

EFFECTS OF CLIMATE CHANGE ON THE SOCIAL & ENVIRONMENTAL DETERMINANTS OF HEALTH IN AFRICA:

What can communities
do to strengthen their
climate resilience?





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Printed in the Republic of Congo

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1 INTRODUCTION

“ THE HIGHEST BURDEN PER CAPITA OF CLIMATE-SENSITIVE DISEASES SUCH AS MALARIA, PNEUMONIA, DIARRHOEAL DISEASES AND MALNUTRITION IS FOUND IN THE AFRICAN REGION ”



Climate change poses immediate and long-term threats to human health and survival across the globe.¹ Nowhere is this anticipated to have a greater impact than in Africa, where social, political, environmental and economic conditions are already fragile and are creating serious health vulnerabilities in many communities across the continent.^{2,3,4} The most severe and immediate effects will be felt by the rural poor.⁵

The highest burden per capita of climate-sensitive diseases such as malaria, pneumonia, diarrhoeal diseases and malnutrition is found in the African region. These diseases already represent the main cause of death among children under five in Africa,⁶ and climate change is expected to cause an overall net increase in the risk of such diseases.

The Intergovernmental Panel on Climate Change (IPCC) and the World Health Organization (WHO) have highlighted particular health vulnerabilities in the African region, mainly in relation to malnutrition, vector-borne diseases, food and water-borne infections and air pollution.^{5, 7, 8}

In the African region, health and environment challenges continue, these include but are not limited to; the provision of safe drinking water; sanitation and hygiene services; management of water, soil and air pollution; vector control and management of chemicals and waste; environmental health of children and women; and health in the workplace.⁹ All of these risks are strongly affected by socioeconomic conditions including; agriculture and food production; education; living and working conditions; unemployment; access to health-care services; housing; unplanned urbanization and urban migration (slums); and uncontrolled rapid population growth.^{10,11} These determinants of health outcomes are affected by climate change in diverse ways, increasing pressure on already overburdened and fragile health systems.¹²

Social determinants of health (SDH) refer to the conditions in which people are born, live and work.¹³ These conditions exist outside the domain where the health sector has direct influence. Social and environmental determinants are inextricably linked,¹⁴ and there is strong evidence that the health impacts of climate change disproportionately affect the poorest people and children, and in some specific situations

the level of risk can differ by gender and age.¹⁵ Overall, climate change is likely to aggravate existing health inequalities, both between and within populations.

Although, significant attention is being paid to the anticipated public health consequences of climate change, many key challenges still lay ahead. First and foremost are inadequate technical and institutional capacities, limited funds, weak health systems and weak inter-sectoral collaboration. In some cases, global and regional commitments have not been translated into national political commitments hindering effective action in many countries. Globally, the health sector has been slow to engage with climate-change issues, particularly when compared to sectors dealing with agriculture, water and environmental issues.

Until recently, much of the focus has been on interventions that are the responsibility of national and state public health agencies. These include top-down national and international processes such as the National Adaptation Plans of Action (NAPAs), National Adaptation Plans (NAPs) and Nationally Appropriate Mitigation Actions (NAMAs). Although these interventions are critical they will not be sufficient in themselves, even with optimal resources and engagement, unless additional activities are undertaken at local level by individuals within their communities.¹⁶

Communities constitute an essential component of national health systems and can play a key role in both climate change adaptation and mitigation.¹⁷ However effective participation of households and communities in the response system still remains rudimentary. In addition, many countries currently do not fully appreciate the possible health effects of climate change on local populations or the potential role of households and communities in adaptation and mitigation, and therefore less attention is being paid to these aspects.

In this paper, we present current evidence on how climate change impacts on social and environmental determinants of health and the link between these determinants and the vulnerability of local communities. We outline proven community-based interventions that local populations in developing countries can scale-up and take ownership of in order to strengthen their resilience to climate-sensitive diseases and conditions, including in the context of climate-induced disasters. Furthermore, this paper serves as a guide for countries to develop community-based Health Adaptation Programmes to climate change (c-HAPs).



2 COMMUNITY DEVELOPMENT, SOCIAL & ENVIRONMENTAL DETERMINANTS OF HEALTH, ECOSYSTEM DEGRADATION AND CLIMATE CHANGE - THE INEXTRICABLE LINKS



Climate change will increase the probability of extreme weather events, which may be associated with either high precipitation (i.e. storms, floods and landslides) or low precipitation (i.e. heat, drought and wildfires).⁵ Poor communities are likely to be most affected because of their precarious social and economic conditions, which include geographic location (such as flood or drought prone areas, sea, and slums and informal settlements), a heavy reliance on ecosystem goods and services and poor health coverage.¹⁸

Climate change can directly affect human health through injury, morbidity and mortality caused by

climate-induced extreme weather events.¹⁹ For example, in 2011, about 150,000 people were affected by floods and cyclones, causing 238 deaths and destroying farmland, homes and social infrastructure, including health facilities, in nine countries in southern Africa.¹

However, much of the health impacts of climate change are indirect through their effect on social and environmental determinants of health.¹² Climate change affects public health and well-being through its effect on the social and environmental determinants of health including access to and quality of drinking water, air pollution, food security, safety and nutrition and disease vectors.²⁰

POOR COMMUNITIES ARE MOST AFFECTED BY THE NEGATIVE EFFECTS OF CLIMATE CHANGE

THE EFFECTS OF CLIMATE CHANGE INCLUDE:

EXTREME WEATHER EVENTS



A DECREASE IN ACCESS TO SAFE WATER



A DECREASE IN AIR QUALITY



A DECREASE IN FOOD SECURITY



AN INCREASE IN CLIMATE-SENSITIVE DISEASES



THESE MOSTLY AFFECT POOR COMMUNITIES

They have precarious social and economic conditions

They live in risky geographic locations with poor infrastructure

They are reliant on ecosystem goods

There is poor health coverage

ⁱ OCHA, world humanitarian data and trends (2014)



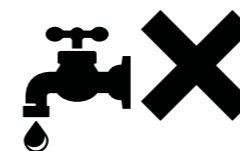
2.1 Climate change and safe drinking water and sanitation:

