



Public Perception of Environmental Pollution in Warri, Nigeria

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ABSTRACT: The study assessed the public perception on the environmental pollution profile in Warri Township. Data were acquired by administering questionnaire among the residents of study area using random sampling method and descriptive statistics was used to explain the frequencies of variables being expressed in percentages. The result of the analysis showed that 72.4% of total respondents affirmed that air pollution was greatest among other types of pollution while the major source of pollution was oil spillage and gas flaring and there is no time that pollution cannot occur as 52.6% of respondents agreed on this. Environmental resources were believed to be partially and totally damaged suggesting that the degree of pollution was high. Furthermore, 26.4% and 14.5% of respondents believed that water pollution leads to loss of aquatic lives and reduction of potable water. Cough disease was believed to be really affecting the entire people of the area as 19.7% and 44.7% of total respondents agreed that water pollution and air pollution respectively caused the disease. However, 96.1% had the opinion that soil pollution caused stunted growth of plants. The study therefore suggested among others that government should promulgate and enforce environmental laws that will reduce the level of pollution in the area, planting of trees should be encourage, gas flaring should be stopped and adequate facilities of transporting petroleum products should be put in place.
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Pollution has been known to be in existence for a very long time and much had been studied on its relationship with the global growth in cities. The industrial revolution brought with its technological progress such as exploration of oil and its virtually universal use throughout different industries have aggravated the concentrations of pollution in recent time. Environmental pollution is the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected. Obafemi (2004) refers to environmental pollution as the process whereby various harmful substances are added to the environment (i.e. land, water, air, and the acoustic environment etc.) by human and natural activities. The harmful substances called contaminants released into the environment (i.e. water, land, air) cause harm or discomfort or damage to humans or other living organisms. However, pollution can be naturally occurring substances, but are considered contaminants when it exceeds natural levels (Hyman, 1992). Federal Environmental Protection Agency (FEPA) (1988) views pollution as man-aided alteration of chemical, physical or biological quality of the environment to the extent that is detrimental to the environment or beyond acceptable limits. In addition, FEPA (1991) presented pollution as "any substances in air which could harm man, other animals, vegetation etc.

Environmental pollution has become an unending problem in the modern society and it is now becoming a threat to the livelihood of the people. The air we breathe, the water we drink and the soil on which most of our food is grown, constitute the main

elements of our environment (Harrop, 2002). Nature maintains that composition of these elements within certain ranges so as to ensure our survival on this planet, but in modern days, man depends on better methods and techniques to achieve his aims for better standard of living e.g. to provide good food, transport, shelter, good roads and so on. His efforts both technologically and industrially have resulted in the exploitation of the earth's resources which in effect has led to environmental degradation. Pollution of the environment is likened to different sources. For instance, air pollution results from the discharge of toxic materials from man's domestic and industrial activities into the air which remain suspended in the air for a period of time. More importantly, there are about five major pollutants that are constantly discharged into the air namely carbon monoxide, particulate matter, sulphur dioxide, hydrocarbon and nitrogen oxides. These pollutants are obtained from burning of agricultural combustion, space heating etc. (Abumaizar and Smith, 1999; Makino, 2009). Carbon monoxide results from incomplete combustion of fuel in engines, sulphur dioxide results from burning of coal and oil both in utility and industrial plants. Petroleum refining is also a major source of sulphur oxide (SO₂). The particulate matter includes soot, lead, asbestos, dust which varies in size ranging from the visible to the microscopic components. Horsfall and Spiff (2009) highlighted the sources of hydrocarbons as evaporation of industrial solvents, combustion of weed as well as emissions from internal combustion engines using gasoline while the harmful nitrogen oxides result from certain combustion processes industrial boil from plants and transportation vehicle. Similarly, Godish (1997)

explained that discharge of waste materials like industrial effluents, dust, smoke, solid waste and so on, are the products of industrialization and urbanization. The introduction of these has led to adverse effect of environmental pollution on the health of man, animals, both aquatic and terrestrial and of course on plants. On the whole, man is essentially responsible for many of the environmental problems encountered by him suggesting that the unwanted by-products of man's attempts to improve his standard of living have contributed largely to the deterioration of the environment (Harries, 1998).

