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Adaptation and adaptive capacity, to lessen health impacts

Even if greenhouse gas emissions are reduced in the near future, Earth's climate will continue to change. Hence, adaptation strategies must be considered to reduce disease burdens, injuries, disabilities and deaths.

The IPCC has defined the following two closely-related terms¹:

Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Adaptive Capacity: The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with consequences.

The extent to which human health is affected depends on: (i) the exposures of populations to climate

change and its environmental consequences, (ii) the sensitivity of the population to the exposure, and (iii) the ability of affected systems and populations to adapt (Figure 11-1). We therefore need to understand how decisions are made about adaptation, including the roles of individuals, communities, nations, institutions and private sector.

Adaptation and Prevention

Many adaptive measures have benefits beyond those associated with climate change. The rebuilding and maintaining of public health infrastructure is often viewed as the “most important, cost-effective and

urgently needed” adaptation strategy.¹ This includes public health training, more effective surveillance and emergency response systems, and sustainable prevention and control programs.

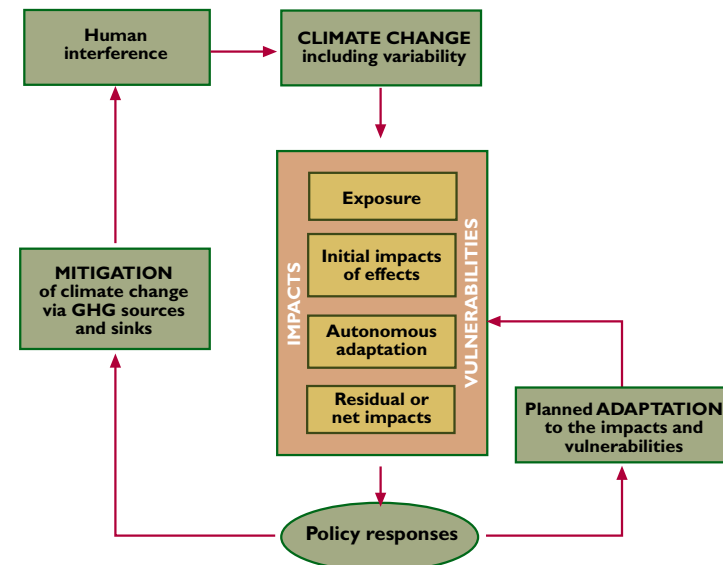
Extreme weather events can have vastly different impacts because of differences in the target population's coping capacity. For example, cyclones in Bangladesh in 1970 and 1991 are estimated to have caused 300,000 and 139,000 deaths respectively.² In contrast, Hurricane Andrew struck the United States in 1992, causing 55 deaths (although also causing around \$30 billion in damages³). Climate-related adaptation strategies must therefore be considered in relation to broader characteristics – such as population growth, poverty, sanitation, health care, nutrition, and environmental degradation – that influence a population's vulnerability and capacity to adapt.

Adaptations which enhance a population's coping ability may protect against current climatic variability as well as against future climatic changes. Such “no-regrets” adaptations may be especially important for less developed countries with little current coping capacity.

Adaptive Capacity

Adaptive capacity refers to both actual and potential features. Thus, it encompasses both current coping

Fig 11.1. Relationships between vulnerability and impacts (including both risks and opportunities) and society's main response options – i.e., mitigation of greenhouse gas emissions and adaptation (Source: reference 1)



ability and the strategies that expand future coping ability. For example, access to clean water is part of the current coping capacity for developed countries – but represents potential adaptive capacity in many less developed countries.

Highly-managed systems, such as agriculture and water resources in developed countries, are thought to be more adaptable than less-managed or natural ecosystems. Unfortunately, some components of public health systems are often relaxed when a particular health threat recedes. For example, the threat of infectious diseases appeared to be retreating thirty years ago because of advances in antibiotic drugs, vaccines and pesticides. Today, however, there is a general resurgence of infectious diseases – and relevant public health measures need to be reinvigorated.

The main determinants of a community's adaptive capacity are: economic wealth, technology, information and skills, infrastructure, institutions, and equity. Adaptive capacity is also a function of current population health status and pre-existing disease burdens.

Economic Resources

Wealthy nations are better able to adapt because they have the economic resources to invest, and to offset the costs of adaptation. In general, poverty enhances

vulnerability – and we live in a world in which approximately one-fifth of the world's population lives on less than US\$1 per day.

Technology

Access to technology in key sectors and settings (e.g., agriculture, water resources, health-care, urban design) is an important determinant of adaptive capacity. Many health-protecting adaptive strategies involve technology – some of which is well established, some new and still being disseminated, and some still being developed to enhance coping with a changing climate.

The health risks from proposed technological adaptations should be assessed in advance. For example, increased air conditioning would protect against heat stress, but could increase emissions of greenhouse gases and other air pollutants. Poorly designed coastal "defences" may increase vulnerability to tidal surges if they engender false security and promote low-lying coastal settlements.

Information and Skills

In general, countries with more "human capital" or knowledge have greater adaptive capacity¹. Illiteracy increases a population's vulnerability to many problems⁴. Health systems are labor-intensive and require qualified and experienced staff, including those trained in the operation, quality control, and maintenance of public health infrastructure.⁵

Infrastructure

Infrastructure specifically designed to reduce vulnerability to climate variability (e.g., flood control structures, air conditioning, and building insulation) and general public health infrastructure (e.g., sanitation facilities, wastewater treatment systems, laboratory buildings) enhance adaptive capacity. However, infrastructure (especially if immovable) can be adversely affected by climate, especially extreme events such as floods and hurricanes.

Institutions

Countries with weak institutional arrangements have less adaptive capacity than countries with well-established institutions.¹ For example, institutional and managerial deficiencies contribute to Bangladesh's vulnerability to climate change.

Collaboration between public and private sectors can enhance adaptive capacity. For example, the Medicines for Malaria Venture – a joint public-private initiative to develop new antimalarial drugs – is developing new products for use in developing countries.

Equity

Adaptive capacity is likely to be greater when access to resources within a community, nation, or the world is equitably distributed.⁶ Under-resourced and marginal populations lack adaptive resources.

While universal access to quality services is fundamental to public health, many still lack access to health care. Overall, the developing world, with 10 per cent of the world's health resources, carries 90 per cent of the disease burden.⁵

Health Status and Pre-existing Disease Burdens

Population well-being is an important ingredient and determinant of adaptive capacity. Great progress has been achieved in public health, yet 170 million children in poor countries are underweight, of whom over three million die each year. Many countries face the double burden of increases of non-communicable diseases, but with continued prevailing infectious diseases.

Conclusions

Adaptive strategies intended to protect public health will be needed whether or not actions are taken to mitigate climate change. Building capacity is an essential preparatory step. Adapting to climate change will require more than financial resources, technology, and public health infrastructure. Education, awareness-raising and the creation of legal frameworks, institutions and an environment that enables people to take well-informed, long-term, sustainable decisions are all needed.