Over 70% of the population in sub-Saharan Africa relies on drinking water sources such as boreholes and improved wells.²¹ Under climatic stress, water infrastructure can be damaged and surface water inundated and polluted. This can lead to water scarcity and increased competition for water resources, disruption of waterborne sanitation systems, contamination of drinking water and exacerbation of the spread of disease such as cholera, typhoid and shigellosis. Water and food contamination will become a greater public concern particularly in areas where the vast majority of the population do not have access to improved sanitation services, practice open defecation or both. Water scarcity may also result in an increase in the cost of water and sanitation provision to the detriment

of the most disadvantaged social groups - for instance, rural and slum settings dwellers.²²

According to a WHO/United Nations Children's Fund (UNICEF) Joint Monitoring Report published in 2015,²¹ though sub-Saharan Africa fell short of the MDG target for drinking water, the proportion of people using improved drinking water sources increased by 20% between 1990 and 2015. However, this figure hides huge social inequalities and inequities. According to the same source, in 2015, it is estimated that 319 million people in sub-Saharan Africa are still using unimproved drinking water sources, including unprotected wells and springs and surface water. Rural populations are particularly disadvantaged, accounting for 93% of people relying on surface water. Seven in ten of the 159 million people depending on water taken directly from rivers, lakes and other surface water live in sub-Saharan Africa.²¹

WATER AND SANITATION - IN PICTURES:



319 million people in Sub-Saharan Africa are still using unimproved drinking water sources



7 in 10 of the **159 million** people depending on rivers, lakes and other surface water live in sub-saharan Africa

2.2 Climate change and air quality

Indoor air pollution usually results from the burning of wood, coal or paraffin for space heating, cooking and lighting purposes.²³ Outdoor air pollution is largely a consequence of fossil fuel combustion for transport and electricity generation, industrial non-fossil fuel emissions and other human activities.

The two air pollutants of most concern for public health are surface ozone and particulate matter.²⁴ Particulate matter (PM) includes, as principal components, sulfate, nitrate, organic carbon, elemental carbon, soil dust and sea salt. The first four components are mostly present as fine particles less than 2.5 mm diameter (PM2.5) and these are of most concern for human health.²⁵

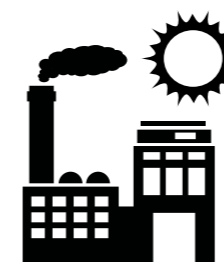
Air quality is strongly dependent on weather and is therefore sensitive to climate change.^{24,26,27} Recent studies have demonstrated that climate change will drastically increase summertime surface ozone and PM concentrations in polluted regions in the coming decades, with the largest effects being seen in urban areas.²⁶

Household (indoor) air pollution accounts for approximately 4.3 million deaths each year, while

3.7 million deaths are attributed to ambient (outdoor) air pollution mostly from urban exposure.²⁸ While all populations are affected by air pollution regardless of income status, the disadvantaged, such as urban slum dwellers and rural communities are often exposed to higher levels of indoor air pollution and are by far the most heavily affected.²⁹ For example, indoor air pollution from the use of biomass and charcoal as cooking and heating fuel in rural parts of developing countries is the second most important environmental cause of disease after contaminated water and more than one third of all child deaths caused by indoor air pollution occur on the African continent.

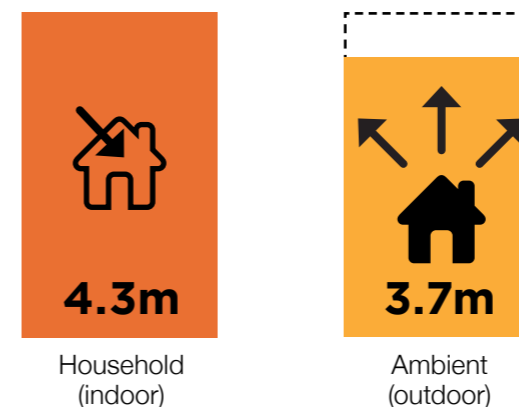
Land transport has emerged as a major source of outdoor air pollution in many parts of Africa.³⁰ With population growth and rapid urbanization, land transport has increased tremendously but without adequate controls or inspection procedures for automobile exhaust gases. For example, according to a study conducted in 2009 in Kenya, mean daytime concentrations of traffic-related particulate matter (PM2.5) in and around Nairobi City ranged from 10.7µg/m3 on a rural background site, to 98.1µg/m3 on a sidewalk in the central business district.³¹ In addition to its impact on health, this type of pollution also contributes to greenhouse gas emissions.

AIR QUALITY - IN PICTURES:

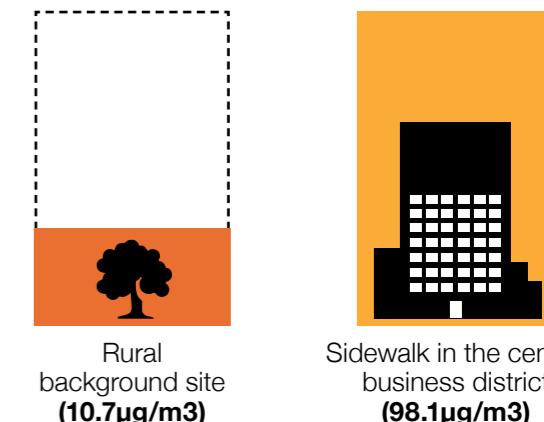


Air quality is strongly dependent on weather and is therefore sensitive to climate change

Annual deaths from air pollution



Concentration of traffic related particulate matter Nairobi, Kenya in 2009





2.3 Climate change and food security, safety and nutrition

The Intergovernmental Panel on Climate Change (IPCC) projections of climate change's impact on health show that in some regions of sub-Saharan Africa, where people are reliant on rain-fed agriculture, yields could be reduced by up to 50% by 2020 putting millions of people at risk of food insecurity and malnutrition and its consequences, including stunting, increasing community vulnerability to climate-sensitive health outcomes.³²

