Nigeria: Information sheet on climate change, air pollution, and health

Climate change and air pollution are closely related and pose significant risks to human health, environments, and economies. Climate change directly harms health while also impacting social and environmental determinants of health – clean air, safe drinking water, secure and sufficient food, housing, education and livelihoods. Greenhouse gases (GHGs), air pollution, black carbon, and methane emitted from energy, industry, transport, household, agricultural, and waste management sectors harm environment and population health. Countries have a unique opportunity to improve both the environment, population health and wellbeing by integrating meaningful health and air pollution mitigation activities into Nationally Determined Contributions (NDCs). This info sheet provides an overview of some of the main health impacts of climate change in Nigeria to help shape adaptation plans while also identifying opportunities to reduce GHG emissions and air pollution – and thus promote public health.

Ambient air pollution from human activities was responsible for more than 21,100 deaths from particulate air pollution ($PM_{2.5}$) in Nigeria in 2021 [1]. Of these deaths, 13.5 percent came from fossil fuel burning and a staggering 51 percent from biomass burning (Figure 1) [1]. The estimated economic value of these premature deaths was US$5.65 billion [1]. The World Health Organization (WHO) reports for Sustainable Development Goal Indicator 3.9.1 (Mortality from air pollution) that deaths attributable to ambient air pollution in Nigeria represent 23 percent of chronic obstructive pulmonary disease, 20 percent of ischemic stroke, 27 percent of ischemic heart disease, 17 percent of lung cancer, and 33 percent of lower respiratory infection deaths [2]. Most of these deaths can be prevented by shifting to renewable energy sources that avoid the combustion of fossil fuels and biomass, while reducing GHG emissions.

NIGERIA'S ENGAGEMENT ON CLIMATE CHANGE, AIR POLLUTION, AND HEALTH

Featuring both tropical and savannah climate characteristics, Nigeria is highly vulnerable to the impacts of climate change and air pollution and is actively engaged in multilateral environment policy and mitigation efforts that integrate air pollution, climate change, and health. Nigeria has endorsed meaningful action to reduce short-lived climate pollutants including methane, black carbon, and hydrofluorocarbons, including through Nigeria's National Action Plan to Reduce Short-lived Climate Pollutants in 2018 [3], joining the Climate and Clean Air Coalition (CCAC) in 2012 [4], the Global Methane Pledge (GMP) in 2021 [5], and partnering with the Clean Cooking Alliance [6]. Nigeria's 2020 National Adaptation Plan Framework includes health as one of nine key sectors [7]. Nigeria is currently developing a Health National Adaptation Plan (HNAP) to guide national policies to mitigate climate – health related risks. Nigeria's second NDC discussed both indoor and outdoor air pollution and super pollutants including black carbon and

methane and featured multiple references health [8]. In addition, Nigeria endorsed the *COP28 Declaration on Climate and Health*, *in which countries committed to "take health into account, as appropriate, in designing the next round of Nationally Determined Contributions*..." [9]. Nigeria has adopted Long-Term Low Emissions Development Strategies (LT-LEDS) targeting energy, transport, industry, agriculture, and waste sectors [10]. These policy objectives can be further strengthened in Nigeria's third NDC, providing benefits for public health, wellbeing, development, and the economy.

SOURCES OF HEALTH-HARMING AIR POLLUTANTS IN NIGERIA

Particulate matter (PM) or particle pollution is a mixture of airborne solid particles and liquid droplets. Out of these, $PM_{2.5}$ (inhalable particles 2.5 micrometres or smaller in diameter) are particularly harmful to health, increasing the risk of heart, cardiovascular, lung, and neurological disease, and cancer, amongst others. Black carbon, or soot, is a powerful pollutant and a short-lived climate pollutant (SLCP, also known as super pollutants). Methane (CH4) is a GHG, SLCP, and major contributor to ground level ozone, which has powerful impact on both human health and climate change. Polluting emissions share the same general sources as GHG emissions – namely energy / power, transport, industry, and waste sector combustion, and agriculture. The leading sector sources of $PM_{2.5}$ in Nigeria are windblown dust, energy, residential buildings, fires, and transport [11]; while the lead sector sources of black carbon include buildings, transport, waster, industry, energy, and agriculture; and the leading sector sources of methane energy (including extraction), agriculture, waster, buildings, transport, and industry [12] (Table 1).

