

## **EFFECTS OF AIR POLLUTION ON HEALTH: A STUDY OF NIGERIA ENVIRONMENT**

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### **ABSTRACT**

The quality of air individual inhale can affect their well-being as air pollution is detrimental to health and causing respiratory challenges. Air pollution is no doubt an issue of significant public interest in many developing countries and the international community at large. Therefore, air pollution health related risks are major concern in Nigeria and with various environmental challenges ranging from water pollution, air pollution, oil spillage, deforestation, desertification, erosion and flooding (resulted from bad or no drainage systems) caused mostly by human activities. Air pollution is a wide-reaching problem and it influence human population a great deal.

Respiratory infection associated with air pollution is also on the increase and other predominant cause of death associated with air pollution include chronic respiratory diseases, cardiovascular diseases, enteric infections, diarrheal diseases, communicable, maternal, neonatal, and nutritional disease and has caused about 900 thousand deaths and 32 million people living with health related disability per annum in Nigeria. Healthy environmental sustainability is critical to improving the quality and life expectancy. Therefore, sustainable development policies and practices is essential to the policymakers to enhance a healthy life. This paper presents a review of the air pollution challenges in Nigeria and proffer some recommendation to forestall continuous air pollution health related problem. Study shows that air pollutions are not only affecting the human by time but also affecting animals and plants.

**Keywords:** Air Pollution, Environment, Health, Population, Pollutant,

### **INTRODUCTION**

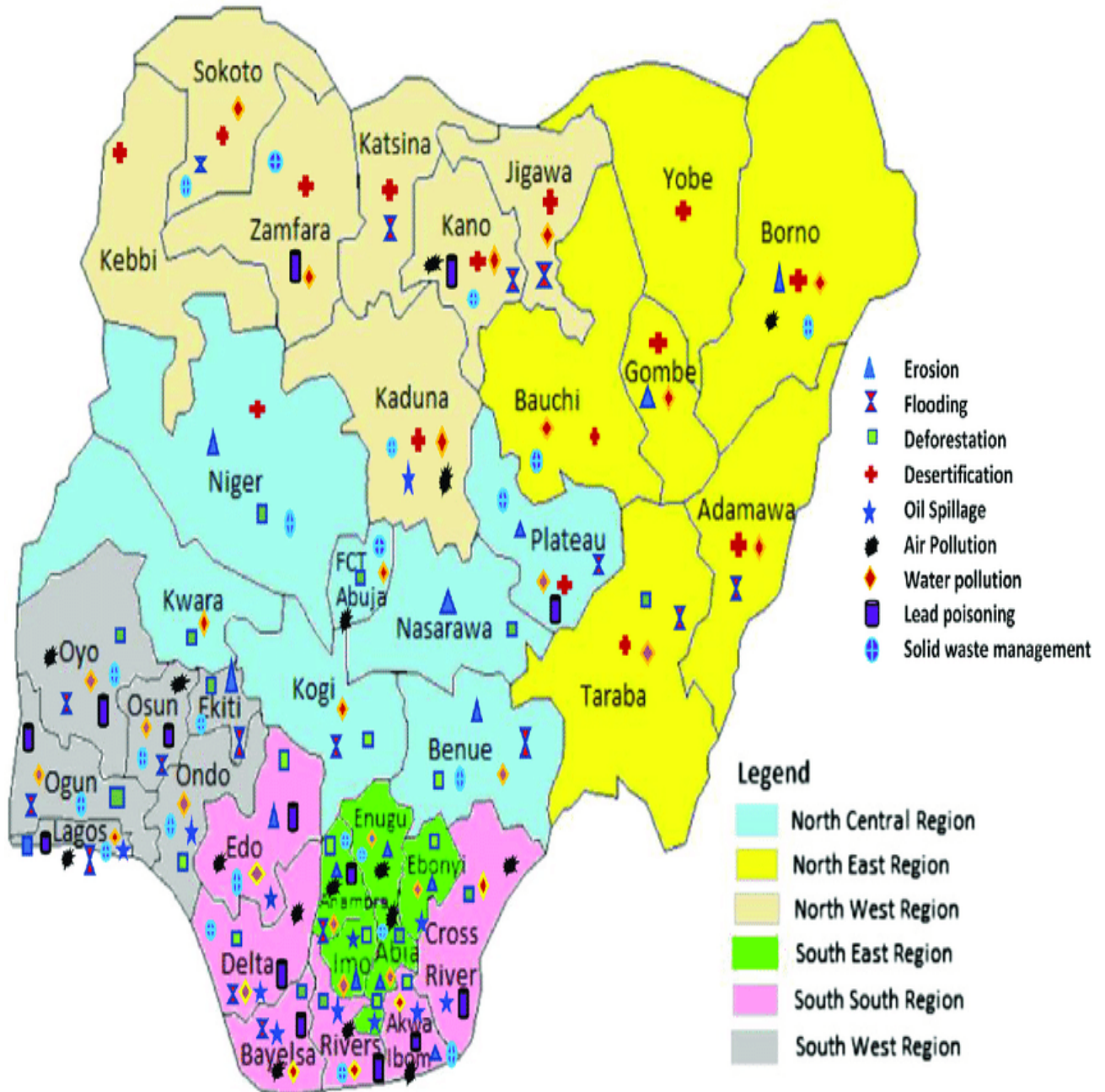
One of the main resolutions of the United Nation Conference on Sustainable Development Goals was the agreement by the member states to launch the health lives and promotes well-being for

