International Journal of Public Health and Epidemiology ISSN 2326-7291 Vol. 4 (6), pp. 162-171, June, 2015.
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Case Study

Climate change impact on the health of African women and adaptation strategies

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Accepted 19 February, 2014

Climate change is now compromising the sustainability of human development on the planet because it threatens human health and the ecological support systems on which life depends. Health impact of climate change is grouped into direct and indirect effects depending on whether they occur predominantly via the impact of climate variables upon human biology or are mediated by climate-induced changes on biological and biogeochemical systems. Direct impacts stem from extreme events such as heat waves, floods, droughts, windstorms and wildfires. Indirect effects of climate change on health may arise from the disruption of natural systems, causing infectious diseases, malnutrition, food and water-borne illnesses and increased air pollution. These effects of climate change are more and expected to be experienced more in Africa. African women whether as resident or migrants are most vulnerable group because of their social role as managers of household resources (water, fuel, food and so on) and care givers. In addition, because of their biological and social disposition, African women are confronted with greater risk of these emerging health challenges due to climate change. This paper therefore discusses the climate change impact on the health of African women and the need for this most vulnerable group, to adapt strategically to these emerging health challenges due to climate change.

Key words: Climate change, impact, health, Africa women, adaptation strategies.

INTRODUCTION

The earth's climate has changed many times in response to natural causes, however since the 1900s our climate has changed rapidly due to persistent man made changes in the composition of the atmosphere or land use (African Women Development and Communication Network, 2013).

Intergovernmental Panel on Climate Change (IPCC) refers to climate change as any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), which defines "climate change" as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (WHO, 2009).

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The United Nations intergovernmental panel on climate change concludes that over consumption of food, material goods, fossil fuels and non renewable resources are putting a huge toll on planet exceeding its capacity to sustain us. Naturally occurring gases in the atmosphere, known as greenhouse gases (this includes carbon dioxide (CO2), trap this heat like a blanket, keeping the Earth at an average of 15 degrees Celsius – warm enough to sustain life and the over use of fossil fuels increases the CO_2 in the atmosphere, trapping more and more heat and warming the earth. As a result, we're seeing more dramatic weather patterns across the globe resulting in devastating natural disasters and shrinking the world's ice shelves and glaciers due to warming sea water. Because ice acts as a solar reflector, the less ice, the less heat the Earth reflects. Women and men face different vulnerabilities to climate change and environmental degradation (Earth Hour, 2013).

When floods strike or droughts persist, women are among the first to feel the impacts on their livelihoods, health and daily lives. As managers of household resources,

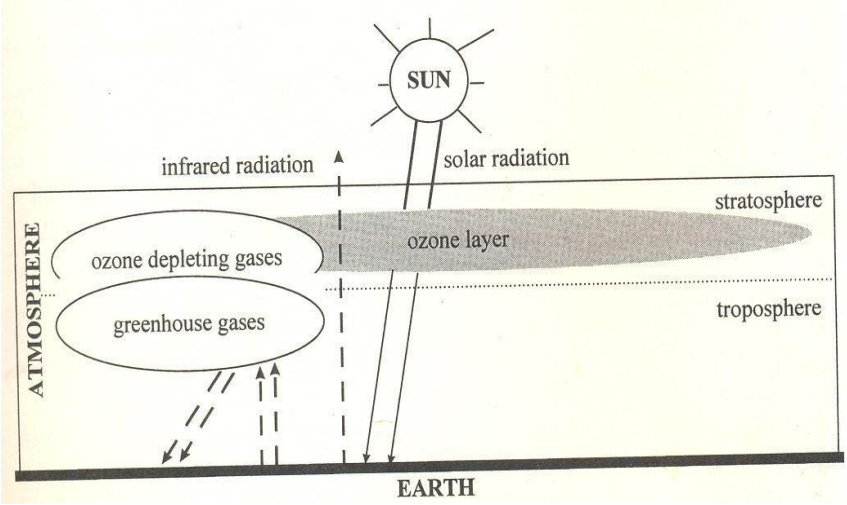


Figure 1. Illustration of the greenhouse effect and stratospheric ozone depletion.

