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Climate change and health security

The Fourth Assessment report of the Intergovernmental Panel on Climate Change highlights the particular vulnerability of the Eastern Mediterranean Region to climate change, which is expected to pose direct and indirect threats to health security. Health systems have the responsibility and operational capacity to address, with preparedness, health outcomes and to lead the drive to protect health from climate change. The Regional Committee is invited to discuss the potential adverse impacts of climate change on health security in the Region and to consider for endorsement a regional framework for health sector action to protect health from climate change.

Contents

Executive summary

The global scientific consensus presented by the Intergovernmental Panel on Climate Change affirms that climate change and global warming are unequivocal, are happening now, and will continue in the future. The Eastern Mediterranean Region is one of the most vulnerable regions to climate change because of its arid nature and reliance on rain-fed food production.

Scientific evidence also confirms that some aspects of climate change and global warming have already caused threats to human health; and that the net global effect of projected climate change on human health is expected to be negative.

Populations in countries of the Eastern Mediterranean Region will be among those whose health is most affected, largely through water stress and its implications to health and food security. Other sources of concern include geographic and seasonal expansion of disease vectors, loss of coastal settlements, rising temperatures, increasing frequency of dust storms, worsening air quality and climate-related natural disasters. Climate change could affect the health status of millions of people in the Region, with increases in malnutrition, in mortality, morbidity and injury due to extreme weather events, in the burden of diarrhoeal disease, and in the incidence of cardiorespiratory diseases and some infectious diseases transmitted by vectors. Climate change could affect communities, burden the health systems, increase health care costs and reduce economic productivity. Moreover, climate change threatens to slow and possibly reverse countries' progress toward the health-related Millennium Development Goals.

Addressing health impacts of climate change in a timely manner is important. National health systems have the responsibility and the capacity to protect health by minimizing the adverse health impacts of climate change. Health sector action includes: a) placing concerns about public health security at the centre of the national and global response to climate change; b) implementing adaptive strategies at local and national levels in order to minimize impacts of climate change on the health; and c) supporting strong actions to promote health in development and mitigate climate change.

Within this broad context, at national level the health sector should: assess health vulnerability to climate change and review health systems preparedness to cope with the additional threat of climate changes; develop and implement interventions to revitalize key environmental health functions that already protect against climatic risks; and strengthen the preparedness of health systems to face the additional and changing disease burden resulting from climate change.

Capacity needs to be developed within national health systems in order to address climate change threats to health. Institutional focal points are needed within the health sector to facilitate and coordinate health sector action to protect health from climate change. The coordination function extends beyond the health sector, and a supportive institutional and legal framework is needed to mandate health sector leadership on health action within the national processes related to implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and to ensure collective action by the health sector and other sectors for health promotion and protection.

1. Introduction

Climate change and global warming are unequivocal and are happening now, according to the strong global scientific consensus provided by the fourth assessment report [1] of the Intergovernmental Panel on Climate Change (IPCC), the scientific body of the United Nations Framework Convention on Climate Change (UNFCCC). The 2007 report affirms that the global temperature will continue to rise at 0.1 °C per decade for decades if greenhouse gas emissions are frozen at 2000 levels. If the current levels of emissions continue, average temperatures are expected to increase by approximately 4 °C over the course of the 21st century. From 1900 to 2005, precipitation declined in the Sahel, the Mediterranean basin, southern Africa and parts of southern Asia. Globally, it is considered likely that the area affected by drought has increased since the 1970s. There is high confidence that many semi-arid areas (e.g. Mediterranean basin, western United States, southern Africa and northeast Brazil) will suffer a decrease in water resources due to climate change. There is now higher confidence that droughts, heat waves, storms and floods will increase in severity and frequency. Sea levels are predicted to rise from about 0.1 to 0.3 metres by 2050.

Evidence from around the world shows that climate change and global warming are adversely affecting the basic necessities of life: water, air, food and human habitat resulting in threats to health security. Malnutrition, diarrhoea and malaria are the most important climate-sensitive diseases. They currently rank among the most important contributors to the global burden of disease: malnutrition is estimated to kill 3.5 million people per year, diarrhoea 1.8 million, and malaria 0.9 million [2]. Moreover, climate change threatens to slow and possibly reverse progress towards the health-related Millennium Development Goals.