all ages and securing a healthy life for all (Evelyn and Tyav 2012) To achieve this, a substantial reduction in the number of deaths and illness from pollutants that comes from hazardous chemicals, air, water and soil contamination is paramount. Our environment is safe when it is in a natural form (Etim et al. 2021). However, air pollution occurs when harmful substances are introduced into the environment, and these substances are called pollutants (Abbey and Kua 2022). Air pollutants are gases or mixtures and have direct impact on health of living things (man, animal and plant) or create nuisance. A pollutant is a substance or energy introduced into the environment that has undesired affects (Ajibade et al 2021). Environmental pollution is the unwarranted disposal of mass of energy into earth's natural resources such as pool, water, land, sand air that result in long or short term detriment of the atmosphere and its ecological health to negatively impact the living beings and their life both quantitatively and qualitatively (Croitoru and Chang et al.2020.).Nigeria is one of the countries in the world with high level of air pollution with a total of 30,435 cases of air pollution related diseases (Ajibade et al 2021).Data from the Institute of Health Metric and Evaluation of Global Burden of Disease (GBD) ascertain that the cause of death associated from air pollution are on the increase, and according to the World Health data report, most of the highest-ranked causes of death in Nigeria are environmental risk related.

Air pollution is of serious concern across the globe, and is fuelled by rapid population growth, continuous urbanization, increases in industrialization, continuous rises in energy demand, deforestation, and increases in car density, especially in major cities (Egbetokun et al 2020).In terms of the country's air quality, national report shows that air pollution continues to plague many Nigerian cities. Data indicates that the average annual level of particulate matter(PM2.5) in Nigeria almost 10 times higher than the World Health Organisation (WHO) recommended value (5Ng/ms) (Egbuna et al 2021). The higher rate of water pollution is also a significant public health burden in Nigeria in the densely populated settlements like Makoko, Iwaya, Ilaje, Amukoko, Oko baba,Yoraoloye, Ogudu village in Lagos state (Dada et al 2021). At the same time the burden of solid waste management is increasing in Nigeria, especially in urban areas. In 2019, the total amount of domestic waster per year in Nigeria was estimated at about 360 million tonnes (0.50Kg/capital) and keeps increasing according to the national bureau of statistics (Muhammad 2022)

The causes of air pollution are Burning of Fossil fuels, gas emitted from vehicles, agricultural activities i.e insecticides, pesticides and fertilizers emit harmful chemicals, factories and industries emits carbon monoxide, organic compounds, hydrocarbons and chemicals (Ogunbode 2023). Mining activities, construction and demolition raw material can cause haze and foul air, burning of garbage waste, microbial decay process which release methane gas which is highly toxic and volcanic eruptions which results to global warming (Oguntunde et al 2014).

