Coordination is Key: Forwarding National Climate and Health Adaptation Policy in Developing Nations

by

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ABSTRACT

Climate Change affects health through various pathways. However, adaptation policy in developing country health ministries is not widespread. This thesis applies an adaptation readiness (AR) framework to structure a review of the climate change and health literature with the aim of identifying key barriers facing health adaptation policy in developing countries. To compliment the literature review, and in order to understand which barriers are most salient for public health, this thesis similarly applies the AR framework to the development and analysis of semi-structured interviews with World Health Organization professionals. While there is no clear consensus as to what are the most important barriers to adaptation in the literature, interviewees argue that funding and leadership challenges are the most significant barriers to adaptation. This thesis argues that overcoming these barriers can be thought of more broadly as a need to help health ministers become more coordinated with national adaptation processes like the National Adaptation Programmes of Action (NAPAs). Contrary to the literature, a lack of usable science was not identified as a barrier to adaptation by interviewees. The findings of this thesis suggest a focusing of the health adaptation research and planning agenda in developing countries towards assisting the health sector with funding and leadership challenges in order to forward health adaptation policy.

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CHAPTER 1: INTRODUCTION

Climate change affects health through a number of pathways. These include changing patterns of disease, increased water and food insecurity, vulnerability of shelter and human settlements, extreme climatic events and population growth and migration (1, 2).

The World Health Organization (WHO) has been involved in climate and health research since 1993 when it first collaborated on a chapter for the Intergovernmental Panel on Climate Change's Second Assessment Report (AR2) on climate research (3). In this report the WHO stressed the need to put health at the center of climate debates because of the numerous, serious, global health impacts a failure to mitigate would have (3). Despite ongoing research on the health impacts of climate change since the Second Assessment Report, it wasn't until 2008 that the health sector was truly included on policy debates regarding environmental change. On World Health Day of this year, the Director-general of the WHO publically recognized climate change as a priority for public health (4). This announcement reflected the growing shift in climate and health research from discussions of mitigation to questions of adaptation. Given that many effects of climate change are now considered unavoidable, health ministers everywhere should be acutely aware of the urgent need to adapt to climate change (5, 6).

Despite this recognition of the need for adaptation, however, adaptation programming is not widespread (7). "For all the attention that these issues receive…a comprehensive strategy to support a public health response is conspicuously lacking" (8). An explanation as to why such a clear gap exists between the known threats to health that climate change poses and the implementation of planned adaptation is complex and not well understood; research on the drivers of adaptation in the health sector, particularly at the level of government, is still in its infancy (9).

While adaptation should be prioritized in both developed and developing countries, developing countries need more guidance and support to plan and implement adaptation measures (10). Not only do they have less resources to adapt, international support for adaptation is considered to be an ethical imperative. This is because low income countries are not the historical drivers of climate change (11).

For this reason, this project aims to improve our understanding of the barriers to climate change adaptation at the policy level for health adaptation in developing countries. This thesis focuses specifically on those barriers felt at the national level in health ministries. It's important to note that while some of the most effective adaptations occur at the grassroots or community level, the national level is also important because this is where support for community-level projects is determined(12-14). Barriers are defined as any condition that makes it difficult to achieve progress towards adaptation (15). In this paper, the terms barriers, challenges, and constraints will be used interchangeably. By comparing the health and climate policy literature with expert opinion in the health sector, this project seeks to understand which barriers are most salient for public health adaptation nationally and how they might be overcome. Filling this knowledge gap is important for the implementation of health adaptation plans by helping researchers and planners alike to target their resources. With this goal in mind, this project specifically addresses the following research questions:

1. What are the main barriers facing health adaptation?
2. What do policymakers and health professionals believe are the primary barriers to health adaptation and what suggestions do they propose to overcome them?

This thesis begins by reviewing the policy literature on health adaptation to climate change to identify the main barriers found in the literature. It then goes on to analyze a series of interviews with World Health Organization Professionals to understand what experts in the field see to be the main barriers to health

adaptation. Both the review and the interviews are structured by an adaptation readiness framework. It will conclude with a discussion of where the two bodies of knowledge converge and diverge and the implications for forwarding health adaptation policy in developing countries.

CHAPTER 2: METHODS AND CONCEPTUAL FRAMEWORK

2.1. Analysis

An adapted version of Ford and King's framework for examining adaptation readiness was used to structure a review of the literature, develop an interview questionnaire, and classifying the answers of interview respondents (*see Figure 1.1*). The framework provides a systematic approach for assessing "the extent to which human systems are prepared to adapt, providing an indication of the likelihood of adaptation taking place"(16). It does this by drawing attention to six key components which determine adaptation readiness, namely, political leadership, institutional organization, availability of usable science to inform decision making, funding for adaptation public support, and decision making. From the original framework, the final concept of 'decision making' which addresses the hesitancy of governments to make decisions given the uncertain context of climate change was not included in this project because a wide body of literature argues that this is not barrier to health adaptation. *See Table 1.1* for a description of each element of the framework.

Because the focus of this study was primarily on barriers to adaptation, information obtained through this project cannot be considered to give a complete representation of adaptation readiness since areas of strength in the health sector were not given equal attention. In this thesis an adapted version of the readiness framework serves primarily to draw attention to key barriers to adaptation and organize related information found in the literature and interviews.

Description of Adaptation Readiness Framework Components	
Adaptation Readiness Framework Component	**Description**
Political Leadership	Climate adaptation at the national level involves many actors competing to have their interests heard (10). Thus, leadership from the health sector is important to have the health impacts of climate change prioritized (17). For this reason, a lack of health leadership is considered to be a barrier to adaptation. In reviewing the literature, we use this component of the AR framework to collect insight on public health's potential to be a leader in adaptation policy, the challenges it faces, and proposed solutions.
Institutional Organization	Institutional organization refers to the political and administrative structures that serve to enable or restrict a sector adapting (16). According to Costello *et al.*, institutional organization, and specifically the coordination challenges that it poses, can be considered the single most important barrier facing adaptation in the health sector (18). There are also important temporal, methodological and capacity issues within health ministries that are highlighted by this component of the AR framework.
Availability of usable science to inform decision making	Health policymakers rely on access to high quality research to make decisions on adaptation(19). This component of the AR framework draws attention to the different drivers which contribute to making an "availability of usable science" a barrier in the creation of health adaptation policy.
Funding for adaptation planning, implementation and evaluation	Sufficient funding is key to successful adaptation and includes the capital costs of interventions as well as funding for human resources to support projects over the long-term(16). In a recent study of the health sector's capacity to adapt to climate change in Cambodia, funding was ranked as the strongest barrier preventing adaptation(20). This component of the framework draws attention to all issues related to funding health adaptation policies and programmes.
Public support for adaptation	Public opinion as to the importance of adaptation plays a key role in influencing decision-making processes (10, 21). This component of the AR framework draws attention to issues of public education on climate change and health impacts and how they might be overcome.

Table 1.1. Description of adaptation readiness framework components.

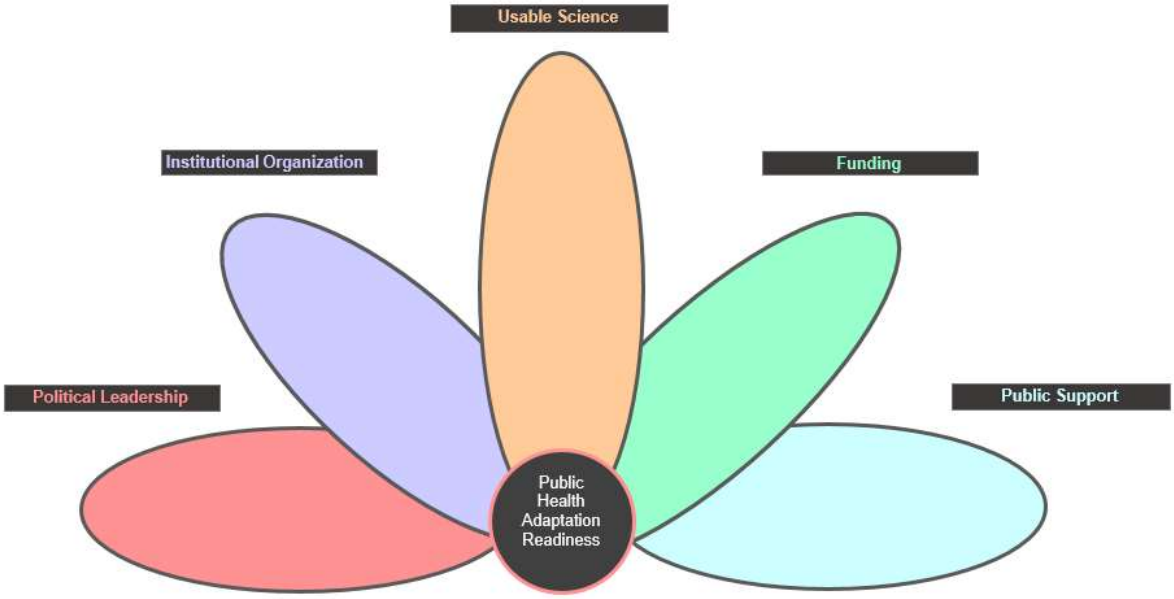

Figure 1.1. Conceptual framework of health adaptation readiness adapted from Ford and King(16).