In a related development, environmental pollution has been seen as a living phenomenon in Nigeria especially in the Niger Delta region of the country in which Warri township is not exempted. This region has recorded several cases of the effect of pollution such as gas flaring, oil spillage in their environment due to pervasive presence and operation of oil and gas companies in the area especially Warri Refinery and Ekpan (Nduka and Orisakwe, 2009). Many people were of the opinion that the Niger Delta region is a troublesome region. This statement is to the outsiders who know few or nothing about the environmental deterioration and exploitation taking place in different dimensions in the area. Ikpatt and Scott (2001) affirmed that there is trouble in the Niger Delta but the truth about the scenario in the region is that the whole components of the environment have been degraded and this in effect may generate chaos from the inhabitants of the area. This study therefore focused on the public perception on environmental pollution in Warri township. The study also examined various types and sources of pollution and the corresponding environmental problems caused by the pollution in Warri. Finally, the study suggested various ways to reduce the rate at which pollution occurs in the study area.

Study Area: The study area is Warri Township in Delta State, Nigeria. It is located on latitudes $5^{\circ} 27' N$ and $5^{\circ} 36' N$ and longitudes $5^{\circ} 40' E$ and $5^{\circ} 48' E$. It is one of the largest and oldest towns in Delta State and located on the banks of the lower Niger Delta (Figure 1). The Warri area is a low lying plain consisting mainly of recent unconsolidated sediments of Quaternary age. The sediments are partly of marine and partly of fluvial origin. Land elevation is generally 50 metres above sea level and there is a marked absence of imposing hills that rise above the general land surface. The area is transversed by numerous rivers that drain into the Atlantic Ocean and these include the Ethiope, Warri and Kiagbodo Rivers. The soils are deeply weathered and nutrient deficient, being derived mainly from unconsolidated

sediments of sandstone which makes the area to be predominantly sandy. Due to the heavy rainfall experienced in the area, the soil is intensively leached, base-deficient and acidic in reaction. The climate of Warri is humid sub-equatorial long wet season lasting from March to October that alternates with a shorter dry season that last from November to February. The climate is influenced by two prevailing air masses namely the south-west monsoon wind and then North-east trade wind. Annual rainfall in the Warri area is up to 2500mm with double peak rainfall regime which takes place both in June and September. Annual average temperature is about $27^{\circ}C$ with no marked seasonal departure from the average. The natural vegetation of the area is rainforest with swamp forest occurring in flat-floored valleys and adjoining low lying areas that are seasonally or permanently water logged. The human occupation in the Warri area includes farming, fishing, trading, lumbering, mining and manufacturing. The major manufacturing industries including Warri refinery and other petro-chemical industries are located within the study area.

MATERIALS AND METHODS

The study employed the use of questionnaire to acquire data relating to environmental pollution in Warri Township. Eighty (80) copies of questionnaire were administered to the residents of Warri community using random sampling technique which gives room for equal chance of any resident to be chosen in the study area but only seventy six (76) questionnaire were retrieved and all further statistical analyses were based on the retrieved questionnaire. Descriptive statistics was used to explain the frequencies of the variables in terms of their percentage. Results of the analysis were presented using tables and graphs such as pie chart, bar chart among others.

RESULTS AND DISCUSSION

Socio-economic Information of Respondents: Table 1 shows the socio-economic data of respondents in the study area. The statistics indicated that males were 59% while females were 41% suggesting that males were more than females in the study area. The result of the analysis also shows that most of the respondents fall within the labour force population with the age brackets of 19-35 years and 36-50 years which are 49% and 38% respectively of total respondents. However, regarding the marital status of the respondents, 51.3% of total respondents were single while about 47.4% were married leaving only 1.3% of the sample that responded to the other marital status. Furthermore, it is also revealed that

most of the respondents had attained a reasonable level in education with about 72% as university graduates while 26.3% and 1.3% accounted for those with secondary and primary education respectively. More so, it is presented that 53.9% were engaged as company workers with 18.4% as self employed. While government workers and the unemployed accounted for 13.2% and 14.5% respectively. Finally, the monthly income of respondents from the analysis showed that 78% and 25% of total respondents

earned as much as #20,000 and above #20,000 respectively while 10.5%, 9.2% and 2.7% earned #5000-10000, #1001-5000 and #0-1000 respectively. Despite having most of the residents earning above #10,000, it shows that the area is still languishing in poverty due to a very weak income base. In a nutshell, the analysis showed that the number of males was more than females and that most of the respondents are within the working age and they were educated.