WHO has long stressed that threats to the basic necessities of life as a result of climate change constitute serious threats to health security, and that these threats are significant, distributed across the world, and hard to reverse. WHO published a report on climate change and human health in 1989 [3]. The World Health Assembly addressed the issue as early as 1998 [4]. Work on this issue has gained momentum and urgency as the scientific consensus has become stronger, and it has become evident that climate change will exert direct and indirect impacts on human health over the coming decades.

The Executive Board of WHO discussed climate change and health in its 122nd session in 2008 [5], and World Health Day 2008 was dedicated to the theme of protecting health from climate change. The Health Assembly addressed the issue in its 61st session and urged Member States and WHO to take necessary action to protect health from climate change threats [6].

The Regional Committee for the Eastern Mediterranean Region discussed the health effects of environmental conditions in 2002 and briefly addressed climate change impacts on health [7]. A regional workshop on health and climate change was convened in December 2006 and identified major health concerns [8]. Most recently, a regional seminar on health and climate change was convened in May 2008 and developed a regional framework for action to protect health from climate change.

This technical discussion paper identifies the potential adverse impacts of climate change on health security in the Eastern Mediterranean Region and presents a regional framework for health sector action to protect health from climate change, for endorsement by the Regional Committee.

2. Situation analysis

2.1 Global context

Climate change will increasingly affect climate-sensitive diseases through its adverse effects on factors such as water availability, food security, air quality, pathogen and vector dynamics, vector distribution and human habitat. Many of the major causes of mortality, including malnutrition, diarrhoeal diseases, respiratory diseases and vector-borne diseases, are climate sensitive and will be most affected. Climate change also poses direct threats to health through heat-related mortality, and injuries, mortality and other effects of climate-related natural disasters. The direct and indirect impacts on health constitute a

hazard to health security, especially in developing countries and among vulnerable populations: the elderly, chronically ill, children and women [2]. These impacts have considerable potential to cause significant loss of life, affect communities, burden the health systems, increase health care costs and reduce economic productivity [9].

Shifting rainfall patterns and increased rates of evaporation, combined with population and economic growth will increase the number of people living in water-stressed basins from 1.5 billion in 1990 to 3–6 billion by 2050 [1].

Declining freshwater availability is probably the biggest threat to health arising from climate change with major concerns for increase in the incidence of diarrhoeal and other water-borne diseases such as salmonellosis, cholera, amoebiasis, giardiasis and cryptosporidiosis, as well as other infectious diseases such as trachoma and scabies that are spread through lack of proper sanitation, often the result of water scarcity. Decreasing freshwater availability threatens household water security for health protection—hygiene, food preparation and sanitation—even in urbanized communities. Lack of freshwater sources delays the extension of water supply services to un-served communities. Erratic and disrupted water supply leads to decline in the quality of drinking water supply. Lack of fresh water for crop production may lead to the use of wastewater, which when improperly treated and monitored poses additional health threats to farmers, their families and the consumers of the foods produced. WHO estimates that in 2002, 47 000 deaths from diarrhoeal disease were already attributed to climate change [10]. By 2030, an increase in the burden of diarrhoeal diseases of approximately 2%–5% is expected in low-income regions [10].

Increased temperature, declining water availability for irrigation and more variable precipitation are projected to reduce crop yields in many tropical developing regions. Communities that are dependent on rain-fed agriculture could witness yield reduction by up to 50% by 2020 [11]. Food security will be compromised and the burden of under-nutrition, which currently results in 3.5 million deaths annually, will increase [12]. WHO estimates there were about 77 000 deaths globally in 2000 that were attributable to malnutrition caused by climate change [12].

Higher mean temperatures will increase the efficacy of viruses, bacteria and other pathogens causing water-borne diseases. Evidence from Lima, Peru shows that incidence rates of diarrhoea are 3–4 times higher in the summer than in the winter, increasing by 8% for every 1 °C rise in temperature [13].

