

Lessons learned

on health adaptation to climate variability and change

Experiences across low- and
middle-income countries



World Health
Organization

Authors: Kristie L Ebi and Mariam Otmani del Barrio

WHO Library Cataloguing-in-Publication Data

Lessons learned on health adaptation to climate variability and change: experiences across low- and middle-income countries.

1.Climate Change. 2.Environmental Health. 3.Risk Assessment. 4.Developing Countries. I.World Health Organization.

ISBN 978 92 4 156495 3

(NLM classification: WA 30.5)

© **World Health Organization 2015**

All rights reserved. Publications of the World Health Organization are available on the WHO website (www.who.int) or can be purchased from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int).

Requests for permission to reproduce or translate WHO publications –whether for sale or for non-commercial distribution– should be addressed to WHO Press through the WHO website (www.who.int/about/licensing/copyright_form/en/index.html).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

Printed in Switzerland

Cover photo: Courtesy of Institute for Environmental Health and Related Product Safety, China CDC

Photo caption: Health education activity in progress at a primary school in Chongqing, China for raising students' awareness about health impacts of climate change (UNDP/WHO GEF project).

Copy editing and layout: Inis Communication – www.iniscommunication.com

Lessons learned on health adaptation to climate variability and change

Experiences across low- and middle-income countries



World Health
Organization

Acknowledgements

The authors are grateful to the anonymous key informants, including project staff from the WHO/UNDP/GEF project, that kindly agreed to participate in the interviews and focus group discussion and shared valuable reflections and experiences.

The authors are also grateful to Dr Diarmid Campbell-Lendrum (WHO) for his support in the strategic thinking and preparation of the focus group consultation and his valuable comments on the document. The authors would also like to thank WHO colleagues who provided helpful and valuable comments on the draft document: Bonifacio Magtibay, Hamed Abdelqader Bakir, Elena Villalobos Prats, Marina Maiero, Bettina Menne, Vladimir Kendrovski, Mao Jixiang, Moh Nasir Hassan and Yeom Jung Sub.

We would also like to acknowledge the donors to the projects on which the assessment is based; the WHO/UNDP project on “Piloting Health Adaptation to Climate Change”, funded by the Global Environmental Facility; health and climate change projects funded by the Millennium Development Goals Achievement Fund; and the WHO Regional Office for Europe project “Protecting health from climate change: a seven-country initiative” funded by the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

This report was supported by the Global Program Adaptation to Climate Change in the Health Sector implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ).¹ We thank Lena Borgmann and Ute Jugert (GIZ) for their valuable comments on the report.

¹ German Development Cooperation

Contents

Abbreviations	1
Executive summary	2
Goals and activities	2
Conclusions and recommendations	3
1. Introduction and background	5
2. Scope and objectives	7
2.1 Scope	7
2.2 Objectives	7
3. Methods of review and synthesis of health adaptation implementation	8
4. Context for the evaluation	10
5. Interventions that proved successful	12
5.1 More effective projects have a clear vision of how the adaptation project fits within country development goals and have strong country ownership	13
5.2 Greater impact is achieved when projects focus on achieving objectives and not just accomplishing outcomes	14
5.3 Multisectoral approaches promote effective adaptation and increase the potential for scaling up	14
5.4 More effective projects have or take time to build capacity and stakeholder engagement	15
5.5 Establishing and reinforcing enabling conditions across scales promotes success	16
5.6 Indicators are needed for monitoring and evaluation (M&E)	16
5.7 Knowledge building and supplementation of country expertise will be necessary for some time	17
5.8 Mitigation and adaptation should be addressed jointly whenever possible	19
5.9 More effective projects have good design and clear management arrangements and coordination	19
6. Potential for scale-up	20
6.1 Many programmes and activities are known to be successful in managing the risks of climate-sensitive health outcomes, although research is needed on their effectiveness in a changing climate	20
6.2 There are multiple entry points for scaling up	23
6.3 Scaling up would be more effective if plans for doing so are developed before a project is completed	23
6.4 Scaling up is facilitated by having a broad vision of objectives and how they can be accomplished	23

7. Key barriers to scaling up	24
7.1 Limited political will and leadership	24
7.2 Financial and human resources remain a constraint	24
7.3 There are limited projections of the future health risks of climate change at the spatial scales of interest	25
7.4 Methods, tools and guidance documents are insufficiently developed	25
8. Additional suggestions	26
8.1 Iterative risk management or similar approaches can help ensure interventions will continue to be successful under future climate and development pathways	26
8.2 Mainstreaming of health sector interventions is necessary but insufficient	27
8.3 Using a theory of change approach to developing overall objectives	28
8.4 Gender considerations should be integral to project design	29
8.5 A common set of indicators is needed for measuring adaptation over short and longer timescales	29
9. Qualitative data collection for the identification of barriers, challenges, and opportunities for implementation and scaling up of adaptation interventions	30
9.1 Methods	30
9.2 Findings of key informant interviews	32
9.3 Findings of focus group consultation	50
10. Conclusions and recommendations	56
References	58
Annex 1. Summary of projects	60

Abbreviations

BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
CORDEX	Coordinated Regional Climate Downscaling Experiment
DoH	Department of Health
EPA	environmental protection agency
EWS	early warning system
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HWTS	household water treatment and safe storage
ICT	information, communication and technology
IPCC	Intergovernmental Panel on Climate Change
IRS	indoor residual spraying
ITN	insecticide-treated net
K	key informant
LMICs	low- and middle-income countries
M&E	monitoring and evaluation
MDG	Millennium Development Goal
MDG-F	Millennium Development Goals Achievement Fund
MEWS	malaria early warning system
MoH	Ministry of Health
SRH	sexual and reproductive health
UNDP	United Nations Development Programme
WASH	water, sanitation, hygiene and health
WHO	World Health Organization
WSP	water safety plan

Executive summary

Climate variability and change are exacerbating many current climate-sensitive health outcomes and have the potential to affect the ability of health system institutions and organizations to maintain or improve health burdens in the context of changing climate and development patterns. Advancing management of these risks requires systems-based and holistic approaches to adaptation. Research and practice that crosses disciplinary boundaries are vital for supporting evidence-based policies and programmes to effectively and efficiently address the health risks of climate variability and change in the context of multistressor environments.

Goals and activities

The goals of this report are to:

- identify lessons learned and good practice examples from pilot health adaptation projects;
- discuss the potential for scaling up; and
- identify key barriers and challenges to scaling up successful interventions.

Two activities were undertaken to achieve these goals:

- a desk review and synthesis of the first five years of implementation (2008–2013) of multinational health adaptation projects in low- and middle-income countries worldwide; and
- qualitative data collection through targeted interviews and focus group discussions to identify barriers, challenges and opportunities for implementation and scaling up of adaptation interventions.

The report will be incorporated into a global operational framework developed by the World Health Organization (WHO) for climate change adaptation in the health sector.

The desk review included evaluation reports and other materials from three multicountry projects covering 14 countries. Qualitative data were collected through a focus group consultation and 19 key informant interviews to document lessons learned and good practice examples from health adaptation projects to facilitate assessing and overcoming barriers to implementation and to scaling up.

The countries included are Barbados, Bhutan, China, Fiji, Jordan, Kenya and Uzbekistan (in the UNDP/WHO GEF-funded project “Piloting climate change adaptation to protect human health”); China, Jordan and the Philippines (in the health components of the Millennium Development Goals Achievement Fund); and Albania, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, the former Yugoslav Republic of Macedonia and Uzbekistan (in the WHO Regional Office for Europe project “Protecting health from climate change: a

seven-country initiative” funded by the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety).

Based on expert judgment, the review evaluated the available documents for evidence and examples of attaining objectives and planned results of interventions; sustainability; stakeholder participation and community engagement; country ownership and sociopolitical constraints; human resources and capabilities; replicability and scalability; and indicators for monitoring and evaluation.

The report also presents findings of a data collection activity from a focus group consultation and 19 key informants purposively selected for their expertise and role in health adaptation to climate change. The activity was intended to document lessons learned and good practice examples from pilot health adaptation projects in order to facilitate assessing and overcoming barriers to implementation and to scaling up.

Conclusions and recommendations

The following conclusions and recommendations emerged from the activity:

1. Adaptation needs are often localized; hence comprehensive vulnerability and adaptation assessments are required to implement effective health adaptation efforts, taking into account specific contextual factors. Further, there needs to be strategic prioritization of climate risks at the country level.
2. Scaling up would be facilitated by explicit consideration of how to do so from the onset of the adaptation process, whether through project-based activities or through national adaptation planning. Because the health risks of climate change are partially driven by local and regional contextual factors, it is important when considering scaling up to identify which factors determining the success of particular interventions are generic and so can be transferred to other regions. Some factors determining success will be unique to a location (such as the strong commitment of an individual policy-maker to health adaptation), so there will need to be consideration of how to work with local and regional stakeholders to build the necessary conditions for successful scaling up.
3. Increasing resilience to the health risks of climate variability and change is likely to be achieved through longer-term, multifaceted and collaborative (multidisciplinary) approaches, with supporting activities (and funding) for capacity-building, knowledge communication, and institutionalized monitoring and evaluation. Managing risks that will change as climate and development proceed will be more effective using iterative approaches, with broad stakeholder engagement. Strengthened cooperation between the health sector and meteorological services in the access to and use of climate and health data for adequate preparedness and response remains a key element of successful health adaptation efforts.
4. It is vital to continue to strengthen mainstreaming of health protection to manage the health risks of climate change. National health plans, policies and budget processes need to explicitly incorporate the risks of current and projected climate variability and change. Projects should be encouraged to focus not just on shorter-term outputs to address climate variability, but also on establishing processes to address longer-term climate

change. It is important to investigate approaches, such as theory of change, that can facilitate achieving objectives and not just outcomes. Medium- and longer-term project funding would facilitate accurate assessments of project and programme outcomes.

5. Mainstreaming health adaptation monitoring into planning stages, through the establishment of country-specific monitoring and evaluation systems, customized according to country needs, would enable national health adaptation assessments of climate-resilient investment strategies at national and local levels. It would be helpful to identify a set of indicators for monitoring and evaluating climate resilience, creating baselines and facilitating the process of longer-term adaptation.
6. Opportunities for capacity development in the health risks of climate change should be created, identified and reinforced for the full range of actors, including public health and health care professionals, the general public, and decision- and policy-makers within the health sector and across ministries. This includes facilitating development of methods, tools and guidance documents to support countries not only as they implement adaptation programmes and activities, but also prior to the implementation phase. In addition, developing a regular forum, including web-based and in-person meetings, would facilitate international exchanges of experiences and lessons learned. Providing some budget for exchanges would facilitate South-South learning and cooperation and further strengthen capacity for implementing adaptation.
7. Donors and development partners should be encouraged to invest sufficient time and resources during the development phase of adaptation proposals to ensure that country ownership, an enabling environment, stakeholder engagement (with adequate mechanisms to involve communities) and other conditions that facilitate project success are maximized. This includes making sure that approaches and plans for documenting good practices and lessons learned are built into projects from the beginning, and that projects include an output to outline requirements for scaling up. These will strengthen the ability of national and local teams to implement adaptation.
8. Support should be given to research and development to further understand the health risks of climate change, including projections of risks across temporal and spatial scales, and to further understand what programmes and activities can be implemented to facilitate avoidance of, preparation for, response to and recovery from impacts.
9. Operational research should lead to actionable changes in practice and policy, facilitating greater cooperation between researchers in high-income countries and those in low- and middle-income countries, informed by country needs.
10. Adaptation projects should be used as opportunities to identify co-financing for adding mitigation components.
11. Irrespective of resource constraints, low- and middle-income countries need to continue to prepare themselves through appropriate public education and awareness programmes, including disaster preparedness measures, resilient infrastructure for effective resettlement of displaced people, and better understanding of health impacts on specific human settlements (for example communities in river basins).

Introduction and background

1

Climate change is one of several global environmental changes of the 21st century, including changes in the nitrogen cycle, biological diversity and land use, that differ from other environmental risk factors in terms of their far-reaching consequences today and in the future, and in terms of the complexities and interrelationships involved. Advancing health system management of these interdependent and ever-changing risks requires systems-based and holistic approaches to adaptation, in order to increase the resilience of particularly vulnerable communities and regions. Research and practice that cross disciplinary boundaries are vital for supporting evidence-based policies and programmes to effectively and efficiently address the health risks of climate variability and change in the context of multistressor environments.

The current and future health risks of climate change range from morbidity and mortality due to extreme events to migration as a consequence of the impacts of environmental degradation on human health and livelihoods. These health outcomes are current concerns, causing preventable morbidity and mortality now. Considerable progress has been achieved in reducing the health burden of climate-sensitive health outcomes over the past several decades through strategies and policies implemented by international, regional and national organizations and institutions, development partners and civil society. However, the effectiveness of these policies varies considerably, with many low- and middle-income countries (LMICs) needing to improve surveillance and monitoring systems, laboratory services and other public health and health care capabilities to manage current climate-sensitive health risks. Further, climate change and some of its consequences are extremely likely to be drivers of changes in the geographical range, seasonality and incidence of climate-sensitive health outcomes. Public health and health care sectors in all countries will need to explicitly incorporate climate change into strategies, policies and programmes to maintain or improve current levels of risk. These actions should be consistent with and support national development policies.

The health risks of climate variability and change continue to be unfamiliar to many actors within and outside the health sector. Understanding of the science of climate variability and change provides an opportunity for the health sector to proactively manage risks, thus avoiding the current and projected negative health impacts that could occur. To do so, the broad range of actors in public health and health care, from researchers and practitioners to policy- and decision-makers, need to:

- understand the possible risks that climate variability and change present to the health sector;
- increase the capacity of organizations to modify current and implement new strategies, policies and programmes to prepare for and manage risks before they manifest as impacts, including through the use of weather and seasonal forecasts and climate change projections (for example mainstreaming);

- identify knowledge and capacity gaps that can be filled through research and development to further enhance the capacity of the sector to proactively adapt;
- work with other sectors to ensure health protection from possible impacts that arise outside the control of the health sector (such as changes in agricultural productivity due to climate change affecting food availability) or that arise because of choices made by other sectors as they adapt to the risks of climate change (such as using treated wastewater for agriculture to address water security);
- identify good practices and lessons learned in adaptation to inform scaling up within and across countries, to more quickly advance adaptation efforts; and
- synthesize the knowledge gained on the health risks of climate change to promote appropriate adaptation and mitigation agreements by national and international actors.

While progress on these tasks is quickly advancing in highly industrialized countries, many LMICs are just starting to consider the health risks of climate change. Most are not yet on track to reach scalability of health adaptation interventions through large-scale implementation of evidence-based effective adaptation.

Scope and objectives

2

2.1 Scope

The scope of the exercise is to undertake a review, synthesis and analysis of the first five years of implementation (2008–2013) of health adaptation projects in LMICs worldwide.

2.2 Objectives

The overall goal is to identify lessons learned and good practice examples from pilot health adaptation projects in order to facilitate assessing and overcoming barriers to implementation and to scaling up. The report will be incorporated into a global operational framework for climate change adaptation in the health sector developed by the World Health Organization (WHO). Specifically, this report will:

- identify examples of interventions that were successful;
- identify key barriers and challenges to implementation and scaling up successful interventions; and
- discuss the potential for scaling up.