**Fig 1: Map of Nigeria showing different locations and environmental Problems**



Source: [www.sciencedirect.com](http://www.sciencedirect.com)

The 2018 World Air Quality Report Region and City PM2.5 Ranking by IQ Air and Greenpeace ranked Nigeria the 10th most polluted country in the world (Richard et al 2023), with an

estimated average PM<sub>2.5</sub> concentrations of 44.8µg/m<sup>3</sup> and the report also ranked Kano in Nigeria the most polluted city in Africa (Sabit 2022).As seen in the map above, erosion is relevant to north-central, north-east, south-east and south-south. Flooding is common to south-east, south-west and north-west region. Deforestation is common in the areas of north-east, south-west, south-south, south-east but most relevant to the north-central region. Desertification north-east and north-west region. Oil spillage is common to all areas apart from the north east and north central, air pollution is common to all apart in Nigeria and water pollution is relevant to all areas. Lead poisoning is known in all part apart from north-east region. Conclusively solid waste management is common to all areas in Nigeria. In summary, the different types of pollution that are common in Nigeria are; air, water, noise and radiation pollution. Other types of pollutions that affect us in a subtle but yet significant are land/Soil pollution and visual pollution which is relatively newer was noted in all areas in Nigeria leaving no area unaffected (Yakubu 2017)

### **AIR POLLUTION AND ITS HEALTH IMPLICATIONS**

Major sources of air pollution in Nigeria include tailpipe exhaust from cars and trucks, smoke from the open burning of residential trash, diesel generators, road dust, industry, and soot from the use of biomass-fuelled cook stoves indoors (Raimi et al 2021).An increased risk of heart disease, wheezing, coughing and respiratory problems and skin, nose and throat irritation can be caused by high levels of air pollution (Okunade 2021). Air pollution affects human health in different ways, air pollution may also cause heart attacks, asthma, and also other respiratory complications. Humans, and animals can also suffer from a variety of health problems because of air pollution (Raimi et al 2021). According to updated figures from the Health Effects Institute (HEI) and the Institute for Health Metrics and Evaluation's (IHME), more than 64,000 people died from household air pollution in Nigeria in 2017. Mainly from the burning of solid fuels such as charcoal and wood for cooking in open fires and leaky stoves

Apart from the effects on human, air pollution causes depletion of ozone layer by the release of man-made chemicals including hydro chlorofluorocarbons (Nwachukwu et al 2012). Some of the other health effects of air pollution could be researched in the nearest future, however, air pollution is majorly affects the circulatory and respiratory system, eye and nose. Many asthmatic cases become more traumatic in areas with air pollution (Kornom-Gbaraba et al 2022) Gastro-intestinal disturbances resulted from contact of polluted air with food or drinking water in a community increases the prevalence of gastro-intestinal disorders (Green and Abbey 2022) while mental and psychological health of the community often affected with disturbance associated with air pollution.

