

HUNGER

ESTIMATES GLOBAL CLIMATE IMPACT



2010 EFFECT TODAY



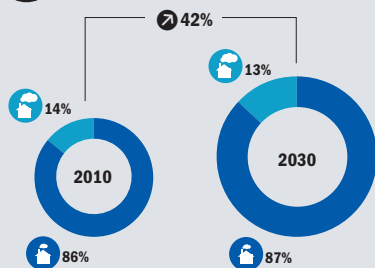
225,000

2030 EFFECT TOMORROW



380,000

MORTALITY IMPACT



CONFIDENCE INDICATIVE



SEVERITY



AFFECTED



INJUSTICE



PRIORITY



MDG EFFECT



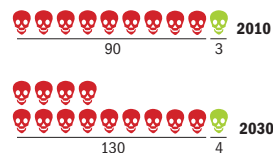
➤ 200 million people affected are estimated to suffer from food insecurity as a result of climate change in lower-income countries

➤ Half of all such deaths are of children and infants in the world's poorest communities, the group least responsible for climate change

➤ Although hunger is among the most preventable causes of human death, there are no quick fixes to the 850 million people facing hunger today

➤ There are major ongoing food emergencies and famine facing populations in the Horn of Africa and the Sahel

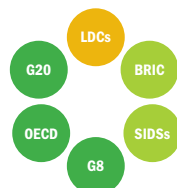
RELATIVE IMPACT



HOTSPOTS



GEOPOLITICAL VULNERABILITY



Deaths



= Deaths per million



Fifteen percent of all human beings are undernourished and 850 million people are prevented from leading active lives as a result of hunger (FAO, 2011). The Millennium Development Goal (MDG) target for reducing hunger has remained static since the early 1990s in all the world's developing regions. Despite enormous increases in wealth over the last two decades, the world has made almost no progress on hunger and its roots in the most extreme forms of poverty. A humanitarian food emergency continues in the Sahel and the Horn of Africa (HPN, 2012; Oxfam, 2012; CARE, 2012). It has long been understood that drought is a key trigger of famine and extreme drought has also been closely linked to climate change. (Glanz (ed.), 1987; Hansen et al., 2012). The combined effects of climate change on agricultural production on land, rivers, coastal zones, and oceans reduces disposable incomes and food availability for the world's poorest, especially in those communities with the least resources to adjust and diversify activities in the face of warmer and more extreme weather (Nelson et al., 2009; Allison et al., 2009). When people are hungry for prolonged periods, they not only suffer illness and potentially death as a result of acute nutritional imbalances, but may also

become seriously predisposed to illness and death from other diseases, such as pneumonia, diarrheal infections, malaria, and measles, dramatically expanding the death toll that is attributable to hunger (WHO, 2004).

CLIMATE MECHANISM

The effects of climate change on agriculture and fisheries are well covered in other sections of this report and extensively examined in the scientific, development, and humanitarian literature (IPCC, 2007; UNDP, 2007; World Bank, 2010). Rising heat, increasing variability, overabundance, or absence of rainfall, flooding, drought, disease and insect infestations are real threats to agricultural communities around the world (Parry et al., 2004; Gregory et al., 2009). Coastal areas are endangered by the rise in sea levels and the depletion of fish populations (Dasgupta et al., 2009; Allison et al., 2009). Increasing temperatures are making it difficult for subsistence farmers to accomplish the same amount of work in a given day and leave them few options other than to go hungry when food availability and/or incomes fall below critical levels (Kjellstrom et al., 2009b). Communities outside of the

subsistence spectrum are much better able to adjust to the effects of climate change and minimize losses.

IMPACTS

The global impact of climate change on rates of hunger causes more than 200,000 deaths each year, half of which are among children in low-income countries. This implies that over 200 million people each year are affected by hunger as a result of climate change. Anticipated increases in socio-economic development should continue to reduce the global burden of malnutrition deaths into the future (Mathers and Loncar, 2005). However, unless actions are taken by 2030, nearly 400,000 lives could be lost each year, and the number of people affected could exceed 400 million. Lower-income developing countries of Africa and Asia are worst affected, with Sub-Saharan Africa, least developed, and land-locked developing countries dominating the list of those hit hardest. However, even as the scale of the problem expands, researchers project a decrease in the number of countries suffering the most acute effects, resulting from expected socio-economic development over the next 20 years. India suffers more than half of all the

hunger effects of climate change, with an estimated climate change-aggravated death toll in excess of 100,000 people yearly. Bangladesh, Indonesia, Nigeria, and Pakistan are also heavily affected.

THE BROADER CONTEXT

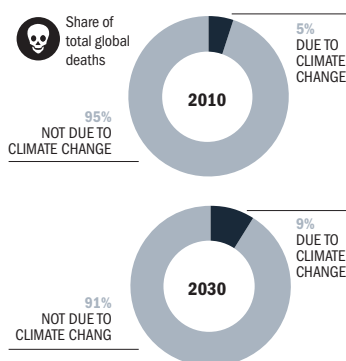
Poverty is declining. Although serious progress has been made on the MDGs, despite the array of challenges faced, the important goal for hunger is not among the success stories (UN, 2012). More than 2 million children die each year solely as a result of undernutrition (WHO, 2009). The number of people living with hunger has been stable for decades and remains undiminished by the opposing forces of rapidly expanding income and population growth. Food prices adjusted to inflation were at their highest in the 1960s and 1970s, declining until around 2000, at which point they have continued to rise, culminating in current new highs (FAO, 2011).