Malaria transmission and distribution will be strongly affected by climate change in response to mean global temperature rise. Rise in temperature, higher humidity and availability of mosquito breeding sites favour malaria transmission in higher altitudes and latitudes. Evidence from East Africa demonstrates increased risk of malaria transmission in the highlands due to temperature rise [14]. Areas where malaria is currently endemic could experience intensified transmission. A temperature rise of 3–5 °C by 2100 would result in an increase in the malaria-affected proportion of the world's population from 45% to 60% [9].

Dengue is a fast growing challenge in tropical cities in developing countries. Distribution of dengue is highly dependent on temperature and rainfall. Dengue cases have increased in the past 40 years due to urbanization and in response to the changing climate. Under current projections, climate change may result in an additional 2 billion people exposed to the risk of dengue transmission by 2080 if other determinants remain unchanged [9].

Other diseases transmitted by insects, snails and other vectors will be affected by temperature rise. Schistosomiasis transmission in China has moved northward as the freezing lines of rivers have moved because of temperature rise, exposing millions of people [15]. Transmission of Lyme disease and tick-borne encephalitis will increase in Europe and North America [12].

Extensive research has shown that heat waves causing ambient temperatures to rise above the local thresholds for heat-related health problems result in higher mortality rates due to heat stress and heat stroke, especially among the elderly. The extended heat wave in the summer of 2003 in Europe is estimated to have resulted in 70 000 additional deaths above the expected deaths in the same period

[12]. Climate change scenarios indicate that in Europe, summer temperature levels experienced during 2003 will be the norm by 2050 [9].

Climate change is expected to increase all air pollution-related illnesses and premature deaths from air pollution. The prevalence of asthma and respiratory diseases is expected to increase due to worsening air quality caused by increased use of fossil fuels, ozone pollution and increased frequency of dust storms. An associated increase is expected in the number of admissions to hospitals and lost days of work and schooling [12].

IPCC reports indicate a rise in the incidence and severity of climate-related natural disasters, such as severe storms, cyclones, floods, droughts and fires, which cause disruption to water and food supplies, damage to human settlements and disruption of medical and other services [12]. Direct death and injuries occur and numerous negative health effects are experienced. Sea level rise will damage human habitats and result in large-scale migration [12]. The health impacts of the recent cyclone in Myanmar demonstrate the magnitude of the threat posed by climate change to health security.

Populations with greater vulnerabilities will be most adversely impacted; high risk groups include the elderly, the very young and the medically infirm [12]. Countries with low income, widespread malnutrition, low levels of education and weak infrastructure will find it difficult to adapt to climate change and related health hazards. Vulnerability is also determined by geography and is higher in areas with endemic climate-sensitive disease, water stress, low food production and isolated populations. Populations at higher risk are those living in small island developing states, mountainous regions, water-stressed regions, megacities and coastal areas in developing countries [2,12].

2.2 Regional context

The fourth assessment report of the IPCC highlights the particular vulnerability of the Eastern Mediterranean Region to climate change. The Region is the world's most arid and water-scarce region. Agriculture is climate sensitive and highly dependent on rainfall. Large populations and economic activities are concentrated in urbanized and flood-prone coastal areas [1]. The report predicts the Region will grow hotter, with a 1–2 °C temperature increase by 2030–2050. The frequency of very hot days and heat waves will increase. The Region will also be drier. Decrease in precipitation will be varied but there will be a slight increase in the southern Arabian peninsula. Higher temperatures and reduced precipitation will increase the occurrence of drought, an effect that is already materializing in the Maghreb. The frequency of dust storms is also expected to increase.

In the absence of quantitative regional or national health vulnerability assessments, predictions of climate change impacts on health in the Region are based on qualitative analysis and on application of global models used for the fourth assessment report of the IPCC. The most important threats to health security in the Region are expected to be from heat waves, water scarcity, reduced agricultural productivity, worsening air quality, increased disease vector intensity and geographic distribution, and potential damage to coastal settlements. [1].