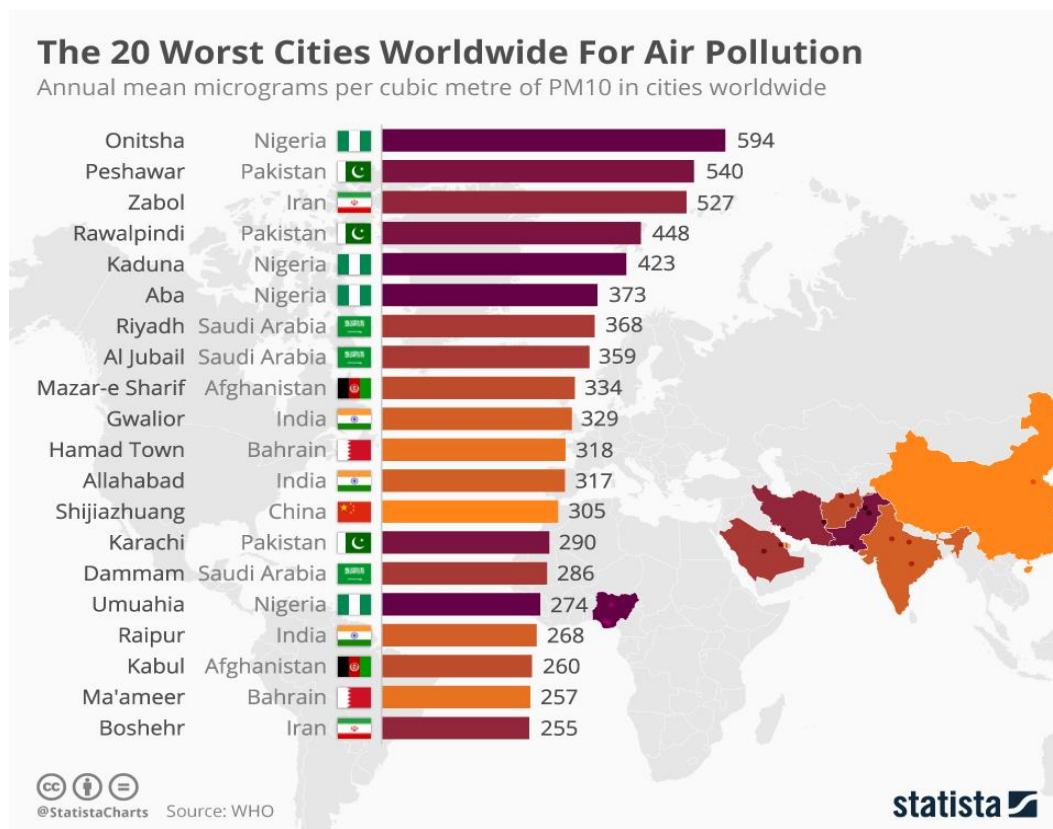


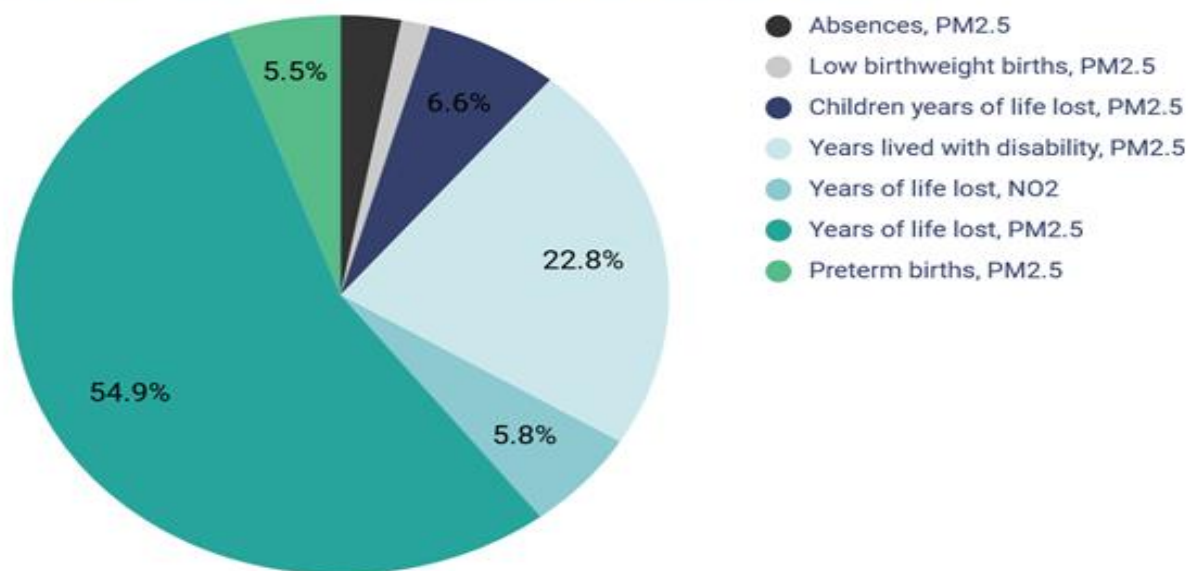
Fig: 2 Source: [www.statista.com](http://www.statista.com)

World Health Organisation (2012) segregates air pollution into indoor and outdoor air pollution and explained the health implications. Indoor air pollution from solid fuel use and urban outdoor air pollution are estimated to be responsible for 3,5 million premature deaths globally every year and 3.5% of the global burden of diseases. In the year 2014, indoor air pollution from solid fuel use was responsible for almost 5 million deaths in which 3% of this estimation was death while 2.7% was global burden of disease (Ogolo et al 2022). This risk factor is the second largest environmental contributor to ill-health aside the combination of unsafe water with poor sanitation (Pona et al 2021). Global estimation revealed that indoor smoke from solid fuel combustion causes about 25% of deaths from lower respiratory infections diseases, 37% from chronic obstructive pulmonary disease and about 4% of deaths from lung cancer as carbon monoxide reduces the capacity of the blood to carry oxygen (Wambebe and Duan 2020). Among the symptoms associated with exposure to carbon monoxide include dizziness, nausea, headache, loss of consciousness and death, and people with coronary artery disease are significantly susceptible (Ukhurebor et al 2021).