To achieve these objectives, two methodological approaches were used: a desk review of evaluation reports and other materials from three multicountry projects covering 14 countries, and qualitative data collection through a focus group consultation and 19 key informant interviews.

The data collection exercise specifically synthesizes:

- success of health adaptation projects in terms of not just whether the projects themselves were successful in determining good practices, but also whether the project activities facilitated climate resilience to the health risks of climate variability and change through implementation, policy or social change over longer temporal scales;
- good practice examples of success of the overall projects in achieving their objectives;
- other specific contributions towards successful adaptation;
- opportunities to enhance the effectiveness of ongoing and future adaptation projects and to potentially scale up programmes; and
- barriers and challenges, including what did not work so well in the implementation process and what were the perceived barriers for adequate scale-up.

The results will serve as a technical guidance and tool focusing on the conditions conducive for implementation and potential scale-up, as well as the sustainability of operations.

3

Methods of review and synthesis of health adaptation implementation

In the context of achieving the objective, a desk review was conducted of evaluation reports and other materials from three projects covering 14 countries. These projects are the first three multicountry health adaptation projects funded by international organizations and development partners, and are as follows:

- A midterm review of the United Nations Development Programme (UNDP)/WHO project “Piloting climate change adaptation to protect human health” (May 2013). The countries included in the project, which is funded by the Global Environment Facility (GEF), are Barbados, Bhutan, China, Fiji, Jordan, Kenya and Uzbekistan.
- Evaluations of the health components of Millennium Development Goals Achievement Fund (MDG-F) projects in China, Jordan and the Philippines. Midterm and final evaluations were reviewed where available.
- Review of the summary of the WHO Regional Office for Europe project “Protecting health from climate change: a seven-country initiative”, funded by the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) (2013). The countries included were Albania, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, the former Yugoslav Republic of Macedonia and Uzbekistan.

Three countries (China, Jordan and Uzbekistan) were included in two multicountry projects. The UNDP/WHO GEF project was the project first developed, but the last project funded. China, Jordan and Uzbekistan capitalized on the preparatory efforts for the GEF project during the funding delay to participate in other adaptation projects (MDG-F projects for China and Jordan; BMU project for Uzbekistan). Annex 1 provides a brief description of each project.

Based on expert judgment, the review evaluated the available documents for evidence and examples of:

- attainment of objectives and planned results of interventions (examples of good practice leading to achieving objectives);
- sustainability (the extent to which the impact achieved was likely to be sustainable);
- stakeholder participation and community engagement (the extent to which stakeholders and communities were engaged in project activities);
- country ownership and sociopolitical constraints (the extent to which the country displayed ownership of the project and any sociopolitical constraints experienced);
- human resources and capabilities (the human resources deployed for the project, and any gaps in capacities noted);

- replicability and scalability (the extent to which the project could be replicated elsewhere or scaled up to a broader geographical region than included in the project); and
- indicators for monitoring and evaluation (M&E) (what indicators were used for M&E).

The purpose of the evaluation was not to document these issues for each project, but rather to evaluate them in the context of the overall objectives. The comprehensiveness of the evaluation was limited to the information in the reports available. No issue was consistently covered across the three multicountry projects. The level of detail in which these issues were discussed in the reports also varied considerably.

4

Context for the evaluation

Two issues require further consideration: determining success and scaling up.

There is limited consensus on the criteria for determining that an adaptation project is a success. Therefore, evaluations take different approaches, depending on their goal and use. For example:

- The GEF evaluation criteria for evaluating projects are relevance, effectiveness, efficiency, results/impacts and sustainability within the context of the project cycle.
- The midterm review of the UNDP/WHO GEF project evaluated the effectiveness, efficiency and timeliness of programme implementation; issues requiring decisions and actions on the strength and weaknesses of the project design; directional and implementation changes that will build on the strengths and correct weaknesses in programme design, implementation and management; and lessons learned for future M&E of health adaptation projects.
- The criteria of the BMU included objectives, concepts, relevance (including replication potential and adaptation capacities), coherence and coordination, effectiveness (including objectives achieved), efficiency, impact and sustainability.

It is not clear what timescale should be used to determine whether a project was successful: today (within the project cycle), or at some future date. Because the climate will continue to change and development pathways will affect future vulnerabilities, there can be a mismatch between the expectations of donors and development partners that projects demonstrate successful adaptation within a short project cycle, and the reality that determining whether programmes and activities have actually increased resilience to climate change will take much longer.

To be considered successful, a project had to focus on short-term activities, with the intention of increasing longer-term resilience. Indicators of success were observable, concrete measures (early warning system implemented; number of people trained). Because of the significant adaptation deficit to climate variability, many activities focused on extreme weather and climate events. Whether outcomes and outputs increased resilience to climate change depends on the extent to which the country project remained a national and international priority after implementation. Longer-term M&E will only occur if local and national government departments and organizations take up the activities.

Therefore, when determining good practices and lessons learned, it is important to also look at process issues, specifically whether the projects helped establish a process that is likely to increase resilience and reduce risk not just throughout the particular project but also over longer temporal scales in the face of increasing climate variability and change.

A second issue requiring further consideration is the lack of an agreed definition on what is meant by scaling up, although scaling up of evidence-based health interventions from pilot projects to regional and national scales is widely acknowledged to be important.

Implementation science, including scaling up, is an active and urgent area of research for increasing the effectiveness of public health and health care services. Within this context, evaluation of scaling up in the reviewed projects considered the extent to which the pilot projects could, through deliberate efforts, be implemented more broadly within the country or region.

5

Interventions that proved successful

The 14 countries included in the review had a wide range of knowledge of the health risks of climate change and experience with adaptation at the start of their projects. At one end, the starting points included at least some knowledge of climate variability and change, strong support within the ministry of health or department of health (MoH/DoH), and good connections between the MoH/DoH and other ministries in the government on climate change. At the other end, there was very limited knowledge, less interest about the health risks of climate change in the MoH/DoH, and weak connections with other ministries. Despite different starting points, the reviews indicated all projects were successful in many aspects of achieving their objectives, and all countries developed strong partnerships for implementation.

The midterm review of the UNDP/WHO GEF project is typical in concluding that highly satisfactory progress was achieved in the attainment of objectives and of global and national outcomes and outputs. All countries had established institutional arrangements with assigned responsibilities for using meteorological and other environmental information for early warning systems (EWS) and other health sector activities, and all countries were in the process, although at different stages, of developing EWS or response systems. The midterm review of the BMU projects showed a very high level of attainment of the review criteria for four of the seven countries. By the end of the project in 2013, all projects had reached the promised goals, aims and impacts.

Because the projects vary in their purpose, design and approach to implementation, the following is not a systematic collection of information on all aspects reviewed, but is a synthesis of common lessons learned, highlighting promising examples of good practices. There are a large number of lessons learned, so they are grouped into a few key themes:

- More effective projects have a clear vision of how the adaptation project fits within country development goals and have strong country ownership.
- Greater impact is achieved when projects focus on achieving objectives and not just accomplishing outcomes.
- Multisectoral approaches promote effective adaptation and increase the potential for scaling up.
- More effective projects have or take time to build capacity and stakeholder engagement.
- Establishing and reinforcing enabling conditions across scales promotes success.
- Indicators are needed for M&E.
- Knowledge building and supplementation of country expertise will be necessary for some time.
- Mitigation and adaptation should be addressed jointly whenever possible.
- More effective projects include good design and clear management arrangements and coordination.

Those key themes will be dealt with in turn below.

5.1 More effective projects have a clear vision of how the adaptation project fits within country development goals and have strong country ownership

A lesson learned is the importance of ensuring a project is consistent with and clearly fits into country development goals. Most countries have climate change teams, generally led by someone within the environment ministry. The extent of engagement of the MoH/DoH in this team varies considerably. Some countries, such as Bhutan, have national-level committees that coordinate climate change work across sectors, to ensure there is alignment with development goals. It is important for the national climate change team to be engaged from the beginning of an adaptation project to increase the likelihood of committing (or supporting requests for) the necessary human and financial resources for scaling up after the project.

The projects provide good practice examples of promoting strong country ownership. After all, it is in the country's best interest to increase its resilience to current and future health risks of climate variability and change. Although time is too short to measure sustainability of the projects, it is reasonable to assume that greater country ownership and institutionalization of climate change into MoH/DoH strategies and programmes will indicate greater likelihood of sustainability. Strong country ownership will also serve to catalyse institutional changes across other sectors that affect health, thus providing a basis for longer-term successful adaptation. Examples include the countries in the BMU project, which each had a government-approved multisectoral committee.

Successful adaptation programmes and activities understand and build on the local to national context that determine the specifics of the design of an intervention and its uptake and effectiveness. Therefore, local to national actors must be engaged in the process, ensuring the project is aligned with the country development and adaptation objectives. External experts can be valuable to supplement expertise, within the context of strong national ownership that institutionalizes results as they are achieved, with local to national departments incorporating them into their strategies, policies and programmes.

It should be noted that ownership can take time to become institutionalized within national and local departments, including operationalizing concrete policies and programmes. While it may be challenging to estimate the time required during project design (with estimates more likely to be optimistic than pessimistic), it is important in the project timeline to build in buffers for when activities take longer than anticipated.



COURTESY OF INSTITUTE FOR ENVIRONMENTAL HEALTH AND RELATED PRODUCT SAFETY, CHINA CDC

An awareness raising session on prevention of health effects of heat-stress in vulnerable groups being conducted in China (UNDP/WHO GEF project).

5.2 Greater impact is achieved when projects focus on achieving objectives and not just accomplishing outcomes

A common issue raised in evaluations of the MDG-F projects is the importance of ensuring the projects focus on what needs to be achieved in terms of the country's vision of what being adapted to climate change would look like, and not just focus on delivering activities. Adaptation projects should be based on a vision of how to move from the current situation, typically with very high vulnerability to climate variability and change, to a more adapted future. Once this vision is established, an adaptation project can be designed based on an understanding of where it fits within that overarching framework. Too often, there can be a disconnect between overall project aims to increase the capacity of national public health and health care institutions to prepare for, respond to and recover from the health risks of climate variability and change, and the outcomes and outputs within a project that focus on specific activities to facilitate achieving some aspect of adaptive capacity.

Many of the projects had initial workshops where stakeholders discussed and agreed goals and specific activities to achieve them. Such approaches were helpful in providing the greatest possible buy-in with the project objective and outcomes, facilitating implementation (although other constraints may have affected success). Going further, carrying out visioning exercises during project development often means projects progress more quickly because all relevant stakeholders have agreed to common goals. While visioning exercises take time, they are an important component of capacity-building and of facilitating stakeholder ownership of adaptation processes and projects. There are a variety of approaches for conducting those exercises, including theory of change (discussed below).

5.3 Multisectoral approaches promote effective adaptation and increase the potential for scaling up

Managing the health risks of climate change requires engagement with more than just the health sector. At a minimum, hydrometeorological services are needed to provide data on weather trends and projected climate change. Therefore, adaptation programmes and projects should at a very minimum include consultation with national meteorological services and possibly with regional or international agencies. A variety of programmes provide regional climate data and projections, such as CORDEX¹ (Coordinated Regional Climate Downscaling Experiment), sponsored by the World Climate Research Programme; and the DATACLIM² project, sponsored by the GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit), for accessing, managing and sharing climate-related data and information. It is important for projects to develop strong and ongoing links with national services. For example, in the Uzbekistan project in the UNDP/WHO GEF project, close collaboration between the MoH and UZHydromet was central to the project, with data collected on cases of cardiovascular, intestinal and respiratory diseases entered into a database of weather and climate data. These

¹ <http://www.meteo.unican.es/en/projects/CORDEX>.

² <http://www.dataclim.org>.

data on weather and health will be used by the MoH to better manage the risks of climate-sensitive diseases.

There are a large number of sectors beyond hydrometeorological services whose programmes and activities could affect health. Ensuring engagement with these sectors is another key to providing more successful project outcomes. At a minimum, projects should include multisectoral national steering committees to foster dialogue and support across sectors and government departments, as was done in most of the projects. Having a plan for engagement and regular interactions facilitated building capacity across sectors in all countries. These interactions will hopefully lead to official intersectoral cooperative mechanisms to support future adaptation activities.

5.4 More effective projects have or take time to build capacity and stakeholder engagement

The importance of significant investment before or at the very beginning of projects to build capacity and stakeholder engagement was highlighted in the reviews of the MDG-F projects. The reviews concluded that these activities are so critical to success that they should be promoted even if it means projects achieve less in terms of outcomes and outputs. For example, in the Philippines project, the evaluation noted that the design and piloting of activities demanded an iterative process before the activities were ready for roll-out. This process, including adopting alternative options and making necessary adjustments, was essential for success. The consultative process in the design, planning and implementation of project activities can generate not only ownership of the process but also ensure the activities take into consideration the local context, which is another critical determinant of success.

The entry point (and often an output) for many adaptation projects was conducting a vulnerability and adaptation assessment. Vulnerability and adaptation assessments generally have a strong stakeholder component, so such assessments can be very successful in building capacity and ensuring ownership of the project across a range of stakeholders from local to national scale. Assessments can identify local to national limits and barriers to adaptation, and approaches to resolving them. Further, by providing insights into the capacity to manage current risks associated with climate-sensitive health outcomes, assessments help target specific outputs and activities to further build needed capacity. The reviewed assessments were often conducted with support and input from WHO (headquarters and regional and country offices); countries found this support critical for success.

Once assessments were complete, another critical step was incorporating the results into a climate change strategy or plan. Ideally, these are then institutionalized into MoH/DoH strategies and programmes, such as was done in the Philippines and other projects. Many countries achieved this, while others are on a path to do so within a short timeframe.

Whether conducting such an assessment or using another approach, successful projects either already had capacity in climate change and health or built it before work was initiated. Building capacity before developing a proposal could improve projects so that they can be more effectively designed from the beginning to sustainably increase resilience to the health risks of climate change.

5.5 Establishing and reinforcing enabling conditions across scales promotes success

Climate change presents health risks at local to national scales (and international scales for issues such as emerging infectious diseases, migration and other teleconnections where impacts in one region can affect other regions). Establishing and reinforcing enabling conditions facilitates moving projects to broad-based adaptation, and scaling up of projects.

Projects such as those in Jordan for the MDG-F and the UNDP/WHO projects specifically focused on establishing national enabling conditions. In Jordan's case, the UNDP/WHO project was designed to ensure that wastewater reuse is a sustainable management option for the country's water scarcity problems. The project built on the MDG-F project to address

water security risks due to climate change by increasing coherence across the fragmented and overlapping responsibilities among the ministries involved in wastewater collection, treatment and reuse (Water and Irrigation, Health, Agriculture, and Environment). The project seeks to manage health risks through strengthening monitoring and surveillance capacity; developing the necessary institutional and regulatory framework for safe use of wastewater; and increasing the capacity to implement health protection measures. This includes developing guidelines and good practices for safe wastewater reuse.

Specifically linking the health adaptation projects with activities being undertaken by the national climate change team can reinforce enabling conditions and provide opportunities for addressing existing institutional barriers to increase the likelihood of successful outcomes and outputs emerging from implementation of a project.



