Impact and vulnerability assessment of the health sector

Health vulnerability assessment: Definition

- A useful definition of '**vulnerability**' in the public health context is the "the degree to which a system is susceptible to injury, damage, or harm".

- "The degree to which a system is **susceptible to or unable to cope** with, adverse effects of climate change"

- An understanding of vulnerability helps to ensure that adaptation strategies target vulnerable groups and reduce potential inequities with respect to the health burden of climate change.

Impact and vulnerability assessment of the health sector

Health vulnerability assessment

- In this module vulnerability will be defined as being a function of:

- **Sensitivity** encompasses:

  (1) the ability of a community to withstand these exposures and the range of associated impacts

  (2) physiological (e.g. co-morbidities or disabilities) and socio-economic (e.g. poverty) factors that increases the susceptibility of individuals to the exposure.

Impact and vulnerability assessment of the health sector

Health vulnerability assessment

The concept of sensitivity also includes access to functioning infrastructure that can influence how people withstand an exposure (e.g. availability of electricity during an extreme heat event).

Impact and vulnerability assessment of the health sector

Health vulnerability assessment

- The potential **public health impact**, jointly produced by **exposure** and **sensitivity**, can be offset by **adaptive capacity**.

- **Adaptive capacity** refers to **behavioural, institutional, and technological responses** and adjustments to lessen the potential impact. Typically, such adaptations limit damages, provide recovery opportunities, and enhance coping with consequences.

Impact and vulnerability assessment of the health sector

Vulnerability and adaptation assessments do not only improve the understanding of the linkages between climate change and health, they can also serve as baseline analysis against which changes in disease risks and protective measures can be monitored.

They can also provide the opportunity for building capacity and can strengthen the case for investment in health protection.

Questions That Will be Addressed

- What is the current population profile of the country or region?
- What diseases are important in the country or region including climate-sensitive disease?
    a) What is the current burden of these diseases?
- What factors other than climate should be considered?
    a) Water, sanitation, etc.
- Where are data available?
- Are health services able to satisfy current demands?

Methods Required to Assess the Vulnerability of Human Health

- Estimating the **current distribution and burden** of climate-sensitive diseases
- Estimating **future health impacts** attributable to climate change
- Identifying **current and future adaptation options** to reduce the burden of disease.

Source: Kovats, et al., 2003

Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR)

Objective

- To assess the impact of climate change on freshwater resources in the Arab Region through a consultative and integrated regional initiative that seeks to identify the socio-economic and environmental vulnerability caused by climate change impacts on water resources based on regional specificities.

*The Regional Initiative aims to provide a **common platform** for addressing and responding to climate change impacts on freshwater resources in the Arab region by serving as the basis **for dialogue, priority setting and policy formulation to inform climate change adaptation at the regional level.***

Implementation Framework – الهيكل التنفيذي للمشروع

حصر المعلومات الأساسية المتاحة وإدارتها
Baseline Review & Knowledge Management

Integrated Assessment(تقييم متكامل)

تقييم تأثير التغير المناخي
Climate Change
Impact Assessment

تقييم قابلية التأثر من التغير المناخي
Climate Change
Vulnerability Assessment

بناء القدرات
Capacity Building & Institutional Strengthening
for Water Ministries, Meteorological Offices, Arab Research Centers

رفع الوعي
Awareness Raising & Information Dissemination

The Issue of Public Health as discussed by RICCAR

- "Water, already a scarce resource in the Arab region, may further decrease in quality and quantity which will put pressure on the availability of drinking water for the population.

- Climate change effects on agricultural production in already arid and semi-arid areas may lead to a loss of labor opportunities in the agricultural sector and trigger further migration to urban centers, which may in turn cause social disturbances and puts further stress on already densely populated areas". (RICCAR, 2015)

The Issue of Public Health as discussed by RICCAR

- "Increasing temperatures, decreasing rainfall as well as the increased frequency and intensity of extreme weather events, such as heat waves and dust storms will be some of the most severe challenges posed by climate change to the population in the Arab region, threatening their livelihoods and health.

