



# GENDER, CLIMATE CHANGE AND HEALTH

DRAFT DISCUSSION PAPER



World Health  
Organization



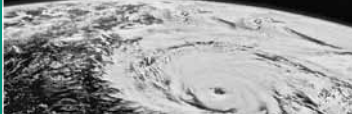
**“Climate change affects every aspect of society, from the health of the global economy to the health of our children. It is about the water in our wells and in our taps. It is about the food on the table and at the core of nearly all the major challenges we face today.”<sup>1</sup>**

—Ban Ki-Moon, UN Secretary-General

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# **GENDER, CLIMATE CHANGE AND HEALTH**



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# ACRONYMS

<b>CODEM</b>	Municipality and the Municipal Emergency Commission
<b>COPD</b>	chronic obstructive pulmonary disease
<b>CSW</b>	Commission on the Status of Women
<b>DSM-IV</b>	Diagnostic and Statistical Manual of Mental Disorders (edition IV)
<b>FAO</b>	Food and Agricultural Organization
<b>IIED</b>	International Institute for Environment and Development
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>MDG</b>	Millennium Development Goals
<b>NTFPs</b>	Non-timber forest products
<b>PTSD</b>	Post traumatic stress disorder
<b>UN</b>	United Nations
<b>UNFCCC</b>	UN Framework Convention on Climate Change
<b>WHA</b>	World Health Assembly
<b>WHO</b>	World Health Organization

# BACKGROUND

Gender impacts of climate change have been identified as an issue requiring greater attention by the Commission on the Status of Women (CSW).<sup>2</sup> Gender norms, roles and relations are important factors in determining both, vulnerability and adaptive capacity to the health impacts of climate change. Women and men's vulnerability to the impact of extreme climate events<sup>3,4</sup> is determined by differences in their social roles and responsibilities. Among women, an expectation that they fulfil their roles and responsibilities as carers of their families often places extra burdens on them during extreme climate events. For men, their expected role as the economic provider of the family often places extra burdens on them in the aftermath of such events.

At the 2007 World Health Assembly (WHA), Member States of the World Health Organization (WHO) adopted Resolution WHA 60.25,<sup>5</sup> on the integration of gender analysis and actions into the work of WHO at all levels. A year later at the 2008 World Health Assembly (WHA), 193 WHO Member States committed through Resolution 61.19<sup>6</sup> to a series of actions to confront the health risks associated with climate change.

In this paper, available information on the differential links between climate change and the health of women and men has been collated and analyzed through the perspectives of: (a) direct and indirect health consequences; and, (b) the possible interaction of biological and social risk factors in determining these impacts. The overall aim of this work is to provide a framework for gendered health risk assessment and adaptation/mitigation actions in relation to climate change.

This framework is intended to strengthen WHO support to Member States in their activities to develop standardized country-level health risk assessments and climate policy interventions that are beneficial to both women and men.

**“Sex”** refers to the biological and physiological characteristics of women and men.

**“Gender”** refers to the socially constructed norms, roles and relations that a given society considers appropriate for men and women. Gender determines what is expected, permitted and valued in a woman or a man in a determined context.

**WHO:** <http://www.who.int/gender/whatisgender/en/index.html>

**Climate change** refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), which defines “climate change” as: “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”.

(Intergovernmental Panel on Climate Change, 2001)



## HEALTH AND CLIMATE CHANGE

Effects of climate change on health will impact on most populations in the coming decades and put the lives and well-being of billions of people at increased risk.<sup>7</sup> The Intergovernmental Panel on Climate Change (IPCC) states that “climate change is projected to increase threats to human health”. Climate change can affect human health directly (e.g. impacts of thermal stress, death/injury in floods and storms) and indirectly through changes in the ranges of disease vectors (e.g. mosquitoes), water-borne pathogens, water quality, air quality, and food availability and quality. It also states that social impacts will vary dependent on age, socioeconomic class, occupations and *gender*, and the world’s poorest people will be most affected.<sup>8</sup>

The risks to health from climate change arise from: (1) direct stresses (e.g. heatwaves, weather disasters, workplace dehydration); (2) ecological disturbance (e.g. altered infectious disease patterns); (3) disruptions of ecosystems on which humanity depends (e.g. health consequences of reduced food yields); and (4) population displacement and conflict over depleted resources (e.g. water, fertile land, fisheries). In addition, melting ice-sheets may mobilize ice-bound chemical pollutants into the marine food chain.<sup>9</sup> An observed temperature rise to date, (about 0.7°C), is already affecting health in many societies; the increasing number of extreme weather events, such as heatwaves, floods, and storms, is leading to a growing toll of deaths and injuries from climate-related natural disasters.<sup>10</sup>

Information on climate change and health can broadly be divided into: (a) the direct and indirect impacts of climate change on health; and, (b) the response to ameliorate the negative health impacts of climate change through mitigation strategies and adaptation actions.

### Why gender and health?

The distinct roles and relations of men and women in a given culture, dictated by that culture’s gender norms and values, give rise to *gender differences*.

Gender norms, roles and relations also give rise to *gender inequalities* – that is, differences between men and women which systematically empower one group to the detriment of the other. The fact that, throughout the world, women on average have lower cash incomes than men is an example of a gender inequality.

Both gender differences and gender inequalities can give rise to inequities between men and women in health status and access to health care. For example:

- A woman cannot receive needed health

care because norms in her community prevent her from travelling alone to a clinic.

- An adolescent boy dies in an accident because of trying to live up to his peers’ expectations that young men should be “bold” risk-takers.

In each of these cases, gender norms and values, and resulting behaviours, are negatively affecting health. But, gender norms and values are not fixed and can evolve over time, vary substantially from place to place, and are subject to change. Thus, the poor health consequences resulting from gender differences and gender inequalities are not static either. They can be changed.

