
CLIMATE CHANGE IN NIGERIA: ASSESSING ITS EFFECT IN THE RESPIRATORY HEALTH OF ELDERLY IN NIGERIA

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ABSTRACT

The study analyzed climate change in Nigeria: assessing its effect in the respiratory health of elderly in Nigeria. In Nigeria, the impacts of climate change are more devastating due to their vulnerability and low coping capability. Nigeria's climate change impacts include rising temperatures, changing rainfall patterns, increased frequency of extreme weather events such as heatwaves, floods, and droughts, and air pollution from industrial activities and urbanization. These factors contribute to the deterioration of air quality, which directly affects respiratory health, especially in the elderly. To address these challenges Nigeria must prioritize climate change adaptation and mitigation strategies that safeguard public health, particularly among vulnerable populations like the elderly. On this basis, it was concluded climate change exacerbates respiratory health issues among Nigeria's elderly due to increased air pollution, extreme weather events, and the spread of allergens and pathogens. Urgent action is needed to mitigate these impacts through policies targeting emissions reduction, air quality improvement, and healthcare infrastructure enhancement. One of the recommendations made was that robust air quality monitoring systems should be implemented nationwide to track pollution levels and enforce stricter regulations on industrial emissions and vehicular pollution.

KEYWORDS: Climate Change, Respiratory Health, Elderly and Nigeria

INTRODUCTION

Worldwide, climate change presents serious risks to public health, and Nigeria is not an exception. Nigeria presents several obstacles in reducing the effects of climate change on human health, especially for vulnerable groups like the elderly, because of its quickly expanding population, urbanization, and industry. In Nigeria, respiratory disorders in the elderly are one of the major health challenges that are made worse by climate change. Rising temperatures, altered rainfall patterns, a rise in the frequency of extreme weather events including heatwaves, floods, and droughts, as well as air pollution from industrial and urbanization activities are some of Nigeria's climate change effects. These elements play a

part in the decline of air quality, which has an immediate impact on respiratory health, particularly in the elderly. Due to age-related physiological changes, compromised immune systems, and pre-existing medical illnesses including asthma, cardiovascular disease, and chronic obstructive pulmonary disease (COPD), elderly people are more vulnerable to respiratory ailments. These circumstances are made worse by climate change via a number of processes. First of all, rising temperatures exacerbate air pollution by raising concentrations of dangerous pollutants including ozone (O₃), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), and particle matter (PM_{2.5} and PM₁₀). Long-term exposure to these pollutants can aggravate respiratory conditions, precipitate asthma episodes, and raise the aged population's risk of respiratory infections.

Second, the transmission of allergens and pathogens like mould spores, pollen, and airborne viruses—which can worsen respiratory symptoms and cause respiratory infections and diseases—is facilitated by shifting weather patterns. In addition, severe weather conditions like as heat waves and floods can impair living circumstances, harm infrastructure, and interfere with healthcare services, making older people more susceptible to respiratory health problems.

There must be coordinated efforts made at the local, regional, and national levels to solve these issues. Nigeria has to give priority to adapting to and mitigating the effects of climate change in order to protect public health, especially in vulnerable groups like the elderly. Reducing greenhouse gas emissions, raising air quality standards, improving healthcare services and infrastructure, fortifying early warning systems for extreme weather events, and fostering community adaptability and resilience are all examples of policy initiatives that could be included. Public health education and awareness campaigns are also crucial for educating the elderly and those who care for them about the effects of climate change on respiratory health and for promoting preventive measures like staying indoors on days with poor air quality, using proper ventilation, and getting medical attention as soon as possible.

CONCEPT OF CLIMATE CHANGE

Climate change is not the same as global warming, even though they are often used interchangeably. Climate change is a broad term that describes the change in the earth's climate over the long term. Climate change is primarily a result of human activities such as burning fossil fuels for electricity and heat in industry and transportation, deforestation, overuse of chemical fertilizers, and industrial animal production, all of which increase the concentration of greenhouse gases in the atmosphere. Jackson (2024), defined climate change as the periodic modification of Earth's climate brought about as a result of changes in the atmosphere as well as interactions between the atmosphere and various other geologic, chemical, biological, and geographic factors within the Earth system. Climate change in a broader sense also includes previous long-term changes to Earth's climate. Climate change has an increasing impact on the environment.