PM2.5s are microscopic particles of 2.5 micrometres or less in diameter which can clog human lungs (Siddiqua et al 2022). They are linked to heart disease, stroke and lung cancer. Nigeria has a mortality for air pollution of 307.4 for every 100,000 people, the second worst in all of Africa (Richard et al 2023). More people die from air pollution in Nigeria than in South Africa, Kenya, and Angola, combined (Richard et al 2023).

Air pollution is a critical risk factor for non-communicable diseases (NCDs) worldwide, causing about 24% of all adult deaths from heart disease, 29% from lung cancer, 25% from stroke, and 43% from chronic obstructive pulmonary disease (COPD) (WHO, 2022). Exposure to biological contaminants of indoor air related to dampness increases the risk of acute and chronic respiratory disease as well as asthma. Radon is a leading causes of lung cancer after smoking and most causes of radon-induced lung cancer occur among smokers resulted from strong combination of smoking and radon (Sabit 2022).

### Air pollution health impacts and cost percentages



**Fig: 3: Source:**[www.statista.com](http://www.statista.com)

In the year 2008, outdoor air pollution in urban area was responsible for almost 1.5 million deaths (3% all deaths) and 1.0% of the global burden of disease (Urhie et al 2020). Transportation related air pollution, which has a significant contributor to total urban air pollution, increases the risks of cardiopulmonary-related deaths and non-allergic respiratory diseases (Yakubu 2017). Research revealed that an association of transportation-related air pollution increased risks of lung cancer, myocardial infarction, increased inflammatory response and adverse pregnancy outcomes (e.g premature birth and low birth weight) (Abbey and Kua

2022). Exposure to particulate matter has been linked to a range of adverse health outcomes including modest transient changes in the respiratory tract and impaired pulmonary function and increase risk of symptoms requiring emergency room or hospital treatment and increase risk of death from cardiovascular and respiratory diseases or lung cancer (Anozie et al 2007). Particulate matter is estimated to cause about 10% of deaths from lung cancer, 6% of deaths from cardiopulmonary diseases and about 5% of death from respiratory infections (Croitoru et al 2020). Short-term exposures to ozone are linked with effects on pulmonary function and the respiratory system, lung inflammation, increased medication usage, hospitalization, and mortality (Dharwal et al 2022).