Figure 2a & b. Women Carrying Firewood: (Sourse: WHO, 1987).

they may struggle to secure water, fuel and food. As small-scale farmers—the vast majority in some areas of the world—they have far fewer resources than men to cope with crop failures or pursue methods of farming more adapted to climate shifts. As migrants and refugees pushed from areas of climatic stress, they confront greater risks of disease and violence. During disasters that follow natural hazards, they count higher among the dead. Climate change is a ignificant and emerging threat to public health, especially to women. Generally women bear a disproportionate burden of climate change consequences such as decreased food security, impact on livelihoods, water resources-shortage and access and as primary care givers, increased burden of care giving. Karanja (2013) reported that experts have been analyzing the vulnerability of different sectors of economies due to climate change. In many parts of Africa, climate change threatens to unravel women's lives putting to danger decades of efforts aimed at improving women's lives and livelihoods. Unfortunately, women in rural areas lack knowledge on the imminent dangers posed by climate change. Despite the fact that women living in poverty are the most threatened by the dangers that stem from global warming, they are also key actors in ensuring their communities' ability to cope with and adapt to climate change. In general, women's lives are more intimately connected to the environment more than men.

There is an urgent need to increase women's economic equality, not only to reduce their vulnerability to the effects of global financial crisis but also as part of the effort to support equality in other priority areas including

Figure 3. The cutting of trees and loss of forest from logging (Sourse: WHO, 1987).

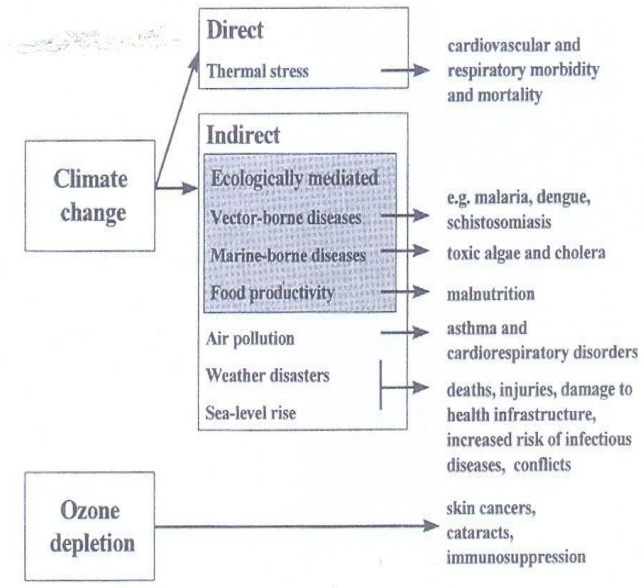


Figure 4. Health impacts due to climatic changes and ozone layer depletion. (Source: Paltz & Balbus, 1996).

participation in all levels of decision-making and elimination of violence against women (Earth Hour, 2013). The effects of climate change on a region are the same for all its inhabitants but men and women have different assets and resources at their disposal to tackle these effects. Women are therefore more vulnerable and the impact on their livelihood is greater (Gonzalez and Belemvire, 2001).

Experts said global warming may bring some localized benefits in certain areas, the overall health effects of a changing climate are likely to be overwhelmingly negative. Climate change affects social determinants of health - clean air, safe drinking water, sufficient food and secured shelter (All African Global Media, 2013).

Climate Change and Health

The major global environmental changes significantly affecting health according to WHO (1996) and McMichael (1996) include climate change and ozone layer depletion. Developing countries, like Nigeria have most vulnerable effects of climate change, Nigeria particularly; because of its dependency on climate-sensitive resources. The primary activity in Nigeria that adds to climate change is the release of harmful substances into the atmosphere from the oil and gas extraction sector, mainly from gas flaring throughout the Niger Delta and off shore. The secondary activity is the cutting of trees and loss of forest from logging and the use of trees as firewood and for wood-products. In fact, Nigeria destroys about 600,000 hectares of her forest annually in feeding these industries (Nwoke and Nwoke, 2008). And these have greatly affected the whole range of socioeconomic life of our people.