Mortality and morbidity due to heat stress are expected to rise in the Region. Recent analyses of concurrent meteorological and mortality data in cities in the Middle East provide evidence that overall mortality rates rise during heat waves, particularly when the temperature rises above the local population's threshold value for heat-related health problems [16]. It is predicted that climate change will cause additional heat-related mortality and morbidity in the Region, especially among the elderly, through increased exposure to heat waves [16]. Extreme cold conditions, such as those recently seen in Afghanistan, may result in significant injuries and deaths especially among vulnerable population groups, including the elderly, the young and the underprivileged with poor nutrition and poor housing and with unreliable access to household energy sources.

Freshwater availability will further decline, placing some countries of the Region at the top of the list of water-stressed countries worldwide. An estimated additional 80–100 million people will be exposed to water stress by 2025 in countries of the Middle East and North Africa [1]. Water scarcity and its implications for health are identified as the key climate change issue in the Region. Intensified water shortages have already resulted in reduced water availability for domestic purposes in Jordan [17].

Intermittent water supply is a common phenomenon in most countries, resulting in decreased household water security and compromised drinking-water quality [17].

Insufficient water supply for domestic use will compromise hygiene and likely increase the incidence of diarrhoeal disease. In Jordan, a recent analysis of the impact of water scarcity on health revealed that decreased water availability is correlated with an increase in the diarrhoea prevalence among the urbanized population [17]. Outbreaks of waterborne disease are increasing where water supplies are intermittent. If flooding occurs as a result of more intense rainfall events, waterborne diseases may become frequent, largely because of damage to water systems and overloading of sewage systems.

Because of water scarcity, wastewater is widely used for agricultural production, often without proper management and health controls [18]. Wastewater reuse is predicted to increase significantly, with wastewater becoming the major water source for crop production in some countries. In the absence of proper treatment and monitoring, wastewater reuse exposes farmers, their families, communities and the consumers of food to serious health threats from biological and chemical agents [19].

Food productivity will decline due to reduction in water availability for crop production, rise in temperature and land degradation. Yields in rain-fed areas are expected to fluctuate more widely, ultimately falling to a significantly lower long-term average. The Food and Agriculture Organization of the United Nations estimates a 15%–35% reduction in crop production across the Region with a temperature rise of 3 °C [20]. Food security will decrease and a large proportion of the population will be vulnerable. No data are available to estimate the size of this vulnerable population.

Urban air pollution is expected to increase due to the rising use of fossil fuels to meet increasing energy demands. Ozone depletion and increased frequency and intensity of dust storms will further worsen air quality in the Region. The poor air quality in Cairo, Karachi and Teheran is already well documented. The incidence of allergies and respiratory disease is expected to increase, along with increased requirements for health care facilities [9,16].

Malaria, dengue and leishmaniasis are the major vector-borne diseases of concern in the Region, and their prevalence is closely related to climate. The distribution of the vectors of malaria and leishmaniasis is expected to change due to the projected rise in ambient temperature, shifting rainy seasons and changing rainfall patterns. Malaria is endemic in certain parts of the Region. Based on a climate scenario, IPCC projects an expansion of malaria into adjoining areas by 2100 [9,16]. In addition, the present non-malarial, higher-elevation areas may experience seasonal epidemics. The sand fly, the vector of leishmaniasis, occurs in many countries in the Region such as Egypt, Islamic Republic of Iran, Iraq, Pakistan, Sudan and Syrian Arab Republic [9,16]. With a temperature increase of 1 °C, it is predicted there will be a seasonal and spatial (e.g. in uplands) expansion of sandflies, and thus potential increases in the incidence of diseases that they transmit. Dengue fever was reported on the eastern edge of the Region in 1995, and recent dengue outbreaks have occurred in Pakistan, Sudan and Yemen. Dengue spread will depend on whether climate changes produce moister and warmer conditions that favour the vector, even if only seasonally [9,16].