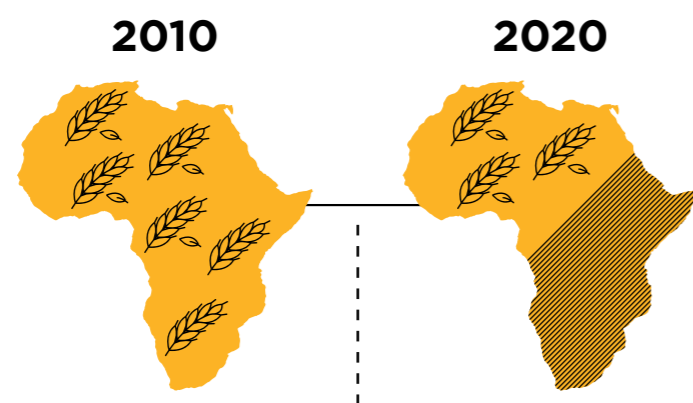
Changes in rainfall patterns, temperature, sea level and flooding of coastal lands, seasonality and drought affect food production and security.³³ These may also increase water scarcity and cause the collapse of ecosystems that provide livelihoods. For example, in 2010, 31 million people were affected by drought because of a poor rainy season in the Sahel.³⁴ In addition to their effects on food security,³⁵ weather and climate affect the nutritional value and safety of food³⁶. For example, outbreaks of mycotoxins, which contaminate food supplies and can cause high levels of morbidity and mortality, occur in unusually warm and humid years.³⁷

2.4 Climate change and disease vectors

The effects of climate change on vector and vector-borne diseases have been extensively reviewed.^{38,39} The distribution and intensity of vector-borne diseases such as malaria, lymphatic filariasis, dengue, Rift Valley fever, are heavily affected by climate change⁴⁰ and have wider socioeconomic impacts, increasing health inequities, and acting as a brake on socioeconomic development. For example, WHO estimates that in 2012, 90% of the estimated 627,000 deaths attributable to malaria worldwide occurred in the African Region.⁴¹ The burden of climate-sensitive diseases is greatest for the poorest populations.⁴² Climate and weather conditions exert a range of indirect effects on vector-borne diseases through broader effects on the natural environment and on human systems, for example because drought may affect water-storage, land-use and irrigation practices and population movement, in turn affecting vector ecology and human exposure to infection.

For example, malaria is a climate-sensitive disease, whose global and regional distribution and seasonality are closely linked to temperature, rainfall, humidity and socioeconomic development.⁴³ Likewise, the

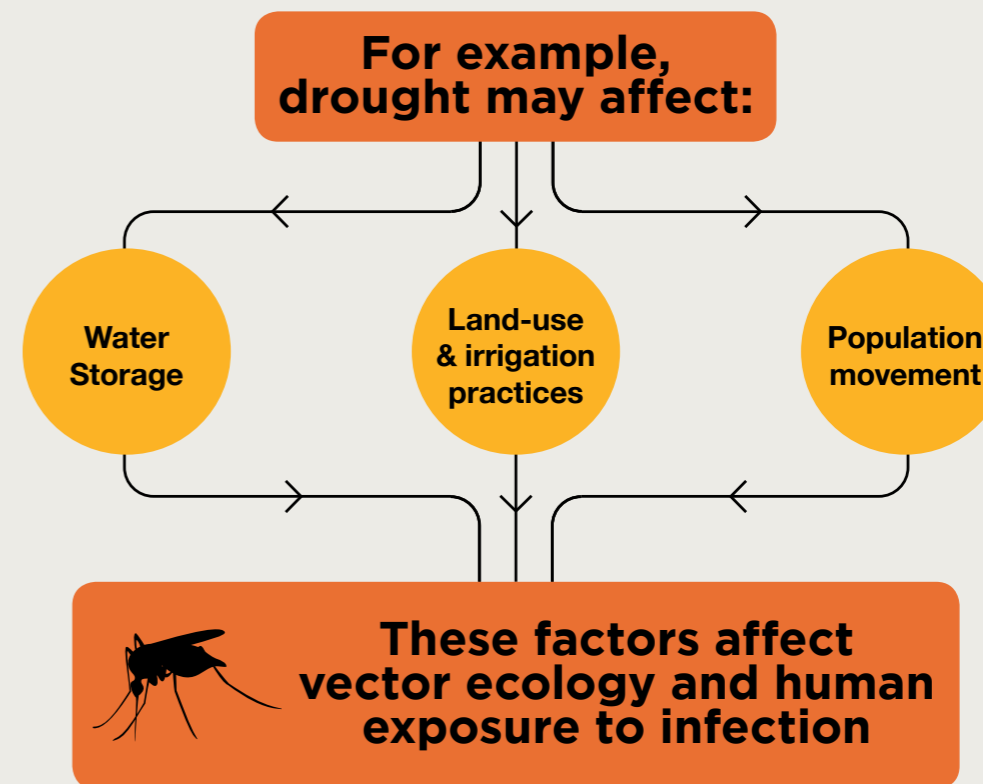
CLIMATE CHANGE POSES A THREAT TO FOOD SECURITY IN AFRICA



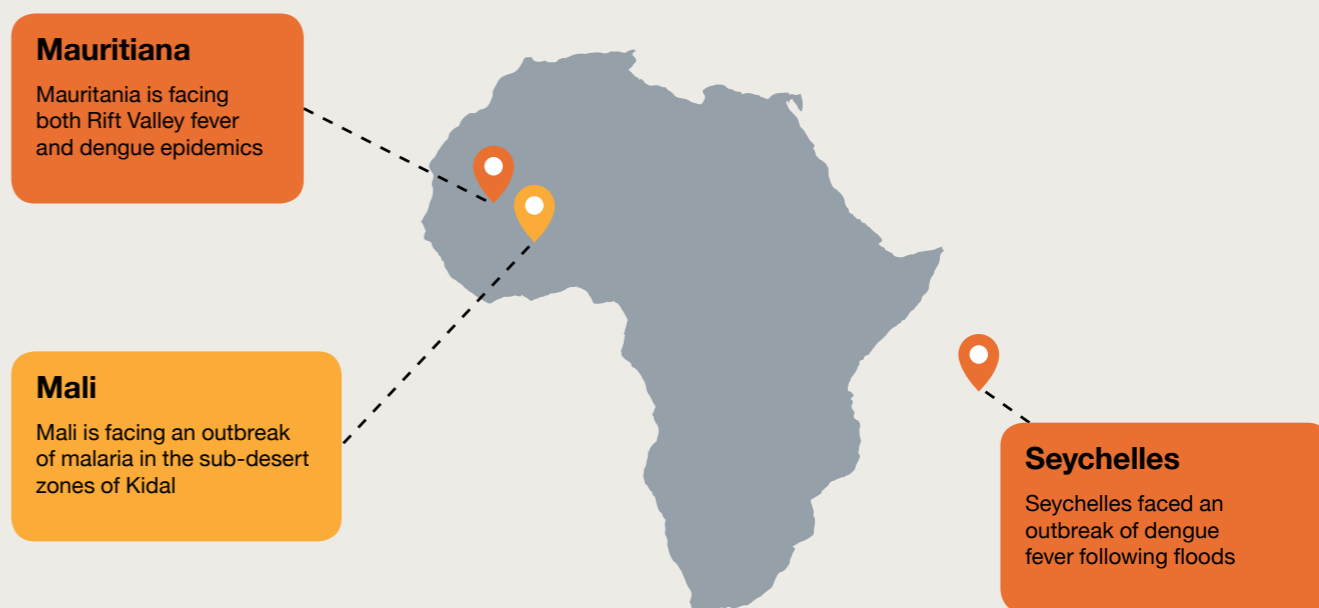
Yields in sub-Saharan Africa could be reduced by up to **50% BY 2020** putting millions of people at risk of food insecurity issues and malnutrition

