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AIR POLLUTION RESULTING FROM INDUSTRIAL ACTIVITIES EFFECTS AND CONTROL MEASURES ON RESIDENTS.

(A Case Study of African Foundry at Ajose, Ogijo LGA, Ogun State)

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Abstract: Breathing is an inevitable activity of man and air we breathe formed one of basic needs of man for his survival. However, as with water pollution and land contamination, it is the quantity or concentration of a chemical in the air that makes the difference between "harmless" and "pollution." For instance, carbon dioxide (CO2), which present in the air around us at less than 0.05 percent concentration usually does no harm when breathing it (you breathe it out all day long); but air with an extremely high concentration of carbon dioxide of about 5-10 percent is toxic and could kill in a matter of minutes.

Since Earth's atmosphere is very turbulent and many live in windy countries, air pollution will often disperse relatively quickly. In less enlightened times, factory operators thought that if they built really high smokestacks, the wind would simply blow their smoke away, diluting and dispersing it so it would not be a problem. The only trouble was, Earth is a much smaller place than we think and pollution does not always disappear so conveniently. Hence, its impact on human beings is harmful and dangerous to human existence. Studies have demonstrated a consistent increased risk for cardiovascular events in relation to both short and long term exposure to present day concentrations of ambient particulate matter.

The studied area as a case study is Ajose community in Ogun state, Nigeria herein African foundry is situated. Methods employed were through administering of questionnaires, direct observation, and oral interviews of the residents. It was discovered that there were presence of air pollution and results depicted that its impact in the area was severe. Air pollution has been extensively and consistently linked with mortality. However, no study has investigated the health effects of air pollution on length of survival among diagnosed respiratory patients. It was also revealed that there were no appreciable government efforts made to control this air pollution resulted from the activities of the company African foundry.

Keywords: Breathing, air, pollution, contamination, mortality, harmful, ambient.

INTRODUCTION

There is nothing quite like opening the door and breathing fresh and clean air but how clean is the air you are breathing right at moment cannot be determined. Unless one is a scientist with a chemistry laboratory at your fingertips, there is no real way of knowing. The gases you are sucking up through your nose could be slowly killing you: according to the World Health Organization, around two million people die prematurely from the effects of polluted air every single year. Air pollution is a huge problem and not just for people living in smog-choked cities: through such things as global warming and damage to the ozone layer, it has the potential to affect us all. Air is also important in production of sound. However, this air could be polluted from various activities either through human activities or natural phenomenon.

Pollution is derived from a Latin word pollure which means to defile. It is an undesirable change in the physical, chemical or biological characteristics of our air, land and water that can be harmful to human life or that of other species, living conditions and cultural assets.

Air is the mixture of gases that fills the atmosphere, giving life to the plants and animals that make Earth such a vibrant place. Broadly speaking, air is almost entirely made up of two gases (78 percent nitrogen and 21 percent oxygen), with a few other gases (such as carbon dioxide and argon) present in absolutely minute quantities. The oxygen component of the air is required to survive. We can breathe ordinary air all day long with no ill effects, so let us use that simple fact to define air pollution, something like this:

Air pollution is a gas or a liquid or solid dispersed through ordinary air released in a high concentration or quantity to harm the health of people or other animals, kill plants or stop their proper growth, damage or disrupt some other aspect of the environment such as making buildings crumble, or cause some other kind of nuisance like reduced visibility, perhaps, or an unpleasant odour.

As with water pollution and land contamination, also, it is the quantity or concentration of a chemical in the air that makes the difference between "harmless" and "pollution. Air pollution worldwide is a growing threat to human health and the natural environment. Although some pollutants are released by natural sources like volcanoes, coniferous forests and hot springs. The effects of this pollution is very small when compared to that caused by emission from industrial sources, power and heat generation, waste disposal and the operation of internal combustion engines. At present there is no comprehensive information on air quality or on the levels of emissions entering the atmosphere from different sources. Major areas of concern are the pollutants in poorer urban and rural household without electricity.