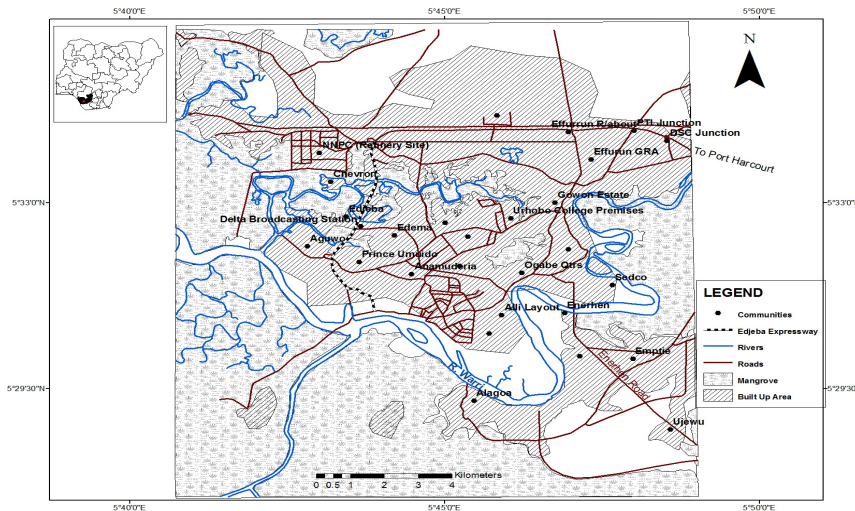


Fig 1: Map of Warri Township showing the communities

Table 1: Socio-Economic Information of the Residents

Sex	Frequency	Per cent (%)
Male	45	59.2
Female	31	40.8
Total	76	100.0
Age	Frequency	Per cent
0-18	5	6.6
19-35	37	48.7
36-50	29	38.2
51 and above	5	6.6
Total	76	100.00
Marital Status	Frequency	Per cent (%)
Single	39	51.3
Married	36	47.4
Others	1	1.3
Total	76	100
Education	Frequency	Per cent (%)
Primary Education	1	1.3
Secondary Education	20	26.3
Tertiary Education	55	72.4
Total	76	100
Amount range (Naira(#))	Frequency	Per cent (%)
0-1,000	2	2.7
1,001-5,000	7	9.2
5,001-10,000	8	10.5
10,001-20,000	40	52.6
Above 20,000	19	25.0
Total	76	100

Source: Authors' Fieldwork, 2011

Types, Sources, Occurrence Rates and Causes of Pollution: Table 2 presents the types, sources and occurrences of pollution in the study area. Of the total respondents, 72.4% affirmed that air pollution is being experienced in the area while 11.8% and 9.2% believed that the area is plagued with soil pollution and water pollution respectively. These are the types of pollution experienced in the area and through the responses from the respondents; it is evident that air pollution was the commonest among others. The result of the analysis corroborated with the findings of Makino (2009) and Obafemi (2004) that pollution

of the environment is in different categories which can be land pollution, air pollution, noise pollution and water pollution. However, air pollution was observed to be in higher rate than others. The reason may be attributed to carbon-monoxide (CO), methane (CH₄) and nitrogen (iv) oxide (NO₂) that are emitted from the industries and also from the vehicles. Teri Shriram Institute for Industrial Research (1999) submitted that chemical industry is a major source of air pollution and the main pollutants are Carbon dioxide (CO₂), Carbon monoxide (CO), Sulphur dioxide (SO₂) and Nitrogen dioxide (NO₂).