Coastal human settlements are under threat of sea level rise and coastal flooding. For the Eastern Mediterranean countries, IPCC reports suggest the social, economic and ecological impacts are expected to be relatively high compared to the rest of the world [9]. Climate change threatens the income and livelihood of rural, urban and coastal populations. Low-lying coastal areas in Egypt, Kuwait, Libyan Arab Jamahiriya, Qatar, Tunisia and United Arab Emirates are at particular risk. In urban areas in North Africa, a temperature increase of 1–3 °C could expose 6–25 million people to coastal flooding [9]. The tropical storm that hit Oman in 2007 is a vivid reminder of the potential damage that may be caused by climate-related natural disasters and of the need for preparedness by the health sector and other sectors to protect health.

With the exception of ten countries (Afghanistan, Djibouti, Egypt, Iraq, Morocco, Pakistan, Palestine, Somalia, Sudan and Yemen), the Region has made strides towards achievement of the health-related Millennium Development Goals. Climate change will not only slow the achievement of the MDGs in those ten countries, but possibly compromise and reverse existing achievements in other countries.

Climate change is likely to affect achievement of all Millennium Development Goals, particularly those related to health in the following ways.

- MDG 1 (eradicate extreme poverty and hunger). Climate change will result in less agricultural production, less access to food and compromised food security, especially among the poor.
- MDG 4 (reduce child mortality). Child health will be threatened through compromised access to safe water and sanitation and increased air pollution, insecurity and displacement. Increases in the incidence of diarrhoea, acute respiratory infections and other waterborne and foodborne diseases are expected, and consequently child mortality may increase.
- MDG 5 (improve maternal health). Climate change will affect maternal health through decreased water supply, particularly in rural areas, and less access to food resulting in low birth weight, miscarriages, difficult labour and possibly a rise in maternal mortality.
- MDG 6 (combat HIV/ AIDS, malaria and other diseases). Climate change will create additional challenges to achieving the goal and possibly undermine current achievements, as the geographic distribution of malaria will change.
- MDG 7 (ensure environmental sustainability). Progress towards target of reliable access to safe water sources will likely be slowed and current achievements may be compromised due to water scarcity.

2.3 Current response and challenges

Since 2005, the Regional Office, largely through the Centre for Environmental Health Activities (CEHA), has been a major contributor to the development of WHO global work on health and climate change. In 2005, the Region participated in development of the WHO global project for adaptations to protect health from climate change, addressing water scarcity and health in particular. Since 2006, the Regional Office has engaged in a consultative process with Member States. A regional workshop was convened by CEHA to further examine the impact of climate change on health in the Region and to identify coping mechanisms. The Ministry of Public Health of Tunisia undertook an initiative to assess health vulnerability, identify adaptation strategies and plan action to protect health from climate change. CEHA assisted the UN country team in Jordan to develop a programme to support Jordan in sustaining Jordan's achievement of Millennium Development Goals, with WHO and FAO responsible for the health and food security components. The Ministry of Health of the Syrian Arab Republic engaged in the preparation of the health section of the Second National Communication under the United Nations Framework Convention on Climate Change. Most recently, the Regional Office convened a regional seminar on climate change and health and developed a regional framework for health sector action to protect health from climate change.

The health sector at national and local level has the responsibility, political leverage and workforce with the necessary competencies to protect health from additional threats induced by climate change. World Health Assembly resolution WHA61.19 [6] recognized the imminent threats of climate change to health and the importance of timely action by the health and other sectors to address those threats. The resolution outlines the following actions for Member States to protect health from climate change:

- Develop health measures and integrate them into plans for adaptation to climate change as appropriate;
- Build the capacity of public health leaders to be proactive in providing technical guidance on health issues, be competent in developing and implementing strategies for addressing the effects of, and adapting to, climate change and show leadership in supporting the necessary rapid and comprehensive action;
- Strengthen the capacity of health systems for monitoring and minimizing the public health impacts of climate change through adequate preventive measures, preparedness, timely response and effective management of natural disasters;
- Promote effective engagement of the health sector and its collaboration with all related sectors, agencies and key partners at national and global levels in order to reduce the current and projected health risks from climate change;

- Express commitment to meeting the challenges posed to human health by climate change and to provide clear directions for planning actions and investments at the national level in order to address the health effects of climate changes.