Direct impacts of climate change stem from extreme events such as heat waves, floods, landslide, droughts,

Figure 5. Rising-sea level and over floodingare major impact of climate change (Source: Nwoke and Oguariri, 1993).

windstorms and wildfires. Indirect effects of climate change on health may arise from the disruption of natural systems, causing infectious diseases, malnutrition, food and water-borne illnesses and increased air pollution (Nwoke and Nwoke, 2008).

Impact of Climate Change on Health

a) Heat waves and Ultra Violet Radiation (UV radiation)

Directly, an increase in mean summer and winter temperatures would mean a shift of the thermal-related diseases and deaths. National Science and Technology Council (2008) reported that there has been a 50% increase in the number of unusually warm nights, which deprives the body of breaks from the heat. These lead to death, especially in the cities. There is evidence that vulnerability varies by sex, more women than men died during the 2003 European heat wave (WHO, 2009).

Low-income families are especially vulnerable to heat because they may have less access to adaptive features (Hoerner and Robinson, 2008). Heat wave and UV radiation increase mortality and women are more at risk in relative and absolute terms of dying in such events (Kovats and Hajat, 2008).

b) Sea level rising/floods, Droughts, & Wildfires

Increase in temperature contributes to sea level rises and precipitation is becoming heavier in and more variable in many regions. The vulnerability is differentiated by social dimensions. Saline contamination of drinking water sources affected pregnant women resulting to hypertension, Pre-eclampsia and Eclampsia, though no formal epidemiological study was done, this was by doctors blamed on salinity (Khan et al., 2008).

Flooding is equally associated with stress related ill-nesses. Human settlement is affected by climate change in a variety of ways. These include extreme climatic changes such as sea level rise, tropical storms, flood, landslides, winds, heat and cold. It has already threatened the facilities of low-lying coastal populations at risk, as evidenced in Lagos, Nigeria and some of the coastal communities in the Niger Delta region in Nigeria.

Sea level rise has disrupted urban and rural population and led to their relocation. Again, the intense rainfall has continued to increase the risk of flooding, which introduces chemicals, pesticides and heavy metals into water systems and increase the risk of water-borne disease outbreak- causing high mortality and morbidity, especially among women and children.

Women and children mostly suffer from nutritional imbalances. Droughts as a result of climate change destroy crops and grazing land, reduce the quantity and quality of water resources and cause famine because they ruin crops; consequently resulting to malnutrition. In fact drought exacerbates extreme poverty and hunger and women are the worse hit. Pregnant and lactating women face additional challenges, as they have an increased need for food and water and their mobility is limited. Globally, at any given time, an average of 18–20% of the reproductive age population is either pregnant or lactating (Rohr, 2007). These biological factors create a highly vulnerable population within a group that is already at risk (Shrade and Delane, 2000).

The frequency and intensity of wildfires have been increased by drought. In addition to destroying homes and property, these wildfires can cause eye and respiratory diseases (Hoerner and Robinson, 2008). It also leads to post-traumatic stress disorder, grief, depression, anxiety disorders and drug and alcohol abuse. The group mostly affected are women.

Indirect Impacts

(a) One of the major indirect impacts of global climate

Figure 6a. Drought as a result of climate change destroy crops and grazing land. (Source: WHO, 2008).

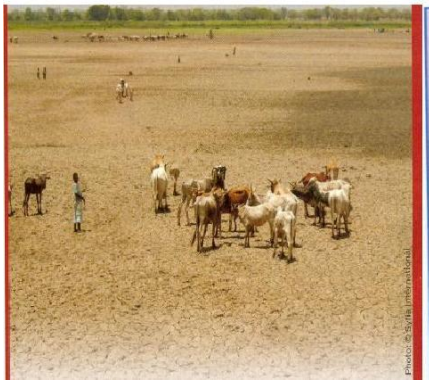


Figure 6b. Animals Looking For food

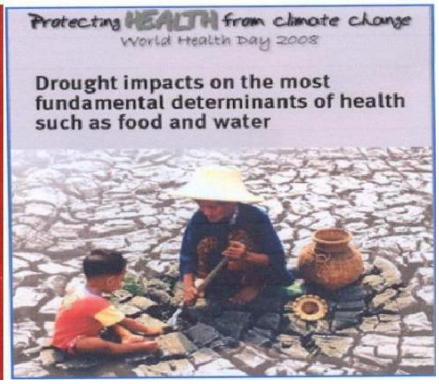


Figure 6c. A woman looking for water where there is none.