PHOTO COURTESY OF THE WATER AND ENVIRONMENT RESEARCH CENTRE OF THE UNIVERSITY OF JORDAN

Safe food production using treated wastewater as an adaptation measure to offset water scarcity induced by climate variability in Jordan (UNDP/WHO GEF project).

5.6 Indicators are needed for monitoring and evaluation (M&E)

Indicators are standard tools for measuring trends in, for example, the burden of disease, and for measuring progress against goals and objectives. Defining indicators for the health risks of climate change is an emerging field. An agreed set of minimum indicators, similar to those defined for measuring meteorological and climatological variables, along with means of verification, are needed to help establish baselines and for measuring the degree of success of health adaptation activities. This set could then inform indicators chosen within adaptation projects. Having a common set across projects would help future comparisons and evaluations, as was done within each multicountry project.

Evaluations of the MDG-F projects noted these projects were implemented within monitoring frameworks with large numbers of indicators (for example, 55 for the China project, with the evaluation concluding that indicators were the weakest part of the project). The evaluations concluded that there were too many indicators and that they did not measure well the progress made to achieve the expected outcomes and outputs. The BMU and UNDP/WHO GEF projects had fewer indicators; these were generally tied to specific outcomes and outputs. For example, the 16 outcome indicators of the BMU were developed through a process facilitated by the WHO Regional Office for Europe and were evaluated every two years; they included indicators such as the number of heatwave deaths avoided.

An appropriate suite of adaptation indicators would move beyond measurement of current protection to climate-sensitive health outcomes, and include indicators describing key steps in the process of adaptation in the context of changing development patterns. Such indicators need to track efforts to prepare for and manage changes in the geographical range, seasonality and incidence of climate-sensitive outcomes. A theoretical example is a community that wants an indicator of whether it is prepared for the possible expansion of the geographical range of dengue fever. Such an indicator should consider not just the capability of its surveillance programmes to detect the vector and the presence of the virus, but also the effectiveness of education and training programmes for health care providers and individuals to identify risks and avoid possible exposure.

Local to national indicators (and means of verification) are needed that measure the extent to which public health and health care policies and programmes:

- assess and manage climate-related risks from a systems perspective, taking into consideration the multiple environmental and social drivers of the geographical range, seasonality and incidence of health outcomes;
- design, implement, monitor and evaluate interventions using projections of health impacts under different climate and socioeconomic futures; and
- explicitly incorporate learning (informed by M&E) into iterative management cycles, building capacity for further adaptation as the climate continues to change.

5.7 Knowledge building and supplementation of country expertise will be necessary for some time

Climate change remains a new issue for many parts of the health sector, with relatively few MoH/DoH staff having the educational training and experience needed to effectively prepare for and manage the health risks of climate change. A conclusion from all projects reviewed is that additional training could yield significant benefits. The resulting increases in capacity would enhance the quality and relevance of projects. In addition to inception workshops, there was high interest in having ongoing training in climate change issues throughout projects.

As noted in the MDG-F project evaluation of China, the knowledge base of the current workforce cannot meet the current and emerging needs in climate change; the evaluation

recommended in-service education of environmental health staff. Options for increasing training and capacity on climate change and health include:

- increasing the capacity of WHO and its regional and country offices to provide significant backstopping expertise;
- establishing formal training courses;
- supplementing climate change training courses that do not include health components; and
- sending researchers to university short courses on climate change and health.

An experience in Uzbekistan was typical; the medical school would have liked to include at least a few lectures on climate change in the general curriculum but did not have the expertise to do so and did not know how to obtain it. The development of online courses will help to some extent, but in-person training continues to be the preferred approach because of opportunities for asking questions and group discussions. In the BMU projects, 35 capacity development meetings were organized on a range of issues, including how to conduct a vulnerability and adaptation assessment, data analysis methods and training in infectious disease surveillance.

However, it should be noted that a few days of lectures may not be sufficient to train public health professionals in the multiple possible pathways and interactions by which climate change affects human health, and the new approaches needed to effectively manage the risks.

As noted in the evaluation of the BMU projects, capacity-building should be targeted at a very broad range of stakeholders, including the general public, medical and public health professionals, and decision- and policy-makers. Taking a more inclusive approach to education and training means that future policy-makers, civil society, journalists and the private sector understand basic information on the health risks of climate change.

Supplementary expertise will continue to be an important component of many successful adaptation projects. This expertise can come from within WHO offices, regional and international organizations, nongovernmental organizations, and researchers or consultants with expertise in the country. For example, the Fiji project received significant benefits from regular visits from and interactions with an expert in climate change and health and in developing EWS. Some sectors have invested more heavily in supplementing country expertise, resulting in differences in, for example, the MDG-F projects where the health components often focused on vulnerability and adaptation assessments, while other sectors implemented adaptation options based on earlier work. It is vital that the supplementary expertise be structured to build national and local capacity.

A related issue that arose in many projects was personnel turnover, with individuals moving to other positions. This can create challenges when each project only has a small number of personnel familiar with climate change. While there is little that can be done about turnover, education and training can build expertise within and outside a project, thus reducing the effects of turnover on projects.

Participants in the UNDP/WHO GEF and BMU projects strongly endorsed the international exchanges of experiences afforded during these projects. The evaluations indicated that

creating additional opportunities would further build capacity. These exchanges should apply not just to the heads of projects, but also to peer-to-peer exchanges within and across projects. For example, community health workers could exchange visits with their peers in other communities and learn from each other on how to improve their ability to help the communities they serve. Project personnel could visit their counterparts in other projects to discuss approaches, challenges and successes in order to inform implementation of their projects and to gain a broader perspective. Providing some budget for these exchanges would facilitate South-South learning and further strengthen capacity for implementing adaptation.

5.8 Mitigation and adaptation should be addressed jointly whenever possible

Based on national needs and on the interests of donors and development partners, all projects focused on implementing adaptation projects to increase resilience to the health risks of climate change. The very significant adaptation deficit in the health sector means such projects will be critically needed for years to come. In addition, some countries in the BMU projects used the projects to explore renewable energy sources to increase reliability of power supply and to reduce their greenhouse gas emissions, in order to reduce the magnitude of climate change to which health systems will need to adapt later in the century. This suggestion is not to divert attention from adaptation, but to note that some outputs could beneficially incorporate consideration of mitigation at low cost. For example, outputs relating to health care facilities might use the opportunity of the adaptation project to apply for supplementary funding to also green the health care sector.

For example, to address intermittent power supplies to health care facilities in Kyrgyzstan, five pilot hospitals conducted energy efficiency assessments. One hospital installed a solar water heater and four installed solar photovoltaic power plants. This was the first large-scale implementation of renewable energy sources in the public health sector. Taking advantage of adaptation projects to catalyse mitigation efforts can cost less than undertaking mitigation projects separately, result in earlier uptake of renewable energy and other technologies, and help green the health care sector.

5.9 More effective projects have good design and clear management arrangements and coordination

As is true for all projects, good programme design and clear management are critical for successful implementation and to increase the potential for longer-term impacts. The project design and management arrangements in the evaluated projects were good, with the usual challenges with any large, complex project. It would be good practice for the prospectus of a project to consider more than management roles and responsibilities, design of outcomes and outputs, and evaluation of results. Other important considerations include formulating a strategy for capacity development, approaches to reinforce an enabling environment, and an output on designing scaling up activities (discussed below).

6

Potential for scale-up

While all projects aimed to facilitate scaling up, no information was available on whether scaling up had taken place. However, some observations on the potential for scaling up are possible based on experience in the health systems management of other issues.

6.1 Many programmes and activities are known to be successful in managing the risks of climate-sensitive health outcomes, although research is needed on their effectiveness in a changing climate

Because the health risks of climate change are not new, evidence-based interventions are available for all climate-sensitive health outcomes, although the extent of their implementation varies across countries. Examples include:

- **Strengthening primary health care, public health and laboratory services for climate-sensitive health outcomes.** All projects successfully included aspects of strengthening health systems. There are many examples of increasing the capacity of local and national actors to manage risks, including through monitoring and surveillance, altering current and planned programmes to incorporate risks associated with climate variability and change, incorporating health into climate change policies and strategies within and outside the health sector, and facilitating intersectoral cooperation and collaboration on climate change.



Using health records of community residents to establish a baseline for surveillance of health impacts of heat-stress with instruction from the local Centers for Disease Control and Prevention office in China (UNDP/WHO GEF project).

COURTESY OF INSTITUTE FOR ENVIRONMENTAL HEALTH AND RELATED PRODUCT SAFETY, CHINA CDC

- **Addressing extreme weather and climate events.** Given the increase in the frequency, intensity and duration of some extreme events, and the significant (and preventable) associated health impacts, many projects incorporated outputs to address extreme weather and climate events. For example, the Albania project included activities to improve medical management of health emergencies due to extreme events by training personnel on issues from diagnosis and treatment to developing hospital contingency plans. China, Kazakhstan, Tajikistan and the former Yugoslav Republic of Macedonia are examples of countries that designed and implemented heatwave EWS and response systems that guide the issuance of warnings, particularly to the most vulnerable, and outline response plans to facilitate timely coordination of resources and strategies in response to heatwaves. The multidisciplinary nature of these systems is illustrated by the plan of the former Yugoslav Republic of Macedonia, which involves health, transport, education, science, hydrometeorology, emergency management and nongovernmental sectors.
- **Improving health protection in low-resource locations.** Because rural and remote areas can be at particular risk from climate variability and change, countries such as Bhutan and the Russian Federation included activities to improve health protection in regions with particularly limited human and financial resources. Bhutan developed educational materials for all levels of health care, including village health workers. Pre- and post-training knowledge tests and meetings with district health managers, basic health units and village health workers demonstrate very high awareness of changing weather and disease patterns, and how climate change could exacerbate or ameliorate current health burdens. In the Russian Federation, a health adaptation strategy was developed with the local government. The project facilitated communicable disease surveillance and control through providing equipment for detection of tick-borne encephalitis, for example.
- **Integrating surveillance and monitoring into programmes.** Surveillance and monitoring are critical for detecting trends in any health outcome and for identifying outbreaks early enough for effective interventions. Because these programmes may be constrained by limited human and financial resources, and in some places by a lower priority than for other health issues, improving surveillance and monitoring is often a highly successful approach to increasing knowledge of the geographical range, seasonality and incidence of climate-sensitive health outcomes. Most countries included outcomes to augment monitoring to increase the capacity to assess risk, promote diagnosis and treatment, and implement prevention programmes. For example, in Albania, an air quality monitoring system was established in the capital Tirana, including the purchase, installation and activation of two air pollution monitors. The success of the programme led the European Commission to extend the system for funding additional equipment to other regions. The project also built local capacity for an air quality alert communication mechanism.
- **Mapping vulnerability and hazards.** Vulnerability mapping can be useful to identify regions and populations at particular risk from climate-related hazards. Many projects mapped outputs of the vulnerability and adaptation assessment to better understand where to invest greater efforts in managing risks of weather and climate variability. For example, the Kazakhstan project mapped vulnerable areas along with indicators of health system resilience. Many projects also mapped projected climate hazards; however, mapping hazards alone provides only part of the information needed to focus policies

and programmes to increase resilience to further climate change. There have been limited efforts to explore how to project changes in vulnerability under different development pathways.

- **Implementing EWS.** EWS save lives and can continue to do so, if appropriately implemented and maintained over coming decades. The malaria early warning system (MEWS) being established in the Kenyan project should serve communities well as the climate continues to change, including through monitoring any changes in the geographical range or seasonality of the disease, and making adjustments as locations of outbreaks change and technologies advance. The Uzbekistan project (under the BMU project) is developing a pilot system to warn of dust storms, in order to enhance resilience and raise public awareness.



COURTESY OF WHO/UNDP GEF PROJECT MANAGEMENT IN UZBEKISTAN

A workshop on strengthening early warning and response systems in progress in Uzbekistan (UNDP/WHO GEF project).

- **Adopting a broad approach.** An “all hazard” approach, as used in the BMU projects, can effectively promote resilience.

This very solid basis for promoting health protection means countries have many specific interventions available to them when developing strategies and policies to manage current and future health risks of climate change. However, there is little to no comparative evidence, globally or in particular locations, of which interventions would be more cost-effective and efficient to address the challenges posed by a changing climate. Waiting for such evidence would result in preventable morbidity and mortality, so choices need to be made even as research is conducted to provide the necessary evidence; conducting such research should be a priority at all levels.

It is important for climate variability and change to be explicitly incorporated from the beginning when modifying current or developing new interventions, to ensure strategies are as effective as possible. In addition to applying what is already known, health protection from climate change also involves modifying public health approaches to make sure that processes are established for iterative management as climate and development alter risks.

That said, not all interventions will be appropriate or successful in all regions. The general success of EWS in preventing climate-sensitive morbidity and mortality means that outputs of several projects were to develop EWS and response systems. However, such systems proved challenging to develop in some countries. Reasons include insufficient data on the climate-sensitive health outcome of interest (too short time series, too few observations because outcomes were uncommon or because populations were small, and not frequent enough observations of outcomes); insufficient data on other drivers of the health outcome; weak associations between weather and climate in the locations studied; or limited evidence of thresholds for initiating action in an EWS. Just because a health outcome is climate sensitive does not mean that developing an EWS is possible or useful.

6.2 There are multiple entry points for scaling up

The projects were primarily designed to implement adaptation at local scales, with linkages in most cases with national policies and programmes, with the vision that the projects could subsequently be scaled up from local to regional and national scales. Countries do not always need to start with such a project-based community-focused perspective, but could start from a more programmatic, mainstreamed approach through conducting a national or regional vulnerability and adaptation assessment, or through developing the health component of the national adaptation plan.

6.3 Scaling up would be more effective if plans for doing so are developed before a project is completed

All projects were implemented assuming that scaling up was possible. However, none of the projects included an explicit component to develop plans for scaling up, other than developing a climate change action plan for the health sector. A component focused on scaling up could consider regions where scaling up would be likely, working out timelines for scaling up and estimating the human and financial resources necessary to do so. It could also be helpful for the United Nations agencies, donors and development partners supporting the projects to consider holding meetings of key stakeholders across projects to provide advice on opportunities for scaling up. In addition, good practice guidance would be helpful for developing plans for scaling up at the end of adaptation projects.

6.4 Scaling up is facilitated by having a broad vision of objectives and how they can be accomplished

As noted earlier, projects are more likely to be sustainable when they focus on achieving broad objectives aligned with national development priorities, and not just on accomplishing outcomes. Envisioning steps to achieving the overall objective, including the contribution of a particular project, can facilitate scaling up.

7

Key barriers to scaling up

The following key barriers to scaling up were identified during the study:

7.1 Limited political will and leadership

A critical constraint to promoting health protection from climate change is the limited awareness of the importance of climate variability and change for the health sector. Leadership from international and national organizations and continuing advocacy efforts will hopefully shift the priorities of health sector policy-makers, and of funders of health adaptation efforts, to take advantage of the considerable available information to proactively prepare for and respond to climate-related risks.