Climate change and global warming' are often used interchangeably but have distinct meanings. Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional, and global climates. These changes have a broad range of observed effects that are synonymous with the term. Natural processes, which have been overwhelmed by human activities, can also contribute to climate change, including internal variability and external forcing (NASA, 2024). Ramkumar (2022) mentioned that climate change is a broad term used to refer to changes in the Earth's climates, at local, regional, or

global scales, and can refer to the effects of these changes. In recent decades, the term 'climate change' is most often used to describe changes in the Earth's climate driven primarily by human activity since the pre-industrial period, particularly the burning of fossil fuels and the removal of forests, resulting in a relatively rapid increase in carbon dioxide concentration in the Earth's atmosphere.

Climate change is the global phenomenon of climate transformation characterized by the changes in the usual climate of the planet (regarding temperature, precipitation, and wind) that are especially caused by human activities. Because of unbalancing the weather on Earth, the sustainability of the planet's ecosystems is under threat, as is the future of humankind and the stability of the global economy (You Matter, 2020). Climate change is a long-term shift in the average weather conditions of a region, such as its typical temperature, rainfall, and windiness. Climate change means that the range of conditions expected in many regions will change over the coming decades. This means that there will also be changes in extreme conditions. In addition to changes in climate that are caused by natural climate variability, climate change can also be caused by human activity. The kind of climate change we are experiencing now is being caused primarily by these human factors. (Canada, 2020). Climate change is the long-term increase in the earth's average surface temperature and the large-scale changes in global, regional, and local weather patterns that result from that increase, caused by a significant increase in the levels of greenhouse gases that are produced by the use of fossil fuels. Climate change is the significant variation of weather patterns over long periods (Palmetto, 2021).

CONCEPT OF RESPIRATION

The word respiration is another term for breathing. However, the best definition of respiration depends on the level of organization the audience is studying. First, respiration may refer to external respiration or the process of breathing (inhalation and exhalation), also called ventilation. Secondly, respiration may refer to internal respiration, which is the diffusion of gases between body fluids (blood and interstitial fluid) and tissues. Finally, respiration may refer to the metabolic processes of converting the energy stored in biological molecules to usable energy in the form of ATP. Bailey (2019) defines respiration as the process in which organisms exchange gases between their body cells and the environment. From prokaryotic bacteria and archaeans to eukaryotic protists, fungi, plants, and animals, all living organisms undergo respiration. Respiration may also refer to any of the three elements of the process.

Respiration is a metabolic process that occurs in all organisms. It is a biochemical process that occurs within the cells of organisms. In this process, energy (ATP-adenosine triphosphate) is produced by the breakdown of glucose, which is further used by cells to perform various functions. Every living species, from a single-celled organism to dominant multicellular organisms, performs respiration (Byju's, 2024). Respiration could be defined as a metabolic biochemical process that takes place in all living cells of an organism, where they produce energy through the intake of oxygen and the liberation of carbon dioxide from the oxidation of various organic substances. The energy produced is in the form of adenosine triphosphate, or ATP, which is also known as the energy molecule (Vedantu, 2024). Brecht (2023) stated that respiration is a single, complete act of breathing. It is the process of metabolising nutrients, making energy in the form of adenosine triphosphate (ATP), and releasing waste products. This process may involve the consumption of oxygen and the production of carbon dioxide, as seen in aerobic cellular respiration, or it may not involve the

consumption of oxygen, as in the case of anaerobic respiration. Respiration is a procedure that is related to breathing. It is the process of taking oxygen into the lungs and taking out carbon dioxide. Respiration supplies all the energy needed by living organisms. This reaction happens continuously in all living cells. Every living entity, from unicellular organisms to dominant multicellular organisms, undergoes respiration (Geeks for Geeks, 2024).