Drought reduce the quantity and quality of water resources, cause Famine and exacerbate extreme poverty and hunger (Source: WHO, 2008).

change upon human health could occur via effects upon cereal crop production. Cereal grains account for around 66% of all foodstuffs consumed by humans. These impacts would occur via the effects of variations in temperature and moisture upon germination, growth and photosynthesis, as well as via indirect effects upon plant diseases, predators-pest relationship and supplies of irrigation water. Globally, approximately 800 million people are currently undernourished.

Climate change is likely to further affect food production, distribution and storage, especially in sub-Saharan Africa (Epstein, 2005).

Resource scarcity coupled with population growth can lead to war, political instability, poverty, substance abuse, crop failure, rising consumer prices and the disruption of social structure. This again makes it difficult to ensure environmental sustainability and eradication of extreme poverty and hunger in affected areas. When there is such resource scarcity, famine and war, the women are mostly affected.

(b) Food and Water-borne Diseases

Water-borne pathogens often act in concert through two major exposure pathways: drinking water and recreational water use. WHO (1996) noted that with global climate change, outbreaks of food and water-borne infectious diseases such as diarrhea, Cryptosporidium, Giardia, Salmonella, E. coli and rotavirus are projected to increase. These diseases occur as a result of the contamination of water supplies through the disruption of water and sanitation systems, which can be caused by toxic runoff from increased rainfall and flooding (Patz, 2005; Kovats, 2004). Developing countries are particularly susceptible to this, as water carries wastes, shallow water provides breeding conditions for mosquitoes and drainage and sewage systems can become backed up. Water treatment facilities can become damaged, which can result in the distribution of untreated or improperly treated water. Sewer and water pipes can break, which can cause drinking water to become

Figure 7a & b. Bush burning (Source: WHO 2008).

contaminated with sewage. Floods can also transport fecal matter from the ground or sewers that have over flown and contaminate wells, boreholes and surface waters. Children are especially vulnerable to food and water borne-diseases because they are more likely to die from dehydration from diarrhea and vomiting. Minority children and children of lower socioeconomic status in areas that lack adequate capacity to provide food and water supplies are at the greatest risk (Kovats, 2004).

It is clear that in areas affected by food and water-borne diseases, it will be very difficult to achieve reduced child and maternal mortality and morbidity or to combat diseases. In view of the fact that women and children are most vulnerable to these diseases, universal primary education and gender equality and empowerment will be greatly hindered.

(c) Air Pollution and Aeroallergens

Extreme heat or higher temperatures cause ground-level ozone to increase, and short term exposure to ozone increases the rate and severity of asthma attacks, causes nasal and eye irritation, coughs, bronchitis, and respiratory infections. Again, higher temperatures enhance production of various secondary air pollutants and aeroallergens. Consequently, there is increase in the frequency of allergic and cardio respiratory disorders and deaths caused by these air pollutants. Urban air pollution may afterwards be costing a lot of people their health.