7.2 Financial and human resources remain a constraint

The magnitude and pattern of the current and projected health risks of climate change highlight the needs for effective risk management. Estimates of the adaptation needs of developing countries are in the tens of billions of dollars per sector per year; the numbers vastly exceed available funds. This estimate does not take into consideration the often weak and underfunded health systems in many LMICs. The large gap between needs and available funds means priority-setting and often difficult decisions on which health outcomes and regions to focus. In addition, human resources are highly constrained and are likely to remain so for some time to come. Therefore, the health sector needs to consider how to move forward on adaptation when resources are not sufficient.

The importance of increasing financial resources needs to be highlighted to potential donors and development partners. With climate change, there are multiple sources of adaptation funding, from GEF to development partners to national funds. The health sector has been slow in applying for adaptation funding. Doing so could benefit the health sector and help integrate issues across sectors, making sure issues such as the nexus of water, agriculture and health are understood and explored holistically. As important as this funding is likely to be in promoting health adaptation, countries will not be able to rely on the climate funds alone. Increasing resilience will require incorporation of climate risks into health investments from national and external resources.

There are lessons that can be learned from approaches adopted for other important health issues to increasing financial and human resources, such as the approach of the Global Fund to Fight AIDS, Tuberculosis and Malaria to seeking funding from multiple donors. Another lesson learned is the importance of coordination among donors and development partners.

Systematically considering climate change in public health activities will make new demands on technical knowledge and capacities, require enhanced and novel surveillance, and necessitate engagement across all sectors where climate change-related impacts may

affect human health. These requirements mean that early investment in human resources will provide greater capacity for conducting successful adaptation projects over the years to come.

7.3 There are limited projections of the future health risks of climate change at the spatial scales of interest

The literature base remains small on projections of the magnitude and pattern of possible future health risks of climate change, which means adaptation projects have a limited basis for putting shorter-term adaptation into longer-term perspectives. Multiple models are needed for each health outcome of concern because different models serve different uses. For example, a model developed as the basis of an EWS, which contains sufficient detail and contextual information to be able to forecast where and when health risks could increase under particular environmental conditions in a specific location, is not likely to be appropriate for projecting how health risks could evolve over this century under different climate and socioeconomic scenarios at different spatial and temporal scales. Increasingly detailed understanding of the determinants of a climate-sensitive health outcome over short timescales can enhance the effectiveness of public health interventions. However, this level of detail may not be needed or useful to provide realistic projections of disease burdens in mid-century and beyond under different possible futures. Projecting the extent to which alterations in weather patterns may affect future health burdens requires moving beyond simple models based on exposure–response relationships and projected temperature and precipitation change to models that incorporate a range of drivers of the health outcome and plausible environmental and socioeconomic futures. Finer temporal and spatial scale models are needed to inform decision-making.

7.4 Methods, tools and guidance documents are insufficiently developed

Understanding and effectively managing the health risks of climate change requires methods, tools and guidance documents on a range of issues, including adaptive management, indicators, and estimating the costs and benefits of specific programmes and interventions. WHO and its regional and country offices are building a database of such documents. Some are more focused on highly industrialized countries, and others on LMICs. New methods, tools and guidance documents are needed to support country-level adaptation projects, such as approaches to conducting detection and attribution studies, and using socioeconomic scenarios. Current methods, tools and guidance documents also need to be kept up to date.

8

Additional suggestions

8.1 Iterative risk management or similar approaches can help ensure interventions will continue to be successful under future climate and development pathways

Effectively managing the health risks of climate variability and change requires interventions to explicitly consider risks that are changing over spatial and temporal scales, with high degrees of uncertainty as to the rate and magnitude of changes in a particular location at a particular time. This includes risks from a changing climate as well as from changes in other factors that determine the distribution and incidence of climate-sensitive health outcomes. In other words, addressing the current adaptation deficit may be insufficient to address future adaptation needs because effectively managing current risks may not be enough to manage future risks.

One approach to handling these uncertainties is adaptive management, which is a structured, iterative process of decision-making in the face of imperfect information. Adaptive management aims to reduce uncertainty through M&E. It recognizes the uncertainties associated with projecting future outcomes and considers a range of possible future outcomes when formulating interventions. Interventions are designed to be flexible, taking into account multiple stakeholder objectives and preferences, and are subject to adjustment in an iterative, social learning process. Adaptive management encourages stakeholder engagement in decision-making, and aims to reduce decision-making gridlock by making it clear that decisions are provisional; there is often no “right” or “wrong” decision, and

modifications are to be expected. It explores alternative ways to meet objectives, predicts the outcomes of alternatives based on the current state of knowledge, implements one or more alternatives, monitors to learn about the impacts of actions, and then uses the results to update knowledge and adjust interventions.

All projects incorporated some elements of adaptive management, including a strong emphasis on stakeholder engagement and taking a systems-based approach when modifying current or implementing new interventions. Because most projects were more focused on understanding vulnerability and beginning to implement adaptation than on explicitly establishing long-term adaptation processes, no projects included all elements of adaptive management. Additional aspects could be incorporated in future projects.



Climate change and health logo being launched during a media event in Bay Street, Bridgetown, Barbados.

8.2 Mainstreaming of health sector interventions is necessary but insufficient

The climate change adaptation literature contains extensive discussions of the importance of focusing adaptation efforts on building climate change into ongoing programmes and activities, making sure that climate change is not treated separately from other drivers of outcomes. This generally means that each programme and activity takes full responsibility for incorporating climate variability and change, rather than creating separate national or regional programmes on adaptation. Parallel structures are rarely as successful and efficient as incorporating the management of the risk factor within the programmes responsible for the health outcome of concern. For example, national and regional malaria control programmes are generally best placed to incorporate all factors that can affect the geographical distribution, incidence and seasonality of malaria. Therefore, it is critically important for the programmes managing the risks of climate-sensitive health outcomes to explicitly include climate variability and change into their workplans to ensure they have maximum effectiveness in increasing resilience under different climate and development futures, as was done in all the projects reviewed. This implies that these programmes incorporate M&E to identify current and possible future weaknesses that can be addressed through adaptive management approaches.

As critical as these mainstreaming processes are, they are not sufficient for successful adaptation if they are not closely linked with national or regional adaptation programmes, for at least two reasons. One reason is that it is impractical to require expertise across all programmes for climate-sensitive health outcomes in all regions at all scales, from local to international. There are many dimensions to understanding climate variability and change, with information continually changing. Given the demands on people's time, it would be more efficient to have a resource from which individuals can obtain the latest information on weather variables of importance at the scale of relevance. Most countries have at least national climate change teams that can provide information on weather and climate. Developing close working relationships with such teams will help facilitate the provision of necessary data by the hydrometeorological services and other departments or ministries, along with guidance to help ensure the data, including projections, are used appropriately. There still needs to be training of public health professionals on recognizing and managing the health risks of climate change.

Equally as important, many mainstreaming activities focus on including climate change considerations within particular programmes, without ensuring the nation develops the cross-sectoral broad-based vision of the complex drivers (and their interrelationships) of the health risks of climate change. Multisectoral approaches could improve the capacities of other sectors to make choices with respect to adaptation, mitigation and development that promote health co-benefits, as well as preventing or appropriately modifying policies with negative health consequences. A broad approach can facilitate strengthening links with other sectors with responsibility for programmes and activities that are critical for population health (such as water safety and security). Early engagement can be effective

in modifying activities before full implementation, thereby preventing or reducing health impacts that could have arisen.

Finally, a risk when mainstreaming is focused only on building capacity within current and planned programmes and activities is that adaptation funds could be used to address development gaps, and not to increase resilience to future climate change.

8.3 Using a theory of change approach to developing overall objectives

Although not used by any of the projects reviewed or in the health sector generally, theory of change is an approach to consider for developing overall objectives and for articulating the steps necessary. Theory of change aims to develop an explicit, specific and measurable description of a change (such as reducing the risks of infectious diseases) that is then used as the basis for planning, implementation and evaluation. Articulating the theory of change behind a project facilitates examining assumptions and connections and developing specific indicators to monitor and evaluate the expected change or changes. Key elements include the context for the problem the project is seeking to influence, including socioeconomic and political conditions and the actors able to influence them; the long-term change being sought; the process and sequence of change; explicit statements of the assumptions about how change might happen; and a diagram and narrative summary of the process and expected product.³ Typical steps in developing a theory of change include:

- agree what a successful outcome would look like, including who the change will benefit;
- identify who needs to be influenced for the change to happen;
- state the timeframe over which the benefits will be achieved;
- map the intermediate actions needed for success (including the evidence needed to measure success);
- describe the underlying assumptions at each step and the preconditions needed for success; and
- justify why this theory of change is plausible.

Developing a theory of change requires a systems-based approach to understanding the actors and dynamics at work, to facilitate achieving the particular objective. A variety of guidance documents exist for developing a theory of change.⁴

³ Such as the business case and intervention summary of the International Climate Fund-supported WHO project “Building adaptation to climate change in health in least developed countries through resilient WASH” (iati.dfid.gov.uk/iati_documents/3910062.doc).

⁴ For example, *Practical approaches to theories of change in conflict, security and justice programmes*, United Kingdom Department for International Development (<http://www.smallarmssurvey.org/fileadmin/docs/M-files/CCRVI/CCVRI-theories-of-change-part-1.pdf>).

8.4 Gender considerations should be integral to project design

Although few projects included specific mention of gender, many adaptation activities implicitly include gender. Projects may have considered gender, but this may not have been included in the evaluations. Activities to increase resilience to particularly vulnerable groups should consider gender and the roles and responsibilities of men and women, across and within communities. It would be helpful (as discussed under indicators) to encourage specific consideration of gender in the design and conduct of health adaptation projects.

8.5 A common set of indicators is needed for measuring adaptation over short and longer timescales

The three multicountry projects used different indicators of success within their projects. This raises a couple of issues.

It would be very useful for comparison purposes to have a common set of indicators that health adaptation projects could use for M&E of the extent to which they achieved outcomes and outputs. As noted earlier, this set of indicators should also include indicators of the extent to which the process established would facilitate resilience over the longer term.

The focus of the indicators used in the multicountry projects was on whether the national projects achieved their individual objectives. The objectives were designed on the assumption that success within a project would provide some assurance that longer-term adaptation was also successful. It would be helpful to test that assumption by revisiting some country projects after a suitable time period to determine whether the outcomes and outputs achieved were in fact sustained.

9

Qualitative data collection for the identification of barriers, challenges, and opportunities for implementation and scaling up of adaptation interventions

9.1 Methods

9.1.1 Study design

A qualitative study was conducted, based on in-depth semistructured interviews using open-ended questions. Individual interviews were considered the most appropriate method to gain feedback and understanding of the research questions. However, in two cases, interviews with two and three people were conducted at the request of informants. A focus group consultation with stakeholders of one country was considered to be a suitable method to enrich the findings from interviews and to go into more detail on barriers, challenges and opportunities with respect to malaria control programmes and health adaptation to climate change.

9.1.2 Sampling of informants

The sampling was purposive, and interviews were conducted with 19 key informants, including project and programme managers, project representatives from the UNDP/WHO GEF project, and technical officials in the fields of health adaptation to climate change, climate variability and change, and climate and health risk management. Interviewees of different sexes and ages from LMICs in Africa, Latin America and the Caribbean, Asia and Europe were selected based on their current and previous leadership roles at institutions and organizations that implement initiatives on climate variability and change, public health, and health adaptation programmes and interventions. The informants were also purposively selected for their expertise in health adaptation to climate change and their experience at various levels in governmental, nongovernmental and multilateral organizations. In terms of geographical distribution, countries covered in the study included Albania, Barbados, Bhutan, China, Fiji, Jordan, Kazakhstan, Kenya, Kyrgyzstan, the Philippines, the Russian Federation, Tajikistan, the former Yugoslav Republic of Macedonia and Uzbekistan. The focus group consultation in Kenya was carried out with a national stakeholder group comprising 11 men and women of different ages and responsibilities, selected for their experience as public health professionals, from health data records officials to officers in

charge, in different designated malaria-prone areas and in health centres dealing with climate health risks and malaria preparedness, control and response.

9.1.3 Data collection

Qualitative data were collected through targeted interviews and a focus group consultation in Nairobi, Kenya, in May 2014. Following ethics requirements for practice of qualitative research, the researcher explained in advance to the focus group participants and informants the research objectives, the nature of the qualitative method to be followed (the purpose and nature of the questions to be discussed), and how the results could be used (1, 2). All key informants (interviewees and focus group participants) formally agreed to be interviewed and consulted respectively, and gave permission to use the content of the interviews and focus group consultation. Except in one case, all informants gave permission to audio-record the sessions. Only anonymized quotations are included in this report. All key informants were given the opportunity to comment on the resulting draft of this report. In order to protect the anonymity of key informants, no identifying information is included in this document. Confidentiality was assured throughout all steps of the research process.

Interviews were conducted with one key informant at a time except for two cases, wherein three persons and two persons were interviewed at the informants' request. Interviews were conducted by one researcher and lasted between 30 and 65 minutes each, based on a semistructured questionnaire. Questions were aimed at eliciting interviewee's knowledge, personal views and experiences from implementation of health adaptation to climate change initiatives. After 13 interviews, the range of feedback and perceptions on successes, barriers and opportunities for implementation and scaling up had been captured and saturation level had been reached. An interview guide was used; it was evaluated and refined throughout the interview process. It was also adapted for the focus group discussion, which was guided by a series of open-ended questions and took two hours to complete. Specifically, key informants were asked to reflect upon the following:

Successes:

1. Description and perception of the quality of results
2. Description of the most successful outcomes/approaches/strategies or interventions of your projects and where those results lead

Barriers or challenges:

1. Examples of unexpected results from the process and outputs of the project
2. Future expectations
3. Strategies or actions done differently if given the opportunity to initiate the project today
4. Main barriers or challenges contributing to the goals of the programme or intervention

Scaling up:

1. Potential areas or initiatives for scaling up and main barriers
2. Tracking and monitoring through adequate indicators

9.1.4 Data analysis

Interviews and focus group consultation were transcribed by hand and manually coded to look for emerging themes related to the three study aims or specific objectives, covering (a) successes, (b) potential for scale-up, and (c) barriers to implementation and scale-up. Coding was conducted using a constant comparative method (3) following detailed analysis of information in the data, and looking for similarities and differences to break down, compare, categorize and label the data previously divided into meaning units (4). After all interviews had been coded once, a second round of coding took place, verifying codes to check accuracy of ideas captured and continuously comparing the data throughout the whole process until one theme emerged (5, 6).

Responses are grouped into information categories representing different components of good practices and potential for scale-up. The findings (emerging themes on successes, barriers and scaling up) were organized into six information categories, representing specific components of the implementation and scaling up process:

1. attributes of the intervention, approach or strategy being implemented;
2. attributes of the implementation team, which refers to specific abilities of the resource team responsible for the project implementation;
3. institutional context and national implementation framework;
4. choice of implementation strategy;
5. attributes of the community or audience targeted for health adaptation purposes; and
6. attributes of the intervention, strategy or approach for potential scale-up in the medium term.