2.2. Literature Review

A scoping review was conducted in the fall of 2014 in Pubmed and Web of Knowledge with the aim of identifying key barriers to climate change adaptation in the health sector. The following search string was used to search these journals: ["*climate change*" AND *health* AND (*polic** OR *govern** OR *admin**)]. While a previous review on barriers to public health adaptation by Huang *et al.* included the terms "constraint" and "barrier" in their search string, these terms were excluded for this project(15). This is because there was little consistency in the terms and language used to refer to barriers to adaptation, and restricting the search to certain terms may have excluded a number of relevant studies. For example, some studies on climate and health policy identified 'priority areas of focus' or 'policy needs', which, in the absence of which we can assume that adaptation efforts would be hindered. Instead of including

terms related to the concept of "barriers", abstracts, discussions, and subheadings of articles were scanned for relevant information on barriers to adaptation for review.

Next, the main WHO and regional websites in developing nations were also searched for policy reports pertaining to health and climate change policy. The fourth and final source of articles was found through scoping the reference list of Chapter 11 (Human health: impacts, adaptation, and co-benefits) of Working Group II of the Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report. Snowballing from the reference lists of articles found through the above four methods was used to identify additional articles. *Table 2.1* outlines the inclusion and exclusion criteria applied in this review.

Inclusion	**Exclusion**
• English, French or Spanish • Available in PubMed, Web of Knowledge, the WHO website or referenced in Chp. 11 of IPCC 's AR5 • Articles snowballed from the reference lists of articles found through the above sources • Peer Reviewed Literature and/or WHO Policy Reports • Published January 1st, 2010- Oct. 30th, 2014 • Major Focus on Adaptation and not Mitigation • Human Health Focus • Abstracts refer to developing countries • Abstract, discussion and/or (a) subheading (s) of article refers to barriers, constraints, challenges, priority areas of focus or policy needs	• Literature that is not Peer Reviewed and/or a WHO Policy Report • Major focus on Mitigation and not Adaptation • Focus on non-human health related adaptations(for example adaptations targeted at the health of coral reefs) • Abstract refers only to developed countries • Abstract, discussion and/or (a) subheading (s) of article does not refer to barriers, constraints, challenges, priority areas of focus or policy needs

Table 2.1. Literature review exclusion and inclusion criteria.

2.3. Interviews

To compliment the literature review, and in order to better understand which barriers to health adaptation are salient to public health, semi-structured interviews were conducted with health

policymakers from, or associated with, the World Health Organization's (WHO) Department of Public Health and Environment (PHE) in Geneva, Switzerland. Three interviews were conducted with members of PHE's climate and health adaptation team, two were with experts from PHE but who were not members of the adaptation team, and three were from other departments. WHO staff were chosen as interviewees because they have been active in the climate and health field for over two decades, are experts in policy creation, and work closely with developing country health ministers on adaptation issues. Nearly all of the interviewees were organizers and/or attendees of the recent Climate Change and Health Conference attended by WHO member states in August 2014 in Geneva. For this reason, the interviewees chosen for this project are acutely aware of the most pressing needs of health ministers in developing adaptation policy, and can provide unique insight on any barriers to adaptation that have not yet reached the literature. All interviews were conducted over skype between the months of September 2014 and January 2015, and lasted approximately thirty minutes each. Ethics approval for this project was granted by the McGill Research Ethics Board. Written informed consent was received from all participants before the interviews. Interviews were recorded and transcribed. Transcriptions were manually coded to classify answers within one of the five components of the adaptation readiness framework. See *Table 2.2* for examples of key questions posed to interview participants.

Examples of Key Questions Posed to Interview Participants	
AR Component	**Questions**
General	What is the greatest barrier in terms of forwarding climate change adaptation in the health sector? Why is this the case? What can be done to overcome this barrier?
	Are there any barriers that you consider to be unique to the health sector?
Political Leadership	Environment sectors have dominated adaptation to climate change work. How can the health sector take a leadership role in climate change adaptation?
Institutional Organization	Lack of institutional capacity has been identified as a barrier to adaptation. What are your thoughts? How might we overcome this?
	Climate change adaptation calls for multisectoral action and coordination for public health on an unprecedented scale. What are your thoughts on this? How can we work to attain coordination and cooperation between sectors?
Usable Science	Lack of scientific research on the impacts of climate change is a well cited barrier. What are your thoughts on this? How might we overcome this barrier?
Funding	How important is funding for forwarding health adaptation? How can funding gaps for climate change adaptation work be overcome?
Public Support	Do health ministries feel pressure from the general public to take action on climate change? If not, what factors can help rally public support?

Table 2.2. Examples of key questions posed to interview participants.

CHAPTER 3: LITERATURE REVIEW

In using an adaptation readiness framework to analyze key works in our existing body of knowledge on policy barriers to health adaptation, this review will show that a lack of political leadership, institutional organization, availability of usable science, funding, and public support for adaptation are all barriers to policy creation. In revising our understanding of the nature of these barriers, this review will demonstrate that there is no clear consensus in the health and climate literature as to which challenges are most important to overcome for health adaptation to occur. Most scholarship identifies a range of barriers to adaptation, but does not typically rank or characterize importance. This supports the need to study these barriers more closely in order to understand where efforts need to be most targeted by the planning and research communities to eliminate the most important constraints in order to move forward with adaptation. This review will also demonstrate that the literature offers few solutions to these challenges, underpinning the need to solicit expert opinion as to how we can overcome these barriers. In doing this, it will draw primarily on two types of studies: those which aim to evaluate the preparedness of the health sector for climate change, and those which focus on proposing health adaptations to a changing climate and in so doing discuss policy barriers to adaptations.

3.1. Political Leadership

3.1.1. Leadership Potential

According to the literature, a potential leverage point for the health sector in adaptation leadership is that threats to health are often cited in international forums to argue the urgent need to adapt to climate change (22). In a similar vein, the literature reviewed here argues that health ministers should reference the fact that climate change has been cited as the most significant threat to public health of our time in order to take a leadership role in actions to address adaptation issues (23).

3.1.2. Leadership Challenges

The literature highlights that taking a leadership role in climate change adaptation has proven difficult for health ministers since the impacts of climate change on health have only recently been given much attention in the international community (24). Climate change can no longer be seen as only an environmental or development issue (25). Health ministers in countries where the impacts of climate change on health are already being felt, including small island nations, seem to be more easily recognized as adaptation leaders in their communities (26). Articles dealing with health adaptation in small island nations did not discuss a lack of health sector leadership as a barrier to adaption. This suggests the need for ministers to stress those health impacts of climate change which are already materializing in their countries in order to strengthen their authority as leaders in adaptation actions. It also suggests that perhaps the real reason why health is not strongly involved in climate debates is a leadership failure on the part of the health sector to educate the national policy community about the immediate, health impacts of climate change occurring within their country.

3.1.3. Leadership Solutions

To overcome this barrier, one recommendation provided by the literature is that the health sector should engage with other sectors by, for example, stressing the economic costs of diseases (27). By stressing that all sectors are impacted by negative health outcomes due to climate change, the need for health to take a leadership role in adaptation will be emphasized (27). Another is that the health sector should strengthen its leadership authority in climate issues by taking an active role in mitigation efforts(28). This is because the health sector is one of the economy's major contributors of greenhouse gases (23, 28). However, arguably, this solution is not very applicable to developing nations where health currently makes up a much smaller proportion of the economy than in western nations. For this reason, the potential for climate change to reverse improvements in health achieved through the millennium development goals may be a better entry way for health to enter the climate leadership in developing

nations (28). Others argue that the most significant way for health to take a leadership role in adaptation is to become more engaged in the negotiation of key adaptation decisions taking place at the national level and to set priorities for health at national-level meetings (23).