CONCEPT OF RESPIRATORY HEALTH

Respiratory health encompasses a spectrum of conditions affecting the lungs and airways, vital for sustaining life through efficient gas exchange. The respiratory system's intricate structure and function make it susceptible to various ailments, ranging from acute infections like influenza and pneumonia to chronic diseases such as asthma, chronic obstructive pulmonary disease (COPD), and lung cancer. Environmental factors like air pollution, smoking, occupational hazards, and lifestyle choices significantly influence respiratory health. Socioeconomic factors contribute to health disparities in respiratory outcomes, highlighting the need for holistic approaches to address underlying determinants (Global Initiative for Chronic Obstructive Lung Disease, GOLD, 2021). Effective management of respiratory health requires a multidisciplinary approach involving healthcare providers, public health initiatives, and community engagement. Prevention strategies play a pivotal role, including vaccination against influenza and pneumonia, smoking cessation programmes, and efforts to reduce exposure to indoor and outdoor air pollutants. Early detection through screening programmes and timely access to healthcare services are crucial for improving outcomes, particularly for conditions like lung cancer, where early-stage diagnosis significantly enhances treatment success.

Innovations in respiratory care include advancements in diagnostics, such as pulmonary function tests and imaging modalities, enabling accurate disease characterization and personalised treatment plans. Telemedicine has emerged as a valuable tool, facilitating remote monitoring and consultation, especially in the context of respiratory conditions requiring long-term management. Furthermore, research into novel therapeutics, including biologics for asthma and targeted therapies for lung cancer, holds promise for improving patient outcomes and quality of life.

According to the World Health Organisation (2020), challenges persist in addressing respiratory health globally, with disparities in access to care, diagnostic resources, and treatment options exacerbating inequities. The burden of respiratory diseases disproportionately affects low- and middle-income countries, where limited healthcare infrastructure and environmental factors converge to create significant public health challenges. Mitigating these disparities necessitates concerted efforts to strengthen healthcare systems, expand access to essential medications, and promote health education and awareness campaigns tailored to local contexts. Collaborative efforts between governments, healthcare organisations, non-governmental organisations (NGOs), and the private sector are essential for implementing sustainable interventions to improve respiratory health. Investment in research, infrastructure, and capacity-building initiatives can foster innovation and enhance the delivery of respiratory care services. Additionally, promoting policies aimed at reducing tobacco use, mitigating air pollution, and addressing social determinants of health can have far-reaching benefits for respiratory health outcomes, underscoring the importance of a comprehensive approach to tackling this global health challenge.

CONCEPT OF ELDERLY

The term “elderly” is commonly measured by chronological age. Ageing in human life is an inevitable process. Ageing is a gradual, continuous process of natural change that begins in early adulthood. During early middle age, many bodily functions begin to gradually decline. People do not become old or elderly at any specific age. Globally, the age of 65 has been designated as the beginning of old age or the elderly.

The elderly population represents a significant demographic group globally, characterized by individuals typically aged 65 and above. This segment of society often faces unique challenges and experiences, including health concerns, financial limitations, and social isolation. Health issues such as chronic diseases, cognitive decline, and mobility limitations are prevalent among the elderly, requiring specialised medical care and support services. Moreover, financial constraints can exacerbate these challenges, as many seniors live on fixed incomes and may struggle to afford healthcare, housing, and other essentials. Social isolation is another critical issue affecting the elderly, leading to mental health issues like depression and anxiety due to limited social interactions and support networks. Addressing the healthcare needs of the elderly is crucial for ensuring their well-being and quality of life. Accessible and affordable healthcare services tailored to the unique needs of seniors, including preventive care, chronic disease management, and geriatric care, are essential. Additionally, initiatives aimed at promoting healthy ageing through lifestyle interventions, community programmes, and carer support can help mitigate health risks and improve overall outcomes for the elderly population (World Health Organisation, 2015). By prioritising preventive measures and early intervention, healthcare systems can better manage the complex healthcare needs of ageing individuals and reduce the burden on hospitals and long-term care facilities.