+ Mycotoxins contaminate food supplies in unusually warm and humid years

CLIMATE CHANGE POSES SERIOUS CONCERNS FOR THE SPREAD OF CERTAIN VECTOR-BORNE DISEASES



EXAMPLES OF COUNTRIES FACING CLIMATE-SENSITIVE DISEASE OUTBREAKS INCLUDE:





epidemiology of dengue is strongly affected climate change and socioeconomic conditions.^{44,45} Rift Valley fever is associated with livestock keeping in arid and semi-arid areas. These areas are normally expansive plains that are prone to flooding after exceptionally heavy rains (50% above normal). In 2014, Seychelles faced an outbreak of dengue following heavy rains that caused flooding in many areas in the country. In 2015, because of excessive rainfall coupled with socio-political disruption, Maliⁱⁱ and South Sudan are experiencing outbreaks of malaria in the sub-desert zones fringes. Mauritania also faced both Rift Valley fever and dengue epidemics.

2.5 Environmental footprint of community development

Though new technologies have substantially boosted overall productivity to satisfy the growing consumer demand associated with exponential population growth, this can have both direct and indirect negative impacts on population health and well-being. Thus, the potential benefit of increased productivity to disadvantaged communities tends to be offset by its adverse impact on human health and ecosystem integrity.

Regardless of climate change, social and environmental determinants of health (drinking water, air, nutrition, disease vectors) are affected by community development activities including housing, food production and consumption, transport, energy and heating. Table 1 (Annex) summarises the negative effects of communities' development activities on key environmental and social determinants. The table also shows actions that could be taken by households and communities in order to potentially halt or reverse the negative impact of climate change on populations.

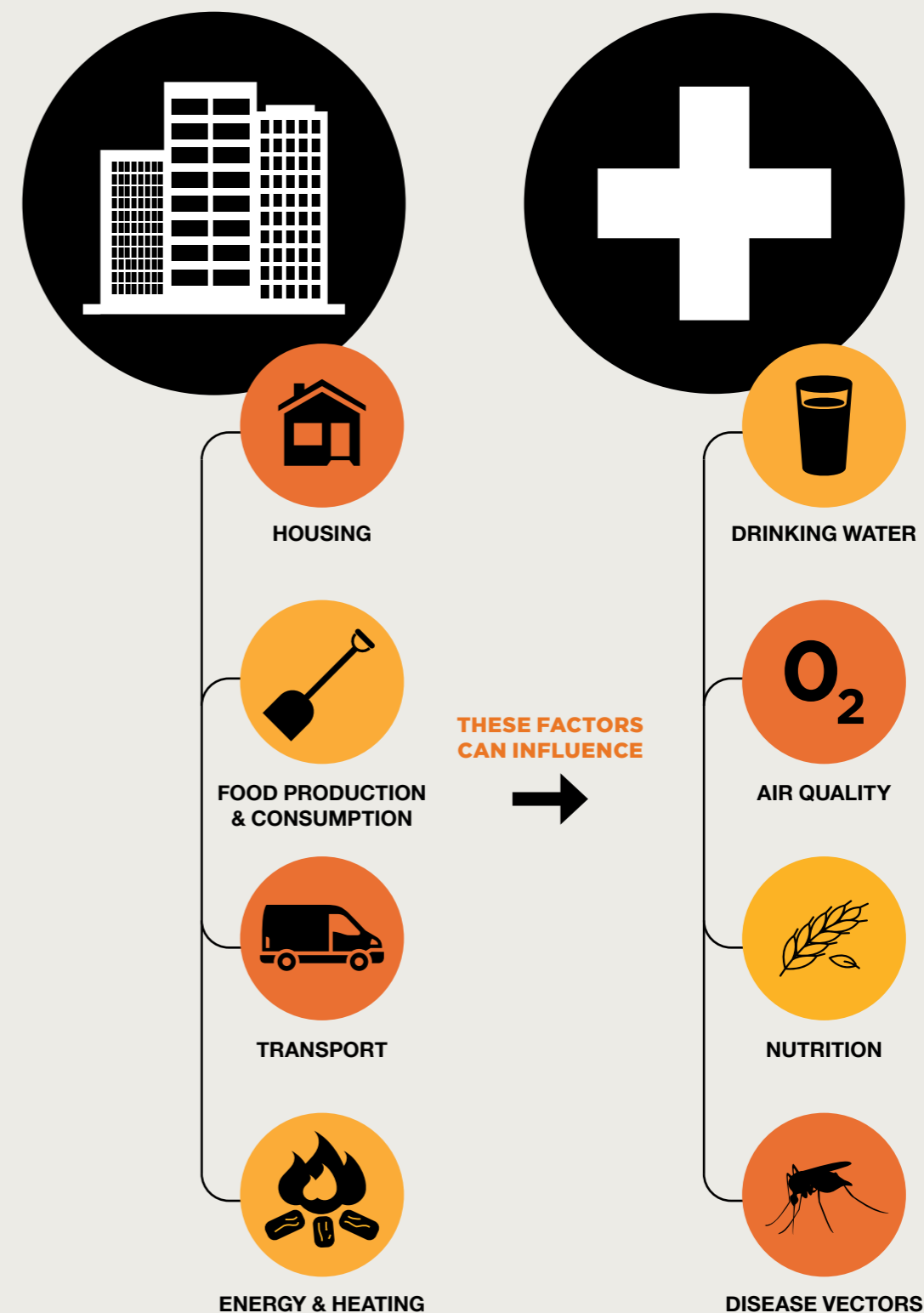
Communities are contributing to greenhouse gas emissions through land use patterns, mainly tropical deforestation and land transport. An example is the slash-and-burn agriculture

system (or burning)⁴⁶ in which the fields are cleared by fire, cultivated for a relative short period of time and then left fallow. This extensive and itinerant agricultural practice leads to substantial land degradation and deforestation in the tropics. Burning is also a big emitter of Short-Lived Climate Pollutants (SLCPs), including black carbon and ozone. In addition to its effect on greenhouse gas emissions, the consequent deforestation and ecosystem degradation associated with this agricultural practice can create unfavourable environmental conditions and exacerbate the spread of diseases including malaria, haemorrhagic fever, filariasis, leishmaniasis and cholera.ⁱⁱⁱ