Countries of the Region have made progress in the fight against many communicable diseases and towards the achievement of several health-related MDGs. Continuing the progress and sustaining achievements in the face of climate change is an additional challenge. With planned preparedness, existing mechanisms for public health protection can be strengthened to identify and cope with the additional threats of climate change.

Throughout the ages, communities in the Region have been under pressure from severe climatic conditions and have developed various technical, institutional and social mechanisms to deal with these pressures. The scale of impact of climate change is likely to be beyond the existing coping mechanisms of communities. However, the existing mechanisms can provide the foundations for developing new mechanisms to deal with the climate change threats.

Almost all countries (18 Member States) are signatories to the international agreements of the UNFCCC and are participating in the UNFCCC processes, such as the preparation of national communications and development of national adaptation programmes and plans of action [21]. Until recently, the health sector has not been engaged actively in these processes at country level, and reporting on health impacts of climate change and development of health protection measures has been done without the leadership, and with minimum engagement of the health sector. Accordingly, health vulnerability assessments are lacking or weak, if available.

There are a few constraints to health sector action to protect health from the additional burden of climate change. There is insufficient literature and research on health and climate change within the Region or about the Region. There are no health vulnerability assessments for the Region or individual countries, largely due to the absence of the health sector from the national UNFCCC processes. Experienced personnel and technical service providers are few. Specialized tools and methods for health vulnerability assessment and for development of health protection strategies are scarce. Yet the existing tools available to the health sector are adaptable and applicable to addressing the additional threats of climate change to health.

3. Proposed framework for health sector action in Member States to protect health from climate change

The proposed framework for action was developed during the Regional Seminar on Health Impacts of Climate Change convened by the Regional Office 2–4 June 2008. The proposed framework takes account of the provisions of World Health Assembly resolution WHA61.19, calling upon WHO and Member States to take measures to address health risks arising from climate change. The framework takes account of regional and national priorities of Member States as presented by participating countries at the seminar. The framework aims to implement the recommendations of the Health Assembly resolution at the national level through development of a set of measures that are feasible, prioritized and build on existing programmes that already provide substantial protection from climate-related risks.

Goal

- To protect health from climate change.

Objectives

Objective 1: Ensure public health concerns and health protection from climate change are at the centre of national, regional and international action on climate change.

Approaches to achieve objective 1

- Conduct sustained evidence-based advocacy to raise awareness, within and outside the formal health sector, of the need to protect health security from climate change; Engage effectively, as

the lead sector on health, in the national processes of the United Nations Framework Convention on Climate Change. In this respect develop, in collaboration with other sectors, health protection measures and integrate them in climate change National Communications, National Adaptation Programmes, and National Adaptation Plans of Action.

Objective 2: Implement adaptive strategies at local and national level to minimize impacts of climate change on population's health.

Approaches to achieve objective 2

- Undertake assessment of health vulnerability to climate change and generate a national health vulnerability profiles with two explicit objectives: a) identifying the additional direct and indirect threats to health from climate change; and b) assessing the health systems preparedness to cope with additional burden of climate change on health and health systems.
- Strengthen the health systems monitoring of the health impacts of climate change by establishing capacity for early warning on climate sensitive diseases integrating information on meteorological condition and other environmental determinants of health within existing health information systems and disease surveillance systems.
- Revitalize existing environmental health functions and services, within and outside the formal health sector, that already protect health from environmental risk factors, in order to respond to the additional threats of climate change. Priority threats are water security for health, water quality degradation, droughts, heat waves, food security and safety, vectors redistribution, air quality degradation, floods and other climate related natural disasters.
- Strengthen health systems' preparedness to cope with the additional burden of climate-sensitive health problems. Priority groups of diseases are water-borne diseases, food-borne disease, malnutrition associated with food insecurity, health effects of heat waves and extreme cold conditions, respiratory and other diseases associated with air pollution, vector diseases and health effects of climate related disasters.
- Undertake interdisciplinary applied research and demonstration projects on health vulnerability to climate change and on effectiveness of health protection measures.

Objective 3: Support "healthy" development strategies in other sectors that protect and promote health and mitigate climate change.