Table 1: Nigeria sector sources of PM2.5, Black Carbon, and Methane

$PM_{2.5}$ *(source: State of Global Air [11])*		Black Carbon *(source: Community Emissions Data Systems [12])*		Methane *(source: Community Emissions Data Systems [12])*	
*Windblown dust	70.6 %	Buildings	85.3 %	Energy	46.2 %
Energy	1.9 %	Transport	7.3 %	Agriculture	21.8 %
Residential buildings	10.9 %	Waste	2.6 %	Waste	17.79%
Other fires	4.8 %	Industry	2.5 %	Buildings	14. %
Transport	2.6 %	Energy	2.5 %	Transport	.13 %
Anthropogenic dust	2.2 %	Agriculture	01 %	Industry	.06 %

Sources: State of Global Air 2024 [11]; Community Emissions Data System for Historical Emissions 2024 [12]. Note: not anthropogenic.*

POTENTIAL FOR HEALTH BENEFITS RESULTING FROM MITIGATION IN NIGERIA

Climate change mitigation efforts could provide major opportunities for the health of local populations in Nigeria. By targeting leading sources of GHG emissions, and reducing $PM_{2.5}$, black carbon, methane, and other super pollutants, Nigeria can achieve near-term climate gains while improving its air quality, public health, and the economy. Strengthening the links between climate and GHG mitigation policy, and air pollution and health objectives, including through Nigeria's third NDC, could help shape policy and plans that save thousands of lives, promote healthier populations, improve well-being, and boost productivity.

These targeted actions to reduce emissions can lead to substantial health benefits:

- Avoiding death and disease associated with human-caused air pollution:

In addition to helping reduce climate change-related threats to people's health and wellbeing, interventions to reduce the use of dirty fuels would have major benefits to people's health. Replacing dirty fuels with clean renewable energy sources, as well as increasing energy efficiency, can significantly reduce exposure to air pollution, which increases the risk of asthma, respiratory infections, cardiovascular disease, cancer, dementia, and many other adverse health outcomes. If supported through adequate technology transfer, capacity building, and finance, the deployment of clean renewables can also help reduce energy poverty, providing clean fuel sources in remote locations.

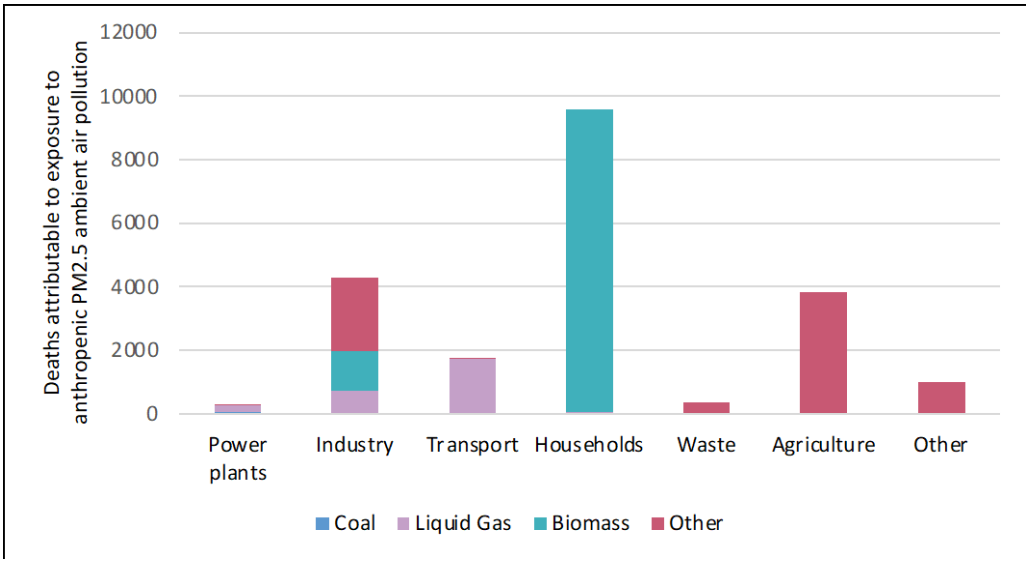
- Sectors with the highest potential to save lives from improved air quality:

Household sector: With over 97 percent of its household energy supply coming from biomass, Nigeria has the opportunity to prevent each year over 9,500 deaths caused by exposure to household-derived outdoor air pollution, by promoting the transition to clean renewable energies in the household sector [1]. In addition to this, interventions in the household sector can also help avoid thousands more deaths coming from exposure to air pollution inside people's homes.

- Potential of green space to improve air quality and more:

Increasing equitable access to safe, adequately designed and quality urban green spaces can help improve air quality while further reducing the negative health impacts of climate change by reducing heat exposure and offering physical and mental co-benefits, including spaces for exercise, social interaction, and connection with nature. In 2023, out of 26 urban centres evaluated in Nigeria, the majority had low, very low, or exceptionally low levels of green space (18) with eight centres reporting moderate, high or very high levels of greenness [1].

Figure 1: Deaths attributable to exposure to anthropogenic PM2.5 ambient air pollution in Nigeria by sector and source of emissions in 2021



Source: The 2024 Report of the Lancet Countdown on Health and Climate Change [1].