These categories were adapted from existing typologies of scaling up and components of scaling up processes (7–9).⁵

9.2 Findings of key informant interviews

9.2.1 Identification of achievements and successes on health adaptation to climate change

Attributes of the implementation team

Ability to foster cross-country collaboration, share information and translate climate change concerns into the health sector

Results show that whenever there was an opportunity for countries to share experiences and discuss challenges, this contributed positively throughout the implementation processes in various settings. Key informants emphasized the importance of facilitating information

⁵ Yamey (9) proposes a framework where success factors in global health interventions are grouped into six categories, representing different components of the scaling up process: attributes of the specific tool or service being scaled up, attributes of the implementers, the chosen delivery strategy, attributes of the “adopting” community, the sociopolitical context and the research context.

exchanges within and across countries and creating mechanisms or platforms that contributed to this sharing of lessons and practices (K1, K15).

A valued asset was the ability to incorporate climate adaptation planning aspects into the health system and health sector, despite the difficulties (K12, K13), and into the overall national planning processes (K4, K5). Some of the specific examples highlighted include a clear health strategy for climate change adaptation adopted at the MoH level (K11, K12); a planning system that takes into account climate change and health (K4, K6) by upgrading adaptation issues, including health, within the national climate change action plan; and working with national environmental commissions on protocols for health adaptation to climate change (K13).

Attributes of the community or audience targeted for health adaptation purposes

Improved awareness, knowledge and capacities on health and climate: the link with decline in disease incidence

An emerging theme that was given important attention by a majority of key respondents was the improvement in knowledge, awareness and capacities following various trainings and sensitization initiatives among the targeted communities, including health workers and decision-makers, at the national level (K1–3, K7–10, K13, K14, K16–19). Equipment supply was reported to have improved, which contributed to the effective implementation of projects, especially in relation to EWS (K19) and MoH drinking water laboratories in some cases (K11, K19).



A health education workshop on malaria prevention and control in progress in Malawi.

Education campaigns and training in communities were found to increase awareness and preparedness; however, it was noted that a comprehensive evaluation would be required to assess if these outputs effectively result in an actual decline in climate-sensitive disease outcomes (K3, K8). It is acknowledged that M&E of climate change adaptation is a relatively new area without a standardized system, as it requires a customized approach according to country needs (10). This is important for mainstreaming health adaptation monitoring into planning stages for national assessments, through institutionalized country-specific M&E systems, an argument captured by key informants (K3, K7):

Now the communities, both parents and children, understand the macro-level trends of global warming and the relationship with the local environment, for example the relationship between mosquito densities or safe water scarcity and disease cases. We need a complete evaluation. The key would be to know if such understanding leads to action to remove the mosquito breeding sites, or to ensure consumption of safe drinking water or hygiene practices such as handwashing. Whether they really put in practice good practices is what we would then need to figure out. We believe that adaptation and preparedness at community level should reduce disease incidence, but we still need more evidence confirming that such increase in understanding leads to action. (K3)

Building credibility and creating a positive impact at community level needs an integrated approach

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) emphasized: “The most effective measures to reduce vulnerability in the near term are programmes that implement basic public health measures such as provision of clean water and sanitation, secure essential health care including vaccination and child health services, increase capacity for disaster preparedness and response, and alleviate poverty” (11).

Key informants argued that home-based case management of malaria by trained volunteers, along with an “integrated approach” (bringing in nutrition, maternal and child health, sexual and reproductive health (SRH), water, sanitation and hygiene, livelihoods, and disaster risk management services) when implementing case management, have resulted in improved health indicators at the community level (K9, K10). In these cases, most successful outcomes occurred where communities had been given the opportunity to participate fully in the implementation processes (case study 1).

CASE STUDY 1.

Continued community involvement: one key for successful interventions

Community strategy models vary across high-, medium- and low-income countries, from strategies for disaster resilience community engagement (12) to community strategies to deliver national health sector strategic plans (13). An opportunity to test community strategy models within malaria control programmes is found in the successful implementation of home-based malaria case management in 113 hard-to-reach villages in Kenya (14). In this case, trained, supervised and incentivized community health workers (volunteers from their own communities) symptomatically assess fever and provide adequate malaria treatment for young children, provided by the MoH. Over time, key informants reported seeing a decrease in malaria prevalence, increased access to treatment and reduced pressure on health care facilities, enabling health care staff to give attention to the most complicated cases, proving that shifting uncomplicated cases from facilities to communities can work with adequately informed community involvement. As well as supporting the control of climate-sensitive diseases such as malaria, involvement of community members in sensitization strategies can contribute to increased understanding of the influence of climate variability and change on the transmission risks of malaria, which can enhance adaptive capacities, identification of drivers, and reduction of vulnerability and risks at community level. Home-based case management of malaria is now being scaled up in other districts, increasing the demand on volunteers’ time and efforts and highlighting the critical need for sustained support. This pilot project proved to be valuable in bringing services closer to communities that otherwise would need to walk long distances to the nearest health care facility.

Attributes of the intervention, approach or strategy being implemented

Joint efforts through improved preparedness and early warning mechanisms

An important theme emerging from key informant interviews was the increase in the abilities to strengthen integrated surveillance systems while trying to improve to some

extent the early warning mechanisms in place. These approaches have led to more proactive and sensitive interventions aimed at improving adaptation and preparedness, particularly at community level, drawing from adequate use of climate information (K3, K7, K10, K17, K19). Specific intervention examples were highlighted in the context of climate-smart agriculture:

We tried to use livelihood-related interventions that are sensitive to a changing climate, for example the use of drip irrigation, greenhouses or the adoption of different technologies among beneficiaries. This has contributed to building resilience of the most vulnerable. (K10)

Water safety planning, wastewater reuse, and household water treatment and safe storage (HWTS)

Key informants stated that implementation of water safety plans (WSPs) and HWTS are proven to be successful measures, as many countries have implemented such schemes and they represent good practice in terms of sharing lessons and disseminating information (K11, K15).

Another key informant highlighted positive results obtained in alleviating water scarcity associated with climate variability and change through specific response interventions that aimed to increase wastewater reuse using marginalized waters for agricultural and other purposes while maintaining good water quality for human consumption (K12).

Attributes of the institutional context

Enhanced institutional set-up, shift in policy and legislation, and improved multisectoral coordination

An important theme emerging from key informant interviews was that the health adaptation implementation efforts resulted in a slow but steady increase in institutional support in the area of health adaptation planning and implementation (K3, K5, K12, K19). Some key informants highlighted that senior-level management, particularly within the MoH, had now accepted that human health impacts of climate change are of integral importance to the health sector. Specifically, adaptation is perceived as a responsibility of the MoH and other ministries (K3), and intersectoral collaboration is key for successful adaptation (K1, K2, K8, K12, K13, K15, K19). It was stressed that multisectoral collaboration has improved, particularly between meteorological departments and the MoH (K15), where traditionally data sharing had been challenging (K1, K2, K15).

For a few years they never shared the data, as it is sensitive and they are very protective, but now they have started sharing and now we have a focal person within the Meteorological Department and within the MoH. This is an excellent example of intersectoral collaboration. Even within the MoH there are a lot of agencies that deal with climate change activities and the relationship has strengthened as well amongst those. (K15)

We ended up discussing at the national level the need for a framework to set the standard for microbiology quality of vegetables and fruits and a monitoring system for wastewater implementation. For this case the Ministry of Environment and the Ministry of Health sat together, and we did not expect this. (K12)



PHOTO COURTESY OF ENVIRONMENTAL HEALTH PROGRAM FROM THE MINISTRY OF HEALTH IN BHUTAN

A health worker collecting weather data at a Basic Health Unit premises as part of an integrated surveillance for climate sensitive diseases in Bhutan.

However, some key informant voices emphasized that there is still a long way to go, despite the good momentum towards an institutional set-up that coordinates action on health and climate change (K5), and particularly within some ministries of health, where climate change is still not sufficiently taken into consideration:

In the MoH there are still many public health workers who think that climate change is not important, and many directors and leaders there share these views, that's why projects like this – on health adaptation to climate change – are so critical. (K2)

In this context, one third of key informants (K5, K6, K12, K13, K15, K17) highlighted the importance of having in place adequate policies, particularly a climate change policy, and a conducive legislative

framework for the recognition of the health implications of climate variability and change. This approach would clearly articulate responsibilities and roles and would facilitate collaboration within and between ministries at the national level, to avoid fragmented approaches and overlapping responsibilities between ministries and duplication of efforts.

9.2.2 Identification of unexpected challenges

Attributes of the implementation teams

Lack of timely preparedness and response

Key informants argued that despite the wide acknowledgement of the important role of climate information for the health sector, response in some instances is not timely and without adequate prior preparedness.

The weather service provides a weather outlook for the next three months but then the MoH is supposed to take action. However, this only happens too late, intervention and preparedness come at the last minute, when the rains have come; then we have floods and malaria outbreaks. (K4)

Resistance from health workers

More often than not, the health sector poses a certain level of resistance to implementing and tackling issues related to climate variability and change (K2, K15), as they are not being perceived as a human health issue. Despite these difficulties and initial resistance from health workers, training and education for public health workers and students on health and climate change proved to be successful in improving their understanding and changing their attitudes and perceptions (K15).

Difficulties with human resources in connection to information, communication and technology (ICT) support

Unequal levels of knowledge and skills, and lack of adequate capacities among project support staff, tend to be recurrent challenges, though in some instances they are not adequately dealt with through advanced planning. In particular, lack of capacity in ICT resulted in difficulties in relation to transmission of online health-related information (K7, K8).

Institutional context and national implementation framework

Data access and data sharing

Strengthened coordination and collaboration between the health sector, meteorological sector and environmental protection agencies (EPAs) remain crucial to ensure success and adequate use of climate information for health purposes. While challenges on climate data access are gradually being overcome with interagency agreements (K3, K15), access to air pollution data, in particular, remains challenging, as it is still regarded as a highly sensitive issue (K1). Not only is access to data hindered by lack of trust in data sharing with other stakeholders, but also difficulties arise even when there is willingness to share the data, because project budget constraints in some cases limit the ability to pay for such data (K1–3).

Community involvement: a critical requirement to avoid community resistance and research fatigue

A number of informants mentioned that often community leaders were opposed, unexpectedly, to the idea of being a pilot community (K1, K14, K15) for their respective health adaptation projects.

Lack of funding, credibility and institutional recognition: the importance of comprehensive climate change action plans

At institutional level it is important that different sectors recognize the need for a coordinating body on climate change at the national level (K4, K5, K13), but some key informants encountered considerable initial difficulties. “Fitting into the system” as a climate change institution with a recognized respected role was found to be initially complicated and attention to climate change issues was limited, despite the urgent need to provide adequate technical advice on climate adaptation and mitigation (K4). Key informants emphasized the need for climate change action plans to overcome barriers related to lack of awareness within the government and among different stakeholders in various sectors, including the private sector (K5, K6).

Other key informants, however, highlighted the positive synergies created at the country level resulting from project involvement, enabling working teams to be identified with the required ability to provide technical advice on sustainable interventions for environmental health-related approaches, policies and standards to other government health branches in relation to occupational health, pollution control and waste management in health facilities (K19).

Choice of implementation strategy

Some implications of donor-driven agendas

Strict donor requirements and donor-driven agendas are not always aligned with national priorities, which may not permit a comprehensive understanding of disease patterns. This circumstance can put pressure on institutions at the country level (including within the various public health programmes at the ministerial level) to showcase results and value for money to funders.

The latest WHO risk assessment of the effects of climate change on selected causes of death (15) shows that climate change is expected to cause approximately 250 000 additional deaths per year between 2030 and 2050, taking into account a subset of the possible health impacts. Despite available evidence on the effects of climate change on human health, projections for future years showing additional yearly deaths due to climate change are not always taken into consideration when there is a need to justify current funding streams. Positive outcomes of ongoing disease control programmes need to be reconciled with the acknowledgement of climate change as a threat to human health:



©WHO/STEPHENE HOLLOWAY

In Cambodia a pilot study is underway to discover the efficacy of using fish for larval control in water jars to prevent dengue outbreaks in communities.

We have different programmes on vector control, on water and sanitation, et cetera, in the ministry but each of them have their own objectives, so when one tells them that vector-borne diseases are likely to increase they do not accept it. This is because their aim is to reduce the number of cases and as they are funded by a donor, when they report to the donor they are likely to have to show that there has been a decrease of diseases because of the control measures in place (resulting from that specific funded project). Even if disease cases are high, in (X) particular division they do not report to donors because they need to showcase to the donor the result that the number of cases is reducing. (K14)

Human migration and human settlements not considered during project formulation

The IPCC highlights that demographic trends will be affected directly through the impacts of climate change on human health and indirectly through the impacts of climate change on the viability of natural resource-based economic activity (11, 16). Furthermore, some migration flows, as an adaptation strategy to climate change impacts, are sensitive to changes in resource availability and ecosystem services. Human settlements also will be influenced by risks posed by extreme events (17).

Key informants described the challenge presented by human migration from rural areas to other locations with more intense economic activity due to the drying up of water

sources (K13). Informants explained that water stress induced by climate change or excess water abstraction tends to influence the decision of populations to migrate, but that more evidence at the country level is needed to better understand impacts of climate variability and change on human settlements in river basins.

Attributes of the community or audience targeted for health adaptation purposes

Certain cultural sensitivities

In settings where there is limited availability of safe water, adaptation measures are being implemented in an effort to cope with water stress, including wastewater reuse.

As demand and competition for freshwater supplies increase in both rural and urban settings, so the pressure on this natural resource increases, particularly in arid, semi-arid and densely populated regions (18). Improved communication, low-interest loans and pricing mechanisms for different water uses can contribute to promotion of resilience (19).

However, wastewater reuse still encounters resistance in some countries. Difficulties have been encountered with aquifer recharge initiatives, even with sanitized wastewater, and with projects focused on wastewater reuse for irrigation and agriculture for food production. Key informants argue that the key is to communicate risk properly, particularly for farmers and consumers. The existence and use of traceability mechanisms for treated wastewater and for contaminants, such as pesticides, would facilitate corrective measures if needed and contribute towards better integrated risk communication and transparency (K12, K16).

Historical conflicts coupled with conflicts over control of and access to natural resources

Peace-building activities that promote adaptation when conflict is resource based have been documented as an important contribution to conflict management (20, 21). Historical conflicts coupled with conflicts over control of and access to natural resources, particularly in the face of water scarcity and its impacts on pastures as a result of extreme climatic events, constitute barriers to project implementation (K10). As a response to this problem, resource-based community agreements have been successful in promoting shared access to water sources for irrigation and farming and shared protection of a natural resource.

9.2.3 Identification of approaches or strategies if given the opportunity to start all over

Key informants highlighted the following approaches or strategies within their country implementation processes:

Attributes of the implementation team

More coordination with the meteorological services and EPA, and intersectoral collaboration at national level

Many informants said they would foster greater coordination and intersectoral collaboration at national level to address the health risks of climate change if they had the opportunity

to start the projects all over, ensuring all sectors of the government recognized the need for a coordinated response (K2). Particular attention was given to the involvement with meteorological services and EPAs (K1). The need to improve coordination and articulate an integrated approach on issues pertaining to climate and human health was also stressed:

All issues around climate are in a fragmented state. I would bring them under one platform, because we have river basin management, the entire sanitation sector, rural water supply management, industries interested in greener approaches, all driven differently. In a small country like ours, we can make a huge impact. (K13)

Through regional agreements, such as the Libreville Declaration on Health and Environment in Africa and the Parma Declaration on Environment and Health, countries have committed themselves to act on climate change and health challenges (22, 23). Key informants highlighted that a good framework exists with the Libreville Declaration, but that binding agreements for better joint operational working collaboration among all entities would be required for more effective results (K19).

