with the hazards of wastes. Hazards can be physical, microbiological, biological or chemical agents of disease. Wastes that can cause health problems are human and animal feces, solid wastes, domestic wastewater (sewage, sullage, greywater), industrial wastes, and agricultural wastes. Sanitation is a long-standing, public health issue. When early peoples settled in communities and started to cultivate crops and raise animals, sanitation became a primary concern for society.

Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. Worldwide, 40 percent of the population does not have ready access to clean, safe drinking water, and approximately 60 percent does not have satisfactory facilities for the safe disposal of human waste. Infectious agents in drinking water and food cause the diarrheal deaths of several million children annually.

Waterborne agents are the cause of many diseases in the world. (Diarrhoea, Guinea worm, Typhoid Fever, Dysentery, Malaria, Cholera and Ring worm) These diseases may be caused by bacteria, viruses, and protozoans. Bacterial diseases include typhoid, shigellosis, and cholera. Viral agents cause diseases such as include polio and hepatitis. Parasites include the protozoa *Entamoeba histolytica* and *Giardia lamblia*, which cause amebiasis and giardiasis, respectively. Another example of sanitation as it relates to waterborne diseases globally is schistosomiasis. Schistosomiasis is a chronic debilitating disease with significant morbidity and mortality that affects more than 200 million people worldwide.

a) *Concept of Sanitation*

The word 'sanitation' also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal. [5] The word "sanitation" entered the English language in the nineteenth century, and the term is inextricably linked with integrated water and sewer systems. Sanitation includes the appropriate disposal of human and industrial wastes and the protection of the water sources. World Health Organization states that: "Sanitation generally refers to the provision of facilities

and services for the safe disposal of human urine and faeces. According to Saunders Veterinary Dictionary Sanitation is the establishment of conditions favorable to health, especially with respect to infectious diseases. This includes disposal of infective materials, especially carcasses, discharges and excrement, application of disinfectants and general cleaning to make disinfection effective, isolation of infective animals and improvement in ventilation of buildings, improving feeding and watering arrangements to avoid fecal and urinary contamination of food and water.

The term "*sanitation*" can be applied to a specific aspect, concept, location, or strategy, such as:

Basic sanitation - refers to the management of human feces at the household level. This terminology is the indicator used to describe the target of the Millennium Development Goal on sanitation.

On-site sanitation - the collection and treatment of waste is done where it is deposited. Examples are the use of pit latrines, septic tanks, and Inhofe tanks.

Food sanitation - refers to the hygienic measures for ensuring food safety.

Environmental sanitation - the control of environmental factors that form links in disease transmission. Subsets of this category are solid waste management, water and wastewater treatment, industrial waste treatment and noise and pollution control.

Ecological sanitation - a concept and an approach of recycling to nature the nutrients from human and animal wastes.

b) *Personal Hygiene*

Good basic personal hygiene and hand washing are critical to help prevent the spread of illness and disease. Clean, safe running water is essential for proper hygiene and hand washing. Keeping hands clean helps prevent the spread of germs. Washing your hands with soap and safe water is the best way to reduce the number of germs on them. If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol.

Follow these steps to make sure you wash your hands properly:

Wet your hands with clean, running water (warm or cold) and apply soap.

Rub your hands together to make lather and scrub them well; be sure to scrub the backs of your hands, between your fingers, and under your nails.

Continue rubbing your hands for at least 20 seconds.

Rinse your hands well under running water.

Dry your hands using a clean towel or air dry them.

When to Wash Hands

Before, during, and after preparing food

Before eating food

- Immediately after defecation and urination with safe water and soap/ash when soap is not available.
- After changing diapers or cleaning up a child who has used the toilet.
- Before and after caring for someone who is sick.
- After blowing your nose, coughing, or sneezing.
- After touching an animal or animal waste.
- After touching garbage.
- Before and after treating a cut or wound.

Apart of from the various ways mentioned above, individuals should also adhere to certain personal hygiene, these prevent the spread of germs and diseases. Toilets should be washed daily with soap and disinfectants. Compounds and environments be kept clean on a daily bases.