<http://www.who.int/gender/genderandhealth/en/index.html>



## HEALTH, GENDER AND CLIMATE CHANGE

The links between gender norms, roles and relations and health impacts of climate change are often unnoticeable, and there is limited research or case studies analysing and highlighting them. The following framework (see Figure 1), which has been adapted from the synthesis report<sup>11</sup> of the International Scientific Congress on Climate Change: Global risks, challenges and decisions, Copenhagen (March, 2009), will be used in this information sheet to structure the available information on the gendered health outcomes of climate change.

**Figure 1:** Effects of climate change on human health and current responses: a gendered perspective

Impact pathways		Current responses	
Meteorological conditions exposure	Human/social consequences of climate change	Mitigation actions	Adaptation actions
<p><i>Examples:</i></p> <ul style="list-style-type: none"> <li>• Warming</li> <li>• Humidity</li> <li>• Rainfall/drying</li> <li>• Winds</li> <li>• Extreme events</li> </ul>	<p><i>Examples:</i></p> <ul style="list-style-type: none"> <li>• Displacement</li> <li>• Shift in farming and land use</li> </ul>	<p><i>Examples:</i></p> <ul style="list-style-type: none"> <li>• Alternative energy</li> <li>• Accessible clean water</li> </ul>	<p><i>Examples:</i></p> <ul style="list-style-type: none"> <li>• Addressing water shortage</li> <li>• Crop substitution</li> <li>• community education on early warning systems and hazard management</li> </ul>
<b>Examples of impact outcomes and responses that are gendered in their effects:</b>			
<ul style="list-style-type: none"> <li>• Injury/death</li> <li>• Hunger</li> <li>• Epidemic outbreaks</li> <li>• Post traumatic stress disorder (PTSD)</li> </ul>	<ul style="list-style-type: none"> <li>• Emigration</li> <li>• Exacerbation of malnutrition</li> <li>• Increased violence against women and girls</li> </ul>	<ul style="list-style-type: none"> <li>• Hydropower – leading to more snail hosts for schistosomiasis</li> <li>• Cleaner air – less cardio-respiratory diseases (gendered profiles)</li> </ul>	<ul style="list-style-type: none"> <li>• Unexpected nutrient deficiencies</li> <li>• Impacts of water quality</li> <li>• Less deaths in extreme events</li> </ul>

Adapted from: McMichael, A and Bertollini, R. Effects of climate change on human health, in *Synthesis report from climate change: global risks, challenges and decisions*. Copenhagen, University of Copenhagen, 2009.



# 1. IMPACTS: HEALTH

## 1.1. METEOROLOGICAL CONDITIONS AND HUMAN EXPOSURE

There is some evidence showing that women and men suffer different negative health consequences following extreme events like floods, drought and heatwaves. While disasters create hardships for everyone, natural disasters on average kill more women than men, or kill women at a younger age than men. These differences persist in proportion to the severity of disasters, and also depend on the relative socioeconomic status of women in the affected country. This effect is strongest, for example, in countries where women have very low social, economic and political status. In countries where women have comparable status to men, natural disasters affect men and women almost equally.

A study based on information from 147 countries has highlighted that physical differences between men and women are unlikely to explain these differences and social norms may provide some additional explanation.<sup>12</sup> The same study also looked at the specific vulnerability of girls and women with respect to mortality from natural disasters and their aftermath, and found that natural disasters lower the life expectancy of women more than that of men. Since women's life expectancy is generally higher than that of men, natural disasters actually narrow the gender gap in life expectancy in most countries. The research also confirmed that the effect on the existing life expectancy gender gap is proportional to the severity of disasters: Major calamities lead to more severe impacts on women's life expectancy (relative to that of men). The study verified that the effect on the life expectancy gender gap varied inversely in relation to women's socioeconomic status.<sup>13</sup> This highlights the socially-constructed and gender-specific vulnerability of women to natural disasters, which is integral to everyday socioeconomic patterns and leads to relatively higher disaster-related mortality rates among women compared to men.

### 1.1.1. Warming and humidity

Many specific impacts of warming and increased humidity can be anticipated or, in some cases, observed. Modelling studies indicate that a 2°C rise could potentially cause 5–20% reductions of cereal grain yields in South Asia, South-East Asia and sub-Saharan Africa, significantly exacerbating undernutrition and adverse health outcomes (especially physical and mental development of children). In many urban populations, it is estimated that a 2°C rise would increase the annual death rate from heatwaves approximately two-fold. In China, a 2°C temperature rise would allow a 50–100% increase in the geographic distribution of water snails, and hence the potential transmission of schistosomiasis, endangering many tens of millions of people. Recent experience from coastal Alaska showed that a 1°C rise in water temperature has, by passing a significant threshold, enabled summer-long bacterial proliferation in shellfish and consequently increased incidence of gastroenteritis among consumers.<sup>14</sup>

### *Direct consequences*

- More women than men died during the 2003 European heatwave. The majority of European studies have shown that women are more at risk, in both relative and absolute terms, of dying in a heatwave.<sup>15</sup> There may be some physiological reasons for an increased risk among elderly women.<sup>16 17</sup> Social factors can also be important in determining the risk of negative impacts of heatwaves. For example in the United States, elderly men seem to be more at risk in heatwaves than are women, and this was particularly apparent in the Chicago events of July 1995.<sup>18</sup><sup>19</sup> This vulnerability may be due to the level of social isolation among elderly men.<sup>20</sup> Evidence for the importance of social contact as a protective factor against heatwave mortality is based on case control studies conducted in the United States.<sup>21</sup> In Paris, France the heatwave-related risk increased for unmarried men, but not unmarried women.<sup>22</sup> Men may also be more at risk of heatstroke mortality because they are more likely to be active in hot weather.<sup>23</sup>