More inclusiveness, including involving the communities at grass-roots level

Increased inclusiveness of government departments and public health workers in the development of climate change action plans was identified as one of the needs that key informants would have addressed if given the opportunity to start their initiatives over (K4, K5), recognizing that health systems need to become more resilient through greener hospitals and waste management, for example, as they also contribute to climate change (K13).

We would like to see more health personnel involved in climate change work for their own sector. The health personnel should see the connections between their operations and what happens in the environment, otherwise they are not likely to put in place mechanisms to become more resilient to climate change. This cannot be solved only by a purely theoretical approach where health personnel sit in classes to learn about what climate change is. (K4)

Some informants reported involvement of communities at grass-roots level as a key factor for success (K9, K10). Some mentioned that had they incorporated communities from the beginning, resistance to proposed adaptation options would have been much lower, thus facilitating implementation and community ownership of resilience measures (K14, K15).

Tackling weaknesses in technical capacities prior to implementation stages: the need for a thorough initial assessment

Many key informants explained the difficulties encountered at the initial stages of project implementation due to weak technical capacities to support the projects, highlighting the need to support and build capacities prior to implementation (K3, K14, K16, K17). However, in addition to attributing difficulties to lack of capacity, key informants also discussed the importance of assessing needs at the national level to estimate accurately what is required:

Issues of capacities are not always about lack of adequate personnel. More often than not there is not a thorough assessment of what is exactly needed and what kind of institutional

structure is missing that can enable capacities to be developed and further strengthened.
(K5)

Another issue highlighted was the need to limit, to the extent possible, not only changes in personnel due to different political cycles but also changes of personnel at project sites. This requirement would ensure the availability of dedicated, secured (in terms of job stability) staff for implementation or coordination of programmes. The area of environmental health was acknowledged to be very broad, and key informants said that personnel tend to focus on environmental health components, such as air pollution, chemicals or health adaptation to climate change. This can mean that focused and continued support for a specific programme or subarea may prove difficult if personnel change, for example due to government reshuffling (K19).

Paying more attention to leadership abilities and capacities

The importance of leadership abilities to influence the availability of resources and adequate allocation of staff to ensure implementation outputs and sustainability was emphasized in various interviews, especially with regard to high-level management (K17, K19).

Institutional context and national implementation framework

More conducive policy and legal support

Key informants stressed that had they had the means or the know-how, they would have pushed for more conducive policy and legal support (K12, K15).

Choice of implementation strategy

More integration within project outcomes and country needs: the need to avoid fragmented approaches

Key informants highlighted the importance of addressing project objectives in an integrated manner to build synergies and bring together interconnected outputs and activities that are mutually supportive (K3, K10).

We somehow did a fragmented approach, I would like to see more overall connection and driving forces of all connected activities. Capacity-building and EWS are well interconnected; however, as it relates to community outreach, this is delegated to implementing agencies that operate differently to us. We see two outcomes connected and one autonomous. (K3)

The main focus on just one single infectious disease, malaria, for early warning purposes, without taking into consideration the development of EWS for other vector-borne diseases, was raised as a growing concern by health and meteorological sectors. This circumstance was felt, in some cases, to be driven by research agendas not grounded in country needs (K19) and by the lack of an institutionalized EWS (K4).

I believe that this project has focused on only one disease, and when thinking about early warning systems we should not just talk about malaria only. Malaria is becoming a priority to every other scientist, but we should have also thought about covering other health

problems arising from vectors. With malaria everybody is there, and we are leaving other pressing issues, such as dengue fever and other climate-sensitive diseases. Models need to cover highland and lowland areas, we are not covering coastal regions and other malaria-endemic plain areas. (K19)

M&E schemes designed and established at country level

M&E of health adaptation is an important aspect of lessons learned, ensuring climate investment strategies are more successful and contributing to understanding what effective adaptation means in each specific setting. The growing importance of value for money in adaptation has placed robust M&E schemes as a central component in programming efforts (24).

One of the weaknesses key informants described was the need for strengthened M&E components, which often did not receive sufficient attention at initial stages of the project cycle. In some cases, measuring the effectiveness of adaptation initiatives could not be carried out as expected:

As we did not include the evaluation component up front, now we need further investigation to find out if there is a correlation between community outreach and disease incidence and distribution. We should have taken into consideration the M&E component from the beginning. (K3)

Existence of clear guidance for project implementation at country level

Another major knowledge gap identified by many key respondents was the absence of clear guidelines for the development of EWS in particular, especially at initial stages of implementation. While acknowledging that these were pilot projects whose main goals included drawing lessons and identifying challenges, some key informants highlighted lack of general clear guidance as a constraint when commencing implementation of a project (K13, K14, K16, K17):

We entered a project [on climate change and health] that was new, so in terms of understanding the methodologies and understanding the outcomes there was no guidance document, so it was as if one was muddling through, it was more a case of trial and error as you went through the process. So had we had specific guidance, things would have worked better for us. (K17)

9.2.4 Identification of main barriers in the implementation process

Attributes of the intervention, approach or strategy being implemented

Lack of agreement around the “climate resilience” concept and the importance of recognizing the figure of the environmental health officer

There are various approaches to increase long-term climate resilience of most (resource) systems, and policy mechanisms need to identify existing sources of resilience and enabling adaptive capacities at the national level to determine whether those approaches increase or undermine health resilience to climate variability and change (25). Key informants said that

there was no agreed definition of climate resilience that encompasses disaster preparedness and response, waterborne disease prevention, food safety and security, and vector control measures, among others. These components for which the health sector is responsible, informants argued, need to be regrouped and recognized as part of the efforts required to tackle climate variability and change:

We see disaster response, waterborne disease prevention, food safety, et cetera, but suddenly we are regrouping all these in the name of climate resilience. We need to regroup and reorient those existing elements of MoH work to climate change work. Eighty per cent of those components are handled by environmental health officers – they are the ones testing the water, cleaning the water, doing food safety inspections, vector control measures (insecticides), when there is an outbreak coming up. But because they are not considered as the main workforce compared to physicians and nurses, they are marginalized and weakened, especially when there are financial constraints or crises, they are the first ones to be dismissed and actually this has happened in many countries. (K3)

Institutional context and national implementation framework

Misinformation and the need for strategic prioritization

Health decisions should be informed by evidence that meets standards of accuracy, timeliness and relevance in each specific context. It is well known that information has political value and decision-making processes require, in both developed and developing countries, access to robust evidence for action pertaining to climate-sensitive diseases and resilience of health systems. When this scenario does not occur, implementation of evidence-based health adaptation measures and strategies is affected, for example by lack of quality-assured climate information at appropriate temporal and spatial scales to inform actionable health decisions.

Key informants added a word of caution in relation to the need for increased involvement of stakeholders in decision-making when designing and implementing adaptation options. As climate change is receiving growing international and national attention, opportunistic interventions can play an influential role in driving decisions, providing advice that is not always based on sound scientific evidence, particularly of effective and efficient adaptation interventions (K4). Misinformation is a recurrent concern among informants when discussing the importance of accurate evidence-based advice to governments and decision-makers (K5, K7, K14):

The problem we experienced is, we realized that there was a gap, and some clever people realized there was a vacuum that they could occupy and they thought they would be the



A member of the Yunnan Institute of Parasitic Diseases collecting water from a bamboo shoot to check for mosquito larvae in Simao, Yunnan Province, China.

authority on climate change and they started off certain things that were not so easy to come in, and many of them were not informed by science. They said climate change is a big issue, they thought they would advise the government on matters to do with climate change, and I think those are oversights. So we think that the problem of misleading information and being advised by certain stakeholders on issues pertaining to climate change but not being informed by science – i.e. not evidence based – is a problem. The government should not allow this to happen in the future. (K5)

Concerted public awareness-raising is highlighted as one of the key strategies to face this problem, and is an important component of capacity-building efforts within national climate change action plans (K4, K5).

Key informants expressed frustration at how misinformation and the lack of coherently organized evidence hindered prioritization, highlighting the matter with actual examples. Comments also show why comprehensive vulnerability and adaptation assessments are critical, and that one adaptation model does not fit all (K4, K6):

In our case, we have an example that shows the confusion of stakeholders given the huge amount of information on climate change they receive, because one day they have a person talking about water harvesting, the next day about something else, telling them this other thing is a priority, and so on and so forth, and so we do not know which way to go, where are the priorities. So we get requests of help to pick out what is our priority. People ask what decision should I make? What should I implement? What should I implement first? (K4)

Another example from [X] district is: what works for adaptation for point A does not work for point B. There is not one solution that fits all cases, and sometimes this is the practice. In our example, everyone knew the problem was water scarcity but community villagers did not expect [the advice of] drilling of boreholes because the uncontrolled drilling of boreholes has actually made our water table sink to such low levels that now they are forced to dig up to 100 feet to find water when initially they could find water around 45 feet below the surface. Somebody must have told the authorities that drilling more boreholes is a solution. This is why there is a need for thorough vulnerability analysis for every single locality, especially for adaptation. Adaptation needs are very localized. (K6)

Human resource constraints: acknowledging the learning curve and identifying opportunities for action

Informants discussed some challenges arising from limited human resources to coordinate the national climate variability and change response, highlighting opportunities lost in terms of adaptation and mitigation activities that could have been undertaken, such as more sustainable transport and more efficient traffic flows, investment in renewable energies or greater action in emission reduction schemes:

Every country is obliged to give results and show something about the emissions [internationally], and we are lagging behind as a country. It is not our fault, but it is still our responsibility. (K5)

Key informants also discussed the difficulties encountered in identifying a competent person with a combined environmental and public health background; it usually takes time for one person to acquire the necessary knowledge at the country level (K3), although this was not always taken into consideration prior to the project implementation phase. This can result, as an example, in vulnerability and adaptation assessments that are not as comprehensive as intended or required, due to the lack of technical capacities (K14). It was therefore strongly emphasized that capacities before implementation should be built at national and local levels (K14, K16, K18):

Before starting implementation I would first build capacities at national level, because the project proposal has been developed by other experts in some other country, and it is important to know what this project means to us, particularly to our own country, and what are the likely impacts on health. (K14)

Choice of implementation strategy

Better knowledge and understanding of the local context: needs-based operational research and community involvement

In the process of implementation of adaptation measures at the community level, some key informants discussed possible improvements in planning and implementation approaches to ensure health adaptation strategies were well understood at community level (K4, K14), and strongly emphasized the need to safeguard community ownership and collaboration (K9).

Talk to our communities, talk to the community leaders, talk to the people who work at the community and then identify what are the vulnerabilities and impacts at the community. Now when we go to the communities and we tell them that climate change impacts health and we propose adaptation measures they are a bit reluctant. So they should gain ownership, I believe adaptation measures should not come from the central level, we need to know well first what their problems are. Top-down approaches imposing adaptation measures do not work at community level, we face this challenge now. (K14)

Key informants also stressed that research should be geared towards a more practical, needs-based and operational focus, not only to avoid research fatigue within the communities but also to ensure more efficient results for programme beneficiaries. Stronger linkages and cooperation between health practitioners, researchers and personnel working on climate adaptation at the community level are required to ensure that research is informed by real needs and that operational research is successfully undertaken, resulting in concrete and measurable positive outcomes at community and national levels.

New knowledge resulting from an increasing number of publications is one direct result of operational research; however, this should also lead to actionable changes in practice and policy (26). Few direct benefits to the communities might be apparent initially, as the focus is on the value of the knowledge to be gained through the research undertaken. However, ethical considerations, as a key element of community-based research, require a thoughtful assessment on how the results will revert back to communities. Sometimes community

members observe that “researchers come to do their research but they still need to come back to share the results”.⁶ Various key informants strongly emphasized the inadequacy of theoretical and purely academic approaches to specific national issues, particularly pertaining to the health sector:

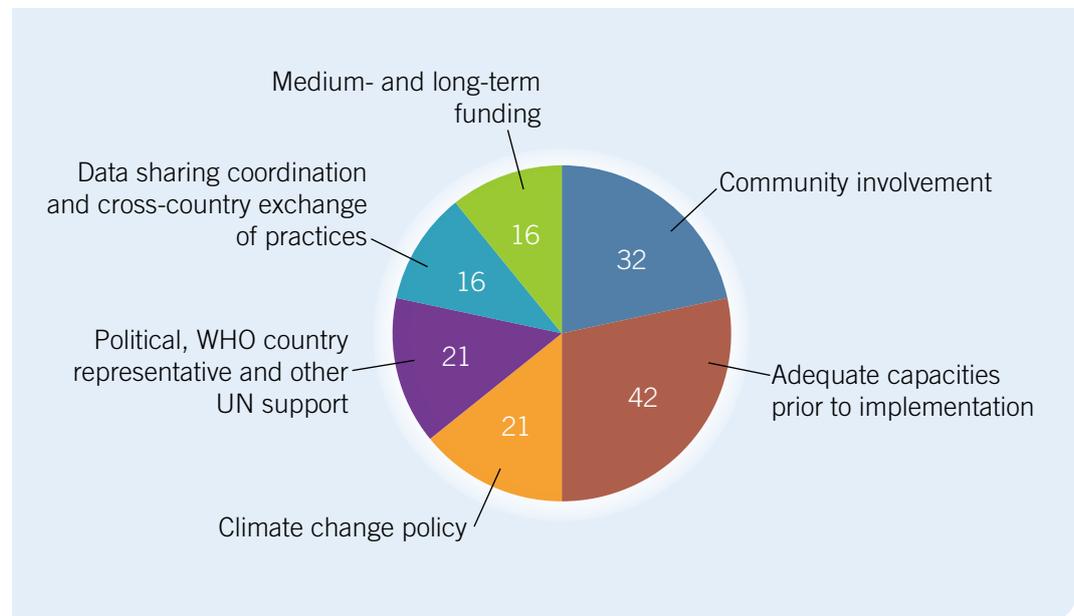
Communities and stakeholders at community level suffer exhaustion of research, feeling they are “piloting items”, and they want to see the country moving from piloting to implementation, they want to see research on health issues that are really affecting nationals in relation to climate change, such as issues of human comfort or discomfort, addressing the reality of the productivity of future generations. (K5)

Research needs to be informed by real needs on the ground, to stay away from that purely theoretical approach. There is a generalized feeling of an increase in huge amounts of research papers published far away that are not useful for helping to address the real issues on the ground. (K6)

9.2.5 Support that would have been useful to ensure success

Most key informants linked up the barriers faced with the support they would have required to successfully face those challenges. Figure 1 summarizes types of support reported by key informants.

FIGURE 1. Reported support required to ensure success (% responses)



⁶ Personal communication with researcher during a visit to a Maasai community in the United Republic of Tanzania, July 2014.

Attributes of the intervention, approach or strategy being implemented

A well-established instrument to work with the community

Key informants encountered resistance from community leaders or managers to implement adaptation measures (K1, K14, K15) and some identified that a well-established instrument to work with the communities would have facilitated the implementation process (K3, K9). It was highlighted that whereas the strength of WHO lies in comprehensive technical expertise on issues such as epidemiology, the organization is lacking in outreach mechanisms, and there was a need for a “well-established instrument” to work with communities (K3). A proposed solution relates to the need to reinforce partnerships with those implementing institutions and organizations that tend to bring successful outcomes in community outreach.

