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Review Article

Implication of Climate Change on Human Health in Sub-Saharan Africa

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Abstract

Climate change would affect different regions of the world differently. There are uncertainties about the impact of climate change but there are many areas of agreements by atmosphere scientists. For example, it has been strongly established that climate change would impact profoundly on the public health of sub-Saharan Africa both directly and indirectly. Heat stroke related deaths would increase as temperatures soar in the sub region. Prolonged and frequent droughts will increase malnutrition, hunger, poverty in the sub region. While increase in precipitation, sea levels storm rising sea levels and storm surges will increase flooding. Flooding can increase contamination of public water supply and this can create serious public health problems manifesting as diarrhea and cholera epidemics. Malaria which is a major killer disease would be extended to more people and more geographic space in Africa. So would be dengue fever episodes and many other strange alignments. Extreme heat events can also lead to stress, heat cramps, fainting and exhaustion, heat stroke and death. This paper has identified most of these public health concerns of climate change in sub-Sahara Africa. It has also identified adaptation strategies and mitigation measures to address these identified human health impacts of climate change in sub-Saharan Africa.

Keywords: Climate change; Implications; Human health; Sub- Saharan Africa

Introduction

There is little controversy about climate change at least on the global scale. We now have at our disposal both direct, and indirect, instrumental and non-instrumental evidence of climate change. For example, the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC,) rightly noted: the warming of the climate system is unequivocal as is now evident from observation of increases in global average air and ocean temperature, widespread of melting of snow and ice, and rising global average sea level". The 2019 was the second warmest year on record after 2016, according to the world metrological organizations consolidated analysis of leading international dataset. Average temperatures for the five years (2015-2019) and ten years periods were the highest on record. Since the 1980s each decade has been warmer than the previous one. This trend is expected to continue because of record levels of heat trapping greenhouse gases in the atmosphere.

Average across the five data sets used in the consolidated analysis, the annual global temperature in 2019 was 1.1 degree centigrade warmer than average for 1850-1900, used to represent pre- industrial conditions. 2016 remains the warmest year on record because of the contribution of a very strong El Nino event, which has a warming impact and long-term climate change. Before then eleven of the twelve years (1995-2006) rank among the 12 warmest years in the instrumental record of global surface temperature since 1850 (World Climate News, 2008). The five warmest years in history are, 1998,2005,2002,2001 and 1995 (in decreasing order) (World Climate News 2005) but the present trend has shown that there are dangers of increasing temperature as the year go on with its attendant effects and consequences.

Apart from soaring global temperatures, evidence from rising sea levels, changing precipitation patterns, melting ice caps, disappearing terrestrial and alpine glaciers, increasing period and intensification of El-Nino events plus increasing frequency and intensity of extreme weather events all lend support to climate change [1].The debate about climate change is now abating because we now know the science, see the threat, it is now time for action to check climate change and adapt to its various impacts.

These impacts vary from continent to continent and from region to region but the sub-Saharan Africa which is the focus of this paper would be impacted upon in many significant ways. For example, a wide band of Sahel region stretching from Mauritania across Niger, Burkina Faso, Chad and Sudan, large areas of South Africa face the prospect of steep declines in yields, along with chronically food insecure countries such as Ethiopia and Somalia. Climate change will exacerbate drought prone countries of southern Africa including Angola, Malawi Zambia and Zimbabwe. This region faces some of the gravest food security challenges in the world and with high levels of poverty, malnutrition and a protracted crisis in rain fed agriculture; these will translate into lower income, less secure livelihoods, and increased threat of chromic hunger episodes Human Development Report [2] and recent research have correlated between high ambient temperatures and increased all-cause mortality as identified in Ghana and Kenya Azongo & Egondi et al. [3].

The health implications of climate change is the main focus of this paper. These health concerns can be direct, such as stroke from heat waves or indirect such as the impact of Cholera as a result of flooding or poor hygiene associated with increasing water shortages occasioned by long spells of drought or even hunger and malnutrition because of food insecurity and insufficiency.