Some of factors influencing the pollution problem in south western Nigeria are:

- **Seasonal Patterns:** Unstable air circulates and dissipates pollutant in wet seasonal due to the low pressure over the land.
- **Temperature Inversion:** In dry season warm air rises from artificially heated cities or the sides of valley. Cold night air moves in below the hot air and temperature, thus rises with height, called a low level inversions. Pollutions are trapped in the cold layer by the warmer air above and cannot be dissipated.
- **Wind Speed and Direction:** Wind speed and direction influences the rate of diffusion of pollutants.

The case study area where the impacts and effects of air pollution were studied was Ajose Community where the African Foundry is located in Ogijo Local Government Area of Ogun state. The factory mainly produces steel rods and their activities consequently grossly pollute the environment.

Aim and Objectives

The aim of the study is to assess the devastating impact of air pollution on residents and buildings in Ajose community of Ogijo Local Government Area of Ogun state and the objectives are as follows:

- to collect data for the diverse effects of air pollution in Ogijo Local Government.
- to assess the effects of air pollution in people living in the area.
- to assess efficiency of both preventive and corrective measures put in place by the inhabitants and governments at various level.
- to analyses the response of the fact gathered.

It is estimated that we breathe 20,000 liters of air each day. This means the more polluted the air is, the more polluted air we breathe into our lungs. More hazardous pollutants are discharged into the air each year than are released to surface water, ground water and land (combined). Air pollution has caused several inhabitants of Ogijo local government sleepless night and some had even vacated their ancestral homes. It has also discouraged the settlement of families in that area due to the effect of air pollution. This project covered the rate at which the inhabitant of Ogijo local government (Ajose Community) is being affected and the preventive or corrective measure that were put in place with suggested possible solutions in tackling the effect of air pollution in that area.

As at time of our visitation to the Africa Foundry (where mild and high yield steel is being produced), air pollution was observed to be on the rise owing to the activities of the company. There appears to be a correlation between industries, vehicles and the level of particulate matter in the air. To determine the effects of this on the pollution levels, this work was carried out to found out the extent of air pollution that has been caused by the industry, its effect on human life and possible control measures.

LITERATURE REVIEW

Air pollution may be described as contamination of the atmosphere by gaseous or solid wastes by-products that can endanger human health and welfare of plants and animals reduce visibility and produce undesirable, odours.

Air quality is affected by economic activities which introduce pollutant into the atmosphere that poses threats to human health and other life forms on earth. Furthermore, it has the potential to change the climate with unpredictable but potentially severe consequences on a local and global scale. Because large bodies of air cannot be contained, atmospheric pollution can only be controlled at its source.

The quality of the air we breathe is affected by many factors. These include emissions from local industry, domestic sources and exhaust gases from traffic travelling around.

Causes and Effect of Air Pollution

There are many different sources that can be sited as causing air pollution, and they all fall into two different categories are natural sources and human sources. The first category natural causes of air pollution cannot be controlled by us. These causes includes things like smoke that comes from wildfires, another natural sources would be volcanoes, which put sulfur and ash out into the air as they perform their typical activities. Methane is another natural cause of air pollution that is produce when animals digest food e.g. cattle. Another natural source of air pollution is dust which comes from large barren of land. The dust blows around polluting the air and anywhere the wind may take it.

Air pollution from human sources is caused by burning of fossil fuels which is a part of our everyday life. We burn fossil fuels in our cars, fossil fuel is burned to extract fossil fuel from the earth and its used to process fossil fuel into its individual components. Every step of the way releases sulfur and nitrogen oxides, carbon monoxide, carbon dioxide, heavy metals and particulates into the air. Each step is process increase the number of disease cases.

The human is affected due to poor air quality, principally; air pollution affects the body's respiratory system and cardiovascular system. Though the individual reactions to air pollution depend on the type of pollution a person is exposed to, the degree of exposure. Air pollution may cause long term health problems. The health effect caused by air pollutants may range from biochemical and physiological change like difficulty in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions. Air pollution can damage our crops and forests, contaminating and destroying the food supply. It also slow the growth of forests and even causes some trees to die, which in turn leaves more carbon dioxide and less oxygen in the environment. Gaseous and particulate pollutants polluted air irritates the eye and pollutants like lead accumulate in the body which led to brain damage in children. Polluted air from automobiles caused lung cancer. Carbon dioxide when inhaled reacts with hemoglobin reducing the oxygen-carrying capacity of blood, which is more injurious to people affected with anemia.