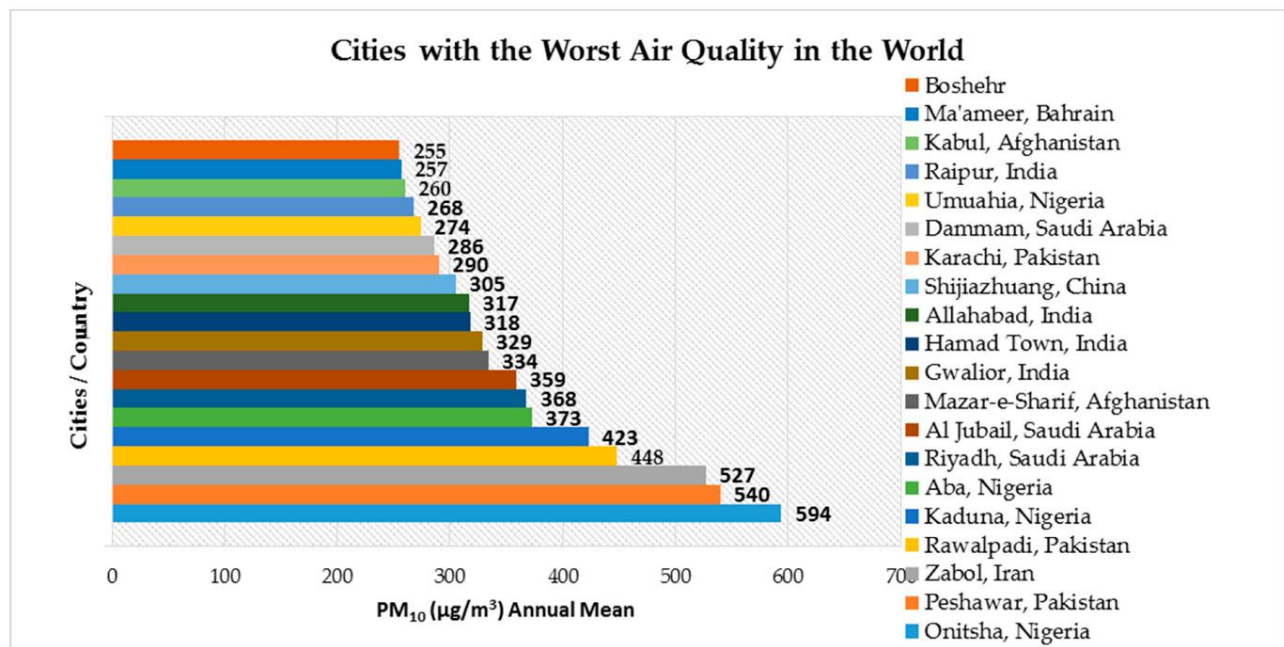


Fig: 4: Source: [www.statista.com](http://www.statista.com)

Reduced lung function has been associated with long-term ozone exposure (Egbetokun et al 2020). Short-term exposures to nitrogen dioxide, an indicator for a complex mixture of mainly traffic-related chemicals, have been associated with effects on pulmonary function, increased allergic airway inflammation reactions, hospital admissions and mortality. Reduced lung function and an increased probability of respiratory symptoms are associated with long-term exposure to nitrogen dioxide (WHO, 2010). About three million deaths were attributable to air pollution exposure in both China and India in the 2019, and two of the most harmful air pollutants to human health are nitrogen dioxide (NO<sub>2</sub>) and particulate matter (Elemile et al 2021). Exposure to ambient particulate matter pollution is responsible for many deaths every year. Delhi was once again the most polluted capital city in the world in 2019 with the

concentration of PM2.5 particulate matter in the Indian capital averaged 98.6 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) (Dharwal et al 2022), and this is well above the  $10 \mu\text{g}/\text{m}^3$  limit set by the World Health Organization. On average, the most polluted country in the world is Bangladesh, which is home to the second most polluted capital city - Dhaka. One of the main causes of particulate pollution in Bangladesh is the brick industry, and its many coal-fired kilns(Dada et al 2021).

Fossil fuel combustion is a major cause of air pollution and is produced from a number of sources such as power plants and industrial facilities. However, the main cause of air pollution in urban areas in Nigeria is transportation emissions ((Dada et al 2021). Possible health effects of air pollution in Nigerian cities include cough, catarrh, eye infection, asthma, chronic bronchitis and other cardiovascular diseases (Ajibade et al 2021). The health effects of air pollution can impact various aspects of health including the physical, social and psychological well-being of humans. Elders, infants, children, sensitive people and those suffering from asthma and such other disorders are more vulnerable (physically and psychologically) to the effects of air pollution (Abbey and Kua2022).Long-term exposure to polluted air results in a variety of psychological problems (such as stress, depression, anxiety, irritation, becoming shorttempered, and mood swings), which adversely affects social health such as behaviour. The quality of air individuals breathe can affect their health as air pollution is detrimental to the health of humans, particularly causing respiratory problems which may affect physical, social and psychological health. For instance, World Health Organization (2012) reported that, air pollution exposure caused deaths of 7 million people, or one in eight of total global deaths.