Similarly, in drier ecosystems, communities build irrigation systems to adapt to water resource scarcity while improving food production.⁴⁷ This irrigated cultivation practice and related water spillage contribute significantly to an increased water and vector-borne disease burden.⁴⁸ In rural African savannah, most mosquito breeding sites are man-made.^{47,49} Actions by communities including construction, deforestation and land-use changes can lead to the creation of anthropogenic larval habitats favourable for disease vectors. On islands such as Cape Verde and Comoros, community level water reservoirs are a breeding ground for mosquitoes during the long dry season. Similarly, brick production for housing creates ponds and stagnant water bodies that are suitable breeding sites for mosquitos and other disease vectors after floods.

Communities themselves can exacerbate environmental risk factors to human health and ecosystem integrity including climate change. Regardless of the effects of climate change, the current environmental footprint of communities is not sustainable. Conversely, grassroot actions taken at the community level can promote environmental integrity, sustainable community development and reduce their carbon footprint. Engaging communities in this broader process of adaptation will not only enhance their resilience to climate stressors, but will in all probability increase their ability to cope with a wide range of other societal issues.¹⁶

COMMUNITY DEVELOPMENT CAN HAVE BOTH DIRECT AND INDIRECT NEGATIVE IMPACTS ON POPULATION HEALTH AND WELL-BEING



ⁱⁱ <http://maliactu.net/mali-recrudescence-du-paludisme-au-mali-la-situation-sous-contrôle>
ⁱⁱⁱ <http://www.prb.org/Publications/Reports/2001/HealthyPeopleNeedHealthyForests.aspx>



3

ADAPTATION AND MITIGATION IN THE AFRICAN REGION - A POTENTIAL ROLE FOR COMMUNITIES

Until now, the focus of African governments has been on top-down approaches and interventions that are the responsibility of national and state public health agencies. For example, African countries have established inter-sectoral coordination mechanisms including the establishment of multi-sectoral Country Task Teams (CTTs)^{iv} to undertake joint planning and implementation of Health National Adaptation Plans (HNAPs). As part of the process of implementation of these plans, funds have been mobilized to support countries in carrying out large-scale projects on the impact of climate change on diarrhoeal and vector-borne diseases. Although these interventions are critical, they will not be sufficient in themselves, even with optimal resources and engagement, so long as target communities are not fully engaged in the response system.¹⁶

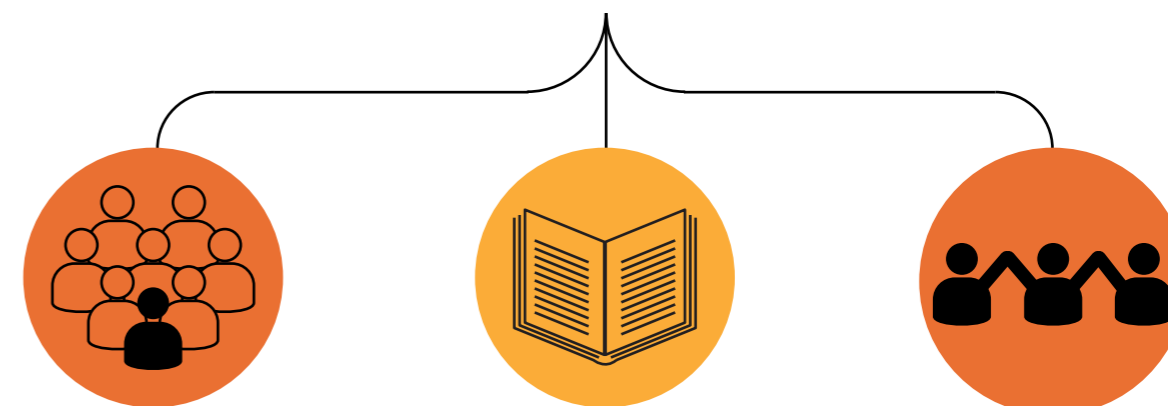
Adaptation in general, and community adaption in particular, requires strengthened partnerships and inter-sectoral collaboration, heightened advocacy, increased resources and reinforced community systems to address the public health impacts of climate change at grassroots level. Community-based adaptation to climate change is a community-led process, based on community priorities, needs, knowledge and

capacities, which should empower people to plan for and enable them to cope with the impacts of climate change.¹⁸

So far as public health is concerned, adaptation is all about prevention. It is recognized that climate change will not only create new health risks but will exacerbate already-existing public health threats. Proven and cost-effective public health interventions already exist to reduce climate-sensitive risks to health and to improve health while reducing emissions of climate pollutants. Consequently, programmes for health adaptation to climate change may not necessarily bring new interventions, but will rather require better integration, organization, management and strengthened implementation of existing policies and strategies in ongoing health and environment scenarios.

Communities can play important roles in climate change adaptation and mitigation in diverse ways. These include reinforcing existing community systems for leadership and stewardship roles, improving community literacy on health, environment and climate change, social and behavioural change, and community empowerment for effective adoption and deployment of simple, cost-effective interventions.