The main types of air pollution are:

Indoor Pollution

This type of pollution exists in our homes, offices, halls etc. we spend a lot of time in our homes, so it comes as no surprise that the quality of the air we breathe can affect our health. Everything from our pets to our appliances to pesticides can add up to the pollution research shows that indoor air can be more polluted than outdoor air because three types of each responsible for increasing symptoms of asthma, allergies and other ailments. Certain types of household products increase the amount of pollution in the air including perfumes, hair sprays, and air fresheners, cleaning chemicals, paints and stains. The short term health effects of indoor air pollution include sore eyes, burning in the nose and throat, headaches, flu symptoms and worsened symptoms of asthma and allergies.

Indoor cooking and heating with biomass fuels (agricultural residues, dung straw, wood) or coal produces high levels of indoor smoke that contains a variety of health-damaging pollutants. There is consistent evidence that exposure to indoor air pollution can lead to acute lower respiratory infections in children under five and chronic obstructive pulmonary disease and lung cancer (where coal is used in adults. In addition, it can cause headaches, dry eyes, nasal congestion, nausea and fatigue. People who already have lung disease are at greater risk.

Outdoor Pollution

Outdoor air pollution is caused by small particles and ground level ozone that comes from car exhaust, smoke, road dust and factory emissions. Outdoor air quality is also affected by pollen from plants, crops and weeds. Outdoor pollution can be high anytime near busy roads and where people burn wood. When inhaled, outdoor pollutants and pollen can aggravate the lungs and can lead to chest pain, coughing, digestive problems, dizziness, fever, lethargy, sneezing, and shortness of breath, throat irritation and watery eyes. Outdoor air pollution and pollen may also worsen chronic respiratory diseases, such as asthma.

Outdoor air pollution poses a special problem for people such as home builders and people who work outside. Urban residents are typically exposed to such outdoor air pollutants as ozone, particulate matter (dust and smoke) and mixtures that contain chemicals like benzene. In addition, sulfur compounds, carbon monoxide, nitrogen dioxide and compounds containing bromine and chlorine may be found in the air in urban areas.

The outdoors air pollutants that rural residents are exposed to are slightly different from pollution encountered in urban areas. Outdoor air pollutants regardless of their sources, tends to cause or worsen respiratory best protection from outdoor air pollutants is to remain indoors, especially during alerts.

Industrial Pollution

This may be defined as pollution which can be directly linked to industries. While industrialization is an essential feature of economic growth in developing countries, industrial practices may also produce adverse environmental health consequences through the release of air and release of hazardous wastes.

Air pollution in developing countries is derived not only from stack emission of pollutants from relatively large industries, like iron and steel, non-ferrous metals and petroleum products industries, but also from fugitive emission of pollutants from small-scale factories such as cement mills, lead refineries, chemicals fertilizer and pesticide factories and so on, where inadequate pollution control measures exist and pollutants are allowed to escape to the atmosphere since industrial activities always involve energy generation, the combustion of fossil fuels is a main source of air pollution in the developing countries, where coal is widely used not only for industrial, but also for domestic consumption. The exposure levels of the general population in developing countries e.g. Nigeria, are usually higher than that in developed countries, where air pollution is more strictly controlled and resident areas are usually far from industries. Accidental releases of toxic substances into the atmosphere resulting in serious health risk are usually more common in developing countries. The reasons include inadequate safety planning, lack of skilled technical personnel to maintain proper facilities and difficulties in obtaining spare parts and so on.

Air pollution cannot be completely eradicated but it can be reduced to a harmless state that is having no effect on living organisms. Different techniques are used for controlling air pollution caused by "gaseous pollutants" and that caused by "particulate pollutants". The air pollution caused by gaseous pollutants like hydrocarbons, sulphur dioxide, ammonia, carbon monoxide, etc. can be controlled by using three different methods namely Combustion, Absorption and Adsorption.