Table 2: Types, Sources, Occurrence Rates and Causes of Pollution

Types of pollution		Frequency	Per cent (%)
Soil pollution		9	11.8
Air pollution		55	72.4
Water pollution		7	9.2
Others		5	6.6
Total		76	100.0
Sources of Pollution		Frequency	Per cent (%)
Improper disposal of waste		16	21.1
Oil Spillage and gas flaring		35	46.1
Carbon monoxide injection		18	23.3
No idea		1	1.3
All of the above		6	7.9
Total		76	100.0
Occurrence Rates of pollution		Frequency	Per cent (%)
Every week		20	26.3
Every month		7	9.2
Every year		9	11.8
All of the above		40	52.6
Total		76	100.0

Source: Authors' Fieldwork, 2011

It is also revealed that there are three major sources of environmental pollution in the study area and these included improper waste disposal, oil spillage and gas flaring; and ejection of carbon monoxide into the atmosphere. Of the total respondents, 21.1% and 46.1% submitted that the sources of pollution in the area were mainly through improper disposal of waste and oil spillage respectively while 23.3% believed that it was through the injection of carbon monoxide into the atmosphere. Improper waste disposal would have great effects on both soil and water especially for those dumpsites located at the fracture that water passes and thereby the pollutants are transferred along this passage to pollute the soil and eventually the groundwater. Gas flaring is a wasteful emission of green house gases that increases global warming and according to Shell (1999); Nigeria currently flares more gas than any other country in the world. Oil spillage was discovered to be a major source that caused most of the pollution in the area. This would have affected both soil and water whereby the micro-organisms and aquatic lives would have been affected. Oil spillage may be attributed to sabotage

by community members, corrosion from company facilities, ageing of the pipes and human/technical errors. When and whenever pollution is generated, its resultant effects have serious implication for the different spheres of the environment. Cantor (1997) revealed that industrial effluents, agricultural run-offs, transport, burning of fossil fuels, animal and human excretions, geologic weathering and domestic waste contribute to the metal levels in water bodies. This is also corroborated in Nduka and Orisakwe (2009)'s study which revealed that rapid urbanization and industrialization of Warri and its environs between 1968 and 1990 created pollution potentials that are as high as the sources of pollution. Egboge (1995) complained that the rivers, estuaries, creeks and air have been contaminated for decades. Thus, the aquatic lives are subjected to great danger and according DWAF (1996), discharge of some metals into natural waters at increased concentration in sewage, industrial effluent or from mining and refining operations, can have severe toxicological effects on aquatic environment and humans.

The result of the analysis on the rate of occurrence of pollution in the study area vividly revealed that 26.3% of total respondents agreed that pollution occurs every week, while 9.2% and 11.8% agreed that it occurs every month and every year

respectively. However, 52.6% agreed that pollution can occur on a weekly, monthly and yearly basis (Figure 2). On this note, it may be concluded that all the types of pollution identified in the study area can be experienced at anytime if care is not taken.