Households refuse disposition be done in appropriate manner either burning /garbage pit.

Stagnant water in the environment disposed because these can harbour vectors.

c) What Is Cholera?

Cholera is an infection of the small intestine, an acute infectious disease caused by a bacterium, *Vibrio cholerae* (*V. cholerae*). Robert Koch identified *V. cholerae* with a microscope as the bacillus causing the disease.



E. coli bacteria under magnification

Epidemics of *Vibrio Cholerae* are caused by one of two strains: 01, and strain 0139. Bad sanitation and hygiene have to coincide with people carrying the *Vibrio Cholerae* bacterium for the outbreak of the epidemic. Cholera is one of the most widespread and deadly diseases of the 19th century, killing an estimated tens of millions of people.^[5] It is estimated that cholera affects 3-5 million people worldwide^[1], and causes 100,000-130,000 deaths a year as of 2010.^[2] This occurs mainly in the developing world.^[2] More than 100,000 people die from the disease every year, with the majority of cases in Sub-Saharan Africa. In the early 1980s, death rates are believed to have been greater than 3 million a year.^[1] Cholera was one of the earliest infections to be studied by epidemiological methods. Cholera remains both epidemic and endemic in many areas of the world.^[1]

John Snow was the first to identify the importance of contaminated water in its cause.^[2] Transmission is primarily due to the fecal contamination of water and due to poor sanitation. In developed Countries cholera is typically transmitted by either contaminated water or food, while in the developing world it is more often water Cholera.

The source of the contamination is from individuals infected by cholera, when their untreated diarrheal discharge gets into waterways or into groundwater or drinking water supplies. Also, lack of treatment of human feces and drinking water greatly facilitate its spread, but bodies of water can serve as a reservoir, and seafood shipped long distances can spread the disease. Drinking any infected water and eating any foods washed in the water, can cause a person to contract an infection. Cholera is rarely spread directly from person to person. For every symptomatic person there are 3 to 100 people who get the infection but remain asymptomatic.^[7] 75% of people infected with *Vibrio Cholerae* do not develop symptoms. But they excrete the bacterium with their faeces for up to 14 days a potential source of infection for others.

i. symptoms

The main symptoms are profuse watery and painless diarrhoea and vomiting of clear fluid that often contains flecks of whitish material (mucus and some epithelial cells)^[8] that are about the size of pieces of rice. The diarrhea is frequently described as "rice water" in nature and smells fishy. Symptoms usually start suddenly, one to five days after ingestion of the bacteria.^[1] The severity of the diarrhea and vomiting can lead to rapid dehydration and electrolyte imbalance. Although cholera may be life-threatening, prevention of the disease is normally straightforward if proper sanitation practices are followed. Effective sanitation practices, if instituted and adhered to in time, are usually sufficient to stop an epidemic.

The following symptoms and signs may develop.

Vomiting, Rapid heart rate, Loss of skin elasticity, Dry mucous membranes, Low blood pressure, Thirst, Muscle cramps and Restlessness or irritability (especially in children)

Treatment of Cholera

If the severe diarrhea and vomiting are not aggressively treated it can, within hours, result in life-threatening dehydration, in some cases even death. Resulting from loose of copious amount of body fluids.^[1] Primary treatment is with oral rehydration solution. If people with cholera are treated quickly and properly, the mortality rate is less than 1%; however, with untreated cholera, the mortality rate rises to 50–60%.^{[1][9]} In most cases, cholera can be successfully treated with oral rehydration therapy (ORT), which is highly effective, safe, and simple to administer.^[10] Rice-based solutions are

preferred to glucose-based ones due to greater efficiency.^[10] One such recipe calls for 1 liter of boiled water, 1 teaspoon of salt, 8 teaspoons of sugar, and added mashed banana for potassium and to improve taste.^[11] In severe cases with significant dehydration, intravenous rehydration may be necessary.

d) Ecological Setting of Nigeria

A brief description of the vegetation of Nigeria provides a basis for the ecological zoning of the country which also has close links to climatic zonation.