Summary 3.1. *Weak leadership in the health sector is a barrier to adaptation at the national level. However, it is not well understood what drives poor leadership on this issue, and how we might overcome this barrier. It is generally believed that poor education on the health impacts of climate change among policymakers works to prevent health sector leadership. Only a few suggestions are proposed in the literature on how to overcome this barrier suggesting the need for more in-depth research.*

3.2. Institutional Organization

3.2.1. The Need for Multisectoral Action

Multisectoral action refers to collaboration between different sectors of government. The literature reviewed here identifies multisectoral action as a key barrier to health adaptation because it is both a necessary and difficult process. Multisectoral action is necessary because a number of other sectors including energy, agriculture, transport and housing play an important role in determining the risks of morbidity and mortality due to climate change (6, 9, 25, 29).

For example, adaptation projects in sectors like agriculture which involve rainwater harvesting programs may have serious impacts on public health if the need to prevent mosquito breeding is not considered (5). Likewise, if rapid urbanization focuses purely on economic growth rather than sustainability, this is likely to lead to increased emissions which will impact health equity in the long-term (30). Given that other sectors often do not consider the health impacts of their portfolios, the

literature reviewed here argues that the need to engage in multisectoral action is an important barrier to health adaptation (2, 31-33).

What we don't know however are the actual difficulties that the health sector faces on the ground in trying to work collaboratively on adaptation projects based in other sectors. (34, 35). At this time, the literature presumes that the challenges are similar to those felt in other multisectoral action projects. These include the need to navigate varied structures and processes which exist between sectors, as well as differences in knowledge and understanding of the need for this kind of cross-sectoral work (29, 31). Further, the literature identifies the following as general barriers to multisectoral action: limited resources to fund cross-sectoral work, weak incentives to engage in interdisciplinary research and the allocation of health research funding to mainly curative or technological solutions rather than to population health (34). Thus, despite highlighting the challenging nature of multisectoral action, the literature provides very little understanding as to why multisectoral action is challenging in an adaptation context.

As a result of this inattention to the health adaptation context, few solutions are offered by the literature in terms of overcoming this barrier. One exception is Fussel who stresses that current adaptation planning frameworks provide an opportunity to overcome multisectoral barriers to adaptation (43). This is because these meetings unite key actors from all relevant sectors (33). In a similar vein, the WHO argues that National Adaptation Programmes of Action (NAPAs) are considered to be an unprecedented opportunity for fostering cross-sectoral action between health and other sectors (25). Thus, despite the scale of the issue, the challenges of multisectoral action in an adaptation context are not well understood, and the stronger engagement of the health sector in national adaptation planning frameworks is the only solution proposed.

3.2.2. A Need to 'break into' the Environment Domain

Given that environment ministries dominate the adaptation field, the literature reviewed here argues that health ministries will need to work more closely with environment departments in specific going forward(2, 36). However, historically, the environment and health communities have failed to work together on many environmental health issues (2, 37). To overcome this barrier, the WHO argues that "there is a need for the creation of an enhanced awareness among ministries of health and environment of the mutual relevance and benefits of each other's policies, strategies and programmes" (38). Additionally, there is general agreement in the literature that the development of closer collaboration between public health and meteorological agencies will facilitate the kind of monitoring projects which are discussed in *section 3.4.8*. (39). Thus, despite the historic nature of this issue, there is no discussion in the literature as to why breaking into environment portfolios may be more difficult in an adaptation context. Furthermore, the only solution proposed is that better communication and collaboration is needed between health and environment ministries—a solution so general that it is hard to imagine how this barrier will be overcome.

3.2.3. The Need to Engage with Civil Society

The literature identifies an increasing awareness of the need to incorporate NGOs and bilateral organizations into adaptation planning as further complicating the issue of multisectoral action(38). It is generally agreed that while these organizations contribute unique perspectives to climate change decision-making because of their first hand experiences of dealing with the impacts of climate change on health, incorporating additional actors into decision-making is difficult (40). The literature offers few solutions as to how to incorporate civil society into the health adaptation process. The exception is Bowen *et al*. who have created a framework to assess governance and decision-making processes on climate change and health. This framework helps depart from a 'silo-ed' approach to health in order to understand how a variety of actors can work together on health adaptation decision-making (31). Thus,

while the challenge of engaging with civil society is a barrier to adaptation action, the literature offers few solutions on how to overcome this issue.

3.2.4. Temporal and Methodological Barriers

In climate change adaptation, institutions need to be capable of planning for long time horizons(16). The literature reviewed here, however, argues that health professionals are not used to working in the kind of large time scales involved in climate and health relationships (41, 42). Health decision making tends to focus on immediate health risks (34). Therefore there is a "mismatch in temporal scales between climate impact projections and typical adaptation decisions" (33).

Because the timing for different adaptations varies, the literature argues that health institutions are more likely to implement some adaptations more than others, and that therefore our health systems provide a barrier to certain types of adaptations(43). However, how this barrier actually plays out at the policy level is only hypothesized in the literature at this time. For example, in the case of preparing for a heat wave, Fussel predicts that stocking up on medical supplies before an emergency might be an easier adaptation to implement than establishing a heat wave warning system or making changes to town planning in light of reducing the urban heat island (43). This is because the latter two take considerably more time than the first (33). Given that this is only a prediction however, more research is needed to better understand the nature of this barrier and how health professionals suggest we can overcome it.

Current solutions offered by the literature to overcome this issue are not very concrete and tangible. Frumkin and McMichael question whether we need a paradigm shift in public health in order to accommodate the new time scales imposed by the health impacts of climate change(42). If our current clinical paradigm which focuses on individuals forces us to think in short time frames, then a new paradigm that focuses on caring for communities should push the public health agenda to invest in the kind of long term solutions prioritized in climate change adaptation (42). How the health sector might

come about this shift in paradigms however is not explained in the literature. Others have argued that the long-term focus of adaptation efforts actually align quite well with public health as a discipline given its history in helping communities prepare for long-term changes(29) However, validation of this theory is also yet to be seen. Thus, while the traditional time scales of health decision making and adaptation efforts seem to be at variance, it is difficult to understand the nature of this barrier from the literature, including how it plays out for policymakers. Current solutions offered by the literature to overcome this challenge are also not easy to implement. This suggests the need to solicit expert opinion on this issue in order to understand the nature of this challenge better and how we might overcome it.

3.2.5. A Lack of capacity & Human Resources where Adaptation is Needed Most

One of the greatest institutional challenges reviewed in the literature here is that the health impacts of climate change are being felt first where health systems are poor to begin with(2). In these settings, building the capacity of government and universities to respond to climate change could take a long time (2). Many health systems currently can't withstand the impacts of extreme heat events, natural disasters, flooding, and water-supply problems (44). An estimated 24% of the current global burden of disease and 23% of all deaths can be attributable to environmental factors (45). Countries that are already struggling with environmental threats to health simply do not have the resources to institute proposed adaptations (5). However, how to address adaptation planning in these settings, and thus how to overcome the ways in which poor health systems act as an institutional barrier to adaptation is not well addressed in the literature. This highlights the need to seek out expert opinion in this area to better understand how poor health systems create institutional barriers to adaptation and how we might overcome this constraint.

Summary 3.2. There are three main drivers of the institutional barrier to adaptation. The first is a need for multisectoral action, the second is temporal and methodological characteristics of traditional public

health models and the third is an existing lack of capacity in low resource settings. Both how these factors constrain institutional capacity and how we might overcome these challenges is not well understood. This suggests the need to seek out expert opinion on these issues.

3.3. Availability of Usable Science to Inform Decision Making

3.3.1. A Pre-existing Lack of Data on Environmental Health

Models that take into account social and environmental determinants of health can help us to understand the cause-and-effect relationships between climate change and health outcomes (46). However, because climate change impacts health in many different ways, and through many different pathways, a common barrier identified in the literature is that a range of data is needed to create these types of models. This includes everything from data on individual's wellbeing to remote sensing data on land use and land change (25, 37). This data need can be overwhelming for the health sector, especially in the developing world where there is a preexisting gap in health data collection (37). For this reason, a common theme in the literature is that health ministry's should begin to adapt to climate change by filling existing data gaps on climate sensitive diseases and their risk factors(33). However, given that various health policies are constantly being made in countries where enormous data gaps exist, there is clearly a need for a deeper understanding of why a lack of data is a problem with climate change adaptation in particular and how we can overcome this constraint.