We have a contractual [focusing on delivery] rather than a collegial relationship. We should work together because they are good at dealing with community outreach. Cross-tabulation, epidemiological training is what WHO can provide. Outreach experts that can support partners at country level would be ideal. (K3)

Six out of 19 informants considered that community involvement was or would have been key to ensure health adaptation measures were successfully implemented at country level.

Attributes of the implementation team

Building adequate capacities before starting implementation

In various cases, despite projects being designed in partnership with countries, long delays in funding implied that the human resources initially involved were no longer working for a specific project, thus new staff encountered certain technical challenges in the initial stages of implementation. Adequate capacity (in terms of human resources and technologies), as well as clear guidance established prior to the implementation process, would have been beneficial, according to several key informants (K5, K7, K8, K14, K16–K19).

The project was handed over to me at the ministry. For me it was a nightmare when I received the project proposal. I did not know anything about climate change and health before the project was being implemented. Either WHO or any other funding agency could build our capacities in different sectors, this would be a great support. (K14)

Institutional context and national implementation framework

Climate change policy regulation and recognized climate change institution

A climate change policy regulation and recognized institution or unit at the national level was reported to be necessary (K5, K13, K15, K17), together with adequate political and managerial support at the highest levels of the United Nations system (K3, K11, K12, K15). There was also a perceived need for strengthened coordination mechanisms and exchange of lessons from adaptation (K1, K2, K7).

Choice of implementation strategy

Adequate medium- and long-term funding

Adequate medium- and long-term funding was considered to be critical for adequate sustainable results, particularly to assess progress and measure impacts. The importance of allocating funds beyond the project timeline for proper evaluation of project results was also strongly emphasized by key informants (K3, K9, K10, K13, K14).

Investments should not be for two- or three-year projects, but more long-term projects of at least five years; this way we can see change, progress and impacts. If you give us funding for two years and want to measure impact, as some donors request, which I should be able to see after five years of implementation, then we have a problem. Many donors give funds and they still want to do evaluation, but this can only be done after five years, after project conclusion. (K9)

9.2.6 Scaling up: opportunities and challenges

Responses from key informants reflected a lack of common agreement on the term “scaling up”, despite all informants acknowledging the need to give greater attention to this issue, particularly in the area of health adaptation, where positive outcomes were achieved throughout the implementation phase.

Respondents argued that scaling up should be understood as an expansion of the coverage of health and climate-related initiatives, approaches or interventions to the national level or, in some cases, across regions. In particular, special attention was given to the expansion in coverage of a strengthened national environmental health system as the main pillar for health adaptation to climate variability and change.

Box 1 summarizes the main areas identified by key informants as having particular potential for scaling up, in three main categories: strategies, approaches and interventions; activities; and tools.

BOX 1. Areas identified by key informants as having particular potential for scaling up

Strategies, approaches or interventions

Community-level engagement through trained, incentivized and supervised community health volunteers
Interventions that have proved to be effective in tackling air pollution
Interventions that tackle jointly mitigation and adaptation purposes
Malaria control programmes in collaboration with meteorological services
Crop and livestock insurance as an adaptation strategy
Safe use of wastewater as a regular practice at national level
Integrated approaches to programming, including water scarcity and nutrition/food security
Climate adaptation strategy from local to national levels

Specific activities

Training of project implementers
Training of general health practitioners
Training of farmers on safe use of wastewater
Safe rainwater harvesting

Tools

MEWS with proved accurate and effective climate models
Software and technology use for EWS
Preparedness tools and warnings for vector-borne diseases and waterborne diseases
Broadening the evidence base through M&E of integrated surveillance

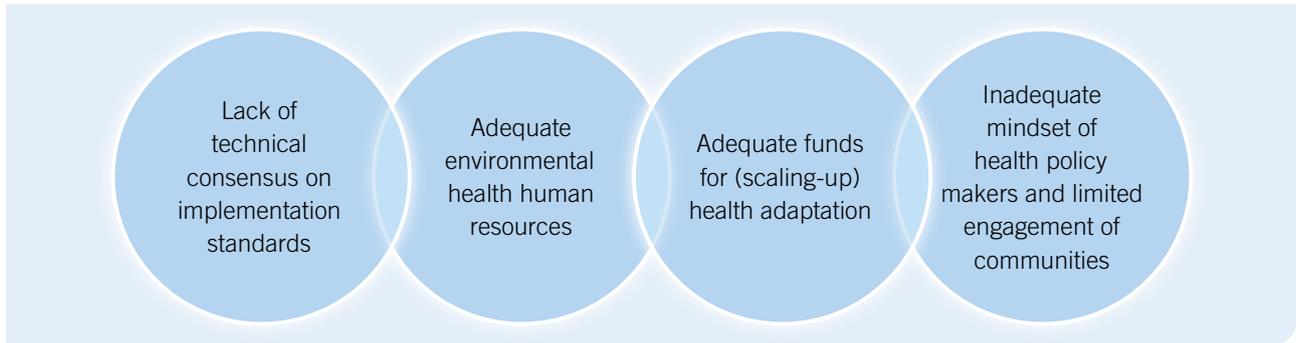
CASE STUDY 2. Health and food security adaptation measure: the case of crop and livestock insurance for peasant farmers

The interviewed technical officials visited pilot districts in Kenya to conduct an evaluation and to measure effectiveness of an initiative that introduced insurance as an adaptation measure. The two evaluators found that in the districts of Busia and Homa Bay, households had adequate supplies of cereals, which was not usually the case for the households of Kenyan peasant farmers:

Farmers had explained they had the courage to invest because they knew that they had insured that. They understood the concept well and were very well informed. We were surprised to see the great impact of this project, and we felt that if it was scaled up, this can give the courage to farmers to take the risk. They understood that in case of failure they would only get compensation for what they insured, but the result came out that they were able to harvest and work with a motivation that we had not seen before. This is something that we have proof that works and can be scaled up. (K5)

Barriers to scaling up health interventions have been documented, including factors such as complexity of interventions, lack of technical consensus, weak human resources and leadership, poor application of proven diffusion techniques, and inadequate integration of research into efforts to scale up (9). Key informants highlighted their views in relation to the main barriers impeding successful scale-up of interventions, initiatives, approaches or strategies in health adaptation efforts (Figure 2).

FIGURE 2. Barriers to scaling up highlighted by key informants



9.2.7 Indicators highlighted by key informants for monitoring progress of health adaptation

The following indicators were highlighted by key informants as important for monitoring the progress of health sector adaptation to climate change:

- decline in disease incidence, particularly for heatwave impacts
- number of projects designed and implemented on health adaptation to climate change
- existence of control measures for climate-sensitive diseases
- number of general practitioners or health personnel trained
- community behaviour indicators
- WSPs incorporating climate resilience measures
- reduction in frequency of disease outbreaks
- confounding factors (e.g. socioeconomic factors) in relation to transmission patterns.

9.3 Findings of focus group consultation

9.3.1 Identification of successes

Attributes of the intervention, approach or strategy being implemented

Implementation needs

Needs and opportunities for action highlighted during the focus group consultation included information sharing and setting priorities in response to climate information at the local level. Participants pointed out the usefulness of timing interventions through public information campaigns and social mobilization mechanisms to reinforce awareness, based

on the transmission season, and the importance of maintaining these interventions even as prevalence drops.

Indoor residual spraying (IRS) highly effective in epidemic-prone areas as a preventive intervention

The use of IRS and insecticide-treated nets (ITNs) combined with treatment has been highly effective in reducing mortality (K21, K26) and as a preventive measure (K20, K24), according to key informants.

Climate prediction tool and adaptation

Despite some data gaps in access and problems with data validation, progress was highlighted in improving malaria preparedness by using climate prediction:

Now we are able to clearly relate the climate and malaria data – we have achieved something. It enables us to predict during what periods of time malaria will occur. (K20)

[I appreciate] the possibility to use climate data to manage the seasonal variation in malaria. (K21)

One key informant said that the project enabled them to confirm that parasite and vector development (in terms of density, given water bodies and optimal temperature) are correlated with climate. This knowledge can be used to inform management response to specific temperature parameters, taking into account the 10-day development period for parasites when temperatures are optimal. Climate prediction is thus a useful tool:

This programme is a gift that we have been waiting for. Before this project, correlation of health and climate data was just a theory. We are working within sentinel sites selected for disease surveillance. When we are using our normal threshold for monitoring the trend of malaria we could predict two weeks in advance. When there is a bit of rain, then a bit of a lapse, and warm temperatures in between, then we can expect a malaria upsurge one or two weeks later. (K24)

Key informants also agreed that other climate-sensitive diseases should be considered when formulating adaptation options for decision-making:

[Climate prediction] can be used to assist us in looking into a wider scope [other diseases than malaria]. Climate change adaptation is the way forward in terms of managing these diseases and most of our tropical conditions. For example, respiratory diseases are also climate sensitive. If we are able to correlate directly at local level meteorological and health data, this can be also very convincing in forums with decision-makers. (K24)

Attributes of the implementation team

Governance and ownership

Informants agreed that ownership and engagement are important factors for successful implementation of health adaptation. However, it was argued that this element should be mainstreamed into routine operations, rather than as a separate project item.

9.3.2 Lessons learned, barriers and challenges

Institutional context and national implementation framework

Governance and leadership

Focus group participants, in agreement with key interview informants, highlighted challenges arising from the national governance restructuring into a county system with decentralized budgets. This meant convincing new management of the importance of continuing malaria control. Participants felt district levels should build climate change adaptation into larger programmatic objectives, including for different diseases.

Attributes of the implementation team

Capacity development

Informants identified capacity strengthening and development as a key need to reinforce projects from an initial stage. Highlighted issues included lack of documentation and support for new staff coming into the project or programme – a situation that will inevitably happen with staff turnover – and, specifically, lack of basic information on climate and health.

Difficulties related to effectiveness of the basic system (for example, lack of case management training or comprehensive training for community volunteers) at the county level were also discussed.

Different kinds of malaria data are collected – transmitted in different ways. Training on how to use the new database is on its way, and should address the problem. (K24)

Choice of implementation strategy

Difficulties in service delivery

Challenges to implementation were epidemiological (decreasing prevalence in highland areas) and institutional (changing national malaria policy, and change to county system), emphasizing the importance of not trying to address climate change alone.

Most contributions were specific to malaria control interventions, diagnosis and allocation of resources, but not necessarily linked to the climate change aspects. This reinforces the importance of building climate resilience into everyday operations, as these are what the disease control programmes are struggling to improve on a day-to-day basis. Key informants said that service delivery faced several difficulties, including lack of up-to-date knowledge of policy changes and scientific progress among health workers entering the health system in malarial areas (K20), and involvement of private sector actors that were not using standard and up-to-date management methods (K24).



Bednets being treated with insecticide to prevent malaria in Bangladesh.

Technology barriers, information monitoring and data management

Issues raised by participants relate to ownership and engagement with the flow of information, as well as specific information management issues within this project.

Technological barriers such as the difficulties in the functionality and use of modems, and difficulties in retrieving data to make data corrections, hindered in some cases efficient implementation. To ensure functionality of such systems, adequate follow-up and support are required when difficulties arise in submission of data. Particularly, district health managers expressed the need and desire not only for better systems (current systems and computers are reported not to be user-friendly and do not allow for correct transmission of daily and monthly malaria data), but also to have this system as routine. There is a need to be monitored and supported when they do not submit data, as this indicates difficulties that records officers face that need adequate support and attention:

It would be good if someone followed up as to why we didn't send reports, identify the problem and support us to address it. (K29)

Within the project, all project participants agreed that there were issues with the reliability of the data entry system, for example entering testing data rather than positivity data (K22), and the fact that it was changed several times within the project cycle.

I would like the system to show whether data have been submitted and successfully received – now we are not able to validate data, and to visualize what we have done. It would be good to have a system whereby if a result is not entered for five days, then someone takes it seriously as a follow-up. (K30)

One important lesson, drawing from key informant discussions, was that small sites can be very useful if they can give good data representation. Larger sites can sometimes be less advantageous, partly because they are drawing from a larger catchment:

When sites were first identified, we assumed that the old district hospital would have good records, and the small site would not have good data. In fact it was the other way round. (K24)

Another important lesson is that the lack of procedures for routine linking of meteorological and health information decreases the effectiveness and reliability of the system, as well as the ownership and engagement of practitioners. Proposed improvements highlighted during the consultation related to this need for access and visualization of local meteorological data, so that health managers could use it and explore correlations and patterns.

Health people enter health data, meteorological people do the same, but the local health people can't see the meteorological data until it has been processed and approved at the central level. (K20)

9.3.3 Scaling up: opportunities and barriers

Institutional context and national implementation framework

Mindset of decision-makers and prevention opportunities

Informants agreed that policy-makers still need to completely understand the importance of preventive measures. Throughout the discussions, it was clear that there was a need for scaling up prevention opportunities in the highlands, as their vulnerability is increasing in the absence of IRS as immunity decreases.

Choice of implementation strategy

Financial resources

Informants highlighted that IRS worked extremely well, especially when targeting epidemic-prone areas where participants are deployed.

In epidemic-prone areas, as a result of lower exposure to malaria compared to higher transmission settings, epidemics often lead to high levels of morbidity and mortality and place great stress on the financial resources of health systems (including high recovery costs), particularly in resource-constrained settings (27). According to the IPCC, some projections suggest that climate change may facilitate the spread of malaria to higher elevations in some highland areas, requiring additional and improved surveillance to identify and prevent epidemics (28). Focus group discussions pointed out that finance allocation tends to be biased towards endemic zones, where it is easier to justify higher expenditures, diverting funds away from epidemic-prone areas such as the highlands. This could hinder efforts to reinforce low adaptive capacities, scale up health adaptation strategies and provide free health care provision when upsurges take place, limiting investment possibilities and provision of IRS as a proved successful practice in those areas.

Increasing the number of health facilities as an important opportunity

Given that the current project covers only two sites, various key informants agreed on the need to increase the number of health facilities participating in the malaria control programme to cover regional representative areas (K20, K26), employing selection criteria such as proximity to a meteorological station. In addition, the importance of avoiding referral or district hospitals as reference sites was stressed, as they are not representative because they get cases from a wide and ambiguous catchment:

Referral facilities are highly ambiguous. It would be better to include at least one site from an adjacent subcounty. It was supposed to be a regional project with representative areas.
(K24)

A clear and objective design in the selection of study sites would therefore give the best representation and allow scale-up opportunities in this area.

Institutional context and national implementation framework

Accessing meteorological data by health data officers

One of the main barriers remains access to meteorological data at local levels by health data managers and health data officers. A key informant explained the difficulties with the existing system for transmission of climate data:

Meteorological services installed automated meteorological stations, which transmit data to Nairobi. Health people would like to see the data, and discuss it in a forum at the local level, for example monthly or quarterly, before going to higher level. (K26)

9.3.4 The future: how would you like your programmes to be in five years' time?

Main areas the key informants would like to cover in the near future within their programmes are as follows:

- Health workers are trained on health and climate linkages.
- Health record managers and information officers at local level are able to access meteorological data and see the correlation of health and climate data at the facility level, so they can act on the data before they are shared with others.
- Countrywide evidence-based MEWS are established as a tool to mainstream climate issues in the country, for example in health and agricultural systems.
- The ministry of the environment (meteorological services) is directly involved in decisions: the meteorological services work closely with the famine services.