The total area of Nigeria is 923,768 km². 910,768 km² of that is land, while water takes up 13 000 km². Nigeria's total boundaries are 4 047 km in length. The countries it borders account for most of this. The border with Benin is 773 km, which with Cameroon is 1,690 km, Chad's is 87 km, and Niger's is 1,497 km. Nigeria's coastline is 853 km.

Nigeria's vegetation can be broadly grouped into three main categories. The vast majority of Nigeria's vegetation falls within only two categories namely rain forest and savannah while the third category is montane vegetation. It is very small compared to savannah and rain forest. Is at the extreme east close to Cameroon. While there is a diversity of vegetation patterns within each of these categories, the major physical distinction between rain forest areas and savannah areas is the density of tree cover.

In savannahs, trees are much more widely spaced than in rain forests. Between interspersed trees, savannahs are marked by grasses of varying lengths. The rain forest contain little, if any grass cover and are typically marked by different layers of tree cover. The southern part of Nigeria is dominated by thick mangrove swamps in the immediate coastal regions (particularly in the Niger Delta and in the extreme southeast part of the country), and by rain forests. Further north, the dense rain forests give way to savannahs with dispersed trees. In the extreme northeastern part of the country near Lake Chad, scrub vegetation is dominant.

Below is a list of the seven vegetation sub-types, followed by a general geographical location of each zone. Note that the list generally proceeds from south to north.

Salt-water swamp - lower Niger Delta and southeast Nigeria around the city of Calabar

Fresh-water swamp - upper Niger Delta and coastal strip from Port Harcourt to Lagos

Rain forest - general east-west strip across southern Nigeria whose average width is approximately 130 km

Guinea savannah - largest vegetation zone, lies just north of the rain forest and reaches northward as far Lake Kainji, Zaria, and the Benue River in the East

Sudan savannah, north of the guinea savannah, covering most of the rest of Nigeria

Sahel savannah, covers a small pocket of Nigeria that borders lake Chad

Montane, parts of the eastern highlands bordering Cameroon and parts of the Jos Plateau

i. Locational Attributes

Nigerian, with a total land area of approximately 923,773 km² and a coast line which extends about 853 km along the Atlantic Ocean, lies essentially within the tropical climatic zone approximately between the latitudes 4oN and 14oN and between longitude 13oE and 15oE. The country world's 32nd largest country (after Tanzania, is located in West Africa and shares land borders with the Republic of Benin in the west, Chad and Cameroon in the east, and Niger in the north. Its coast in the south lies on the Gulf of Guinea on the Atlantic Ocean While temperatures rarely exceeds 350(900F) with high humidity (up to 90% in the morning) in the south, in the central and northern parts, temperature could be as high as 38o C (1000F) but with relatively cool nights. The annual rainfall is equally less than 500mm in some parts of the north and greater than 2300 mm in some parts of the south. While the duration of rainfall period varies between 100 and 230 days in the northern Nigeria, it ranges between 270 and 300 days in the Niger-Delta in the south.

Nigeria's most expansive topographical region is that of the valleys of the Niger and Benue River valleys. To the southwest of the Niger there is "rugged" highland, and to the southeast of the Benue are hills and mountains which form the Mambilla Plateau, the highest Plateau in Nigeria. This plateau extends to the border with Cameroon, thus forming part of the Bamenda Highlands in Cameroon. The area near the border with Cameroon close to the coast is a rich rainforest and part of the Cross-Sanaga-Bioko Coastal forests eco-region, an important centre for biodiversity including the drill monkey which is only found in the wild in this area and across the border in Cameroon.

ii. Drainage of Nigeria

Nigeria is a very well drained country with numerous consequent and subsequent rivers. Most of the rivers in the country take their source from within the country flowing either to connect a larger river or to empty into the ocean. Apart from Rivers Niger and Benue which are regional rivers to a large extent, almost all other rivers are local within Nigeria.

e) Analysis of Challenges of Drainage on Sanitation

The presence of water bodies is a factor which challenges sanitation facilities, the implication is often not debilitating without a combination with soil and geology of the area. The drainage network characterizes the presence of water within the administrative boundary of the different states of the country upon which ranking of the possible challenges to sanitation is based. The Table 1 below reflect different states in which flooding

are imminent .Thus, flood ranges from mostly prone, prone, rarely prone, and least floodable states