- Combustion is a technique applied when the pollutants are organic gases or vapors. The organic air pollutants are subjected to 'flame combustion or catalytic combustion when they are converted to less harmful product carbon dioxide and harmless product water.
- Absorption is a method when the polluted air containing gaseous pollutants is passed through a scrubber containing a suitable liquid absorbent. The liquid absorbs the harmful gaseous pollutants present in air.
- Adsorption is a method whereby the polluted air is passed through porous solid adsorbent kept in suitable containers. The gaseous pollutants are adsorbed at the surface of the porous solid and clean air passes through.
- Air pollution caused by particulate emissions like dust, soot, ash etc. can be controlled by using fabric filters, wet scrubbers, electrostatic precipitations and certain mechanical devices. These mechanical devices work on the basis of the following;
- **Gravity:** In this process, the particulate settle down by action of gravitational force and get removed.
- Sudden change in the direction of air flow: It brings about separation of particles due to greater momentum.
- **Fabric filter:** The particulate matter is passed through a porous medium made of woven or filled fabrics. The particulate present in the polluted air are filtered and gets collected in the fabric filter, while the gases are discharged. The process of controlling air pollution by using fabric filters is called "Bag filtration".
- **Wet scrubbers:** They are used to trap sulphur dioxide, ammonia and metal fumes by passing the fumes through water.
- **Electrostatic precipitations:** When the polluted air containing particulate pollutants is passed through an electrostatic precipitator, it induces electric change on the particles and then the aerosol particles get precipitated on the electrodes.

Some other methods of controlling Air pollution

- Tall chimneys should be installed in factories.
- Better designed equipment and smokeless fuels should be used in homes and industries.
- Renewable and non-polluting sources of energy like solar energy; wind energy etc. should be used.
- Automobiles should be properly maintained and adhere to emission control standards.
- More trees should be planted along road sides and houses because trees breathe in carbon dioxide and breathe out oxygen and humans breathe in oxygen and breathe out carbon dioxide.

Research Methodology

Ajose community is one of the regions in Ogun state which falls into a local government named Ogijo local government. Ajose community is sparsely populated. It is known for trading and farming and also an under developed area.

The research instrument adopted was administering of questionnaire to extract relevant information needed for the research work, direct observation and oral interviews of residents/respondents. The sample and sampling technique employed by the researcher is simple random sampling techniques to ensure that every person stand equal chance of being selected.

Descriptive statistics was the method used to analyzed the data collated resulted from questionnaire, personal observation and oral interview. The population under study is the number of people sampled suffering from the impact of air pollution coming from the steel making factory located in the area (African Foundry).

Results and Discussion

The effects of air pollution in residential areas of Ajose Community, Ogijo Local Government area of Ogun State are shown in the result tables and charts drawn below

Table 1: Distribution of the respondents with regard of their age

AGE CATEGORIES (IN YARS)	FREQUENCY	PERCENTAGE (%)
Middle age (36 – 50)	42	42.0
Young age (20 – 35)	48	48.0
Old age (51 plus)	10	10.0
Total	**100**	**100.0**

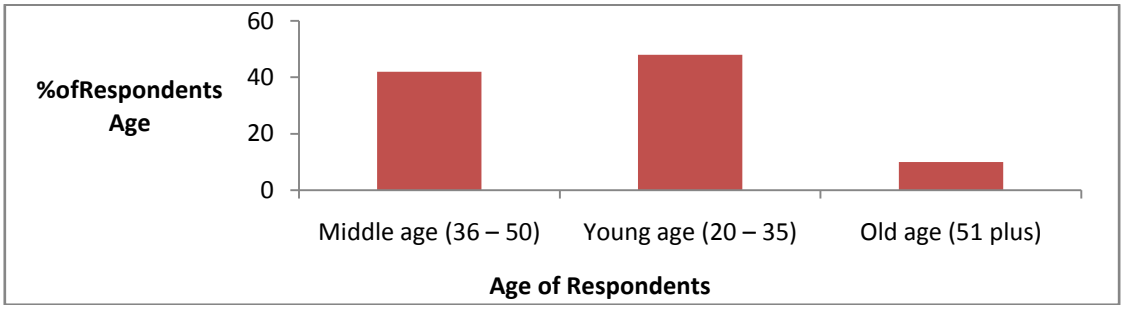

Figure 1. Distribution of the respondents with regard of their age

Table 2: Distribution of respondents with regard to their education status

EDUCATIONAL STATUS	FREQUENCY	PERCENTAGE (%)
School certificate	41	41.0
ND	31	31.0
HND	11	11.0
1st Degree	10	10.0
Master	2	2.0
PHD	1	1.0
None	4	40
Total	**100**	**100.0**