3.3.2. A Need for Quantitative Data

Quantitative data on the health impacts of adaptation plans is important because it allows the health sector to compete for funding with other adaptation and mitigation projects proposed in other sectors (35). *See section 3.4 for more on funding.* A recent systematic review found that despite the fact that research on climate change and health is growing, quantitative studies remain rare(47). Among

adaptation studies, very few provide the data required by health policymakers (19, 47). In the aftermath of a flood for example, the literature argues that we have little quantitative data on both the risks for infectious and vector-borne diseases and the effectiveness of early warning systems to reduce the health impacts of the flooding event (32, 48). This lack of quantitative data in the literature is often considered to be driven by an uncertainty of future greenhouse gas emissions and climate impacts (33). For this reason, recent models of malaria, for example, have attempted to measure and control for climatic uncertainty in order to produce quantitative data for policymakers (49). Other studies on cholera have attempted to quantify the impacts of climate change on incidence rates but have warned that their results should be interpreted with caution because they failed to control for uncertainty (50, 51). Therefore, using established methods for quantitative health risk assessment is difficult when the exposure is complex or unknown(33).

Solutions to this problem in the literature are mixed. Some scholars have argued that in order to overcome this challenge that the health sector may have to let go of its attachment to quantitative data in the field of adaptation all together. Adapting to climate change may ultimately be about "building confidence that community-based research does have value in the sciences needed to make a difference in a climate-changing world" (52). This is particularly important in rural or remote areas where collecting quantitative data is particularly difficult or costly (52). Others still believe that a positivist—quantitative-oriented approach to public health needs to be combined with concepts of "wellbeing" found in the social sciences to create some kind of middle-ground methodology to approaching adaptation (19, 53). *See section 3.2.2*. for more on methodological barriers. It's important to note however that how this shift away from the use of quantitative data would actually occur in a policy setting is not well explored in the literature. For this reason it is difficult to understand where resources would need to be targeted to change this quantitative health standard. For this reason more research is needed in this area.

3.3.3. A Need for Better Understanding of the Pathways between Climate and Health Outcomes

One of the barriers to adaptation identified in the literature is that there are still knowledge gaps in how changes in climate affect specific disease outcomes. Although we understand some climate and health relationships very well, uncertainty in risks varies by health outcome (33). For example, there is still a lack of understanding on the relationship between changes in climate and seasonality and the incidence of many infectious diseases (54, 55). We also have a poor understanding of the climatic drivers of water-borne diseases like diarrheal diseases (56, 57). In the field of mental health, there is an even larger gap in the literature as to the psychological effects associated with fear of climate-driven events including floods and severe storms (37). Additionally, there is a need to develop a more comprehensive undertanding of which diseases are climate senstitive, since many diseases previously not thought to be driven by climatic drivers , like chicken pox, are now seen as dependent on environmental factors (44, 58). Thus preparing for the impacts of a changing climate on health requires a better understanding of the pathways through which climatic changes affect specific disease outcomes. However, an understanding of how to encourage further research that meets the needs of policymakers is not explored in the literature and requires further study.

3.3.4. A Need for Regional Data

Our current models tend to generalize health outcomes between locations (2). The literature identifies this as a barrier to adaptation because projections cover too large a scale to be useful for decision makers (46). Given that the impacts of climate change are “highly population-specific”, large-scale data is not considered to be very useful in adaptation (33). Qualitative research conducted at finer spatial scales in contrast allows for the identification of vulnerability hotspots and intervention planning (32, 59). Currently, regional data is most lacking in Sub-Saharan Africa, meaning that adaptation efforts are being delayed in areas where they are needed most (38, 60). For this reason, some scholars argue that the most important barrier to climate change adaptation is our continued study of the large-scale

impacts of climate change in place of desperately needed regional studies (44). How to support the implementation of more regional studies however is largely not discussed in the literature.

3.3.5. A Need for Health Service Data & Dissemination of Practical Adaptation Options

According to the WHO, "the most important barrier to improved policy is often not a lack of research data but poor knowledge management: A failure to ensure that research is relevant to the requirements of stakeholders" (34). Our current research has been identified as a barrier to adaptation because it is not generally focused on disseminating guidelines to help improve health systems (2, 44). While the research community is concerned with understanding the impacts of climate change on health, how to increase public health capacity has received little attention (61, 62): "Many key issues involved with translating the climate change literature into health services and workforce development have been neglected"(44). While general adaptation recommendations are available for the health sector, specific adaptation options suitable for different healthcare settings, especially low resource settings, do not exist (5). Thus, while we understand a lack of health systems research to be a barrier to adaptation, the literature doesn't explore why this barrier exists and how we might encourage more research on health service adaptation.

3.3.6. Technology Gaps

While many of our current technologies like mosquito nets and water filters are considered to be effective responses to the impacts of climate change in the majority world, technology is still considered to be a barrier to adaptation in the literature (2). This is because maximizing basic health technologies requires access to considerable financing and distribution expertise in low resource settings (2). In the case of adapting the health sector to deal with the predicted increase in incidence of malaria in some regions for example, there are important technological barriers to consider. These include questions of whether sufficient numbers of insecticide-treated bednets can be manufactured

and supplied to all exposed regions (5).Other scholars point to the difficulties of adapting to climate-sensitive communicable diseases like dengue, schistosomiasis and leishmaniasis which currently have no associated vaccine to assist in prevention(2, 29). While technology is considered to be a barrier to adaptation, it is not clear how it prevents decision making or what solutions might help solve this issue. For this reason additional research is needed.

3.3.7. A Need to Pool Research and Agree on Common Methods

Another important reason for multisectoral action not mentioned in *section 3.2.1.*, is that research on the health impacts of climate change is highly dispersed between disciplines, individuals and institutions(25). This makes the literature difficult for policymakers to review and apply to their work (25). Because of the large range of conceptual frameworks and methods involved in assessing the impacts of climate change on health, decision makers have a difficult time comparing and assessing potential interventions(25). While there is a general consensus that traditional health impact assessments need to be adapted in light of climate change, what methods should be used is unclear for policymakers(19, 63, 64).Furthermore, a recent review by Fussel found that none of our current health adaptation assessment models adequately address all key health adaptation challenges, meaning that policymakers need to combine elements from different guidelines (59). Thus the dispersed nature of research across disciplines and a lack of common methods can be considered to a barrier for health policymaking. What solutions policymakers propose to assist them in their work however is largely not considered in the literature.

3.3.8. A Need for New Public Health Methods of Monitoring and Evaluation

One barrier to health adaptation highlighted by the literature is a lack of measures to monitor adaptation to climate change(39). This is a challenge because policy decisions rely on positive feedback from the monitoring and evaluation of previous projects (19). Policymakers are reluctant to invest resources into projects that have ambiguous returns(65). However, the same health metrics that the

health sector relies on for measuring the impacts of an immunization campaign on the incidence of disease, for example, aren't useful in measuring the effectiveness of climate change adaptations (66). One of the reasons for this are significant 'spatial-temporal lags' between the implementation of a given adaptation and the protective effects of said adaptation (37). According to the literature, socioeconomic changes within a community can also serve to produce significant confounding bias vis-à-vis the effectiveness of an adaptation (37). For this reason, monitoring and evaluation programs need to be modified for climate change adaptations to ensure that they are generating evidence on the health impacts of climate change (5, 19). According to the IPCC, scientific evaluation of the health implications of adaptation measures are needed at both the community and national levels (6). Monitoring is also challenging because of the existing gaps in data covered in *section 3.3.1*. Thus the development of innovative monitoring and evaluation tools for health adaptation projects is desperately needed to help build the case for the implementation of adaptation projects in the health sector. What these monitoring tools should look like however is not explored in the literature and requires further research which engages with experts in the field.

Summary 3.3. A common theme in the literature is that the unique research needs of the health sector act as a barrier to adaptation. They include a lack of: environmental health data in developing countries, quantitative data, understanding of the pathways between climate change and specific disease outcomes, regional data, health service research, technology, common methods, and monitoring and evaluation tools. The literature offers few solutions as to how to overcome this barrier, and is it not clear which factors within this barrier constrain adaptation the most. This suggests the need for further research to fill these gaps.