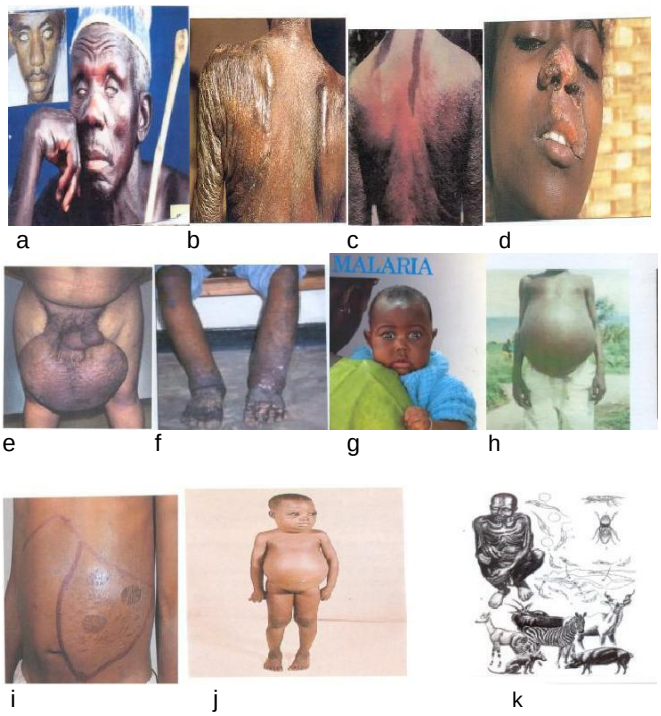
IPCC (2007) reported that children are more vulnerable to these effects because they take in more air per body weight than adults and have narrower airways. This therefore indirectly affects the mothers whose responsibility it is to take care of these children.

(d) Climate Change and Vector-Borne Diseases

The important determinants in the spread of vector-borne parasitic diseases are especially influenced by fluctuation in climatic variables, notably temperature, precipitation, humidity, surface water availability and wind as well as biotic factors. Against this background, the current climate change scenario is expected to cause widespread shift in the pattern of a number of infectious diseases and alter the life cycle dynamics of vectors and parasites (Nwoke et al., 2005). According to WHO (1996), vector borne diseases that are most likely to be affected by rising temperature are malaria (+++), schistosomiasis (++), river blindness/onchocerciasis (++) and dengue (++). Others that are less likely (+) include lymphatic filariasis, guinea worm, African and American trypanosomiases, leishmaniasis and yellow fever.

The influence of climate change on these vector-borne parasitic diseases can be direct or indirect on the vector biology. For instance, an increase in temperature accelerates the vector's metabolic rates, which consequently affects the nutritional requirement of the vector. Under such condition, the blood-sucking vectors, such as mosquitoes, sand flies and black flies feed more frequently, leading to increased egg production. This in turn increases the transmission potential of these vectors.

Other vector borne diseases have been observed to shift in their prevalence from known geographical boundaries. For instance, from 1953, the climatic conditions in the Sahel part of Africa (including Nigeria) have become drier and harsher and as a result, the northern boundaries of tsetse fly and African trypanosomiasis distribution have shifted 50-100km southwards (Laveissiere and Hervouet, 1991). This no doubt has contributed to negative impact on the trypano-



Figures 8a-k. (a) Anterior occular blindness, **(b)** Onchocercal atrophy of the skin, **(c)** Onchocercal Skin disease, **(d)** Leshmaniasis, **(e)** Scrotal elephantiasis, **(f)** elephantiasis of both legs, **(g)** malaria, **(h)** Hepatospleenomegaly due to schistosomiasis, **(i)** Gross enlargement of the spleen **(j)** Nephrotic syndrome in a child with pmalariae infection, **(k)** Man, Tse-Tse fly and reservoir host of schitosomiasis.

These vector borne diseases which are increased due to climate change cause tremendous pain and suffering ranging from ulcers, internal damage and disabling anaemia, to gross deformities of face and limbs, blindness, brain damage and death.

somiasis transmission and distribution in the Sahel region (Cattand, 1993). Linked also to higher temperature and low humidity is cerebro-spinal meningitis which endemicity boundary has now shifted southwards in Nigeria and leishmaniasis that hitherto none existing in Nigeria has now been reported in northern part of the country. Schistosomiasis is a major water-based parasitic disease and any climate change or environmental modification/degradation that affects the physical or chemical properties of the water bodies and human behavior as well as the contact of man with snail-infested water bodies will definitely affect disease emergence and re-emergence (Prah and James, 1997; Nwoke et al., 2005; Nwoke and Nwoke, 2008).