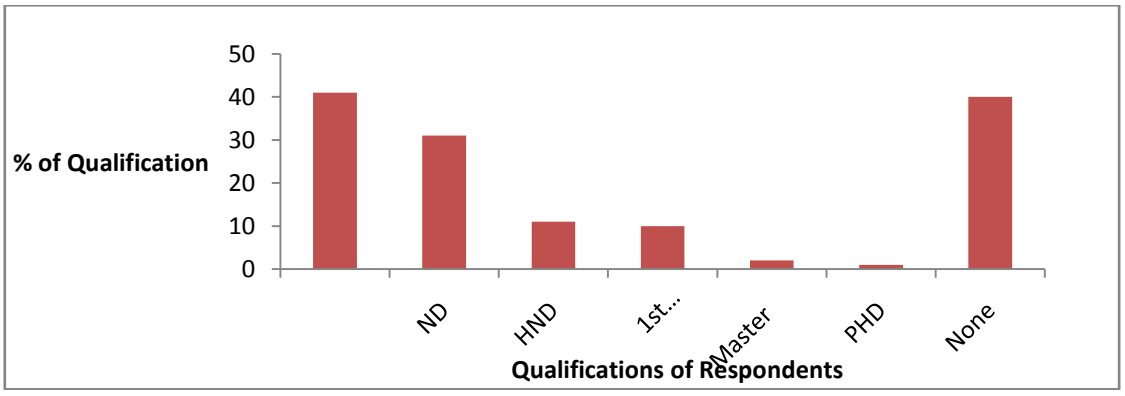

Figure 2: Percentage Distribution of respondents with regard to their education status

Table 3: Distribution of respondents with regard to the economic activity

OCCUPATION	FREQUENCY	PERCENTAGE (%)
Self employed	48	48.0
Government employed	6	6.0
Not employed	15	15.0
Private employed	6	6.0
Student	25	25.0
Total	**100**	**100.0**

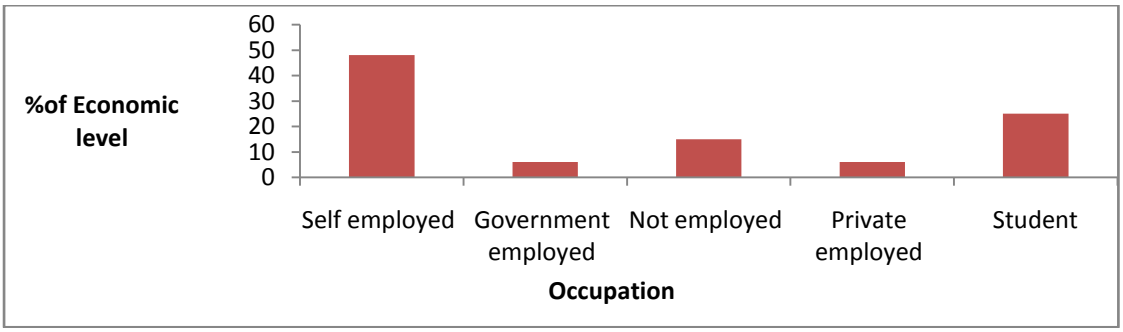

Figure 3. Relationship of Economy Level of Respondents and Percentage

Table 4: Distribution of respondents with regard to disease caused by national from factory (air pollution)

DISEASE	FREQUENCY	PERCENTAGE (%)
Lung disease	25	25.0
Heart disease	10	10.0
Other disease	65	65.0
Total	**100**	**100.0**