Area of Study

For the purposes of this study, sub-Saharan Africa is the African continent minus the Maghreh Nations (Algeria Libya; Egypt and Tunisia and the Republic of South Africa). The sub Saharan African people are group of developing countries whose more than 50 percent of total population live on income of less than 1 US Dollar in a day. They are generally classified as low-human development area lacking in most basic of human needs such as sanitation, shelter, food and ravaged by diseases with very high infant and maternal mortality and morbidity rates. Though the African continent contributes only between 3%-2% of the global Co2, the continent is projected to bear more than proportionate impact of global warming including its health impacts [4].

Climate change and sub-Saharan Africa

Though climate change is a global phenomenon but as earlier noted in this paper, the impact and potential impacts would not be evenly distributed globally. Vulnerability and adaptability would not also be evenly distributed because of differences in geographic and altitudinal locations, application of adaptive technologies, access to early warning information in respect of extreme weather and hydro meteorological events and ability to respond to emergencies and disasters. In all counts, sub-Saharan Africa is the least region to adequately respond to climate change and associated impacts and risks. This is so because the regions are heavily ravaged by poverty and diseases and hence lack the basic financial, technological and human capabilities to adequately respond to the risks and potential risks that would come with climate change.

This state of affairs portends grave danger for the sub-Saharan region given that climate change would come with serious health problems that could further compound the current high morbidity and mortality rates resulting from HIV/AIDS, Malaria, Cholera, Typhoid and Dengue Fevers among others.

Current health problem of sub-Saharan Africa

At the moment, sub-Saharan African has serious health problems. These serious health concerns are attributable to some factors related to geography, poverty, ignorance, culture, poor sanitation habits and lack of potable water and inadequate medical facilities. Only about 32 percent of sub-Saharan Africa use improves sanitation compares with above 90 percent in developed countries of the world. Also, only 55 percent (about half) of the people of sub-Saharan Africa have access to improve source of water, compared to about 98 percent in developed countries.

Under-five mortality rate range from 100 in Eritrea to 268 Sierra Leone per 1000 live births. It is between 2 and 5 per 1000 births in developed countries. Also, HIV prevalence amongst 15-49 age groups is very high in sub-Saharan Africa. It ranges between 0.1 to 0.3 percent in the developed countries of the world. But in sub-Saharan Africa, the value is between 0.9 percent in Senegal to as high as 17.0 percent in Zambia [5]. Life expectancy at birth in the developed world is high and ranges between 70-81 years. In Sub-Saharan Africa, life expectancy at birth ranges between 46 to 49.1 years. In Nigeria only about 4 percent of children aged 0-5 years used insecticide treated bed nets between 1999-2005, compared with 60 percent in Benin Republic and 69 percent in Central African Republic. (Human Development Report, 2007/2008) [5] and up till the present decade not much have change yet in these places while the level of climate change is fast increasing.

The health statistics presented above have vividly shown the serious health concerns of Sub-Saharan Africa, but this present situation would be made more pathetic by emerging health issues that are strongly associated with climate change. The next section of this paper would present these emerging health issues that are associated with climate change.

Direct and indirect impacts of climate change on human health

Temperatures are only part the story. The past years and decades have been characterized by retreating ice, record sea levels, increased ocean heat and acidification and extreme weather. These have combined to have major impacts on the health and well- being of humans and the environment, as highlighted by WMOs Provincial Statement on the State of the State of the Global Climate in 2019, which was presented at the UN Climate Change Conference, COP25 in Madrid, Spain. From the reports we can understand that there are many potential health impacts arising from climate change. Some of these impacts are beneficial, but many are very adverse. These impacts could also be direct or indirect. For example, deaths resulting from heat waves or cold spells are direct, but deaths caused by changes in the range and transmissibility of vector-borne infection diseases are indirect.

Indirect impact also includes death resulting from malnutrition (as a result of increasing food insecurity, lack of safe and adequate

water (as a result of water pollution) [6]. It should also be noted that climate change would and have been indirectly impacting on public health which depends a lot on such factors as sufficient food, safe drinking water, secure shelter, good social conditions; and a suitable environmental and social setting for controlling infectious diseases.