### *Indirect consequences*

- Rising temperatures will also increase the transmission of malaria, which already causes 300 million acute illnesses and kills one million people every year.<sup>24</sup> Pregnant women are particularly vulnerable to malaria as they are twice as 'appealing' to malaria-carrying mosquitoes as non-pregnant women. A study that compared the relative 'attractiveness' of pregnant and non-pregnant women to mosquitoes in rural Gambia found that the mechanisms underlying this vulnerability during pregnancy is likely to be related to at least two physiological factors. First, women in the advanced stages of pregnancy (mean gestational age 28 weeks or above) produce more exhaled breath (on average, 21% more volume) than their non-pregnant counterparts. There are several hundred different components in human breath, some of which help mosquitoes detect a host. At close range, body warmth, moist convection currents, host odours and visual stimuli, allow the insect to locate its target. During pregnancy, blood flow to the skin increases, which helps heat dissipation, particularly in the hands and feet. The study also found that the abdomen of pregnant women was on average, 0.7°C hotter than that of non-pregnant women and that there may be an increase in the release of volatile substances from the skin surface as well as a larger host 'signature' which allows mosquitoes to detect them more readily at close range. Not only do pregnant women appear to be physiologically more attractive to mosquitoes, but changes in their behaviour can also increase exposure to night-biting mosquitoes, since pregnant women leave the protection of their bed net at night, for example to urinate, twice as frequently as non-pregnant women. While the important role of immunity and nutrition is recognized, it is suggested that physiological and behavioural changes that occur during pregnancy could partly explain this increased risk of infection.<sup>25</sup> Maternal malaria increases the risk of spontaneous abortion, premature delivery, stillbirth and low birth weight.
- Some studies have looked at links between meteorological conditions and the incidence of eclampsia in pregnancy, and found increased incidence during climatic conditions characterized by low temperature, high humidity or high precipitation, with an increased incidence especially during the first few months of the rainy season.<sup>26 27 28 29 30 31 32</sup> A study from Kuwait found that incidence



of pregnancy-induced hypertension was highest in June when the temperature was very high and the humidity at its lowest. The reverse was true for the incidence of pre-eclampsia, which was high in November when the temperature was low and the humidity high.<sup>33</sup> Another study from the southern province of Zimbabwe evaluated hypertensive complications during pregnancy and observed a distinctive change in the incidence of pre-eclampsia during the year. These changes corresponded with the seasonal variation in precipitation, with incidence increasing at the end of a dry season and in the first months of the rainy season. This observed relationship between climate change and the occurrence of pre-eclampsia raises new questions regarding the pathophysiology of pre-eclampsia. Possible explanations could be the impact of humidity and temperature on production of vasoactive substances. Dry and rainy seasons, through their influence on agricultural yields, may also impact on the nutritional status and play a role in the pathophysiology of the women.<sup>34</sup>

### 1.1.2. Extreme winds

#### *Direct consequences*

- In the 1991 cyclone disasters that killed 140 000 in Bangladesh, 90% of victims were women.<sup>35</sup> During the same cyclone, the death rate among people aged 20–44 was 71 per 1000 for women, compared to 15 per 1000 for men.<sup>36</sup>

#### *Indirect consequences*

- During Hurricane Katrina in the United States in 2005, the poorest population group in that part of the country – African-American women – faced the greatest obstacles to survival. Similarly, women, young people, and people with low socioeconomic status are thought to be at comparatively high risk of anxiety-mood disorders after disasters.<sup>37</sup> One study of anxiety-mood disorder (DSM-IV) after Hurricane Katrina found that incidence was consistently associated with the following factors: age less than 60 years; women; education less than college graduation; low family income; ‘other’ pre-hurricane employment status (largely unemployed and disabled); and being unmarried. In addition, Hispanic individuals and people of other racial/ethnic minorities (exclusive of non-Hispanic black) had significantly lower estimated incidence of any disorder compared with non-Hispanic white individuals in the New Orleans area, as well as a significantly lower estimated prevalence of post-traumatic stress disorder (PTSD) in the remainder of the sample. These same associations have been found in community epidemiological surveys in the absence of disasters, suggesting that these associations might be related to pre-existing conditions. But, this also indicates that those who are already suffering from mental disorders will be most affected following extreme events.<sup>38</sup>

### 1.1.3. Flooding and heavy rains

Flooding is one of the most widespread climatic hazards that pose multiple risks to human health and yet, there has been only limited systematic research on the health outcomes of flooding.<sup>39</sup> From the few studies available it is apparent that the indirect impacts of flooding on women can have serious negative health and social consequences. Very little is known about the health effects of flooding on men.