COMMUNITIES CAN PLAY IMPORTANT ROLES IN CLIMATE CHANGE ADAPTATION AND MITIGATION THROUGH:



STRENGTHENING LEADERSHIP/ STEWARDSHIP ROLES

LITERACY IMPROVEMENT

COMMUNITY EMPOWERMENT

The framework of community-based Health and Adaptation Plan (c-HAPs) will encompass:

- (a) identification of locally important environmental health problems;
- (b) health and environmental risk assessments related to the above, including natural risk factors and also community environment footprints. These may be the result of agricultural practices, land transport, mining, fishing, construction etc. These assessments will include local health conditions that climate change is likely to exacerbate and to health services coverage;
- (c) analysis of community systems, including social organization, capacity, social cultures, mapping of existing community-based organisation, NGOs, women's associations, religious leaders, corporate groups and farmers as appropriate to the locality;
- (d) mapping of community-based interventions to address identified risks. This will include ongoing interventions that communities are already implementing and the supplementary activities needed to address the additional risk that climate change will bring;
- (e) packaged interventions to enable synergies and integrated delivery such as: Household Water Treatment (HWT), cleaner household energy, integrated vector management, improved land use and improved housing, using local resources, knowledge and awareness creation etc.;
- (f) preparation of community plans of joint action (participatory planning);
- (g) resource mobilization including use of climate funds and carbon credits; and
- (h) implementation, monitoring and evaluation of the community plans of joint action.

^{iv}The main sectors represented in a CTT include: health, environment, agriculture, academia, research and management of water resources and other related areas such as local governance, civil society organizations and NGOs.



THE DEVELOPMENT OF COMMUNITY-BASED HEALTH AND ADAPTATION PLAN (C-HAPS) WILL ENCOMPASS:

3. ANALYSING COMMUNITY SYSTEMS

Analysis of community systems, including social organization, capacity, social cultures, mapping of existing community-based organisation, NGOs, women's associations, religious leaders, corporate groups and farmers as appropriate to the locality

4. MAPPING INTERVENTIONS

Mapping of community-based interventions to address identified risks. This will include ongoing interventions that communities are already implementing and the supplementary activities needed to address the additional risk that climate change will bring

5. PACKAGING INTERVENTIONS

Packaged interventions to enable synergies and integrated delivery such as: Household Water Treatment (HWT), cleaner household energy, integrated vector management, improved land use and improved housing, using local resources, knowledge and awareness creation etc.

2. ASSESSING RISK FACTORS

Health and environmental risk assessments related to the locally significant environmental health problems, including natural risk factors and also community environment footprints. These may be the result of agricultural practices, land transport, mining, fishing construction etc. These assessments will include local health conditions that climate change is likely to exacerbate and to health services coverage

1. IDENTIFYING HEALTH PROBLEMS

Identification of locally important environmental health problems

6. PREPARING PLANS

preparation of community plans of joint action (participatory planning)

7. MOBILIZING RESOURCES

Resource mobilization including use of climate funds and carbon credits

8. IMPLEMENTING PLANS

Implementation, monitoring and evaluation of the community plans of joint action.





ELEMENTS OF COMMUNITY-BASED HEALTH INTERVENTIONS ARE:

Engaging communities in the c-HAP process will not only enhance their resilience to climate change, but will in all likelihood reduce their environmental footprint as well as increase their ability to manage an extensive range of other local development issues.¹⁶

The role of government, national and international agencies, including the WHO, is to create an enabling environment for the preparation and implementation of c-HAPs.

This includes:

- Health education and technology transfer such as promoting resilient technologies, adapting or updating technical norms and regulations and enhancing management of services.
- Predicting (modelling) additional risks associated with climate change to be factored into community plans.
- Mobilizing the additional financial resources needed.
- The development of early warning systems that combine climate sciences and epidemiology with integrated community communication.
- Support operational research, monitoring and evaluation.

Today, simple, affordable, acceptable, and environmentally friendly community-based interventions tools are available. Community sensitization and awareness raising, and monitoring by community health workers has contributed to enhanced community uptake of community-based interventions.

For example, integrating vector control interventions in rural development and community extension programmes such as the Farmer Fields Schools (FFS) on integrated pest⁵⁰ management can significantly contribute to a reduction in the burden of vector-borne diseases.⁵¹ Similarly, improving housing can reduce indoor air pollution and mosquito density.^{52,53,v} Additionally, in water-stress conditions that occur consequent to extreme climate events (floods and drought), communities can be organized and mobilized to concertedly manage their own water sources. When compared to urban settings,

communities in rural and semi-urban areas are more reliant on improved water sources such as boreholes, protected wells and pumps, than on piped water. In these conditions it is of paramount importance that communities are trained in the maintenance of water pumps and in water treatment techniques. Furthermore, as the vast majority of the rural African population still practices open defecation, which increases the risk of water pollution and food contamination, behavioural-change strategies such as Community-Led Total Sanitation (CLTS)⁵⁴ can bring about important changes.

Many sources of air pollution (combustion of fossil fuels and biomass) are also sources of greenhouse gases. Measures that address these sources (cleaner household energy sources such as liquefied petroleum gas, biogas and improved cookstoves) can have significant benefits for health, both in terms of the direct impacts of air pollution and in terms of the indirect health impacts of climate change. Community sensitization to switch toward walking and cycling can reduce the incidence of non-communicable diseases related to physical inactivity and reduce outdoor air pollution. Furthermore, an increased use of public transport is likely to reduce emissions of air pollutants.

The inextricable links between the socioeconomic and environmental determinants of health, climate change and community systems leads¹⁴ to the realization of the need for integrated delivery of community-based interventions. Combining HWT with the promotion of clean household energy (improved cookstoves) has a dual impact on both climate change adaptation and mitigation through the reduction of waterborne diseases and indoor air pollution. This in turn contributes to a reduction in the current pace of desertification and, therefore, to curbing pressure on biomass use and ecosystems.

Improving community literacy on health, environment and climate change issues is critical in order to have an empowered community ready to take appropriate action to protect the health and well-being of the population.



^vRoll Back Malaria Partnership 2015. Housing and Malaria. Consensus Statement. Geneva, Switzerland



The DelAgua Health's Rwanda Programme,^{vi} the biggest integrated community action plan to date, is a good example of engaging communities to become actors in developing their own resilience. This joint HWT and improved cookstove project distributed 600,000 advanced water filters and 600,000 high efficiency cookstoves to the poorest 30% of households, targeting about three million people. *The DelAgua Health Programme* provided health education and training at local level so as to ensure proper use of the stoves and filters. This programme, partially funded by carbon credits, was fully adhered to by the communities concerned.