Financial security is another pressing concern for the elderly, with many facing economic hardship in retirement. Social security benefits, pensions, and savings may not always be sufficient to cover the cost of living, healthcare expenses, and long-term care services (Administration for Community Living, 2021). Policymakers and organizations must explore solutions to address these financial challenges, such as expanding access to affordable housing, enhancing social safety nets, and promoting employment opportunities for older adults. Additionally, financial literacy programs and elder financial abuse prevention efforts are crucial for safeguarding the economic well-being of seniors.

PREVALENCE OF CLIMATE CHANGE ON NIGERIA

Climate change is a global issue impacting countries across the world, and Nigeria is no exception. Nigeria, as a developing nation, faces various challenges related to the prevalence of climate change, affecting its environment, economy, and social structures. Nigeria’s climate has been changing, evident in increases in temperature; variable rainfall; rises in sea level and flooding; drought and desertification; land degradation; more frequent extreme weather events; affected freshwater resources; and loss of biodiversity. The durations and intensities of rainfall have increased, producing large runoffs and flooding in many places in Nigeria (Huma, 2019). Here is an overview of the prevalence of climate change in Nigeria:

- **Temperature Rise and Extreme Weather Events:** Nigeria has experienced an increase in average temperatures, humidity, rainfall and sunshine of a location over an extended period, contributing to more frequent and intense heat waves. Extreme weather

events, such as floods and droughts, have become more common, impacting agriculture and water resources. Excess rain and drought associated with climate change affects this natural distribution of crops in Nigeria and reduces their production in large quantities to meet the population's demand (Olaniran, 2019).

- **Sea Level Rise and Coastal Erosion:** Coastal areas in Nigeria are vulnerable to rising sea levels, leading to erosion and loss of land. Natural extreme events such as sea surges and tidal waves are already causing significant morphological changes along Nigeria's coastline. This poses a threat to communities, infrastructure, and ecosystems along the coastline. The country's coastline's poor condition would be exacerbated by global warming-induced accelerated sea-level rise (Mbanyeude, 2022).

- **Impact on Agriculture:** Changes in temperature and precipitation patterns affect Economic sectors such as: agriculture, fishery and forestry are more predisposed to the adverse effects of climate change. Agriculture, a crucial sector for Nigeria's economy, it is one of the major contributors to the Nigerian economy and source of income for some Nigerians. Shifts in growing seasons, increased pests and diseases, and reduced crop yields pose challenges to food security. Climate change in Nigeria threatens economic growth in sectors dependent on climatic conditions (Lawal, 2017).

- **Water Scarcity and Desertification:** Changes in rainfall patterns contribute to water scarcity in certain regions of Nigeria. Water scarcity affects a large proportion of the population, with less than 40% having direct access to potable water. Climate change increases rainfall variability, resulting in flooding in some humid areas of the country's south and a precipitation decrease in the savannah north. Desertification, particularly in the northern states, poses threats to livelihoods and ecosystems. These could lead to droughts and a reduction in surface water resources in the north (Usaid, 2023).

- **Government Initiatives and Policies:** The Nigerian government has recognized the challenges posed by climate change and has initiated policies and programs to address mitigation and adaptation strategies. Climate-focused policy research and initiatives include an LPG Framework to reduce dependence on wood and kerosene, feasibility studies of grid-connected solar power plants, and a transportation system running on natural gas, as well as digital Environment Impact Assessments (Airenakho, 2022).

EFFECT OF CLIMATE CHANGE ON RESPIRATORY HEALTH OF ELDERLY IN NIGERIA

Climate change has become a major challenge globally. Evidence has established that people's health can be affected by climate change Human activities have several direct and indirect impacts on health. In Nigeria, the impacts of climate change are more devastating due to their vulnerability and low coping capability. Climate change poses a significant threat to public health, particularly affecting vulnerable populations such as the elderly. In Nigeria, a country already grappling with various health challenges, the effects of climate change on respiratory health among the elderly are becoming increasingly pronounced. The effect of climate change on respiratory health among the elderly in Nigeria is a growing concern that requires urgent attention (Monday, 2019). Below are listed the effect of climate change in respiratory health of elderly in Nigeria:

- **Air Pollution:**

Rising temperatures and changing weather patterns contribute to increased air pollution levels in urban areas of Nigeria, primarily due to industrial emissions, vehicular exhaust, and biomass burning. High levels of particulate matter and other pollutants exacerbate respiratory

conditions such as chronic obstructive pulmonary disease (COPD), asthma, and respiratory infections among the elderly. Air pollution can increase the risk of heart attacks for older adults, especially those who are diabetic or obese. (Olowoporoku, 2020).