### *Indirect consequences*

- In Bangladesh and the eastern region of India where the arsenic contamination of groundwater is high, flooding intensifies the rate of exposure among rural people and other socioeconomically disadvantaged groups.<sup>40</sup> Studies have also found a negative correlation between symptoms of arsenic poisoning and specific socioeconomic factors, in particular educational and nutritional status.<sup>41 42 43</sup> Health problems resulting from arsenic poisoning include: skin lesions, hardening of the skin, dark spots on hands and feet, swollen limbs and loss of sensation.<sup>44</sup> Skin lesions often have negative social repercussions, and many arsenicosis sufferers have been ostracized and/or stigmatized at the household or village level. One case study documented the case of a woman suffering from skin lesions due to arsenic poisoning whose children were unwilling to eat the food she served, and whose husband eventually divorced her.<sup>45</sup> In some contexts, where marriage is considered culturally important, unmarried women are highly vulnerable to social exclusion and poverty.<sup>46</sup> Both women and men can be shunned, excluded, and stigmatized based on physical appearance, although there is a relative lack of information on the gendered impacts of arsenicosis on men.
- In the southwest region of Bangladesh, waterlogging (local increases in groundwater levels) has emerged as a pressing concern with health consequences. Women are often the primary caregivers of the family, shouldering the burden of managing and cooking food, collecting drinking water, taking care of family members and livestock. Because of these responsibilities they often spend time in waterlogged premises and other settings. Research reveals that waterlogging severely affects the health condition of women in affected communities. Women are forced to stay close to the community and drink unhygienic water, as tube wells frequently become polluted. Pregnant women have difficulty with mobility in marooned and slippery conditions and are often thus forced to stay indoors. Local health-care workers have reported that there are increasing trends of gynaecological problems due to unhygienic water use. Since men are often out of the area in search of work, they are frequently not as affected as their female counterparts. Waterlogging, therefore, has given rise to differential health effects in women and men in coastal Bangladesh.<sup>47</sup>
- Studies on the health effects of flooding in England found that women suffered markedly more than men at the worst time of flooding.<sup>48</sup> Qualitative research suggests that this is because women have the main responsibility for, and probably a greater emotional investment in, the home than men, and usually have the primary responsibility for the care of children and the elderly, as well as for getting the home back to normal after a flood.<sup>49</sup> Women may also be more ready to admit to feelings of stress, anxiety and depression and to seek medical help in the aftermath.<sup>50</sup>
- Girls and women may face decreased access to important life skills due to gender norms or expectations around behaviours deemed 'appropriate'. For example, in some Latin American and Asian countries women and girls are often not taught to swim for reasons of modesty.<sup>51</sup> In the South Asian context, social norms that regulate appropriate dress codes in accordance with notions of modesty hinder women and girls from learning to swim, which can severely reduce their chances of survival in flooding disasters.<sup>52</sup>



- In flooded areas of Bangladesh, women are often the last to receive assistance as some men push them out of the way in the rush for supplies. Women who may have lost clothing in the flood are unable to enter public areas to access help and aid because of their inability to sufficiently cover themselves.<sup>53</sup> A further example of this is the loss of culturally appropriate clothing which inhibits women from leaving temporary shelters to seek medical care or obtain essential resources.<sup>54</sup>

### How gender norms, roles and relations explain the differences in fatality between women and men in floods in Nepal

In 1993 a severe flash flood devastated the district of Sarlahi in the southern plains of Nepal. After an unprecedented 24-hour rainfall, a protective barrage on the Bagmati River was washed away during the night, sending a wall of water more than 20 feet high crashing through communities and killing more than 1600 people. Two months later, a follow-up survey assessed the impact of the flood. This survey was unusual in that an existing prospective research database was available to verify residency prior to the flood. As part of a large community-based nutrition programme, longitudinal data existed on children between the ages of two and nine and their parents from 20 000 households, about 60% of the households in the study area. The survey established age and sex-specific flood-related deaths among more than 40 000 registered participants (including deaths due to injury or illness in

the weeks after the flood). **Flood-related fatalities were 13.3 per 1000 for girls aged between two and nine, 9.4 per 1000 for boys of the same ages, 6.1 per 1000 for adult women and 4.1 per 1000 for adult men. The difference between boys' and girls' fatalities existed mostly among children under five.** This possibly reflects the gender discriminatory practices that are known to exist in this poor area – the fact that when hard choices must be made in the allocation of resources, boys are more often the beneficiaries. This could be reflected in rescue attempts as much as in the distribution of food or medical attention.

*Adapted from: Bartlett S. Climate change and urban children: Impacts and implications for adaptation in low and middle income countries, IIED Human Settlements Discussion Paper – Climate change and cities 2, 2008.*

#### 1.1.4. Drought/drying

The impacts of climate change on water systems are already apparent in many parts of the world, with accelerating impacts likely for several decades regardless of future agreements to decrease greenhouse gas emissions. For example, droughts and drying are leading to social instability, food insecurity and long-term health problems in some settings, damaging or destroying related livelihoods.<sup>55</sup> In arid, semi-arid and dry sub-humid areas, drought already presents a serious threat to the well-being and health of the local populations. Extended periods of drought are linked to fuel, food and water shortages, conflicts, mass migration, increased poverty, increased risk of fires, decreased availability of fuel and limited access to health care. The few studies that are available point to differing impacts on men and women.



Water shortages are linked to increases in diarrhoea and cholera incidence, especially among children and the elderly, since hygienic practices are commonly sacrificed to more pressing needs for water, such as drinking and cooking. This includes an increase in diarrhoeal disease – a leading cause of death among children in developing states.<sup>56</sup> Almost half of all urban residents in Africa, Asia, and Latin America are already victims of diseases associated with poor water and sanitation facilities.<sup>57</sup>