3.4. Funding for Adaptation Planning, Implementation and Evaluation

3.4.1. Indecision on How to Best Fund Adaptation

As was documented in *section 3.2.3, health* systems in much of the developing world are not very strong. This translates into a barrier to adaptation by causing confusion as to how best to approach funding for adaptation (61). For example, it is not clear whether funding should be allocated to supporting current activities or towards developing innovative programming (61). This indecision on how to approach funding is a barrier to adaptation because finances from various adaptation funds set up through the UNFCCC can only be seized if the health sector knows what it needs to do differently to adapt to climate change(22). This is to say that funds can only be applied for if climate and health initiatives are not part of normal development planning and seek to address the 'additional risks of climate change'—a complicated requirement since some of the best adaptations will come from strengthening basic health systems (40). Few solutions are offered in the literature as to how to overcome this barrier. Some scholars suggest that health ministers need to be better educated on the co-benefits of mitigation policies since framing adaptation funding projects as having both adaptation and mitigation benefits may assist in creating successful funding applications(67)q. Implementing co-benefits projects may also create financial benefits for health ministers since mitigation efforts often have financial returns in the long run (68).

3.4.2. Competition for Funding Within and Between Sectors

Within the health sector, attention to climate change is not always strong since present needs tend to take priority over future threats to health (69). For this reason, one barrier highlighted in the literature here is that climate change adaptation is constantly competing for resources with other public health policies(69). Unfortunately this issue tends to be the most widespread in developing countries where adaptation support is most needed(33, 61). This is because these are the same countries with

very high infectious disease rates (33, 61). Because of this competition for funding, it is important that researchers calculate cost-benefit analyses of potential adaptation options rather than just listing a range of potential adaptations for the health sector (33). However, as we saw in *section 3.3.5*., we are still struggling with offering the health sector concrete adaptation options, let alone ranking their financial viabilities.

Bowen *et al*. note that competition *between* sectors is also a barrier to adaptation funding (40). For this reason, the authors emphasize the need for health ministries in developing countries to be heavily involved in the preparation of national adaptation plans so that their financial needs are prioritized (40). However, how the health sector can actually break into these planning processes which are often dominated by sectors outside of health continues to be a gap in the literature.

3.4.3. Lack of Knowledge on How to Apply for Climate Funding

In the health community, climate funding mechanisms are considered to be an attractive opportunity to assist in adaptation (36). However, the literature emphasizes that one barrier to attaining these funds is that health ministers are often not aware of how to tap into this funding(3, 36, 40) .The main vehicle by which developing countries can receive funding for adaptation is through participating in the creation of National Adaptation Programmes of Action (NAPAs) (35). NAPAs outline the adaptation priorities of a country in order to facilitate financing through the United Nations Framework Convention on Climate Change (UNFCCC) (35). Health sector engagement in NAPAs however has been limited, stressing the need for multisectoral action as covered in *section 3.2.1* (40). At the WHO conference on health and climate in 2014, health ministers highlighted the need for a better understanding of the opportunities to utilize financial mechanisms offered through the UNFCCC, the Global Environment Facility and other partners as key to taking action on climate change adaptation (3). However, despite the

clear emphasis in the literature reviewed here on the need for research aimed at understanding how best to support health ministers in accessing climate funding, few studies exist in this area.

Summary 3.4. Funding is key to adaptation. Barriers to funding adaptation include deciding on how best to fund adaptation, the need to compete with other health departments and sectors for limited funding and a lack of knowledge on how to apply for climate funding. Few solutions are offered by the literature as to how best to assist health ministers with funding gaps.

3.5. Public Support for Adaptation

As a result of the "complexities and uncertainties associated with climate change, facilitating an informed and thoughtful public health response could become as difficult as managing the risk itself" (39). This is to say that before action on adaptation can be taken, people need to first be informed of the impacts of climate change on health. In a similar vein, Ebi *et al.* have argued that "the extent to which society is willing to expend resources to avoid the [health] effects of climate change will depend in part on its perceptions of the risks posed by climate change"(39). This suggests the need to educate the wider public about the health impacts of climate change in order to put pressure on health policymakers to support adaptation projects.

While there is little in the literature that aims to study public opinion on health adaptation to climate change, as we saw in *section 3.1.2*, this may be because people are so poorly educated on the impacts of climate change on health to begin with. In response to this, some scholars have suggested framing climate change as an air pollution issue (29, 70). This is because air pollution has significant and visible impacts on a number of health outcomes including respiratory diseases, stroke, cardiovascular disease and low birth weight(70). Choosing a single framing which people can easily understand may be the best means of garnering support for health adaptation(29). Despite this one proposed solution, the

need for public support for health adaptation and the means to encourage this support has not been widely addressed in the literature.

Summary 3.5. It is not clear whether a lack of public support for adaption is a barrier to policy creation although it is generally agreed in the literature that people aren't well educated on the health impacts of climate change. This may in turn prevent the public from pressuring their governments to take action. The solution then becomes more education on the visible health impacts of climate change like the impacts of air pollution on respiratory diseases. More research is needed on the role of public support in impacting health adaptation.

3.6. Discussion of Literature Review Findings

From the literature it is clear that there are many barriers to adaptation in the health sector (*see Fig 3.1 for a graphic summary of the findings of this chapter)*. These include political leadership, institutional organization, availability of usable science, funding, and public support for adaptation. However, it is unclear whether some barriers are more important than others; few scholars point out a single barrier as being the most challenging to health adaptation. Rather, a range of constraints are explored by authors studying climate and health policy. Knowing whether some barriers pose larger challenges to adaptation than others is important so that resources can be targeted to overcoming the areas of most need. Furthermore, few solutions are actually proposed to help overcome barriers presented in the literature. This justifies the need for qualitative research which engages health policymakers in an attempt to understand not only which challenges are most important to overcome to forward adaptation, but also how we might overcome these barriers. Without an understanding of which challenges to target first and how we might solve them, our body of knowledge on health barriers will not help the health sector adapt to climate change.

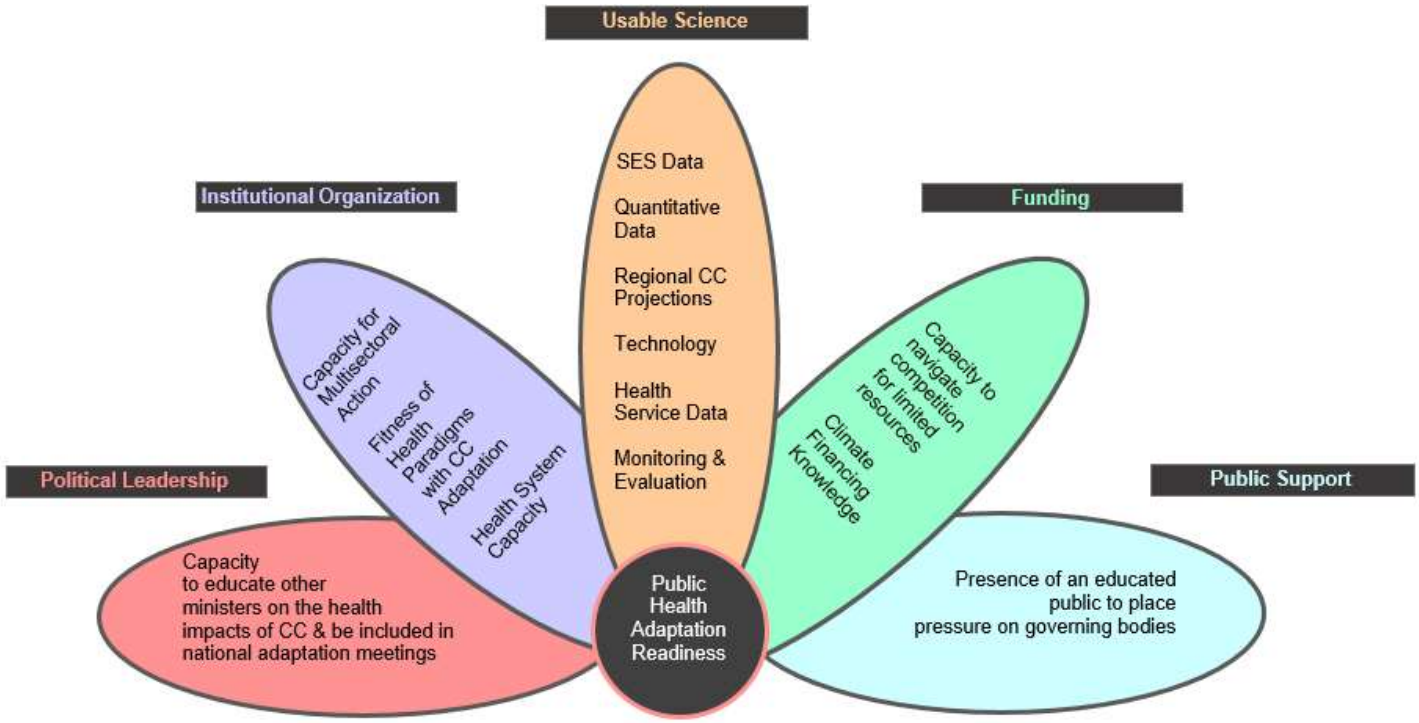

Figure 3.1. Adaptation readiness framework summarizing key findings from the literature reviewed.