- **Extreme Weather Events:**

Climate change leads to more frequent and intense extreme weather events in Nigeria, including heat waves, droughts, and floods. A warmer climate is expected to increase the risk of illnesses and death from extreme heat and poor air quality. These events can worsen respiratory health conditions among the elderly through heat stress, dehydration, exacerbation of existing respiratory diseases, and displacement, leading to inadequate access to healthcare. Changing weather conditions are one factor that influences the spread of diseases transmitted by vectors (such as fleas, ticks, and mosquitoes), which spread pathogens. (Akinyemi, 2020)

- **Infectious Diseases:**

Climate change influences the distribution and prevalence of infectious diseases such as malaria, dengue fever, and respiratory infections in Nigeria. Increased temperatures and altered rainfall patterns create favorable conditions for vector-borne diseases and respiratory infections, posing a significant risk to the elderly population with weakened immune systems. People with compromised health, such as the elderly and the sick, may suffer serious health effects when exposed to prolonged periods of high temperatures. (DurodolaS, 2021).

RESPIRATORY HEALTH EFFECTS TO THE ELDERLY

Respiratory health is a critical aspect of overall well-being, especially for the elderly population. The respiratory system undergoes multiple changes with aging, which increases the frequency of commonly seen symptoms, such as cough, rhinitis, and dyspnea. Aging bodies often experience changes that make them more susceptible to respiratory issues, ranging from chronic conditions like chronic obstructive pulmonary disease (COPD) to acute infections such as pneumonia (Arif,2020). Here are the outlined on the respiratory health effect to the elderly:

- **Common Respiratory Conditions in the Elderly:**

They are common respiratory disease or disorder that affect the elderly (Yohannes, 2020).

- **Chronic Obstructive Pulmonary Disease (COPD):** COPD, including conditions like emphysema and chronic bronchitis, is prevalent among the elderly due to factors like smoking history, environmental exposures, and age-related changes in lung function.
- **Pneumonia:** Elderly individuals are at increased risk of pneumonia due to weakened immune systems, underlying health conditions, and impaired cough reflexes, which can lead to serious respiratory complications.
- **Asthma:** While asthma is commonly associated with childhood, it can persist or re-emerge in older age, often with more severe symptoms and complications.

- **Risk Factors for Respiratory Issues in the Elderly:**

On a global scale, average life expectancy is increasing and beginning to pose specific medical issues within the respiratory field as well as economical ones. Risk factors include

age-related modifications affecting airway reactivity, atopy, tobacco smoking, environmental pollution and gastro-oesophageal reflux disease (Incalzi, 2024).

a. Age related Changes: Structural changes in the respiratory system, decreased lung elasticity, and reduced immune function make the elderly more susceptible to respiratory ailments.

b. Smoking and Environmental Exposures: A history of smoking and prolonged exposure to indoor and outdoor air pollutants can exacerbate respiratory conditions and increase the risk of developing new ones.

c. Comorbidities: Chronic conditions such as cardiovascular disease, diabetes, and obesity can exacerbate respiratory issues and complicate treatment among the elderly.

- **Impact on Quality of Life and Healthcare Burden:**

Multidimensional evaluation is an effective tool to evaluate the quality of life and the objective and subjective health of the elderly. These variables can be related to the improvement of health and well-being (Lorenzini, 2018).

- a) Respiratory illnesses can significantly impair the quality of life for elderly individuals, leading to symptoms like dyspnea, fatigue, and reduced physical activity.
- b) These conditions impose a considerable healthcare burden, including hospitalizations, medication costs, and the need for long-term care and support services.
- c) Family caregivers also bear the burden of managing respiratory conditions in elderly loved ones, often experiencing emotional and financial strain.