- Higher temperatures, especially in the summer months, may have severe impacts on public health, in particular affecting the young and elderly and those working in economic sectors requiring outside work, such as agriculture, security and construction". (RICCAR, 2015)

RICCAR

- Thus, RICCAR identified the following three key climate change impacts on people to be included into the vulnerability assessment of the Arab region:
- Change in the availability of water for drinking
- Change in the rate of employment in the agricultural sector
- Change in the state of human health due to heat stress

The RICCAR modeling outcome

- The RICCAR modeling outcome has predicted at least an increase of 2 C within the next few decades.

- A far as the health sector is concerned, the people of the Arab region will then be subjected to impacts of less water availability for drinking, hygiene, and agricultural production.

- This will directly impacts the population through the many pathways

The RICCAR modeling outcome

- The water availability decrease through decreased precipitation and increased temperature patterns will almost hit all of the Arab region especially those depending greatly on the surface water resources to cater for their agricultural production.

- Heat waves has also been predicted to come on a more frequent pattern with intensity and higher durations.

The RICCAR modeling outcome

- Flooding events for the coastal and inland areas was also predicted to happen at a much increased frequencies and duration.

- The impacts of this on the drinking and sanitation infrastructure and services and the subsequent impacts on human health and the possible spread of diseases related to this are expected to be huge.

- The health sectors should be prepared to deal with the more incidents of diseases (depending on the local conditions) , such as Cholera; Typhoid, Bacillary dysentery, Infectious hepatitis ,Giardiasis, Scabies, Lice, Trachoma, Dysenteries, Ascariasis, chistomiasis, Bilharziosis, Threadworm, Yellow fever, Dengue fever, and Malaria

Vulnerability Assessment tools of the health sector to climate change impacts

- In response to the request in 2008 from the World Health Assembly for WHO to support countries in strengthening actions to protect health from climate change, WHO built on past guidance and technical tools to outline a flexible process for vulnerability and adaptation assessment.

Vulnerability Assessment tools of the health sector to climate change impacts

- The guidance is designed for countries to assess which populations are most vulnerable to different kinds of health effects, to identify weaknesses in the systems that should protect them, and to specify interventions to respond.

- Further, the resulting assessments can improve evidence and understanding of the linkages between climate and health, serve as a baseline analysis against which changes in health risk and protective measures can be monitored, provide the opportunity for building capacity, and strengthen the case for investment in health protection.

Steps in assessing vulnerability and adaptation

Steps in assessing vulnerability and adaptation

- Assessment steps need to be considered in future policy development.

- It is worth mentioning that not all steps may be possible or desirable, and the determination of which steps are included depends on the objectives and resources available for the assessment.

1. Determine the scope of the assessment

- The first step is to specify the scope of the assessment in relation to:
  - The health and community security issues of concern today and of potential risk in the future;
  - The geographical region to be covered by the assessment; and the time period.

Identify health outcomes (the climate-sensitive diseases) for inclusion in the assessment

1. Determine the scope of the assessment

- Interactions between weather and climate and health are location-specific; using epidemiological evidence based on local data if the are available is therefore important.

- Assessments should include current vulnerability to climate variability to inform understanding of what could occur with climate change.

1. Determine the scope of the assessment

- The national boundaries may not be the most appropriate geographical framework for the assessment.

  Climate, diseases and vectors do not respect national boundaries, and other countries may therefore need to be considered to assess the national risk.

1. Determine the scope of the assessment

- The responsible national or regional health authority can identify the health outcomes to be included in collaboration with, when appropriate,

  (1) the authorities responsible for the social security, environmental affairs and meteorological offices;

  (2) the research community; and

  (3) other stakeholders, such as nongovernmental organizations, business and the public.

Matrix used to assess climate-sensitive health risks in **Kiribati**, in terms of their likelihood and impact.