### *Indirect consequences*

- A study on drought management in Ninh Thuan, Viet Nam showed that 64% of respondents agreed that recurring disasters have differential impacts on women and men, and 74% of respondents believed that women were more severely affected by drought than men due to differing needs for water. Women collect water from water sources that are farther away as each drought takes its toll. With fewer water sources nearby, women have to walk long distances to fetch drinking water. They also cook and clean, rear children and collect firewood, so they have to cope with an enormous physical burden on a daily basis.<sup>58</sup>
- Fuel shortages increase women's workload where they are responsible for its collection; an estimated 2.4 billion people currently rely on biomass fuels for cooking and heating, impacting health by increasing the risk of chronic obstructive pulmonary disease (COPD) and increasing respiratory symptoms, as well as worsening lung function<sup>59 60</sup> while simultaneously exacerbating global warming.<sup>61</sup>
- For women, long journey's walking to the nearest well and carrying heavy pots of water (up to eight hours a day in some places) not only causes exhaustion and damage to bones, it also comes with opportunity costs, such as time wasted that could be spent productively, going to school or working.
- Women and (usually) girl children fetch water in pots, buckets or ideally more modern narrow-necked containers, which are carried on the head or on the hips. A family of five needs approximately 100 litres of water each day to meet its minimum needs; the weight of that water is 100 kg (220 pounds). In these circumstances, women and children may need to walk to the water source two or three times each day, with the first of these trips often taking place before dawn. During the dry season in rural India and Africa, 30% or more of a woman's daily energy intake is spent just in fetching water. Carrying heavy loads over long periods of time causes cumulative damage to the spine, the neck muscles and the lower back, thus leading to the early ageing of the vertebral column.<sup>62 63 64 65 66 67</sup> More research is needed to uncover the negative health implications of the burden of daily carrying of water as it seems to fall outside of the conventional categories of water-borne, water-washed, and water-related ailments.
- The stresses of lost incomes and associated indebtedness can spill over into mental health problems, despair and suicide among men. There is some empirical evidence linking drought and suicide among men in Australia.<sup>68</sup> This negative health outcome among Australian rural farmers has been linked to stoicism and poor health-seeking behaviour, which is an intrinsic element of rural masculinity.<sup>69</sup> In India too, there has been a consistent reporting of increased suicide among poor male farmers following periods of droughts in contiguous semi-arid regions.<sup>70 71</sup>



## 2. IMPACTS: SOCIAL AND HUMAN CONSEQUENCES OF CLIMATE CHANGE

### 2.1. MIGRATION AND DISPLACEMENT

Climate change can affect migration in three distinct ways. First, the effects of warming and drying in some regions will reduce agricultural potential and undermine 'ecosystem services' such as clean water and fertile soil. Second, the increase in extreme weather events – in particular, heavy precipitation and resulting flash or river floods in tropical regions – will affect ever more people and generate mass displacement. Finally, sea level rise will destroy extensive and highly productive low-lying coastal areas that are home to millions of people who will have to permanently relocate. In this context, health challenges can involve among others, the spread of communicable diseases and an increase in the prevalence of psychosocial problems due to stress associated with migration. The human and social consequences of climate change in this context are very poorly studied, if at all.

There are not many studies on the linkages between extreme events as a result of climate change and domestic and sexual violence. However, a report that looked into the issue of recovery after the Indian Ocean tsunami in 2004 indicated that women and children were very vulnerable in these situations. While the occurrence of tsunamis is not attributable to climate change, one can assume that in the aftermath of extreme events and the ensuing displacement of groups of people that may occur, scenarios similar to the post-tsunami conditions are plausible.

- The *World disaster report* recognizes the widespread consensus that, “women and girls are at higher risk of sexual violence, sexual exploitation and abuse, trafficking, and domestic violence in disasters”. Women who were subjected to violence prior to the disaster are more likely to experience increased violence after it, while at the same time become separated from family, friends and other potential support and protective systems. After a natural disaster, women are more likely to become victims of domestic and sexual violence and may avoid using shelters as a result of fear.<sup>72 73 74</sup>
- Psychological stress is likely to be heightened after disasters, particularly where families are displaced and have to live in emergency or transitional housing. Overcrowding, lack of privacy and the collapse of regular routines and livelihood patterns can contribute to anger, frustration and violence, with children and women most vulnerable.<sup>75</sup>



- Adolescent girls report especially high levels of sexual harassment and abuse in the aftermath of disasters and complain of the lack of privacy in emergency shelters.<sup>76</sup>

## 2.2. SHIFTS IN FARMING AND LAND USE

For farmers, insecurity due to erratic rainfall and unseasonal temperatures can be compounded by a comparative lack of assets and arable land, and in some cases lack of rights to own the land they till. This means that credit available for suitable agriculture technology (e.g. watering implements, climate appropriate seed varieties, non-petroleum fertilizers, and energy efficient building design) is limited, as is their capacity to rebuild post-natural hazards in this context.

- Loss of biodiversity can compound insecurity because many rural women in different parts of world depend on non-timber forest products (NTFPs) for income, traditional medicinal use, nutritional supplements in times of food shortages, and as a seed bank for plant varieties needed to source alternative crops under changing growing conditions. Thus loss of biodiversity challenges the nutrition, health, and livelihoods of women and their communities.<sup>77 78 79 80</sup>
- Nutritional status partly determines the ability to cope with the effect of natural disasters.<sup>81</sup> Women are more prone to nutritional deficiencies because of their unique nutritional needs, especially when they are pregnant or breastfeeding, and some cultures have household food hierarchies. For example, in South and South-East Asia 45–60% of women of reproductive age are underweight and 80% of pregnant women have iron deficiencies. In sub-Saharan Africa, women carry greater loads than men, but have a lower intake of calories because the cultural norm is for men to receive more food.<sup>82</sup> For girls and women, poor nutritional status is associated with an increased prevalence of anaemia, pregnancy and delivery problems, increased rates of intrauterine growth retardation, low birth weight and perinatal mortality. According to the Food and Agriculture Organization (FAO), where iron deficiency is prevalent, the risk of women dying at childbirth can be increased by as much as 20%.<sup>83</sup>
- Pregnant and lactating women face additional challenges, as they have an increased need for food and water, and their mobility is limited. At any given time, an average of 18–20% of the reproductive age population is either pregnant or lactating. These biological factors create a highly vulnerable population within a group that is already at risk.<sup>84</sup>

## 2.3. INCREASED LIVELIHOOD, HOUSEHOLD AND CARING BURDENS

- Apart from the nutritional impacts of livelihood, household and caring burdens, decline in food security and livelihood opportunities can also cause considerable stress for men and boys, given the socially ascribed expectation that they should provide economically for the household. This can lead to mental illness in some



cases. It has been recognized that men and boys are less likely to seek help for stress and mental health issues than women and girls.<sup>85</sup> The implications of this include the fact that preparations for, and responses to climate change need to be sensitive to gender dimensions of health-care (including mental) and health-seeking behaviours.