Climate change is expected to lead to more increase in the intensity of extreme weather events that can pose serious threat to humans and their environment. For example, heat waves, flooding, storms and drought can cause deaths, injuries, famine and the displacement of population (environmental refugees) and disease outbreaks (cholera, malaria, dengue fever, typhoid fever etc.).

An unstable and changing climate according to the WHO has the potential to affect human health in a number of ways. There will be risks of more deaths from climate - sensitive diseases such as diarrhea and malaria. There may be devastating indirect impacts on food crops and the availability of fresh water-invariably, the poor and elderly who are the most vulnerable will be the first and the hardest hit. Studies have established some relationships between extreme events such as droughts, floods, storm and wildfires which are linked to climate change directly to devastating human health that are most prevailing in our environment presently. Heat waves and winter storms both can cause upsurge in cardiac and respiratory deaths, floods can increase fungal growth and provide new breeding sites for disease carrying insects. Floods can also contaminate clean water sources by spreading pathogenic causing microorganism that cause diarrhea. Prolonged droughts punctuated by heavy rains can lead to the upsurge in the breeding of "nuisance organisms" such as insects and rodents [7] .

There are numerous impacts of weather on the general health of people and these include morbidity, short-term changes in mood, emotional well-being, and aberrations from normal behavior. For example, White (1985) and Goldestein (1980) cited by Eze [7], have noted that asthma attacks, many of which occur from inhalation of airborne agents such as spores and molds, appear to be related to various meteorological variables and that pneumonia, influenza and bronchitis are weather related.

How climate change will exacerbate sub-saharan human health problems

Sub Saharan Africa is currently grabbling with many serious health problems such as HIV/AIDs, Malaria, TB, Cholera diarrhea, typhoid and yellow fever. But it has been projected that climate change will further exacerbate these health concerns and this would further stretch the very lean health facilities in the region. This would lead to more mortality and morbidity in the region. Malaria is a major health concern in Africa and the tropics in general. Approximately 270 million people suffer from malaria worldwide. This disease lead to 1-2 million deaths annually and more than 90 percent of these deaths occur in Africa. Malaria is the major killer of children under the age of 5 in sub-Saharan Africa. As many as 800,000 of them die annually from the malaria scourge [5]. Malaria generally extends only to places where the minimum winter temperature is not lower than 16 °C but climate change is projected to bring warmer winters to many places and this would make new areas vulnerable to malaria attach.

In fact, malaria is already being reported at unusually higher elevations in the mountains of Central Africa as well as Ethiopia. Also, highland urban centers such as Harare, Zimbabwe and Nairobi (Kenya) are now at increasing risk of outbreaks. Rainfall, temperatures and humidity are the three variables that can strongly influence transmission of malaria and climate change will affect all the three factors. Increased rain, warmer temperatures and humidity create perfect condition for the spread of the plasmodium parasite that causes malaria. Rising temperatures can extend the range and elevation of mosquito populations as well as halving incubation periods. For sub-Saharan Africa any extension of the malaria range would pose grave risk to public health. Some four in five people in the region already live in malarial areas [5]. Apart from malaria, another disease whose prevalence would spread as result of climate change is dengue or break bone fever. Dengue is a very climate - sensitive disease which occurs regularly in Asia and Latin America but increasing flooding in Africa may create fresh breeding conditions for the rapid incubation of aedes aegypty, the mosquitoes that transmit dengue fever.