* Review of the available data on climate and climate-sensitive diseases

* Consultations with stakeholders across departments, as well as other government agencies and non-government organizations

Likelihood	Impact (Considering Consequence and Coping Capacity)				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost Certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	Medium
Rare	Low	Low	Low	Low	Medium

2. Describe the association between disease outcomes and climate variability and change

- Once health outcomes (the climate-sensitive diseases) are identified for inclusion in the assessment, the current evidence (published literature) should be reviewed.
  - A variety of statistical methods is available to analyze associations with exposure to weather or climate, taking into account modifying and/or interacting factors.
  - Meteorologists can provide input into how to define and describe the important types of weather exposure; for example, the severity and recurring periods of extreme weather events.

2. Describe the association between disease outcomes and climate variability and change

The current burden of the climate-sensitive diseases can be described using the following indicators and outcomes:

- The current incidence and prevalence of the disease and the trend (is the disease increasing or decreasing), which may be available from routine statistics from the appropriate national agency; and

2. Describe the association between disease outcomes and climate variability and change

- The attributable burden of a disease to climate and/or weather, such as what proportion of all cardiovascular deaths are attributable to high or low temperatures or the number of deaths caused by floods.

- For vector-borne diseases, having **a map** showing the current geographical distribution of human cases and vectors may be useful.

    - Finally, environmental and socioeconomic conditions also influence human vulnerability and need to be considered within the assessment.

3. Identify and describe current strategies, policies, and measures that reduce the burden of climate sensitive diseases

Adaptation measures can be identified from:

- (1) review of the literature;
- (2) from information available from international and regional agencies and from national health and social welfare authorities (ministries of health); and
- (3) from consultations with other agencies and experts that deal with the impact of the health outcome of concern.

- Identifying successful adaptations being undertaken to address the negative effects of climate variability and those implemented in anticipation of climate change is important. For example, is an early warning system for heat waves in place?

Example water, sanitation and hygiene interventions for diarrhoeal illness

3. Identify and describe current strategies, policies, and measures that reduce the burden of climate sensitive diseases

The key questions to address for a specific health outcome include the following.

- What is being done now to reduce the burden of disease? How effective are these policies and measures?
- What could be done now to reduce current vulnerability? What are the main barriers to implementation (such as technology or political will)?
  - What strategies, policies, and measures should begin to be implemented to increase the range of possible future interventions?

4. Review the health implications of the potential impacts of climate change on the other sectors

- For example, in cases where domestic water storage is recommended, the implementation of this measure may have implications for vector breeding and the transmission of dengue.

- Water development projects should be subject to environmental and health impact assessment.

5. Estimate the future potential health impact

- The climate change community often chooses from the present until 2050 and until 2100 as the reference periods for projecting the impact of climate change.
- This requires using climate scenarios such as those adopted by RICCAR.
- However, addressing potential effects both in the near term (the next 20 years) and the long term (up to 2050 or 2080) is advisable.
- The focus on the near term provides relevant information within the usual planning horizon of health agencies. A further need is looking beyond the near term to develop comprehensive adaptation measures.

5. Estimate the future potential health impact

- Models of climate change should include projections of how other relevant factors may change in the future, such as population growth, income, fuel consumption and other relevant factors.

- Future capacity to adapt to the effects of climate change depends on the future levels of economic and technological development, local environmental conditions and the quality and availability of health care and of public health infrastructure. Social, economic, political, environmental and technological factors strongly influence health.

6. Synthesize the results and draft a scientific assessment report

Convening an interdisciplinary panel of experts with relevant expertise is one approach to developing a consensus assessment.

- Value judgments have to be made in summarizing the assessment. In particular, decisions should be taken about:
  - how to balance near-term and long-term effects;
  - how to weight the different potential effects in different population groups;
  - how to balance the more certain, quantifiable potential effects with those that are less certain and not quantifiable, as w ell as the qualitative effects; and
  - how to balance the interests of the various stakeholder groups: experts, people potentially affected and decision-makers.