- Women and girls are generally expected to care for the sick, including in times of disaster and environmental stress.<sup>86</sup> This limits the time they have available for income generation and education that, when coupled with the rising medical costs associated with family illness, heightens levels of poverty – a powerful determinant of health. It also means they have less time to contribute to community-level decision-making processes on climate change or disaster risk reduction. In addition, being faced with the burden of caring for dependents while being obliged to travel further for water or firewood makes women and girls prone to stress-related illnesses and exhaustion.<sup>87 88</sup> Women and girls also face barriers to accessing health-care services due to poor access to, and control over, economic assets to pay for health care, as well as cultural restrictions on their mobility that may prohibit them from travelling to seek health care.
- The increased time spent collecting water means a decrease in available time for education for young girls as well as placing women at a great risk of violence when travelling long distances to collect water and fuel. A lower education status implies more constraints for women to access health information or early warning systems as they are developed. This also means the girls and women will have decreased access and opportunities in the labour market, increased health risks associated with pregnancy and childbirth and less control over their personal lives.
- Elderly women may have heavy family and caring responsibilities that cause stress and fatigue while also preventing wider social and economic participation; and their incomes may be low because they can no longer take on paid work or other forms of income generation. They may have inadequate understanding of their rights to access community and private sector services. Even when they are aware of these services, even nominal financial resources for clinic visits and drugs may be out of their reach. Access is further restricted for older women and older men living in rural areas, who are often unable to travel the long distances to the nearest health facility.
- Older men are particularly disadvantaged by their tendency to be less connected to social networks than women and therefore unable to seek assistance from within the community when they need it.<sup>89</sup>

# 3. RESPONSES TO CLIMATE CHANGE

**“Climate change will affect, in profoundly adverse ways, some of the most fundamental determinants of health: food, air, water.”<sup>90</sup>**

**“Climate change could vastly increase the current huge imbalance in health outcomes. Climate change can worsen an already unacceptable situation that the Millennium Development Goals were explicitly and intricately designed to address.”<sup>91</sup>**

—Dr Margaret Chan, WHO Director-General

## 3.1. MITIGATION ACTIONS AND HEALTH CO-BENEFITS

The UN Framework Convention on Climate Change (UNFCCC) states that mitigation measures bringing about societal benefits should be prioritized. Health is one of the clearest of the societal benefits (as mentioned prominently in the opening section of the UNFCCC 1992).<sup>92</sup> Measures undertaken to reduce greenhouse gas emissions in the household energy, transport, food and agriculture, and electricity generation sectors, both in low- and high-income settings, have ancillary health benefits (or health ‘co-benefits’), which are often substantial.

Few studies have considered the links between gender and mitigation efforts. In order to develop effective mitigation policies and programmes, which will also impact on key health outcomes, it is crucial that gender perspectives are integrated into relevant policy and programme design. Integration of a gender analysis component for example, will help in understanding how gender norms, roles and relations determine the different patterns of obtaining and using fuel, energy and water for both women and men.

### 3.1.1. Alternative energy

One of the main responsibilities of women in developing countries is ensuring energy supply and security at the household level. It is therefore crucial to involve them in the design, negotiation and implementation of clean energy choices, which have the potential to improve health and well-being both through reduced risks to health, and through savings in time and financial resources.<sup>93</sup> In addition involving men is also important because they tend to be the decision-makers in households in many parts of the world. Involving both women and men will increase the chances of adoption and sustenance of alternative energy strategies. There is also a need to address existing (and often unequal) power relations regarding decision-making on household security and energy consumption through empowerment of women.



- Lessening the reliance on coal-fired generation of power will reduce air pollution, and associated respiratory and cardiopulmonary disease and death.<sup>94</sup>
- Approximately 2 billion people lack access to electricity and suffer substantial ill-health as a result. Around half the global population cook daily with traditional biomass fuels (e.g. dung, crop residues, wood and charcoal), resulting in exposure to very high concentrations of indoor air pollutants and extensive time spent in collection of fuel and the attendant opportunity costs, particularly for women. Improved energy efficiency cooking stoves are becoming increasingly available in a number of countries and can substantially cut the use of biomass fuels with subsequent health, environmental, and economic benefits.<sup>95</sup>
- While hydroelectric power is a clean and renewable energy source and attractive as a mitigation strategy to reduce greenhouse gases, hydropower plants can significantly impact the surrounding area and provoke opposition for numerous social, environmental, economic and safety reasons. It is estimated that the construction of hydropower plants has already displaced about 30 to 60 million people,<sup>96</sup> usually poor people who are further impoverished economically and suffer cultural decline, high rates of sickness and death, and great psychological stress. The livelihoods of people downstream of dams can also be severely affected, through the destruction of fisheries, the contamination of water supplies and the loss of seasonal floods, which bring fertile silt and water to agricultural land. Dam reservoirs can also become breeding grounds for waterborne diseases such as malaria, leishmaniasis and schistosomiasis.<sup>97 98</sup>
- Sources of renewable energy such as photovoltaic, solar thermal, wave and wind power do not appear to have any important adverse effects on health and their overall impacts are likely to be overwhelmingly beneficial.<sup>99</sup>

### 3.1.2. Transportation policies

Transport is projected to create the fastest proportional growth in greenhouse gas emissions of any sector from 1990–2020, and there are direct connections with urban air pollution (around 800 000 related deaths per year globally), road traffic crashes (1.2 million deaths per year), and physical inactivity (1.9 million deaths a year).<sup>100 101</sup>