In Ethiopia, combined delivery of primary prevention interventions as an essential package (a health extension package) comprising disease prevention and control, family health, hygiene and environmental sanitation, health education and communication at community level through Health Extension Workers (HEWs) has had a demonstrable impact on health outcomes by

bringing health services to disadvantaged population groups living in remote areas.^{55,56}

Regarding food safety and nutrition, climate change can have both direct and indirect impacts on the emergence of risks to food safety at different stages of the food chain. For instance disasters are associated with an increased incidence of water and food-borne diseases. The Five Keys to Safer Food^{vii, 57, 58} is an effective, affordable approach that communities can use in order to help reduce the burden of disease associated with water and food contamination. Concerning food security, the development of auto-generated and self-managed cereal banks by rural communities in West Africa is an effective mechanism of cyclical food crisis management at community level.^{viii} Cereal banks can promote community Famine Early Warning Systems (FEWSs) and build community resilience to food scarcity. The public health aspect of promoting cereal banks includes training in cereal stock handling.

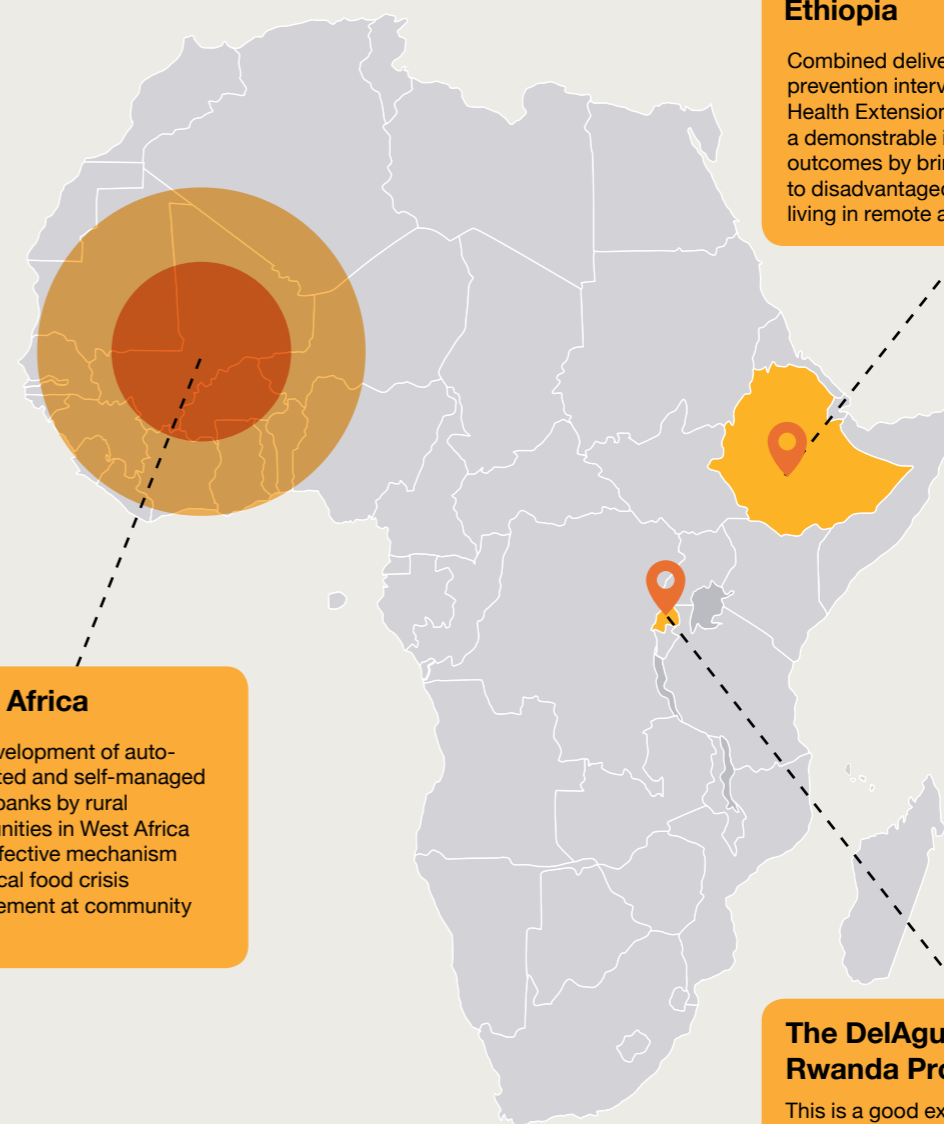


^{vi} <http://www.delagua.org/projects/rwanda>

^{vii} The Five Keys to Safer Food: 1. keep clean; 2. separate raw and cooked; 3. cook thoroughly; 4. keep food at safe temperatures; and 5. use safe water and raw materials

^{viii} http://fsq.afre.msu.edu/mali_fd_strtg/stockage_des_produits-csa.pdf

EXAMPLES OF SUCCESSFULLY IMPLEMENTED COMMUNITY RESILIENCE STRATEGIES



Ethiopia
Combined delivery of primary prevention interventions by the Health Extension Workers has had a demonstrable impact on health outcomes by bringing health services to disadvantaged population groups living in remote areas.

West Africa
The development of auto-generated and self-managed cereal banks by rural communities in West Africa is an effective mechanism of cyclical food crisis management at community level.

The DelAgua Health's Rwanda Programme
This is a good example of engaging communities to become actors in developing their own resilience. This joint HWT and improved cookstove project distributed 600,000 advanced water filters and 600,000 high efficiency cookstoves to the poorest 30% of households, targeting about three million people.