These vectors borne diseases cause tremendous pain and suffering ranging from ulcers, internal damage and disabling anaemia, to gross deformities of face and limbs, blindness, brain damage and death. They constitute public health problem and intense human suffering, often among the poorest people on earth; rob people of their dignity, independence and hope (Nwoke and Oguariri, 1993).

As a cause of high mortality, they remove individuals' supply of labour years in the future; as a cause of disability, they withdraw the affected persons' potential supply of labour years (Benton, 1998). Desertation or depopulation of some major agriculturally fertile villages in Nigeria; and consequent population maladjustment has been attributed mainly to parasitic diseases (Nwoke, 1990). The resultant economic losses due to inefficiency, low productivity, absenteeism at work as well as the cost of caring for the victims of these endemic diseases are quite prohibitive (World Bank, 1993).

In areas where climate change provoke these vector borne diseases it will be difficult to eradicate extreme poverty and hunger and the worse hit are women. Combating of endemic diseases in areas devastated by climate change can be very challenging.

Climate Change Adaptation Strategies

Adaptation to climate change or indeed climate variability is dependent on issues such as wealth, technological power, access to information, all of which are major problem areas for women (Parikh, 2013). Earth's climate will continue to change, hence adaptation strategies must be considered to reduce disease burdens, injuries, disabilities and death. Adaptation actions are adjustments in natural or human systems in response to actual or ex-

pected climatic stimuli or effects, which moderates harm or exploits beneficial opportunities. And the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or cope with consequences is the adaptive capacity.

Case studies related to gender and natural disaster showed that women make an important contribution to disaster reduction, usually informally through participating in disaster management and acting as agents of social change. Women's resilience and women's networks are particularly important in household and community recovery (IPCC, 2007b).

We therefore present here the key recommendations for policies and programs to address climate change adaptation related to injury, disease and death related to natural disasters and heat waves, food borne, water borne and vector-borne illnesses and premature death and disease related to air pollution as well as large human populations displaced by rising sea level, flood, drought and famine. These adaptive strategies when put in place will be of great help to man especially women who are the worse hit.

Immediate Adaptive Strategies

Rain harvesting and Bore holes

Extreme weather-related events can affect water availability, quality, or access, posing a threat to human populations. Rainwater harvesting and boreholes will create immediate alternative domestic water supplies, thereby reducing the outbreak of these water- and food borne diseases. The implementing agencies are the Communities, Local Government Areas, Water and Sanitation Authorities of countries and Federal Ministries of countries in collaboration with UNICEF and other related agencies.

De-silting of Earth Dams and Diversification of Occupation

To reduce the malnutrition resulting from total dependence on rain fed agriculture, there is need for immediate de-silting of dams, especially earth dams. Also diversification of occupation of the population will reduce malnutrition and ensure good health. Ministry of Agriculture and River Basin Development Authority should lead in this adaptive strategy.

Immunization and Treatment

In addition to vector borne diseases such as malaria, schistosomiasis, river blindness/onchocerciasis, dengue, lymphatic filariasis, African trypanosomiasis, leishmaniasis and yellow fever, other infectious diseases, especially water and food borne diseases (diarrhea, Cryptosporidium, Giardia, Salmonella, E. coli and rotavirus) are on the increase or projected to be on the increase with climate change. The immediate immunization and or treatment of affected population or at risk population will help to minimize mortality and morbidity associated with these diseases. Local Government Areas, State and Federal Ministry of Health have leading role to play in this strategy. Sustainability of such programs can be achieved by community ownership of such control/preventive adaptations.

Distribution of Insecticide Treated Nets

In-door biting insects transmit vector-borne diseases like malaria, dengue, lymphatic filariasis and yellow fever; and the distribution and use of insecticide treated nets have proved very useful in their control and prevention. Like in immunization and treatment, Local Government Areas, State and Federal Ministry of Health have leading role to play in this strategy. Again, sustainability of distributing these nets is achievable by community ownership of this adaptation.