- Providing opportunities for the use of safe mass transport (e.g. bus, metro) can also reduce levels of ambient air pollution, traffic-related injuries and death, and active transport (cycling and walking) would potentially bring down obesity rates.<sup>102</sup> Speed reduction policies also have big environmental and health impacts. There are plausible linkages between societal expectations on masculinities related to risk-taking by men, and their roles as drivers, that may be connected to the use of safe mass transportation, and therefore climate change mitigation strategies. Direct evidence on these linkages is currently unavailable.
- Transport and production of food, especially red meat in developed countries, are major emitters of greenhouse gases. Eating foods that are grown locally and those are lower in the food chain (e.g. fruits, vegetables and grains) will help to reduce the risk of climate change and lower risks of coronary artery disease, stroke, hypertension, obesity and diabetes.<sup>103</sup>

### 3.1.3. Water quality

- Carbon dioxide capture and storage has been advocated as a potential measure to reduce greenhouse gases. In this process, there is a possibility of leakage of carbon dioxide from injection wells and abandoned wells, and leakage across faults and ineffective confining layers, which could potentially degrade the quality of groundwater. The release of carbon dioxide back into the atmosphere could also create local health and safety concerns. It is important to note that, at this point, there is no complete insight into the practicality, consequences or unintended consequences of this carbon sequestration concept.<sup>104</sup>
- Agricultural practices for mitigation of greenhouse gases may affect water quality through increased leaching of pesticides and nutrients.<sup>105 106</sup>
- The different roles that men and women play in the management and conservation of forests have to be considered before designing mitigation initiatives such as reforestation or afforestation.<sup>107</sup>

Policies to promote mitigation activities that have strong co-benefits in health and other development needs provide a potential political bridge across the ‘development gap’ between rich and poor countries. Indeed, the provision of affordable clean household energy in developing countries can contribute to the attainment of the Millennium Development Goals (MDGs), both through co-benefits to health and contributions to poverty reduction – attained by the provision of productive work and the reduction of unproductive time. This can in turn lead to a reduction of gender inequities.<sup>108</sup>

## 3.2. ADAPTATION ACTIONS

Adaptation refers to changes in “processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with changes in climate” and involves adjustments to decrease the vulnerability of communities and regions to the impacts of climate change and variability.<sup>109</sup>

Adaptation strategies need to take into account women and men’s relative and different capacities, power and social resilience, vulnerabilities and resources, because gender norms, roles and relations can either enable or constrain adaptive capacities.

- Adaptation measures, such as the promotion of green spaces in urban areas, for example, can reduce ‘heat island’ effects, and improve opportunities for social interactions and physical activity, as well as increase resilience to flooding. Similarly, improved building standards can reduce energy consumption, provide greater resilience to extreme weather and reduce opportunities for infectious disease transmission.<sup>110 111</sup>
- Case studies in Bangladesh, Ghana and Senegal have highlighted grassroots women’s groups developing strategies to cope with issues related to energy and forestry, agriculture, water resources and trade. Women should be recognized



as powerful contributors of change and should be fully integrated into climate change mitigation and adaptation strategies at all levels.<sup>112</sup>

- After Hurricane Mitch in 1998, La Masica, Honduras surprisingly reported no deaths. A disaster agency had provided gender-sensitive community education on early warning systems and hazard management six months earlier. Women were able to assume responsibility for continuously monitoring the early warning system, roles traditionally performed by men. As a result, the municipality was able to evacuate the area promptly when Hurricane Mitch struck.<sup>113</sup>

### La Masica: Good practices in emergency preparedness

The municipality of La Masica in Honduras, with a mostly rural population of 24 336 people, stands out in the aftermath of Mitch because, unlike other municipalities in the northern Atlantida Department, it reported no deaths. This outcome can be directly attributed to a process of community emergency preparedness that began about six months prior to the disaster.

The project involved the establishment of networks of local organizations in charge of risk and disaster management, coordinated through the municipality and the Municipal Emergency Commission (CODEM). Networks were trained in the geographical mapping of hazards and use of an early warning system, and undertook an assessment of vulnerabilities differentiated by gender. Gender lectures were given and, consequently, the community decided that men and women should participate equally in all hazard management activities. When Mitch struck, the municipality was prepared and evacuated the area promptly, thus avoiding deaths. Women participated actively in all relief operations. They went on rescue missions, rehabilitated local infrastructure (such as schools), and along

with men, distributed food. They also took over from men who had abandoned the task of continuous monitoring of the early warning system.

This experience shows that preparedness is an important step in saving lives. The incorporation of women from the start, on an equal footing with men, contributed to the success in saving lives. In addition, and likely because of their active role, women reported a very low incidence of depression. In fact, contrary to repeated findings in the literature on disasters, the community assessed the psychological situation and concluded that help was required for men, rather than women, to restore their capacity to contribute to the community.

One of the most important gender gains at La Masica was the empowerment of women and the community's recognition of their capabilities and contributions. As a token of recognition, a new sign in the mayor's office reads: **"Everything is easier with the cooperation of women."**

Source: Buvinic M et al. *Hurricane Mitch: women's needs and contributions*. IADB, December, 1999.

Table 1 summarizes possible gender impacts of climate change and gender adaptive strategies, and provides recommendations for possible policy interventions to safeguard health, especially of women. The table reflects the gaps in data that can strengthen more specific and targeted interventions.