HEALTH IMPACTS OF CLIMATE CHANGE AND NEEDS FOR ADAPTATION IN NIGERIA

People in Nigeria face growing threats to their health and wellbeing due to climate change. Complementing mitigation efforts, adequate adaptation measures can help address these threats and save thousands of lives every year. Including these opportunities in Nigeria's NDC and National Adaptation Plan offers a unique opportunity to build resilience and protect communities:

- Health impacts from heat exposure:

As temperatures rise, populations in Nigeria face growing risks of disease and mortality associated with heat exposure. Elderly populations, those with underlying chronic health conditions (including cardiovascular disease, heart disease, diabetes), and very young children are most at risk. From 2014-2023, each infant under the age of one and adult over the age of 65 in Nigeria were exposed to an average of at least 6 and 7.5 heatwave days per year, respectively [1]. The total number of heatwave days experienced by each group were approximately 312 percent and 457 percent higher than annual averages from 1986-2005 [1].

The rising temperatures also pose a health threat of heat stress and heat stroke to those undertaking physical activity, including recreational or labour-related activities. In 2023, individuals were exposed to heat levels that posed a moderate or higher risk of heat stress if undertaking light physical activity (like walking), for nearly 8 hours each day on average [1]. Rising temperatures and aging populations resulted in a 150 percent increase in average annual heat-related deaths among adults over 65 from 1990-1999 to 2014-2023 [1]. Without climate change, the increase would have been just 48 percent (driven mostly by a growth in the size of the over-65 population), showing how much rising temperatures have worsened heat-related mortality [1].

- Labour productivity loss due to heat exposure:

Beyond presenting a direct risk to health, exposure of workers to high temperatures also reduces labour productivity, as workers' capacity to do physical labour decreases, and they need to take more breaks. In the period between 2014 and 2023, heat exposure of local workers caused the loss of nearly 15.8 billion potential labour hours annually on average in Nigeria – a 100 percent increase in the loss of potential labour hours due to heat exposure from the 1990s [1]. This translates to an estimated US$16.4 billion in potential income lost annually due to heat exposure between 2014 and 2023, with the agricultural sector bearing 71.5 percent of the total impact (losing approximately US$11.7 billion) [1].

- Growing risk of transmission of infectious diseases:

The rising temperatures and changes in humidity and precipitation patterns caused by climate change are changing the likelihood of transmission of infectious diseases transmitted by vectors (like mosquitoes or ticks). Climatic conditions in Nigeria have remained highly suitable for malaria transmission through *Plasmodium falciparum* and *vivax*, with an average suitability period of five months per year; and, for dengue by *Aedes aegypti* mosquitoes, at a climate-defined transmission potential (R0) of 2.51 [1]. Conditions are however also becoming increasingly suitable for the transmission of dengue by *Aedes albopictus* mosquitoes, the transmission potential for which has increased by 73 percent, from 0.91 on average in 1951-1960, to 1.58 in 2014-2024 [1]. As a result, Nigeria is likely to see an increase in dengue incidence, demanding increased actions to protect local populations. Similar patterns for disease transmission are observed for Zika and chikungunya [1].

- Drought and extreme weather impacts:

Climate change is changing precipitation patterns and, alongside increased incidence of extreme heat events, is increasing incidence of droughts. Droughts have multiple and pervasive impacts on health, including by threatening crop yields, undermining food security, water security and sanitation, increasing the risk of malnutrition, promoting the transmission of infectious diseases, and causing erosion. The latter, in turn, causes an increase in exposure to dust, which can cause harms on respiratory health, and increase the risk of soil-borne disease transmission. From 2019 to 2023, 52.5 percent of Nigeria's land area experienced increasing extreme droughts for at least 1 month on average per year, 37 percent for at least 3 months, and 21.7 percent for at least 6 months [1]. Additionally, in the period between 2018 and 2022, nearly 100 percent of the population experienced sand and dust storms - an increase of 48 percent from 2003-2007 [1].

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ABOUT THIS REPORT

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ABOUT THE LANCET COUNTDOWN

The Lancet Countdown: Tracking Progress on Health and Climate Change is an international research collaboration tracking the world's response to climate change, and the health benefits that emerge from this transition. The Lancet Countdown was established in partnership with Wellcome, which continues to provide core financial support. Based at University College London (UCL), it brings together over 300 researchers from academic institutions and United Nations (UN) agencies and publishes its findings annually in The Lancet journal ahead of the UN Climate Change Conference.

The data in this report can be explored in further detail in the Lancet Countdown's Data Platform. For more information, including previous annual reports, visit www.lancetcountdown.org.

ABOUT UNDP

The United Nations Development Programme (UNDP) is the United Nations' lead agency on international development. We support countries and communities as they work to eradicate poverty, implement the Paris Agreement on climate change and achieve the Sustainable Development Goals. We advocate for transformative change and connect countries to the resources they need to help people build a better life. Working with a broad network of experts and partners in 170 countries, UNDP helps nations to build integrated, lasting solutions for people and planet. Learn more at undp.org or follow at @UNDP.

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ABOUT GCHA

The Global Climate and Health Alliance (GCHA) unites and mobilizes the health community worldwide and accelerates climate action to protect and improve health for all. With 200+ organizational members, from every region and reaching over 125 countries, we work at the frontline of a global movement of health professionals and health and development organizations dedicated to promoting a healthy, equitable, and sustainable future for all. We address the climate crisis through evidence-based advocacy, policy, movement building, research and strategic communications.

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