Health Education and Awareness

Public awareness on how to identify and manage health disorders associated with climate change in Africa has an immediate priority. Building capacity is an essential preparatory step in adaptive strategy in climate change. Education and awareness-raising enable people to take well-informed sustainable decisions necessary to effectively adapt to health impact of climate change. All the tiers of Government in various countries and communities are important in this strategy. There is immediate need for education and mass media campaigns strong enough to spark commitment and action among governments, international organizations, donors, civil society, business and communities, especially among the young people to anchor health at the heart of the climate change agenda. Support outreach activities, using gender-sensitive information, education and communication strategies and materials for advocacy and training.

Maintenance of Primary Health Infrastructure to be Responsive

Immediate maintenance of primary health infrastructure specifically designed to reduce vulnerability to climate variability such as sanitation facilities, wastewater treatment system; laboratory buildings and so on enhance adaptive capacity. Others include surveillance of diseases, early warning system for impending weather extremes (for ex-

ample heat wave, storms) as well as disaster preparedness. The various Countries Federal, State and Primary Health Care Department working with LGAs and communities will definitely achieve the desired adaptation.

Provision of Adaptive Features against Thermal Related Disorders

Enhancing urban planning such as green spacing (planting tree within cities) and select materials with high albedo for roads, parking lots and roofs to reduce the urban "heat island" effect and reduce thermal related disorders. Implementation of climate-proofed housing design (shade, insulation, ventilation and air conditioning) as well as implementation of work schedules for outdoor workers that avoid peak daytime temperature are also immediate adaptive strategies. Empowerment of women to strengthen their capacity to question and change harmful behavioral norms that put them at risk in the case of extreme events. All the tiers of Government and communities are important in this strategy.

Long-term Adaptive Strategies

Construction of Water System with Strong Materials

To reduce constant destruction of water pipes by flood and the consequent water contamination and outbreak of water and food borne diseases, the need to build water system with strong material becomes obvious. The commitment of individuals, LGA, State and Federal Water Boards and Public Utility in the countries is required to achieve this long-term strategy.

Construction of Sea Level Rising and Flood Control Protecting Structures

- To reduce the destructive impact of flood, the need for relevant Environmental Protection Agency policy to implement construction of flood protecting structure becomes very important. This will involve the implementation of engineering measures such as strengthening of sea-walls and ensure strict adherence to building regulations and standards in hurricane prone areas.
- The adoption of land-use planning to minimize erosion, flash flooding, avoidance of poor sitting of residential areas and deforestation will be of immense help.

Strengthen the Primary Health Structure to be Responsive to Emergencies Associated with Climate Change

- In addition to health education, successful climate change adaptation requires information and skill. In general, countries and regions with more "human capital" or knowledge have greater adaptive capacity. Illiteracy increases a population's vulnerability to many problems. Health systems are labour-intensive and requires qualified and experienced staff, including those trained in the operation, quality control and maintenance of public health infrastructure. This requires both immediate and long-term actions from all the tiers of government.
- Maintenance and strengthening of emergency management and disaster preparedness programme, including local public health service capacity to conduct rapid health needs assessment and to make psychological support interventions are very necessary.

Construction of New Irrigation Projects and Facilities in Drought Prone Areas

- With the establishment of irrigation projects in drought prone zones, agriculture will no longer be rain fed. This will lead to increased food production and consequently reduce malnutrition.

CONCLUSION

Preparations for, and responses to, climate change need to be sensitive to gender dimensions of health care (including mental) and health-seeking behaviors.

Adaptation strategies need to take into account women's and men's relative and different capacities, power, social resilience, vulnerabilities and resources, because gender norms, roles and relations can either enable or constrain adaptive capacities.

Equity and social justice cannot be achieved without recognizing the differences in vulnerability and strengths of women and men and the various factors that contribute to vulnerability. Recognizing these differences is a necessary and important component of any prospective attempts to address the gendered health consequences of climate change. There is a need for the development of gender-responsive and accessible health services that reach the poorest populations, thereby addressing particular health needs of women throughout their entire life-cycle.

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