- **Strategies for Prevention and Management:**

Prevention is viewed as a key issue for general practice, yet there is a lack of evidence regarding general practitioners' interventions in both middle-aged and elderly people. (Lionis, 2017). Ways of preventing elderly include:

- a) Smoking Cessation: Encouraging elderly smokers to quit and implementing tobacco control policies can help prevent respiratory illnesses and improve overall health outcomes.
- b) Vaccinations: Annual influenza vaccinations and pneumococcal vaccines are essential for reducing the risk of respiratory infections and their complications among the elderly.
- c) Indoor Air Quality: Implementing measures to improve indoor air quality, such as proper ventilation, air filtration systems, and reducing exposure to allergens and pollutants, can help mitigate respiratory risks.
- d) Comprehensive Care: Multidisciplinary approaches to managing respiratory conditions, including medication management, pulmonary rehabilitation, and patient education, can improve outcomes and enhance quality of life for elderly individuals.

STRATEGIC STEPS TO MITIGATE RESPIRATORY HEALTH ISSUES IN THE ELDERLY

Respiratory health issues significantly influence the elderly population, leading to reduced quality of life, increased healthcare utilization, and heightened mortality risks. Implementing strategic interventions to mitigate these challenges is crucial for promoting

healthy aging and improving overall well-being. For those with compromised respiratory conditions, there are still measures that can be taken to mitigate respiratory concerns (Shay, 2020). These are the key strategic steps to address respiratory health issues in the elderly, drawing on evidence-based approaches and best practices:

- **Promoting Smoking Cessation:**

- a) Smoking cessation remains the most effective strategy for preventing respiratory illnesses and improving lung health among the elderly.
- b) Comprehensive smoking cessation programs, including behavioral counseling, pharmacotherapy, and support groups, should be accessible and tailored to the needs of elderly smokers.

- **Enhancing Vaccination Coverage:**

- a) Annual influenza vaccinations and pneumococcal vaccines are essential for reducing the risk of respiratory infections and related complications among the elderly.
- b) Public health campaigns should prioritize increasing vaccination awareness and accessibility, particularly targeting elderly populations and healthcare providers.

- **Improving Indoor Air Quality:**

- a) Implementing measures to enhance indoor air quality is crucial for reducing respiratory health risks among the elderly, particularly those with pre-existing conditions.
- b) Strategies include proper ventilation, air filtration systems, smoking bans, and minimizing exposure to indoor pollutants such as dust, mold, and allergens.

- **Strengthening Healthcare Infrastructure:**

- a) Investing in respiratory healthcare infrastructure, including facilities, equipment, and workforce training, is essential for delivering timely diagnosis, treatment, and management of respiratory conditions in the elderly.
- b) Integrated care models, incorporating primary care, specialty services, and community resources, can improve care coordination and patient outcomes.

- **Implementing Health Education and Lifestyle Interventions:**

- a) Health education programs aimed at promoting healthy lifestyles, including regular exercise, balanced nutrition, and proper respiratory hygiene, can help prevent respiratory illnesses and improve overall well-being among the elderly.
- b) Engaging elderly individuals and their caregivers in self-management strategies and empowering them to recognize and respond to respiratory symptoms can enhance disease control and reduce exacerbations.

CONCLUSION

In conclusion, climate change exacerbates respiratory health issues among Nigeria's elderly due to increased air pollution, extreme weather events, and the spread of allergens and pathogens. Urgent action is needed to mitigate these impacts through policies targeting emissions reduction, air quality improvement, and healthcare infrastructure enhancement. Public awareness campaigns are crucial to inform and empower the elderly and their

caregivers to take preventive measures. By integrating climate change adaptation and public health initiatives, Nigeria can better protect vulnerable populations and build resilient communities against the health impacts of climate change.

RECOMMENDATIONS

- Implement robust air quality monitoring systems nationwide to track pollution levels and enforce stricter regulations on industrial emissions and vehicular pollution.
- Invest in healthcare infrastructure, particularly in rural areas, to ensure timely access to medical care for respiratory ailments among the elderly.
- Launch targeted public awareness campaigns to educate the elderly and their caregivers about the health risks of climate change and ways to protect themselves, including staying indoors during poor air quality days and seeking medical attention when needed.

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