Table 1

States in Nigeria	Flood Range
Kaduna, Kano, Gombe, Edo, Delta, Cross River, Bayelsa, Kogi, Lagos, Niger, Rivers, Zamfara and Bauchi	Mostly prone to flooding anytime of the year
Taraba, Sokoto, Oyo, Osun, Ondo ,Ogun, Kawra, Kebbi, Kastina, Jigawa, Imo, FCT, Ekiti, and Adamawa.	Prone to flooding only due to extreme rainfall and other flooding causes particularly during the raining season
Yobe, Plateau, Nasarawa, Enugu, Ebonyi, Anambra, Akwa Ibom and Abia.	Rarely prone to flooding except on occasion of extreme events, dam failure or poor drainage management particularly in the urban areas.
Borono	Least floodable due to drainage network

II. METHODOLOGY

a) Instruments Development

In- Depth Interview (IDI) guide Direct Observations and submitted for approval from UNICEF and other stakeholders for comments and additions before setting out for field work. This instrument was divided into four sections which captured the following topics; excreta disposal facilities, preference for safe excreta facility and excreta disposal and sanitation challenges.

b) Sampling Frame

Among the eight states visited, namely; Imo, Kogi Delta, Niger, Sokoto, Kebbi, Balyesa and Cross river, this team paid a visit to, two state namely Sokoto and Kebbi States; Due to the peculiarity of these environments. In each state, 2 L.G.A were visited in both urban and rural areas which 4 communities were selected based on the socio-economic status of the residents. 10 respondents were interviewed per community being carefully selected among the stakeholders at local level.

III. DISCUSSION AND FINDINGS

In this study it was discovered that, the rocky topographical structure of the community visited [Ilela] posed a challenge with regards to sanitation and excreta facility. Some respondents complained about the poor drainage of the area which a time causes flooding of soakaways. It resultant effect is the pollution of water surfaces like Rivers and Lake which also, serves as their source of drinking water.

Geological characteristic some how, made excreta disposal a sort of challenge, according to the

finding in this study, some respondents mentioned that; the loose texture of the soil exacerbate the collapse of the toilets which made some occupant left with the choice of open defecation .

Furthermore, most of the respondents affirmed to the fact that the major cause of the disease out break(cholera and diahhoral) in the community could be as a result of poor sanitation, flooding of soak away especially during raining seasons. This is to buttress the finding of John Snow in his epidemiological field studies, which reveals a correlation between cholera and contaminated drinking water. [38] He was able to demonstrate, that human sewage contamination was the most probable disease vector in cholera epidemics outbreak. [39]

Further findings, in this study shows that most of the mass hospitalization and disease out break that occurred in resent time in the area visited were as a result of poor sanitation, pollution of the environments, water surfaces with excreta, open defecation and flooding of soakaway. This support the opinion that, waterborne agents are the cause of many diseases in the world.(Diarrhoea, Guinea worm, Typhoid Fever, Dysentery, Malaria, Ring worm and Cholera).

IV. RECOMMENDATION

The following are recommendations made by the some of the respondents.

- Proper maintenance of toilets should be promoted among people to avoid the spread of diseases.
- People should be enlightening about the dangers that surround improper usage of toilets and poor sanitation.
- Toilets are to be dug deep and cemented to prevent erosion and flooding during raining season and contamination of water bodies which also serves as source drinking water of the community.
- Sanitary inspectors and wealth workers should conscientiously do their job to check in discriminate disposal of excreta and poor environmental sanitation.

V. CONCLUSION

In conclusion, the issue of personal hygiene and sanitation can not be overemphasized in the prevention of cholera outbreak. Therefore, sanitation is highly paramount although cholera may be life-threatening; prevention of the disease is normally straightforward if proper sanitation practices are followed. Effective sanitation practices, if instituted and adhered to; on time, are usually sufficient to stop an epidemic and it reoccurrence.

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