CHAPTER 4: INTERVIEW FINDINGS

The literature reviewed on climate and health adaptation highlighted that there are many barriers to health sector adaptation, but no clear consensus as to which barriers need to be targeted first to advance health adaptation. To respond to this gap in the literature, this section presents key findings from interviews conducted with WHO health experts in order to understand what the most important barriers for health adaptation are, and where planners and researchers should target their resources going forward (*see section 2.3 for more information on interview methods*). Barriers identified by interview participants were coded into one of the five areas of the adaptation readiness framework (*see Table 1.1.*).

4.0. General Findings

When asked what they considered to be the most important barrier to adaptation in the health sector, half of participants responded funding, just ahead of a group of concerns that were coded as leadership challenges under the adaptation readiness framework (*see Figure 4.1 & Table 4.1).* As will be demonstrated in this section, both funding and leadership barriers can be understood as coordination issues between the health sector and national adaption processes. Interestingly, no participants considered a lack of usable science to be a barrier to health adaptation. This finding will be explored further in *section 4.3.*

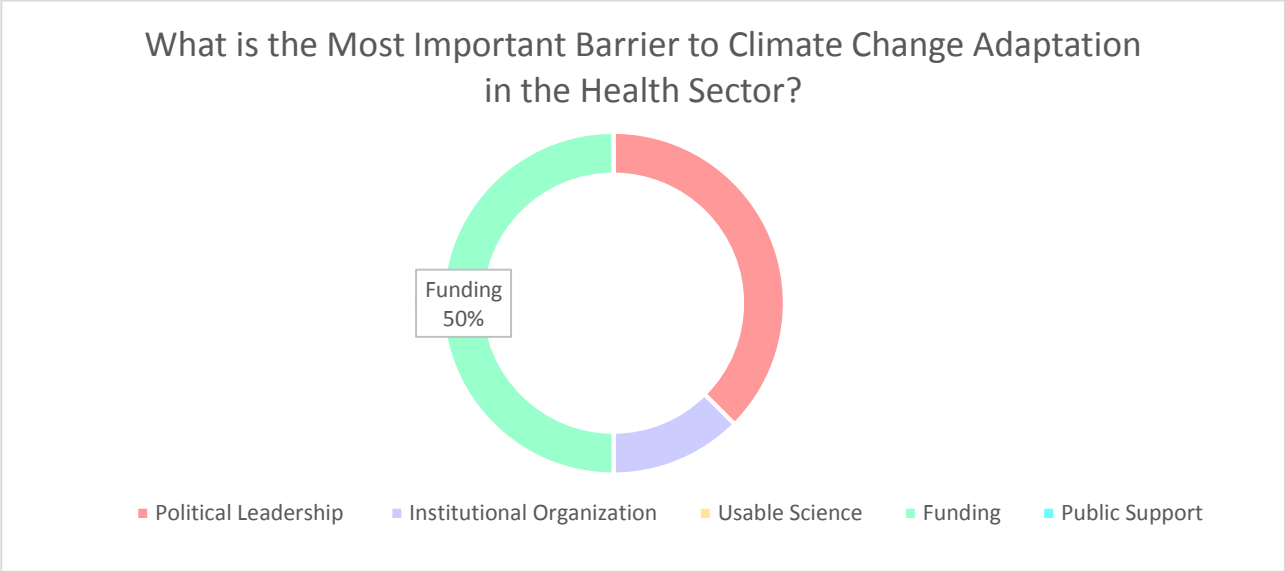

Figure 4.1. Interviewee responses to "What is the most significant barrier to adaptation in the health sector?"

Table 4.1. Codes	
	Political Leadership
	Institutional Organization
	Usable Science
	Funding
	Public Support

Interviewee responses to "What are the most significant barriers to climate change adaptation?"								
Barriers in order of Priority	**001**	**002**	**003**	**004**	**005**	**006**	**007**	**008**
#1	Funding	Preoccupation of ministers with political debates around climate change	Easy to pass responsibility onto Environment Ministry	Concern for treating individuals, not populations	Funding	Lack of connection to national adaptation processes and meetings	Funding	Funding
#2	Concern for treating individuals, not populations	Lack of public understanding of the health impacts of climate change	Concern for treating individuals, not populations	Funding	Lack of public understanding of the health impacts of climate change	Lack of public understanding of the health impacts of climate change	Technical capacity and training for health ministers on adaptation	Easy to pass responsibility onto Environment Ministry
#3			Health sector prefers clear well-established processes and CC is presented as a general problem		Technical capacity and training for health ministers on adaptation			
#4			Technical capacity and training for health ministers on adaptation		Lack of connection to national adaptation processes			
#5			Funding					

Table 4.1. Interviewee responses to "What are the most significant barriers to climate change adaptation?"

4.1. Political Leadership

Six out of eight respondents noted that historically, a lack of awareness of the linkages between climate and health at the senior level of health ministries was a significant barrier to leadership on adaptation. All agreed however, that this barrier has been largely overcome in recent years, reporting now widespread appreciation of the impacts of climate change on health in senior positions. This, in turn, has led to a sense of hopefulness that adaptation actions will increase in number and geographic reach in the coming years through increased health leadership. Two out of the eight of the respondents noted however, that although great strides have been made, it was only this past August that the first ever Climate Change and Health Conference was held at the WHO. For this reason, much more work still needs to be done in terms of educating and preparing heath ministers to take on a leadership role in climate change and health work.

Interestingly, seven out of the eight respondents felt that increasing health sector leadership in adaptation didn't mean that health ministers should be involved in *driving* adaptation planning at the national level but rather taking on more of a coordinating role in national policy making. This is because ministries of environment are still considered to be the major players in charge of adaptation to climate change. However, all respondents agreed that even if environment ministers are leading adaptation planning processes, health ministers should display leadership by creating health adaptation plans and advocating for the incorporation of health priorities into national adaptation planning processes like the National Adaptation Programmes of Action (NAPAs). There was also unanimous agreement that health ministers should display leadership by disseminating guidelines for other sectors on actions that can be taken to promote health adaptation. While adaptation plans are already being created in many health ministries, interview respondents noted that they are often poorly communicated with overall adaptation planning. For this reason, coordination was a key theme that came out of the interviews.

> "Whereas before health was not even welcome in the global climate change discussion because people were not understanding the key linkages between climate and health, the health message is better understood now. The big remaining challenge is making sure that everything is coordinated with the health sector and making sure that [national adaptation programmes of action] take into account our recommendations because again we are not the key main actor, we can just send key messages and recommendations." (Participant 004)

Despite the fact that leadership was not directly spoken about as a major barrier anymore in the interviews, respondents identified a lack of connection with national adaptation planning meetings as a significant barrier to adaptation. Given that connecting with climate change processes will require strong leadership on the part of the health sector, I coded concerns with connecting to national adaptation processes as potential leadership barriers. This is especially true given the sector's relatively late arrival to climate change planning as well as the challenges of participating in multisectoral projects discussed in *section 4.2*. Interviewees also noted that the first step in any health adaptation process at the national level is for health ministers to identify institutional arrangements for coordination and leadership opportunities.