7. Identify additional adaptation policies and measures, including procedures for evaluation after implementation

- This step includes Identifying possible adaptation measures that could be undertaken over the short term to increase the capacity of individuals, communities and institutions to effectively cope with the weather or climate exposure of concern.

- For example, if heat-related morbidity and mortality are health issues in an urban area and if an early warning system for heat-waves is not in place, then would implementing such a system be likely to benefit population health?

7. Identify additional adaptation policies and measures, including procedures for evaluation after implementation

- Every country needs to adapt to long-term climate change.

- The aim of this step is to identify possible measures that can be taken today and in the future to increase the ability of individuals, communities and institutions to effectively cope with future climate exposure, including extremes.

7. Identify additional adaptation policies and measures, including procedures for evaluation after implementation

- Many of the possible measures for adapting to climate change lie primarily outside the direct control of the health sector.

- They are rooted in areas such as sanitation and water supply, education, agriculture, trade, tourism, transport, development and housing.

- Intersectoral and cross-sectoral adaptation strategies are needed to reduce the potential health impact of climate change.

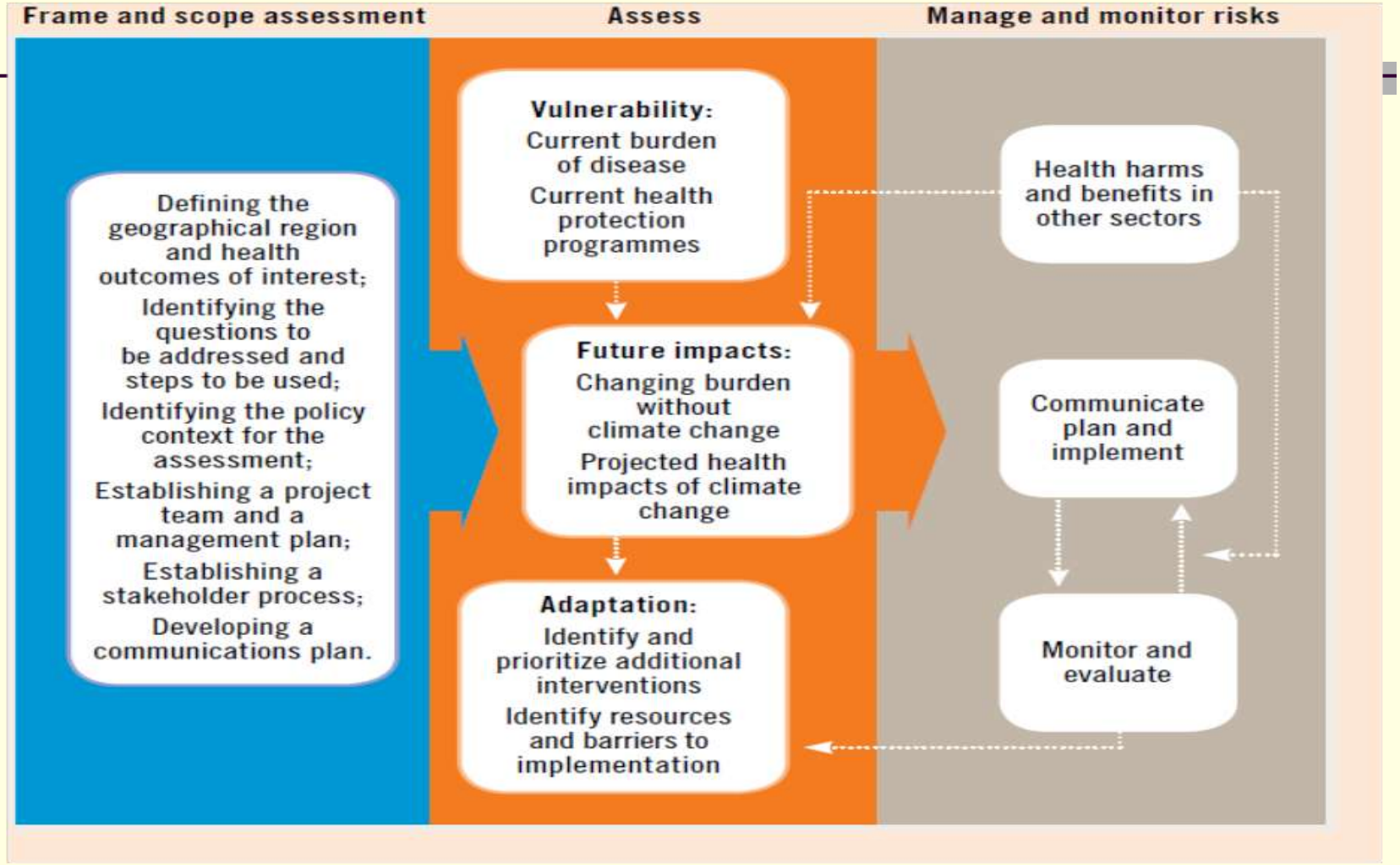
7. Identify additional adaptation policies and measures, including procedures for evaluation after implementation