10 Conclusions and recommendations

The following conclusions and recommendations emerged from the review, synthesis and qualitative research:

1. Adaptation needs are often localized; hence comprehensive vulnerability and adaptation assessments are required to implement effective health adaptation efforts, taking into account specific contextual factors. Further, there needs to be strategic prioritization of climate risks at the country level.
2. Scaling up would be facilitated by explicit consideration of how to do so from the onset of the adaptation process, whether through project-based activities or through national adaptation planning. Because the health risks of climate change are partially driven by local and regional contextual factors, it is important when considering scaling up to identify which factors determining the success of particular interventions are generic and so can be transferred to other regions. Some factors determining success will be unique to a location (such as the strong commitment of an individual policy-maker to health adaptation), so there will need to be consideration of how to work with local and regional stakeholders to build the necessary conditions for successful scaling up.
3. Increasing resilience to the health risks of climate variability and change is likely to be achieved through longer-term, multifaceted and collaborative (multidisciplinary) approaches, with supporting activities (and funding) for capacity-building, knowledge communication, and institutionalized monitoring and evaluation. Managing risks that will change as climate and development proceed will be more effective using iterative approaches, with broad stakeholder engagement. Strengthened cooperation between the health sector and meteorological services in the access to and use of climate and health data for adequate preparedness and response remains a key element of successful health adaptation efforts.
4. It is vital to continue to strengthen mainstreaming of health protection to manage the health risks of climate change. National health plans, policies and budget processes need to explicitly incorporate the risks of current and projected climate variability and change. Projects should be encouraged to focus not just on shorter-term outputs to address climate variability, but also on establishing processes to address longer-term climate change. It is important to investigate approaches, such as theory of change, that can facilitate achieving objectives and not just outcomes. Medium- and longer-term project funding would facilitate accurate assessments of project and programme outcomes.
5. Mainstreaming health adaptation monitoring into planning stages, through the establishment of country-specific monitoring and evaluation systems, customized according to country needs, would enable national health adaptation assessments of climate-resilient investment strategies at national and local levels. It would be helpful

to identify a set of indicators for monitoring and evaluating climate resilience, creating baselines and facilitating the process of longer-term adaptation.

6. Opportunities for capacity development in the health risks of climate change should be created, identified and reinforced for the full range of actors, including public health and health care professionals, the general public, and decision- and policy-makers within the health sector and across ministries. This includes facilitating development of methods, tools and guidance documents to support countries not only as they implement adaptation programmes and activities, but also prior to the implementation phase. In addition, developing a regular forum, including web-based and in-person meetings, would facilitate international exchanges of experiences and lessons learned. Providing some budget for exchanges would facilitate South-South learning and cooperation and further strengthen capacity for implementing adaptation.
7. Donors and development partners should be encouraged to invest sufficient time and resources during the development phase of adaptation proposals to ensure that country ownership, an enabling environment, stakeholder engagement (with adequate mechanisms to involve communities) and other conditions that facilitate project success are maximized. This includes making sure that approaches and plans for documenting good practices and lessons learned are built into projects from the beginning, and that projects include an output to outline requirements for scaling up. These will strengthen the ability of national and local teams to implement adaptation.
8. Support should be given to research and development to further understand the health risks of climate change, including projections of risks across temporal and spatial scales, and to further understand what programmes and activities can be implemented to facilitate avoidance of, preparation for, response to and recovery from impacts.
9. Operational research should lead to actionable changes in practice and policy, facilitating greater cooperation between researchers in high-income countries and those in LMICs, informed by country needs.
10. Adaptation projects should be used as opportunities to identify co-financing for adding mitigation components.
11. Irrespective of resource constraints, LMICs need to continue to prepare themselves through appropriate public education and awareness programmes, including disaster preparedness measures, resilient infrastructure for effective resettlement of displaced people, and better understanding of health impacts on specific human settlements (for example communities in river basins).

References

1. Shaw I. Ethics and the practice of qualitative research. *Qualitative Social Work*. 2008; 7(4):400–14.
2. Richards HM, Schwartz LJ. Ethics of qualitative research: are there special issues for health services research? *Family Practice*. 2002; 19(2):135–9.
3. Strauss AL, Corbin JM. *Basics of qualitative research: techniques and procedures for developing grounded theory*. Sage Publications; 1990.
4. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*. 2004; 24(2):105–12.
5. Furberg M, Evengård B, Nilsson M. Facing the limit of resilience: perceptions of climate change among reindeer herding Sami in Sweden. *Global Health Action*. 2011; 4.
6. Patton MQ. *Qualitative research and evaluation methods*. 3rd edition, 2002.
7. Hanson K, Ranson MK, Oliveira-Cruz V, Mills A. Expanding access to priority health interventions: a framework for understanding the constraints to scaling-up. *Journal of International Development*. 2003; 15(1):1–14.
8. Simmons R, Fajans P, Ghiron L. *Scaling up health service delivery: from pilot innovations to policies and programmes*. Geneva: World Health Organization; 2012.
9. Yamey G. What are the barriers to scaling up health interventions in low and middle income countries? A qualitative study of academic leaders in implementation science. *Globalization and Health*. 2012; 8(1).
10. Karani I, Anderson S, Kariuki N. *Institutionalising adaptation monitoring and evaluation frameworks: Kenya*. International Institute for Environment and Development; 2014 (<http://pubs.iied.org/17251IIED>).
11. Woodward A, Smith KR, Campbell-Lendrum D, Chadee DD, Honda Y, Liu Q, et al. Climate change and health: on the latest IPCC report. *Lancet*. 2014; 383(9924):1185–9.
12. Australia Emergency Management Institute. *National strategy for disaster resilience: community engagement framework*. Government of Australia, Attorney-General's Department; 2013.
13. Wangalwa G, Cudjoe B, Wamalwa D, Machira Y, Ofware P, Ndirangu M, Ilako F. Effectiveness of Kenya's Community Health Strategy in delivering community-based maternal and newborn health care in Busia County, Kenya: non-randomized pre-test post test study. *Pan African Medical Journal*. 2012; 13(Suppl. 1):12.
14. Kisia J, Nelima F, Otieno DO, Kiilu K, Emmanuel W, Sohani S, et al. Factors associated with utilization of community health workers in improving access to malaria treatment among children in Kenya. *Malaria Journal*. 2012; 11:248.
15. *Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s*. Geneva: World Health Organization; 2014.
16. Smith KR, Woodward A, Campbell-Lendrum D, Chadee DD, Honda Y, Liu Q, et al. Human health: impacts, adaptation and co-benefits. In: Field CB, Barros VR, Dokken DJ, Mach KJ, Mastrandrea MD, Bilir TE, et al., editors. *Climate change 2014: impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom, and New York, United States of America: Cambridge University Press; 2014.
17. Adger WN, Pulhin JM, Barnett J, Dabelko GD, Hovelsrud GK, Levy M, et al. Human security. In: Field CB, Barros VR, Dokken DJ, Mach KJ, Mastrandrea MD, Bilir TE, et al., editors. *Climate change 2014: impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom, and New York, United States of America: Cambridge University Press; 2014.
18. WHO guidelines for the safe use of wastewater, excreta and greywater. Geneva: World Health Organization; 2006.
19. Covich AP. Adaptations to sustain high-quality freshwater supplies in response to climate change. *Resources for the Future*; 2010.
20. Jensen D, Lonergan S, editors. *Assessing and restoring natural resources in post-conflict peacebuilding*. London: Routledge; 2013.
21. Tänzler D, Maas A, Carius A. Climate change adaptation and peace. *Wiley Interdisciplinary Reviews: Climate Change*. 2010; 1(5):741–50.

22. Libreville Declaration on Health and Environment in Africa. World Health Organization Regional Office for Africa; 2008 (http://www.afro.who.int/index.php?option=com_docman&task=doc_download&gid=2223).
23. Parma Declaration on Environment and Health. Fifth Ministerial Conference on Environment and Health; 2010 (http://www.euro.who.int/__data/assets/pdf_file/0011/78608/E93618.pdf).
24. Lamhauge N, Lanzi E, Agrawala S. The use of indicators for monitoring and evaluation of adaptation: lessons from development cooperation agencies. *Climate and Development*. 2013; 5(3):229–41.
25. Adger WN, Brown K, Nelson DR, Berkes F, Eakin H, Folke C, et al. Resilience implications of policy responses to climate change. *Wiley Interdisciplinary Reviews: Climate Change*. 2011; 2(5):757–66.
26. Naidoo P, Smuts B, Claassens M, Rusen ID, Enarson DA, Beyers N. Operational research to improve health services: a guide for proposal development. Desmond Tutu TB Centre and International Union against Tuberculosis and Lung Disease; 2013.
27. Lynch C. Forecasting malaria epidemics. *Humanitarian Exchange Magazine*. 2005; 31:16–19.
28. Confalonieri U, Menne B, Akhtar R, Ebi KL, Hauengue M, Kovats RS, et al. Human health. In: Parry ML, Canziani OF, Palutikof JP, van der Linden PJ, Hanson CE, editors. *Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom: Cambridge University Press; 2007.

Annex 1.

Summary of projects

UNDP/WHO GEF-funded project “Piloting climate change adaptation to protect human health”

Status: scheduled for completion in spring 2015.

Description: This is the first full-sized health adaptation project funded by the Special Climate Change Fund administered by GEF. The project was designed to build capacity and provide lessons, globally and nationally, in the actual design, implementation, monitoring and evaluation of specific health adaptation policies and measures. The overall objective was to increase the adaptive capacity of national health system institutions, including field practitioners, to prepare for, respond to and recover from the health risks of climate variability and change. The specific outcomes were:

- Outcome 1: Establish early warning systems (EWS) and response systems with information on the likely incidence of climate-sensitive health outcomes.
- Outcome 2: Improve the capacity of health sector institutions to respond to climate-sensitive health risks based on early warning information.
- Outcome 3: Pilot disease prevention measures in areas of heightened health risk due to climate change.
- Outcome 4: Promote innovation in adaptation to climate variability and change through facilitating cooperation among participating countries.

Each country adapted these to address their local circumstances.

Countries included: Barbados, Bhutan, China, Fiji, Jordan, Kenya and Uzbekistan.

Relevant recommendations from mid-term evaluation:

- Additional technical support and access to technical skills could enhance national capacity, supporting sustainability of the outcomes and outputs. Additional participation in international short courses and access to skills would be beneficial to several countries even now, halfway through the pilot project. Short courses and other capacity-building activities, if they included more than the project team, would help build capacity for further projects.
- Outputs should be revised as appropriate to ensure they are within the context of an iterative management approach to managing health risks as they continue to change with climate change and development.

German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) project: “Protecting health from climate change: a seven-country initiative”

Status: Completed in 2013.

Description: The project was supported financially by the International Climate Initiative of the BMU. The overall aim was to protect health from climate change through strengthening health systems by building capacity in assessing vulnerability, impacts and adaptive capacity in each country. In turn, this would form the basis for developing a national health adaptation strategy or action plan; carrying out awareness-raising activities; and facilitating the sharing of knowledge and experiences. Country-specific pilot activities aimed to address current climate change vulnerability. These included strengthening preparedness and response for extreme weather events; increasing surveillance and response for climate-sensitive infectious diseases; developing WSPs; reducing the risk for respiratory diseases; fostering innovation in energy efficiency and use of renewable energy for health services; and air quality monitoring. A major strength of the project was an all-society approach to awareness-raising, capacity-building and intersectoral policy development.

All countries carried out a common set of activities:

- developing a national health adaptation strategy or action plan;
- assessing health vulnerability, impact and adaptive capacity;
- building capacity and national outreach, including educational activities;
- conducting research; and
- exchanging knowledge and good practices between countries.

Countries included: Albania, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, the former Yugoslav Republic of Macedonia and Uzbekistan.

Conclusion of final evaluation: All projects achieved the promised goals, aims and impacts. See <http://www.euro.who.int/en/health-topics/environment-and-health/Climate-change/country-work/protecting-health-from-climate-change-a-seven-country-initiative-in-the-eastern-part-of-the-who-european-region>.

Contributors to the success of the project included:

- having implementation guided by a government-appointed multisectoral steering committee including a broad range of policy-makers and stakeholders;
- taking a whole-of-society approach to capacity development and outreach activities, including training of medical professionals and awareness-raising activities for the general public;
- strengthening health systems, including in the areas of primary health care, health security and public health activities (such as surveillance), strengthening energy security, and building capacity in the workforce; and
- developing methods and tools to enhance transferability of results to other projects.

Millennium Development Goals Achievement Fund (MDG-F) projects

Status: health adaptation projects completed.

Description: The MDG-F was an initiative funded by the Government of Spain and implemented by United Nations agencies to support countries in their progress towards the Millennium Development Goals (MDGs) and other development goals by funding innovative programmes that have an impact on the population and potential for duplication. The Fund operated through United Nations teams in each country and used a joint programme mode of intervention divided into eight thematic windows corresponding to the eight MDGs. At least 130 joint programmes operated in more than 50 countries.

The Environment and Climate Change thematic window aimed to contribute to a reduction in poverty and vulnerability in eligible countries by supporting interventions that improve environmental management and service provision at the national and local levels, as well as increasing access to new funding mechanisms and expanding the ability to adapt to climate change. This window included 17 joint programmes to contribute to three types of result: (a) mainstream the environment, natural resource management and actions against climate change in all public policy; (b) improve national capacities to plan and implement concrete actions in favour of the environment; and (c) assess and improve national capacities to adapt to climate change.

Three countries included health components: China, Jordan and the Philippines.

Evaluations: The MDG-F established a rigorous process of evaluation. Each programme was subject to an intermediate and final independent evaluation. In addition, nine countries were selected as part of a pilot initiative to develop independent and participatory country evaluations. A global and thematic evaluation was carried out in 2013 to identify aspects that could be improved for similar future cooperation mechanisms (see <http://www.mdgfund.org/content/environmentandclimatechange>). Key achievements were:

- enhanced governability and institutional capacities, including instruments and policy frameworks;
- amplified environmental consciousness, including of the impacts of climate change; and
- improved knowledge base of environmental issues, including climate change, to support informed decision-making.

The focus was on implementing policies that promoted natural resource management and development, within the context of a changing climate. Pilot projects demonstrated concrete activities in natural resource management, sustainable development and adapting to climate change.

PUBLIC HEALTH AND ENVIRONMENT

This document in the first part reviews and synthesizes the first five years of implementation (2008–2013) of projects on health adaptation to climate variability and change in low- and middle-income countries worldwide. The second part of the report presents results of qualitative research undertaken to document lessons learned and good practice examples from health adaptation projects to facilitate assessing and overcoming barriers to implementation and to scaling up.

Public Health & Environment Department (PHE)

Health Security & Environment Cluster (HSE)

World Health Organization (WHO)

Avenue Appia 20 – CH-1211 Geneva 27 – Switzerland

www.who.int/phe/en/

<http://www.who.int/globalchange/en/>

E-mail: carbonfootprint@who.int

ISBN 978 92 4 150769 1



9 789241 564953