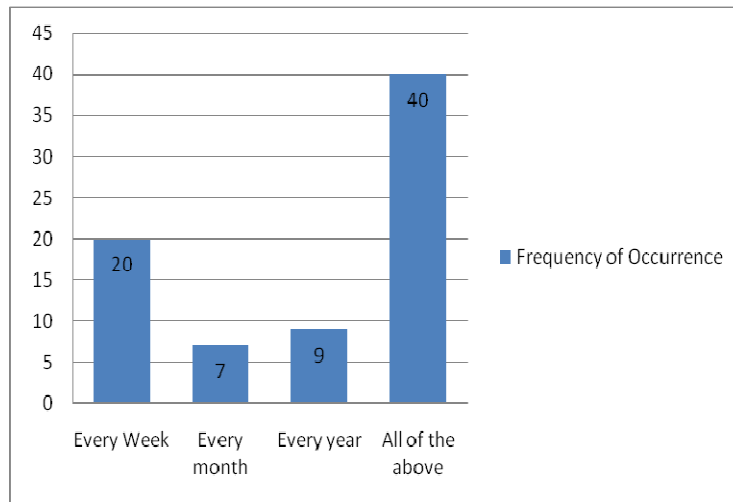


Fig 2: Occurrence Rates of Pollution

Degree of awareness of the impacts of pollution: Generally, the respondents in the study area had the notion that there are some extents at which pollution affects environmental resources out of which crop yield was considered. The extent of the effect of the pollution on crop revealed that 34.3% of the respondents claimed that the extent of the effect of pollution on crop was total damage while about 61.8% believed that the damage was partial. Of the total respondents, 4% said that there was no damage. 64.5% of the total respondents strongly agreed that the plants were partially damaged while 27.6% strongly agreed that the effect was total damage. Moreover, 57.9% of the respondents claimed that the pollution causes partial damage in aquatic lives while 38.1% asserted that total damage is experienced in aquatic lives due to pollution and only 3.9% affirmed that the pollution does not cause any damage to the aquatic lives. Perception on the extent of damage caused pollution on the air, analysis shows that 67.1% of the respondents agreed that the pollution had partial damage to the ambient air while 30.2% agreed that the effect was a total damage with only about 2.6% saying that there was no damage on the ambient air. It is thus discovered that pollution causes damages on crops, plants and human health in the study area. For instance, Segynola (2007) submitted that pollution of water has reduced the number of fishes and this effect has made several fishermen to drop the occupation for another job. Agricultural lands have now become infertile for farming

operations because of oil pollution and that the shortage of agricultural land in this regard has led to rural exodus of residents in the oil producing areas (Omuta 1984; Segynola 2002, 2007).

Perception on the impacts of water, soil and air pollution: Table 4 presents the perception of the public on the impacts of water pollution, soil pollution and air pollution in Warri Township. The analysis reveals that 19.7% of total respondents agreed that water pollution leads to cough, 26.4% agreed on loss of aquatic lives, 14.5% agreed on the reduction of potable water while 18.4% agreed on typhoid. However, 3.9% and 1.3% believed that the effects of water pollution lead to diarrhea and skin infection respectively. More so, the analysis in table 4 reveals that soil pollution affects the growth of plants by causing stunted growth in plants and most often in crops. This is attested to as 96.1% of total respondents agreed that soil pollution causes stunted growth in plants while only 3.9% believed that it causes corrosion in metals. Generally, it is believed that air pollution is very dangerous to human health and livelihood. In this study, 44.7% of the total respondents agreed that air pollution causes cough while about 35.5% agreed to cancer. 10.5% and 9.3% of total respondents agreed that air pollution leads to asthma and catarrh respectively. The analysis therefore reveals that pollution especially water and air pollution lead to various forms of diseases. Emissions from oil refineries contribute to noxious

pollution, which has detrimental and adverse health effects on the surrounding community, inflicting environmental racism and environmental inequity upon the people of Contra Costa County (Pinderhughes, 2004). According to Aremu et al (2002), the levels of Lead, Cadmium, Manganese and

Chromium exceeded the threshold limits (0.01, 0.003, 0.4 and 0.05 mg/l respectively) set by the WHO health-based guideline for drinking water in Warri due to effluents released by the refinery and this could portend environmental hazards.

Table 3: Awareness of the impacts of pollution on environmental resources

Impacts on crop	Frequency	Per cent (%)
No Damage	3	3.9
Partial Damage	47	61.8
Total Damage	26	34.3
Total		100
Impacts on plants	Frequency	Per cent (%)
No Damage	6	7.9
Partial Damage	49	64.5
Total Damage	21	27.6
Total	76	100
Impacts on aquatic lives	Frequency	Per cent (%)
No Damage	3	3.9
Partial Damage	44	57.9
Total Damage	29	38.1
Total	76	100
Effects on ambient air	Frequency	Per cent (%)
Total Damage	23	30.2
Partial Damage	51	67.2
No Damage	2	2.6
Total	76	100.0

Source: Authors' Fieldwork, 2011

This is supported with the analysis by Nduka and Orisakwe (2009) whereby the Manganese levels of potable water supply increased in Ekpan due to the effluents from the Warri refinery. This suggests that the increase in the concentration of these metals can cause danger to human health in the affected areas. Lead exposure has been associated with microcytic, hypochromic anemia with basophilic stippling of erythrocytes (Emory et al, 1999). Hyperactivity, anorexia, decreased play activity; low intelligence quotient and poor school performance have been observed in children with high lead levels (Needleman and Bellinger, 1991). Cadmium is highly toxic, accumulating in the body and eventually causing effects such as tubular dysfunction, disturbances, in calcium homeostatis and metabolism (World Health Organization (WHO), 1992). It is capable of inducing renal, hepatic and testicular injury (Suzuki et al, 1989). Most Chromium (vi) compounds are carcinogenic, long exposure may cause kidney, liver and nerve tissue damage (Praydot, 1999). Bhutan Ministry of Social Services (MoSS) (1990) and Bhutan Ministry of Health and Education (MoHE) (1998) both in England affirmed that air pollution resulted to some diseases like cough and colds, bronchitis and asthma in Bhutan and these diseases were noted to have increased from 16% to 22.4% and 1.95% to 2.95% between 1990 and 1998.