In terms of reinforcing health leadership at national adaptation meetings, four respondents noted the importance for health ministers to use presentations to educate key players on the health impacts of climate change. These key players include UNFCCC focal points, and ministries of planning, finance and environment. Two out of eight respondents argued that adoption of greener technology within the health sector is key to reinforcing health sector leadership in climate change work. Four other participants recognized the potential role of NGOs and other organizations like nursing and medical associations in advocating for the health sector to take on a stronger leadership role in adaptation.

Summary 4.1. *Despite increased education on the health impacts of climate change among health ministers, political leadership is still potentially a barrier to climate change adaptation in the health*

sector given the need for strong leadership to break into already ongoing climate planning processes at the national level. Strong health leadership means creating national health adaptation plans and being able to communicate the needs of the health sector at national meetings. Leadership barriers can be thought of more broadly are primarily coordination issues between the health sector and national adaptation planning processes.

4.2. Institutional Organization

There was general agreement that the need for strong leadership and communication development within the health sector is further emphasized when we consider that adaptation planning is a multisectoral process, and that multisectoral work is inherently difficult. While, theoretically, national adaptation planning processes like NAPAs provide an opportunity to facilitate cross-sectoral work, interviewees noted that in the past health has not been present in these meetings.

According to participants, the main reasons why health has been absent from these meetings in the past is a lack of education in other ministries as to the health impacts of climate change, as well as poor capacity development within health ministries. For this reason, all interviewees noted that considerable focus should be given to these two areas. In terms of capacity development, more technical support from organizations like the WHO is needed to help health ministers develop adaptation plans specific to the needs of their country. Additionally, one participant noted that the health sector's transition into adaptation planning is difficult because the health sector does not hold strong relationships with those ministers which typically make up national adaptation planning processes.

> The ministries of finance, transportation and construction are more involved in planning and sustainable development conversations… their attitude to the health sector is sort of "we'll come and get you when we need you", and this has led to the exclusion of the health sector from climate discussions in the past. So there

> are some very engrained institutional challenges to getting the health sector involved in this kind of work. Strong health leadership will be key to building the relationships necessary to overcoming these barriers. (Participant 005)

The health sector's past absence from adaptation processes is evident in a recent report analyzing National Adaptation Plans of Action (NAPAs) submitted by African countries to the UNFCCC(71). Three participants referenced this report noting that while 95% of NAPAs in Africa consider health as a priority area, only 3% of adaptation funds are currently devoted to health(71). According to interviewees, poor attention to health issues in funding is largely due to poor consultation with the health sector in creating NAPAs and a lack of technical support to help health ministers create adaptation plans in the past. However, despite the health sector's past absence from adaptation meetings, the mood among interviewees was optimistic that as health ministers are supported in capacity development through organizations like the WHO, they will be more prepared to participate in adaptation planning and will be present in all important national-level consultations.

Five out of eight participants noted that part of the issue with addressing climate change adaptation has to do with the fact that in recent decades, public health has been more concerned with treating individuals than populations. This is incongruent with the population-based approach necessary for climate change adaptation. For example, in the case of malaria, instead of the environmental management strategies of the 1950s and 60s, bednet distribution has become the main response of the health sector. Participants believed that this individualistic approach to health can, albeit, be overcome through appropriate policy. It was noted by interviewees however that it will be extremely important that funding for this work comes from the appropriate adaptation funds. This is because the development of more individualistic approaches to health has, at least in part, been a response to donor funding schemes which favour individualized approaches to health.

Participants also agreed that one of the greatest institutional challenges with adaptation is that the health impacts of climate change are being felt first in developing countries where health systems face many constraints. However, contrary to the literature reviewed, this was not considered to be a barrier to adaptation planning per se. Rather, adaptation policy was actually seen as an opportunity to stress the importance of building basic health system resilience- an area that currently receives little funding from health budgets, and that will only become more critical with climate change.

Summary 4.2. *There are various institutional challenges to engaging in health adaptation; however, none of these are seen as significant barriers for involvement of the health sector in adaptation by most participants. The main challenges under this component of the AR framework is for the health sector to build relationships with preexisting adaptation planning processes and a need to adopt, older, more population-based approaches to public health through new policy creation. Adaptation work provides the opportunity to promote health system strengthening and much needed capacity building in low-resource settings.*

4.3. Availability of Usable Science to Inform Decision Making

Interestingly, while the literature reviewed stresses that a lack of regional data on climatic changes is a barrier to health adaptation, those interviewed here generally disagree. According to all participants interviewed, knowledge of general trends is sufficient for planning adaptations.

In terms of the kind of data necessary for planning adaptations, what was viewed as more essential than climate projections is information on socioeconomic status (SES) and other socioeconomic determinants of health, specifically how they interact to create vulnerable populations. Knowledge of these indicators was considered by interviewees to have a larger impact on adaptation planning than detailed data on changes in weather and climate patterns. It is important to note the

significance of this finding given that SES data is less expensive to attain in comparison to climate data, and that it is regularly collected independent of climate change planning. In response to those who consider a lack of perfect data on climate projections as a barrier to adaptation, one participant stressed that climate change should be seen as an opportunity to employ the "precautionary principle". This common public health theory emphasizes that even if perfect data is not available, work to make sure a population is prepared to respond to adverse health outcomes must continue.

In a similar vein, all participants noted that a lack of technology is not a barrier to adapting to climate change. Most of the technology to make the biggest changes is already in place, and what was identified as lacking is the funding for widespread implementation of these technologies. One respondent did note however, that climate change highlights the need to invest more research into certain climate sensitive diseases like dengue, but that a lack of knowledge on interventions for this specific disease does not in any way act as a barrier to adaptation.

> While some of our interventions do need work that is not a reason for people not to address climate change any more than a reason for people to walk away from diseases like dengue in general. (Participant 006)

All interviewees recognized that there are challenges with measuring progress in adaptation work, but noted that this issue was not a significant barrier for the sector's involvement; measuring impact is a common challenge in all health prevention work. In terms of developing metrics for adaptation, all respondents agreed that a mix of quantitative and qualitative indicators is needed. Interestingly, despite the health sector's preference for quantitative measurements, respondents considered the qualitative measures typical of climate change adaptation work to be fairly good measures of adaptation. The most referenced qualitative measurements were "vulnerability reduction assessments" which consist of focus groups with a group of professionals before and after a project in order to measure change in adaptation readiness. Despite trust in this measurement by WHO professionals however, "there seems

to be a certain skepticism from ministries to believe in something that is just based on someone's opinion" (Participant 007). Therefore, to increase validity, it was widely agreed that these measures should ideally be combined with more quantitative measures like coverage of water and sanitation- a good metric for determining protection from waterborne disease. Additionally, four participants cited "health system resilience" as a key adaptation metric. This measure includes an evaluation of the strength of a health system in response to an extreme weather event including whether there are enough staff and medicines to respond to a disaster.

Thus, while the literature stresses the need for the health sector to become more comfortable with qualitative metrics of health adaptation to climate change, most respondents noted that a mix methods approach is by far the best solution. While work remains to be done in this area, overall a lack of usable science is not considered to be a barrier to climate change adaptation.

Summary 4.3. *Contrary to the literature, a lack of usable science is not considered to be a barrier to adaptation. This is the result of the health sector's tendency to place more weight on the importance of SES than climate data in adaptation work, it's familiarity of working with imperfect data, and certain characteristics specific to the health sector. Mainly, a familiarity with prevention work where measuring progress is inherently difficult.*

4.4. Funding for Adaptation Planning, Implementation and Evaluation

The literature portrays a confusion among health ministers as to whether funding should be placed in strengthening health systems or developing innovative programming to address the additional risks posed by climate change. All participants agreed that this was an issue with which health ministers are struggling. According to interviewees, tackling this issue involves steering away from one-off short-term projects with one or two year funding cycles that address various components of adaptation

separately. In its place, it was generally argued that a systematic and programmatic approach to climate change adaptation should be adopted in the health sector. Guidelines for this approach are still under development but ultimately involve supporting countries in developing health adaptation plans, building resilience of health systems in alignment with country priority areas, conducting vulnerability and adaptation assessments to asses and respond to new risks, and designing early warning systems. A programmatic approach to climate change involves addressing a specific set of components and capacities that the health sector needs to strengthen in light of climate change. Interviewees emphasized that while the approach to climate change itself is programmatic, and that specific time and resources should be allocated for adaptation planning, separate climate change programs should not be implemented in health ministries. Rather, there was consensus that health adaptation plans should be created within health ministries and then existing health programmes should be revised in light of these plans in order to mainstream adaptation into existing programming. Key to mainstreaming health into existing programmes is ensuring that funding is made available to cope with the additional risks faced by programmes as a result of climate change.