4 CONCLUSION



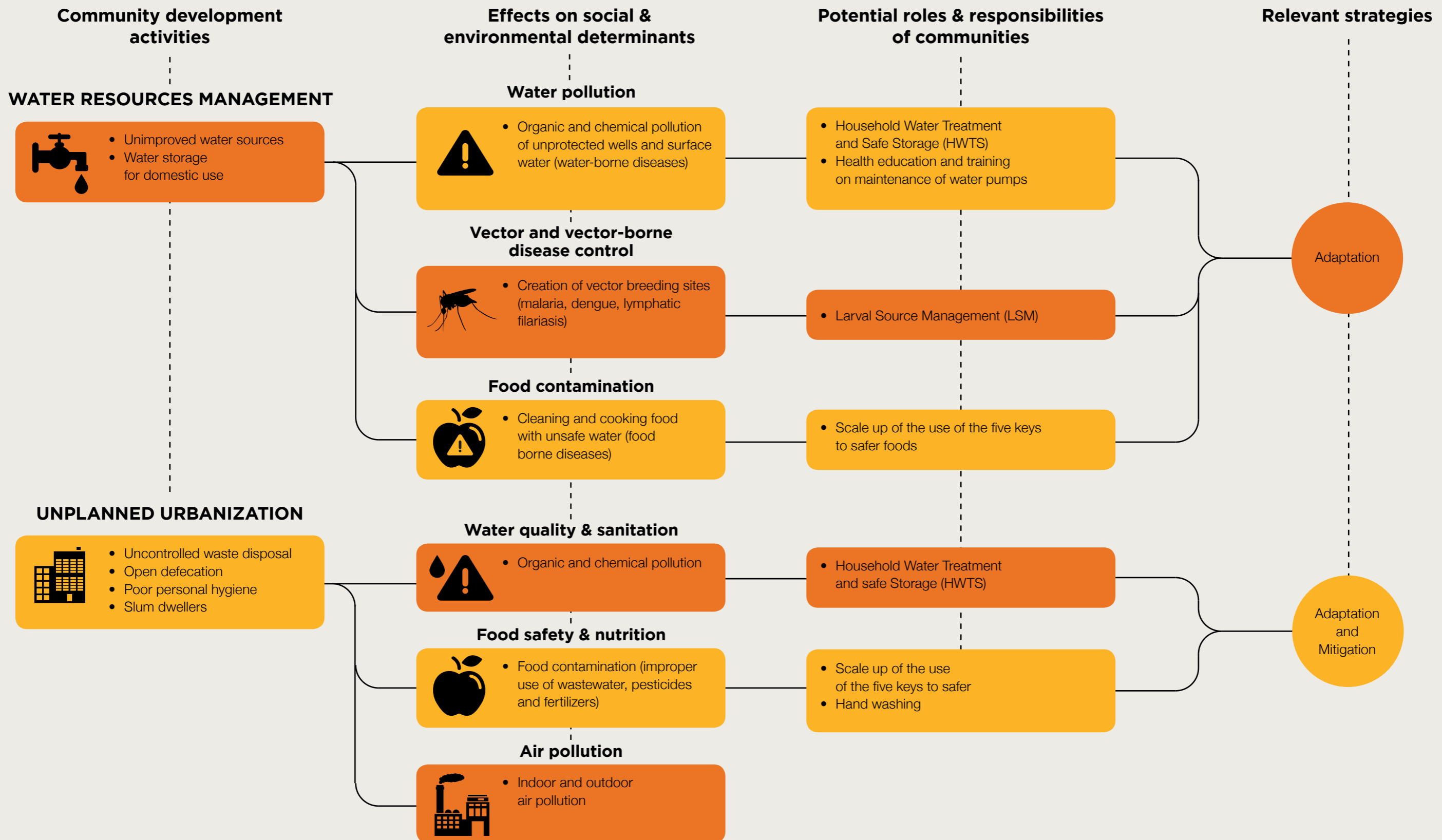
Health protection against climate risks can be improved by ensuring more equitable access to social and environmental determinants of health. The inextricable links between community-managed development processes, social, economic, and environment determinants and climate variability and change, require more integrated approaches to public health service delivery systems at community level. There are proven and cost-effective interventions that can be safely deployed at community level to manage climate-sensitive health risks. These interventions should be delivered as an essential package of community-based interventions in line with national health policies, strategies and plans.

It is evident that the health sector cannot on its own engage the community to address all socio-economic and environmental determinants that exist. The health sector has neither the authority nor the resources to

embark on such a mission. However, the health sector should provide leadership to coordinate and manage intersectoral collaboration at national, sub-national and district levels in order to engage individuals, households and communities to engage in the ultimate aim of public health.

Finally, health benefits associated with climate change adaptation and mitigation can be achieved locally and in relatively short time frames by the reinforcement of local community systems to own and scale up proven, simple, affordable and cost-effective interventions. This empowerment potential for climate change adaptation and mitigation at community level requires committed community leadership and good governance in order to foster community participation by traditional leaders, civil society, research and academic institutions, and international development partners, including WHO and other UN partners. WHO stands ready to assist.

TABLE 1: EFFECTS OF COMMUNITY DEVELOPMENT ACTIVITIES ON CLIMATE-SENSITIVE DETERMINANTS OF HEALTH AND RELATED ADAPTATION AND MITIGATION STRATEGIES



Community development activities

AGRICULTURAL PRACTICES



- Deforestation/desertification
- Open fires/slash and burn agriculture
- Irrigation
- Use of pesticides
- Cattle (methane production)
- Use of wastewater in agriculture

Effects on social & environmental determinants

Vector and vector-borne disease control



- Creation of vector breeding sites (malaria, dengue, lymphatic filariasis)
- Development and spread of vector resistance
- Zoonotic diseases (Rift Valley fever)

Air pollution



- Outdoor air pollution through increased emission of Short-Lived Climate Pollutants (methane, black carbon, tropospheric ozone)
- Increased dust (desertification)

Water pollution



- Organic pollution (erosion)
- Chemical pollution (pesticides and fertilizers)

Food safety & nutrition



- Food contamination (improper use of wastewater, pesticides and fertilizers)

Potential roles & responsibilities of communities

- Mainstreaming vector control in rural development programmes (Farmers' Field Schools),
- Larval source management (LSM) and other community-based interventions, distribution of LLINs, MDA
- Preventive chemoprophylaxis and MDA (NTD)

- Health education on Household Water Treatment and Safe Storage (HWTS)
- Domestic waste management
- Cleaning campaigns

- Combining education in the five keys to safer food stock handling
- Training
- Education on community-centred food production and distribution (cereal banks)

Relevant strategies

Adaptation and Mitigation (co-benefit)

HOUSING/HOUSEHOLD ENERGY



- Brick production for construction
- Deforestation/desertification
- Use of biomass

Vector and vector-borne disease control



- Creation of vector breeding sites
- Increased human-vector contact due to poor housing

Air pollution



- Indoor air pollution (poor ventilation associated with the use of solid fuel as source of energy)

- Improvement of housing (features that reduce the entry of mosquitoes indoors, such as closed eaves, ceilings, screened doors and windows)

- Promotion of use of cleaner household energy sources such liquefied petroleum gas, biogas, improve cookstoves

Adaptation and Mitigation (co-benefit)

LAND TRANSPORTATION



- Urban transport

Air pollution



- Outdoor air pollution (PM and SLCPs)
- Indoor air pollution

- Promote use of public transport, walking and cycling

Adaptation and Mitigation

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