Table 1: Gender, adaptive strategies and interventions

Impact of climate change	Gender dimensions (examples)	Gender sensitive adaptive strategies (examples)	Possible interventions beneficial to both women and men (examples)
<p>Increase in infectious diseases</p>	<p>Women are the ones who take care of the sick (both as household caregivers and front line health workers). Women lack access to health services</p>	<p>A gender perspective must be incorporated into infectious disease analysis and research to target policies and programmes. Data collected must be disaggregated by sex, age, socioeconomic status, education, ethnicity and geographic location where appropriate. Models must be developed and implemented that address gender inequities in infectious diseases in an integrated manner. An understanding of gender and its implications for health and health-seeking behaviour should be incorporated into training of health professionals and development of health sector responses.</p>	<p>Ensure better availability and access to, and support by, health systems for both women and men. Support outreach activities, using gender sensitive information, education, and communication strategies and materials for advocacy and training. Promote childcare facilities and other approaches to support women's care giving role, while trying to transform related gendered roles and norms.</p>
<p>Scarcity of water Salination of Water Increase in arsenic Flooding</p>	<p>Health problems for women who have to walk long distances to fetch water. Increase in work burden, which implies less time to access health-related resources such as education or economic resources.</p>	<p>Promote water-saving practices that take into account the different uses and roles related to water for both women and men. Dealing with salination and arsenic contamination of water. Counter social stigma attached to the effects of arsenic poisoning on both women and men.</p>	<p>Safeguard of affordable drinking water. Appropriate technologies for assuring potable water, closer to where families live. Increase in forestation and water harvesting mechanisms. Promote women's right to own land and land use certificates. Proper implementation of water policies. Ensure equitable access to resources also in relation to payments for environmental services.</p>

*Continues...*

Impact of climate change	Gender dimensions (examples)	Gender sensitive adaptive strategies (examples)	Possible interventions beneficial to both women and men (examples)
Mortality through extreme weather events	<p>Socioeconomic status, age and social gendered norms influence the risk of injury and death.</p> <p>Women are vulnerable due to gender norms that dictate which are the proper behaviours (for example not to learn how to swim, not going out alone etc.).</p> <p>Men are vulnerable because of gender norms that promote risk-taking.</p>	<p>Provision of safe shelters and homes.</p> <p>Training on gender-sensitive disaster risk reduction and early warning systems.</p> <p>Empowerment of women.</p> <p>Promote programmes that facilitate men to seek help for psychosocial problems.</p>	<p>Gender-sensitive disaster preparedness.</p> <p>Gender-sensitive early warning systems.</p> <p>Ensure women's participation on equal basis in all policy or programme cycles.</p> <p>Target women and men differently in communication campaigns and health promotion strategies, taking into account their gender norms and roles.</p> <p>Adopt strategies (at all levels of programming) to change norms and practices that prevent women or men from appropriate reactions and coping mechanisms in situations of natural disasters.</p>
Triggers violation of basic human rights	<p>Increase of violence at household level.</p> <p>Harassment and loss of privacy in shelters.</p> <p>Harassment in relief queues.</p>	<p>Building strong and supportive networks.</p> <p>Promote gender-sensitive training to eliminate violence against women, girls and boys.</p> <p>Capacity building in the health sector for ensuring early detection of domestic or sexual violence.</p> <p>Involve women in the management of shelters and distribution activities.</p>	<p>Policy initiatives in the health, education, finance and labour sectors should be conceived as a part of a cohesive national/ international violence prevention effort that includes women, girls, men and boys.</p> <p>Design referral systems for cases of domestic violence.</p> <p>Design referral system for cases of sexual harassment.</p>
Decreased income-generating and credit opportunities after extreme weather events.	<p>Women working in informal sector are also affected.</p> <p>Increase in household expenses.</p> <p>Out-migration of males.</p>	<p>Saving on expenses or money for lean periods.</p> <p>Promotion of alternative income-generating activities.</p>	<p>Proper and accessible credit facilities for women, both formal and informal.</p> <p>Establishment of market linkages.</p> <p>Vocational training for women and men.</p> <p>Social security, other safety nets.</p>
The change in agricultural production. Decrease in fishery stock.	<p>Increase of work burden.</p> <p>Calories/micronutrients deficiency.</p>	<p>Involve women and men in the conservation of biodiversity.</p>	<p>Training on agricultural extension.</p> <p>Better nutrition supplements to be provided to needy families.</p> <p>Marketing facilities.</p> <p>Land rights for women.</p>





## 4. GAPS IN UNDERSTANDING AND URGENT NEEDS TO BE ADDRESSED

The IPCC acknowledges that disasters affect men and women differently on a number of levels, including: economically, socially, psychologically and in terms of exposure to risk and risk perception. However, there remains a general lack of research on sex and gender differences in vulnerability to, and impacts of, climate change, especially health-related impacts.

Addressing the social and gender dimensions of climate change poses many challenges that are not insurmountable. It requires gender mainstreaming in climate change response activities, sustainable and equitable development, a clear focus on adaptation and mitigation, a strong commitment of resources, and empowerment of individuals to build their own resilience.

Equity and social justice cannot be achieved without recognizing both the differences in vulnerability and strengths of women and men, as well as the various factors that contribute to vulnerability. Recognizing these differences is a necessary and important component of any prospective attempts to address the gendered health consequences of climate change. Gender-sensitive research is needed to better understand the health impacts of climate change in general and extreme events in particular. There is an urgent need to collect, analyze and report relevant data disaggregated by age and sex and, depending on the context, other stratifiers should be included to enable thorough gender analysis. There is a need for the development of gender-responsive and accessible health systems that reach the poorest populations, thereby addressing particular health needs of women and men throughout their entire life cycles.



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**World Health  
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In this paper, available information on the differential links between climate change and the health of women and men has been collated and analyzed. The overall aim is to provide a framework for gendered health risk assessment and adaptation/mitigation actions in relation to climate change.

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