Table 4: The impacts of water pollution, soil pollution and air pollution

Impacts water pollution	Frequency	Per cent (%)
Cough	15	19.7
Loss of aquatic lives	20	26.4
Potable water reduction	11	14.5
Typhoid	14	18.4
Diarrhea	3	3.9
Skin infection	1	1.3
More than 2 sickness	12	15.8
Total	76	100
Impacts of soil pollution	Frequency	Per cent (%)
Corrosion of metals	3	3.9
Stunted growth of plants	73	96.1
Total	76	100
Impacts of air pollution	Frequency	Per cent (%)
Cough	34	44.7
Cancer	27	35.5
Asthma	8	10.5
Catarrh	7	9.3
Total	76	100

Source: Authors' Fieldwork, 2011

Perception on sickness among respondents and Provision of Health Facilities: The perception of the frequency of being ill was investigated in the study area and it is discovered from table 5 that 36.8% of total respondents fall sick at least once in a month while 27.6% and 13.2% believed in twice in a month and three times in a month respectively. However, 5.3% agreed on more than three times in a month while 17.1% had no idea of the number of times they

feel sickly. The presence of health facilities especially hospitals and clinics in the study area was also investigated and it was observed from Figure 4 that 37.0% of the total respondents agreed that there are provision of hospitals and clinics while 30.0% said there are none. This shows that there are few hospitals and clinics in the study area which proves that the lives of the residents in this area are in danger especially whoever contacts any disease.

Table 5: Frequency of sickness among respondents

No of Times	Frequency	Per cent (%)
Once in a month	28	36.8
Twice in a month	21	27.6
Thrice in a month	10	13.2
More than thrice in a month	4	5.3
No Idea	13	17.1
Total	76	100.0

Source: Authors' Fieldwork, 2011

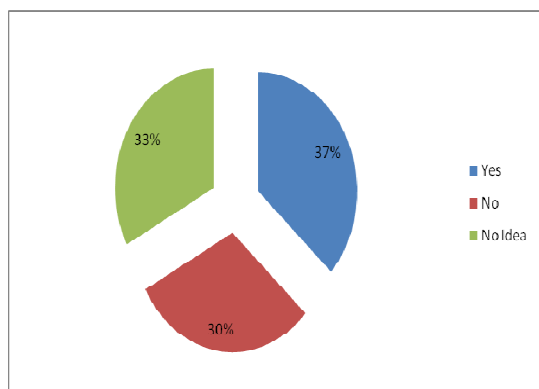


Fig 3: Provision of Health Facilities

Conclusion: It can be concluded that Warri and its environs are being exposed to the danger of pollution of various types in varying magnitude and this would have great impacts on the livelihood of the residents of the area in terms of the food consumed, air inhaled among others. The land, water and air have been degraded and in effect human health has been impaired and the fragile ecosystem has been exposed to more danger. Lastly, the lives of the residents are exposed to more risk health wise as there were few health facilities like hospitals, clinics, dispensaries and maternity centers amidst various forms of pollution in Warri. This study therefore recommends that the government should promulgate and enforce environmental laws that will reduce the level of pollution in the study area, planting of trees should be encouraged as trees have the capabilities of absorbing pollutants released into the environment. More so, gas flaring should be stopped or reduced to a barest minimum and there should be provision of more proper and adequate medical services for the residents of Warri township by the government and even industries located in the area. The study also

strongly recommends that there should be provision of environmental education for the entire inhabitants of Warri through adult literacy programmes and mass media and adequate facilities of transporting petroleum products should be put in place.

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