**Table: 1Number of Death attributed to air Pollution exposure in 2019, by selected country**

COUNRTY	NUMBER OF DEATH	COUNTRY	NUMBER OF DEATH
China	1,848,000	Phillipines	74,800
India	1,667,000	Myanmar	74500
Pakistan	235,700	Vietnam	71,700
Nigeria	197,600	Brazil	60,900
Indonesia	186,300	United State	60,200
Bangladesh	173,500	Japan	42,600
Egypt	91,700	Poland	31,100



Russia	77,500	Germany	29,300
Ethiopia	77,000	Italy	27,900
United Kingdom	15,000	France	14,300
Spain	11,800		

Source: [www.statista.com](http://www.statista.com)

**On the average, people living in the Niger-Delta area of Nigeria are likely to lose nearly 7 years of life expectancy if the air pollution in the area is not addressed (Evelyn and Tyav 2012) and research from University of Chicago revealed that air pollution in Nigeria is second to HIV/AIDS in terms of impact on life expectancy (Green and Abbey 2022). Over 114,000 people died from air pollution in Nigeria in 2017 and this was the highest in Africa. Onitsha has the worst air in 2016 with an annual mean concentration of 594 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). This was nearly 40 times above the World Health Organization (WHO) annual guideline of 15  $\mu\text{g}/\text{m}^3$  for PM10 and Kano had the worst in 2018 (Richard et al 2023). The Nigeria air quality monitoring agency does not issue air quality alerts even when air quality levels are expected to adversely impact health. According to the WHO, Nigeria has 307.4 mortality rate for every 100,000 people, and the country has annual mean concentrations of 46.3  $\mu\text{g}/\text{m}^3$  of PM2.5 pollutants, 9 times (WHO 2021) above the WHO guidelines for outdoor air quality. While many low-and-middle-income countries are tightening pollution controls to reduce public exposure to the toxic air hanging over their cities, the air pollution levels in Nigeria remains dangerously high with no relief in sight (Richard et al 2023). The air pollution levels in Nigerian cities, including Lagos, Abuja, Port Harcourt, Kano, and in particular Onitsha, a port city on the bank of the Niger River in the south, are still at health-damaging levels.**

### **RECOMMENDATION**

Governance and regulation of air pollution present a tremendous challenge for many African cities (Siddiqua et al 2022). Although important global and regional initiatives for better regulation and monitoring systems exist, they are seldom regarded with urgency in the political agenda. Regulatory frameworks are generally weak or none-existent, and most countries experience a poor knowledge transfer surrounding the health risks of air pollution.

Air pollution is causing a lot of distress not only to humans but also animals, driving many animal species to endangerment and even extinction (Urhie et al 2020). Nigeria will need to

implement additional policies with its own resources to meet its unconditional target, but will also need international support to implement policies in line with full decarbonisation to meet and exceed its conditional target of limiting the global warming and air pollution to 1.5°C (Richard et al 2023). Key steps to reducing the gap between current policies and Nigeria's NDC targets include progressing towards and ramping up its renewable energy target and halting the expansion of natural gas.

Nigeria has adopted a new plan to reduce its air pollution, for instance, in January, 2023 Nigeria adopted new Methane Guidelines that include mandatory measures for oil and gas companies, such as leak detection, to reduce methane emissions from the oil and gas sector (Richard et al 2023). Under the climate change act, Nigeria is required to develop a carbon tax and carbon trading, and the policy on carbon tax was unveiled to support reduction of air pollution (Dharwal et al 2022). While these are positive developments, the government's continued reliance on oil and gas risk locking Nigeria into emissions-intensive infrastructure. This will likely lead to the major stranding of assets and misallocation of investment resources and continue to drive up national emissions (Green and Abbey 2022). To meet its net zero ambitions, Nigeria could adopt new Methane Guidelines that include mandatory measures for oil and gas companies, such as leak detection, to reduce methane emissions from the oil and gas sector, pursue a more rapid uptake of renewable energy (Ighalo et al 2021).

Everything on our planet is interconnected, and while the nature supplies us with valuable environment services without which we cannot exist we all depend on each other's actions and the way we treat natural resources (Elemile et al 2021). The reduction in the usage of vehicles among citizens and also avoidance of anything that would cause a release of pollutants to the environment should be strictly followed, and enforcing laws which will create a better environment for the benefits of mankind and our mother earth (Muhammad, 2022). Air Pollution is something that we all live with, some are natural from dirt and dust while other pollutions are man-made(CO<sub>2</sub>,light,etc). Not only would our generation continue to grow with this but the incoming generation. Sadly, it is likely that without reducing our air pollution imprint on this planet earth there will not be a next generation, this is the sad truth.

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