In terms of overcoming the funding barrier for health adaptation, participants overwhelmingly believed that funds for adaptation work should come through the appropriate funding mechanisms set up through the UNFCCC, and not existing health budgets. In the past however it has been challenging for the WHO to support countries in accessing these funds. Because the WHO is a technical body, unlike other UN agencies like UNDP or UNEP, it wasn't set up as an implementing agency for early adaptation funds. The WHO is equally not an implementing agency for the Global Environment Fund (GEF). Interviewees explained that in order to pursue a GEF project currently, for example, the WHO needs to partner with another UN agency whose mandate allows it to implement GEF projects as well as with the GEF country head where the project will take place- normally a country's minister of environment. Since the WHO is not the official implementing agency in these projects, funds are processed outside of the

health sector, causing logistical difficulties, and diverting funds away from health. For this reason, it was generally agreed that current negotiations between the WHO and the Green Climate Fund to name the WHO as an implementing agency of the GCF will help health ministries fund adaptation. It was similarly agreed that should the WHO become an implementing agency of the Global Environment Facility that this would help overcome this major barrier to adaptation.

Equally key to overcoming this barrier according to participants is that funds should be set up specifically for health through international mechanisms like the Green Climate Fund (GCF).

> Until there are specifically health climate funds that are aimed at the health sector as opposed to the environment sector [health adaptation] will continue to be difficult (Participant 003).

Another interviewee noted that because demand for health funding to the UNFCCC has been increasing in recent years, there is more and more willingness to create funds specifically for health. Overcoming the funding barrier is now dependent on countries fulfilling their pledges to mechanisms like the Green Climate Fund.

> The GCF has been receiving lots of requests from countries to give priority to health so there is no problem from their side, again the only question mark is whether the funding will be there, it seems that nobody is denying any more that health is a priority sector and therefore needs to be paid attention to, what is again not new is how much money will be allocated to it, but again we have hope (Participant 007).

Most participants emphasized that accessing future funding will be dependent on health minister's presence at national planning meetings like NAPAs where communication on how to access adaptation funding occurs. And, since, other sectors are hesitant to share knowledge and resources of how to access climate funding it is essential, that, as mentioned in *sections 4.1 and 4.2*, that the health sector be more coordinated with national planning processes. For this reason, most participants spoke about

the challenges of health sector leadership (*section 4.2*) and involvement in climate processes in conjunction with funding issues. Presence at these meetings is key both for the health sector to be able to communicate its needs and also receive information about funding its priority areas.

Summary 4.4. *Sufficient financing is a huge battier to health adaptation. According to interviewees essential to increasing funding for health is for the health sector's main international advising body, the WHO, to become an implementing agency of global adaptation funds, for funds to be created specifically for health through international adaptation mechanisms, and for health ministers to learn more about how to access climate adaptation funding. This can be facilitated through increased coordination with national adaptation planning processes.*

4.5. Public Support for Adaptation

All respondents noted the importance of educating the general public on the health impacts of climate change in order to place pressure on governments to take action and for international bodies to allocate funding for health adaptation. While the health impacts of climate change can often seem abstract and lack a sense of urgency, five respondents argued that drawing attention to the impacts of air pollution on health can be a good entry point for education in this area. This is because the impacts of air pollution on health are already being felt and because action can be taken quickly to reduce pollution with visible and tangible results. This is similar to arguments made in the literature.

Summary 4.5. *Education on air pollution is a key entry point for education on climate and health impacts.*

4.6. Discussion of Interview Findings

The main barriers to health adaptation are funding and leadership challenges. Developing better coordination with adaptation processes through creating relationships at the national level with ministers who are already involved in adaptation work, and through supporting the creation of funds specific to health through international funding mechanisms, is key to overcoming these barriers. Interestingly, in contrast to the literature, a lack of usable science is not considered to be a barrier to health sector adaptation. This highlights the fact that while more scientific research will help with adaptation, a lack of this type of research is not a key barrier preventing health adaptation policy from moving forward, and should not be considered a priority area for planners and researchers.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1. Principle Findings

The literature reviewed in this thesis identified many barriers to adaptation in the health sector. These include political leadership, institutional organization, availability of usable science, funding, and public support for adaptation. However, the literature does not characterize rank or importance of barriers, or what actions should be undertaken to overcome them. In contrast, the interviews identified key barriers that need to be targeted to move adaptation forward, as well as concrete suggestions on how to overcome priority areas identified by interviewees.

Funding was identified as the most important barrier to health adaptation by interviewees. While there are a paucity of solutions offered by the literature to overcome this barrier, interview participants offered many potential actions and areas of research that should achieve more attention going forward. It was generally agreed by interviewees that overcoming this barrier requires taking a policy stance that funding for adaptation should not come from existing health budgets, and that a programmatic approach to adaptation should be supported rather than funding one-off projects. The urgent need to support the creation of funds specifically for health through international mechanisms like the Green Climate Fund (GCF) was also highlighted. Interviewees stressed that the WHO should become an implementing agency of adaptation funds like the GCF in order to be able to better support health ministers in accessing and implementing funds for adaptation projects.

Leadership was identified as the second major barrier to adaptation by interviewees. Overcoming this barrier according to interviewees requires that health ministers are supported in creating health adaptation plans relevant for their countries in order to best advocate for the needs of the health sector at national adaptation planning meetings like the National Adaptation Programmes of Action. This is a significant finding given that the literature offers very little guidance on how best to

support health leadership, arguing everything from the health sector should stress the economic costs of diseases at the national level to the health sector should take a stronger role in mitigation to show its leadership.

One area in which the literature and the interviews most strongly diverges is on the issue of the need for usable science to inform decision making. Whereas the literature reviewed here argues that there are many scientific gaps that prevent adaptation planning from taking place, interviewees widely disagreed. While additional research on the creation and dissemination of practical adaptation guidelines was considered to be a continued need for adaptation, this was not considered to be barrier to adaptation because many such guidelines are currently under development. In contrast to the interviews, the literature highlights a wide range of scientific needs including a need for environmental and quantitative data, a better understanding of the linkages between climate change and specific disease outcomes, technology, common methods and monitoring and evaluation tools. Because interviewees widely disagreed that usable science is a significant barrier to adaptation this suggests a shift in research focus away from scientific issues and towards supporting health ministers to overcome funding and leadership challenges in order to best support health adaptation. A common theme throughout the interviews when participants spoke about overcoming funding and leadership challenges was the need for better coordination between health and national adaptation processes already in place.

5.2. Strengths and Weaknesses

A strength of this study is that it drew on the opinions of key experts in climate and health policy who are familiar with the challenges specific to creating adaptation policy. A potential weakness is that this study focused strictly on policy creation at the national level, while a lot of adaptation action

actually happens at the local level. However, it is generally believed that good health policy should begin at the national level and then trickle down to lower levels of governance, justifying the level of analysis chosen for this study. Because this study communicated with experts who support health ministers in overcoming adaptation challenges, rather than soliciting the opinions of health ministers directly, this could have induced a degree of bias. Notably with respect to comments on how comfortable health ministers feel with their level of climate and health education and their ability to participate in national adaptation meetings. This is because WHO professionals would not want to discredit the abilities of health ministries. However, participants had no issue discussing past challenges in this area, indicating that this was perhaps not an issue in this study.

5.3. Meaning of Study/Policy Implications

Comparing the literature reviewed with the interview results provides a clear action plan for how researchers and others involved in health adaptation can help support adaptation in developing country health ministries. This study draws attention to the fact that health ministers most need support to overcome funding and leadership barriers. Overcoming these barriers can be thought of more broadly as a need to support better coordination between health ministries and national adaptation processes like the National Adaptation Programmes of Actions (NAPAs).

5.4. Questions for future research

The health sector is increasingly becoming more involved in national adaptation work through the support of organizations like the WHO. In the future, it will be important to study barriers to adaptation work at the more local levels of governance.

5.5. Conclusion

The findings of this thesis suggest a focusing of the health adaptation research and planning agenda in developing countries towards assisting the health sector with funding and leadership challenges in order to forward health adaptation policy.

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