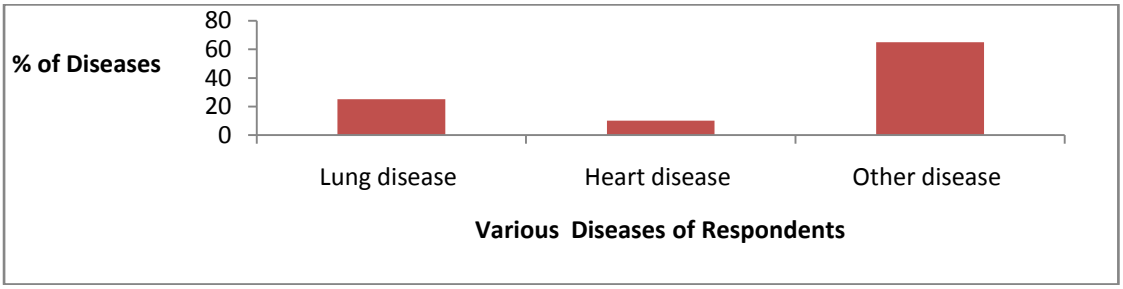

Figure 4. Rate of disease caused by air pollution

Table 5: Distribution of respondent with regard to marital status

MARITAL STATUS	FREQUENCY	PERCENTAGE (%)
Married	48	48.0
Single	37	37.0
Divorced	8	8.09
Widow	7	7.0
Total	**100**	**100.0**

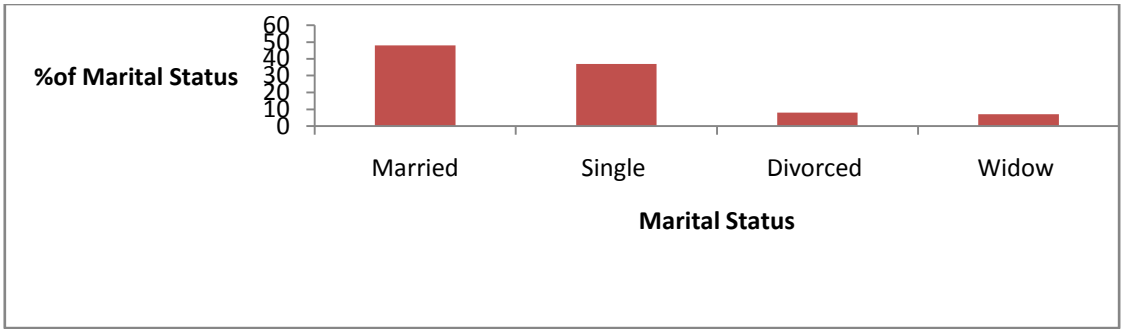

Figure 5. Level of marital status

Table 6: Distribution of respondents with regard to controlling air pollution

CONTROLLING AIR POLLUTION ACTION ON	FREQUENCY	PERCENTAGE (%)
Govt. Act community effort	13	13.0
Management efforts	15	15.0
Community efforts	72	72.0
Any other	0	0.0
Total	**100**	**100.0**

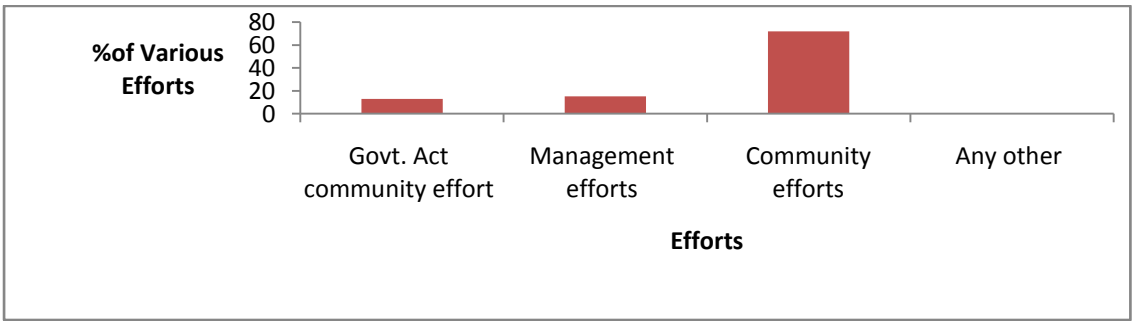

Figure 6. Rate of efforts made

Analysis of data leads to inferences, without which no study is useful, conclusion are drawn on the basis of characteristics and attitude of respondents.