Climate change is strongly associated with increasing period of extreme weather events such as floods, droughts, storms and El Nino events and these extreme weather events lead to some serious public health consequences. For example, recent events extensive flooding over a long period of time have resulted in affecting large population in the affected regions. Apart from taking high toll on human lives and materials goods, it also led to outbreak of diseases such as cholera and diarrhea. Drought years are becoming more frequent and the events are also becoming more stretched resulting to severe famine, hunger, migration and poverty. These outcomes of increasing drought especially in Sudan, Ethiopia, Chad, Niger, Central African Republic, Somalia have created serious public health problems in these listed countries. The El Nina events are also becoming mow frequent and prolonged too. Climate impact assessments have pointed to higher summer - season temperatures, with increasing frequency and duration of heat waves. This portends serious danger to human health in the Sahelian region of Africa. Climate change could contribute indirectly to at least to three classes of wider health problems such as incidence of certain vector-borne diseases like West Nile virus, Lyme disease and malaria incidence may rise, water-borne disease organism to become more prevalent, and photochemical air pollution may increase. Generally, the displacement of people is projected to increase under continued climate change (IPCC 2014) [8]. Sub Saharan Africa will highly be impacted considering the drivers of migration which tends to be complicated with its cultural, economic, and political factors coupled with exposure to the non – climatic environmental factors of desertification and land degradation that affects food safety and security [9].

Discussion of the strategies for reducing the impacts of climate change on human health in sub-Saharan Africa

The first step toward addressing the issue of climate and health is to first determine the extent of climate change in the sub-Saharan

Africa. Detailed impact studies are necessary as this would bring out sector by sector, region by region, the direct and indirect impacts of climate change in Sub-Saharan Africa. The second step is to identify appropriate and detailed sustainable mitigation and adaptation measures to address climate change impacts. Mitigation measures should adequately address the issue of poverty, food insecurity, water scarcity, improved sanitation and improved facilities especially in the primary and secondary health institutions across Africa. This would position these institutions to effectively tackle and address new health concerns that result directly and indirectly from climate change. Malaria has been projected to affect more people and to reach new geographical areas because of climate change. Public health facilities should be expended to take care of this emerging situation. Strong public enlightenment should be mounted to secure necessary awareness about the importance of wider use of insecticide treated bed nets for malaria prevention and control. Sleeping under insecticide treated bed nets is a sure way of reducing malaria morbidity and mortality in sub-Sahara Africa.

Thirdly, Sub-Sahara Africa is projected to suffer from more frequent and more prolonged droughts. There is need to develop appropriate and sustainable water resources and irrigation models that would adequately address the issue of recurring droughts in African. Efforts should also be made to diversity agriculture to include both cropping and livestock holding, including fishery, honey beer rearing, piggery, poultry, snail rearing etc all these would help reduce dependent on reinforce agriculture.

Fourth, sub-Saharan Africa should reinforce her emergency response institutions for more effectiveness. This is very necessary because climate change would introduce a lot of new meteorological and generate more incidence of hydro meteorological hazards such as floods and tropical cyclonic activities to the continent. Flood victims should be promptly evacuated to safe points otherwise they may be quickly exposed to diarrhea and cholera epidemics that are usually associated with pathogenic contaminated flood environments. Heat wave and associated stroke should be adequately addressed in our public health institutions. Those prone to heat stroke (the aged and pregnant women) should be advised to reduce outdoor activities and to take a lot of water and other liquids to reduce dehydration associated with heat stroke.

Lastly, African Governments should muster the political will to address the issues associated with climate change because the projected risks are enormous and if not address early enough, the continent could be seriously endangered. And when to start the action is now.

Conclusion

The year 2020 has started out where 2019 left off with high impact weather and climate-related events. Unfortunately we expect to see much extreme weather through 2020 and coming decades fueled by record levels of heat-trapping greenhouse gases in the atmosphere going by the trend of recording the last ten years as the top warmest years in the ocean historically with modern instrument which began as far back as 1850. WMO [10] Climate change would impact very strongly on the public health of the people of sub-Saharan Africa Soaring temperatures would increase the prevalence of heat strokes and more droughts could generate malnutrition, hunger, poverty and increase in internally displaced persons [11]. Increasing floods could increase malaria and diarrhea epidemics. All these may increase infant and maternal mortality and morbidity in the continent. Sub-Saharan African governments are called upon to strengthen their public health institutions and position them to effectively face the public health challenges that would result from climate change [12].

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