- Criteria should be established in advance for evaluating possible adaptation measures.

- Evaluation should be an ongoing process both to identify opportunities for improving the effectiveness of the measures but also to identify maladaptation and unintended consequences as quickly as possible.

- The traditional public health methods for evaluating the efficacy and effectiveness of a particular intervention should be applied, with appropriate consideration of the local circumstances.

WHO guidance to protect health from climate change through health adaptation planning: Health within the NAP process (HNAP)



This framework is designed to ensure that the process of iteratively managing the health risks of climate change is integrated into the overall National Adaptation Plan (NAP) process

Example of how to convene a methodological framework for the vulnerability assessment

- The vulnerability of a particular system is highly contingent upon four main components: the magnitude of its exposure to climate change hazards, its degree of sensitivity to the hazard, the resulting amount of impact and its level of adaptive capacity.

- **Vulnerability = [exposure to climate stimuli x Sensitivity = impact] / adaptive capacity**

- Following the steps of VA assessment for the health sector, and using the scoring scale shown in Table 4 and the vulnerability ranking scale shown in Table 5 we carry out a vulnerability assessment for the health sector in any country.

Scoring scales for exposure (likelihood, geographical magnitude and confidence)

exposure factors	Score 1	Score 2	Score 3	Score 4	Score 5
likelihood	Event is not expected to occur, but it is possible (there is less than five percent probability of occurrence per year<5%	Event or change is unlikely to occur, but not negligible (there is between 5-33% probability of occurrence per year)	Event or change less likely than not, but still possible (33-66% probability of occurrence per year)	Event or change likely to occur (66-95% probability of occurrence per year)	Event or change very likely to occur (>95% probability of occurrence per year)
Geographical magnitude	less than 5% of the area is Affected	5-33% of the area is affected	33-66% of the area is affected	66-95% of the area is affected	>95% Of the area is Affected
Confidence of being correct	very low: less than 10%	low: 20% chance	Medium: about 50% chance	High confidence: 80% chance	very high confidence: >more than 90% Chance

Table 5: Vulnerability ranking scale

		Impact score					
		Score	**0,1-1**	**1,1 - 2**	**2,1 - 3**	**3,1 - 4**	**4,1 - 5**
Adaptive capacity	**Score**	Description	very low	low	Moderate	High	very high
	0.1 – 1	very low	Moderate	Moderate	Moderate	very high	very high
	1.1 – 2	low	low	Moderate	Moderate	High	very high
	2.1 – 3	Moderate	low	Moderate	Moderate	High	very high
	3.1 – 4	High	very low	low	Moderate	Moderate	High
	4.1 - 5	very high	very low	low	low	Moderate	High