Socio-Economic Characteristics: Data presented in table 1 reflects the age of the respondents. As seen in the table, that 48% of the respondents were of young age group i.e. (20 – 25) years while 42% of the respondents were middle age group i.e. (36 – 50) years. The remaining 10% were in old age group i.e. 51 and above years. Data given in table 2 show that 41% of them, has School Certificate, 31% of them has National Diploma, 11% of them has Higher National Diploma, 10% of them has 1st degree, 2% of them has Master, 1% of them has PhD, while 4% no certificate at all. Table 3 indicates that almost half of them i.e. 48% were self employed, 6% of the respondents are government employed, 15% of them were not employed, 6% of them were private employed, while 25% were students, the table indicates that majority of the respondents belonged to poor class.

Table 4 reveals that all the respondents had awareness about disease caused by air pollution. The table shows that 25% of the respondents suffered from lungs diseases, 10% of them suffered from heart diseases,

while majority of them i.e. 65% of the respondents suffered from other diseases like cough, catarrh, skin diseases, eye burning by materials from the factory (African foundry).

Table 5 indicates that almost half of the respondents i.e. are married, 37% of them were single, 8% of them were divorced and 17% of them were widow.

Table 6 indicates that 72% of the respondents wanted that the factory should be removed of shifted from their area, 13% of them believed that the problem of air pollution can be solved by government efforts and 15% of them believed that the management of the factory can solved the problem of air pollution.

Conclusion

Ambient air pollution is a health hazard. It is a global challenge, as evidence shows that adverse effects still exists even at relatively low air pollutants can be established based on the available data. Pollution in its various forms is increasing tremendously day by day and so the main objective of the research was to check the ill effects of air pollution, on human health.

This study carried out in Ajose community, Ogijo local government, Ogun state, where African Foundry known for the production of steel, melting of rusted irons and metals is located. During burning of these items along with plastic, rubber inside the "melting pot" or furnace, pollution, or smoke is being released into the atmosphere making it very dangerous for people of this area. The factory is creating air pollution as well as land pollution by discharging black smoke, solid and liquid waste openly in streets and with this, diseases like asthma, difficulty in breathing, catarrh, skin and eye irritation, spreads in the area. People who live in the area where the factory is located are of lower class (They could be referred to as belonging to the poor class). Also, in the course of investigation, it was shown that all the efforts of the inhabitants of the area in making sure their lives are protected against the ill effects of the pollution by factory management and government yielded no positive result.

Recommendations

For proper management of air pollution, control strategy has to be implemented. This control strategy development is the process of assessing specific abatement measures, management practices or control technologies to determine the best combination of approaches to provide the air quality standard or goal.

Air pollution control officials should also consider pollution prevention which includes eliminating as much of the pollution emissions as possible at the source, substituting raw and less toxic materials, considering alternative manufacturing processes and improving process control measures. The goal for all control strategies is to achieve real and measurable emission reductions. Developing a control strategy involves the following steps;

- Determine priority pollutants: The pollutants of concern for various locations should be based on health effects and the severity of the air quality problem.
- Identify control measures: For specific source categories, choose the appropriate controls based on the priority pollutants.
- Incorporate the control measures into a plan: Using the control measures identified creates a written plan with implementation dates to formalize the strategy. It is important to adopt a regulatory program and include it in the plan so that control measures will be enforceable.
- Government should take necessary steps to check and solve this environmental damaging problem and resulted health hazard encountered by people living in those area.

In addition, some of the individual steps to help reduce the burden on the air particularly when it comes to factory emissions, we need to breathe are listed below:

- Support our leaders or government in the struggle to implement rules regarding the pollution of our environment.
- Protest against big industries producing too much carbon into the atmosphere.
- Plants trees, trees absorb and store carbon dioxide from the atmosphere and filter out air pollution.
- Factories should be built away from residential areas.
- Every community must take ownership of the environment and effectively take lead responsibility for its protection.

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