Approaches to achieve objective 3

- Build the capacity of health sector professionals in the identification of health impacts of development choices of other sectors (e.g. transport, energy, food, water, housing and urban development) that have bearings on health.
- Engage health sector leaders and professionals in determining and supporting policy choices of other sectors that promote and protect health and at the same time mitigate climate change.
- Establish institutional and legislative mechanisms to facilitate and mandate the health sector engagement in determination of development policies and choices in other sectors.

Objective 4: Strengthen the institutional capacity of the public health systems for providing guidance and leadership on health protection from climate change.

Approaches to achieve objective 4

- Establish a national focal point on climate change and health within the formal health sector to enable health sector leadership and collaboration with other sector on protecting health from climate change and to facilitate effective engagement of the health sector in the national UNFCCC processes.
- Establish health and climate change task force within the ministries of health with membership of concerned stakeholders especially those involved in preventative and protection functions and those involved in preparedness and in response to the climate-sensitive health issues.

- Establish the institutional legislative mechanisms with national UNFCCC focal point to mandate the health sector leadership on health protection from climate change within the national UNFCCC processes.

4. Conclusions

Detrimental climate change impacts on the environment in the Region have already been felt and are expected to magnify in the coming decades. Consequently, climate change is expected to pose direct and indirect threats to health security. Health systems have the responsibility and operational capacity to address, with preparedness, climate-sensitive illnesses and health outcomes and to lead the drive to protect health from climate change. Increased awareness within and outside the health sector of the impacts of climate change on health is needed, and health protection should be placed at the centre of the climate change agenda at national and international levels. Considering that UNFCCC processes are driven by countries, the health concerns and resources for protection action will remain marginal on the agenda of UNFCCC unless the health sector assumes leadership on the health components of the UNFCCC processes at the country level.

There is a pressing need to bridge information gaps on the vulnerability of health to climate change, in order to identify the additional threats to health. Applied research and health vulnerability assessment are prerequisites for the development and implementation of well-targeted and effective national strategies and action to minimize health impacts of climate change and to cope with the additional burden to health.

Protecting health from climate change requires action within and outside the formal health sector on three parallel courses:

- minimizing the impact on health resulting from the detrimental effects of climate on the environmental and social determinants of health. In this respect, environmental health services of the health sector and other sectors should be revitalized as the first line of defence against climate change.
- establishing or strengthening health sector preparedness, building on existing capacities, to cope with the additional disease burden and illnesses, which may arise from climate change.
- galvanizing action by other sectors to promote health concerns in development policies and to contribute to climate change mitigation.

National health sector capacity needs development in order to address climate change threats to health. Establishing an institutional focal point within the health sector will facilitate and coordinate health sector action for protecting health from climate change. The coordination function extends beyond the health sector and an adequate institutional and legal framework is needed to mandate health sector leadership on health action within the national UNFCCC processes and to ensure collective action by the health sector and other sectors for health protection and promotion.

5. Recommendations to Member States

1. Endorse the framework for health sector action in Member States to protect health from climate change.
2. Establish within the formal health sector a national focal point on climate change and health and establish effective coordination mechanisms within and outside the formal health sector, to strengthen its institutional capacity and enable its leadership and collaboration with other sectors on protecting health from climate change, and to facilitate effective engagement of the health sector in the national UNFCCC processes.
3. Conduct sustained advocacy to raise awareness, within and outside the formal health sector, of the need to protect health security from climate change.
4. Engage, as the lead sector on health, in the national processes of the United Nations Framework Convention on Climate Change. In this respect, the health sector is to develop, in collaboration

with other sectors, health protection measures and integrate them in climate change national communications, national adaptation programmes, and national adaptation plans of action.

5. Generate national profiles on health vulnerability to climate change, identifying the additional direct and indirect threats to health and assessing the health systems preparedness to cope with additional burden of climate change on health and health systems.
6. Develop national health and climate change adaptation strategies and plans of action to minimize the adverse impacts of climate change on health security, specifically revitalizing health protection function of environmental health and strengthening existing health systems preparedness.

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