VULNERABILITIES AND WIDER OUTCOMES

The world's poorest groups spend virtually all their income on food,



BIGGER PICTURE



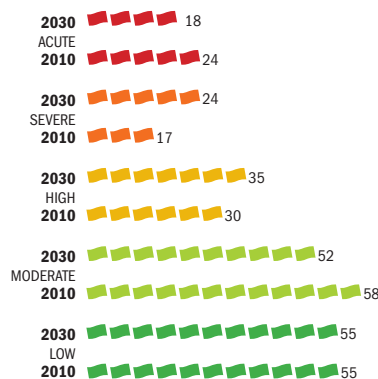
SURGE



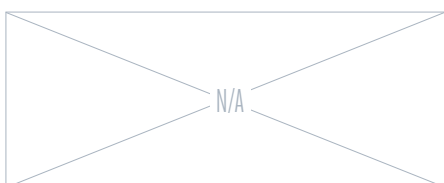
OCCURRENCE



VULNERABILITY SHIFT



PEAK IMPACT



GENDER BIAS



INDICATOR INFORMATION

MODEL: McMichael et al., 2004

EMISSION SCENARIO: S750 (IPCC, 2007)

BASE DATA: WHO BDD, 2011

making them more vulnerable to shifts in food prices. Issues affecting food prices include fuel oil, food preferences, population and income growth, trade regulations, extreme weather, and macroeconomic sensitivities in commodity markets, to name a few (FAO, 2011). Welfare is most compromised when affected communities are less able to take autonomous action in response to additional pressures from climate change. By far the worst off are subsistence, small-scale farmers, and fishermen in developing countries (Morton, 2007; Nelson et al., 2009). Hunger stalls development progress. This can be understood through analysis of the effects that sickness and death from hunger have across the full spectrum of the MDGs. First, Goal 1, aimed at eradicating hunger itself. Goal 2, aimed at universalizing primary education is affected, since school attendance rates are lowest in communities with the highest levels of malnutrition; this, in turn, affects Goal 3 (gender equality), since it prevents girls from beginning school (Glewwe and Jacoby, 1993; UN, 2012). Goal 4, which aims to reduce child mortality is affected, since hunger is a vicious killer of children and infants under 5—

around 50% of all mortality). The close interlinkages between malnutrition, child and maternal health also imply serious effects for maternal health (Goal 5) (Black et al., 2008). Finally, progress towards MDG Goal 6, aiming to significantly reduce HIV/AIDS, malaria and other diseases is also threatened, since a majority of deaths from hunger occur as a result of diseases for which low weight is a key risk factor, especially malaria, pneumonia, diarrheal diseases, and measles (WHO, 2004).

RESPONSES

First and foremost is the humanitarian imperative to intervene and avert highly preventable deaths as a result of hunger aggravated by climate change (Parry et al., 2009). The inability of the international community to defuse the simultaneous and ongoing Horn of Africa and Sahelian food crises is a testament to the lack of preparedness and the inadequacy of contemporary responses to food security emergencies (Oxfam, 2012; CARE, 2012). There is no vaccine for hunger. Decades of development commitments and foreign aid have not eradicated global hunger. Trade conditions continue to disfavour equitable food availability



for many of the world's poor, and the World Trade Organization negotiations offer faint hope for the world's most vulnerable groups despite the solutions proposed (FAO, 2011; Moser and Rose, 2012; Priyadarshi, 2009).


Development programmes, it is hoped, will become more effective (Brown and Funk, 2009). The Ghana country study in this report emphasizes what steps must be taken to counteract the pressure on the disposable income of food-stressed families and communities. Without these sensible steps, it will be challenging to adopt and sustain the wide range of sensible technical or social protection measures which could limit risks, through insurance policies, new seed and fertilizer purchases, or investments in irrigation infrastructure, capital, and financial resources (Parry et al., 2009). Possibilities for expanding the purchasing power of the most vulnerable communities could be created through the promotion of small-scale agricultural industries that increase options for farmers to access and sell their goods in global supply chains. It is possible to enable rural communities currently locked out of global markets to benefit from higher food prices, rather than, as net importers of food, to suffer from them (Swinen and Squicciarini, 2012).



THE INDICATOR

The indicator measures the risk for malnutrition and disease for which low-weight is a principal risk factor as a result of global climate change (WHO, 2004). It relies on the latest global health data updated by the World Health Organization (WHO BDD, 2011). Scientists and the IPCC have recognized the challenges of hunger in the context of climate change. In addition to socio-economic considerations, which add layers of complexity and potential error, the many uncertainties related to impacts on agriculture apply to hunger. Nevertheless, the scientific community is virtually unanimous that lower-income groups are profoundly affected by the impacts of climate change on agriculture (Loetzel-Campen et al. in Edenhofer et al., 2012). The indicator could have benefitted from the use of updated emission scenarios than those upon which the base model is built. The base model includes carbon fertilization, which is otherwise considered a "carbon" issue in this report.

ESTIMATES COUNTRY-LEVEL IMPACT

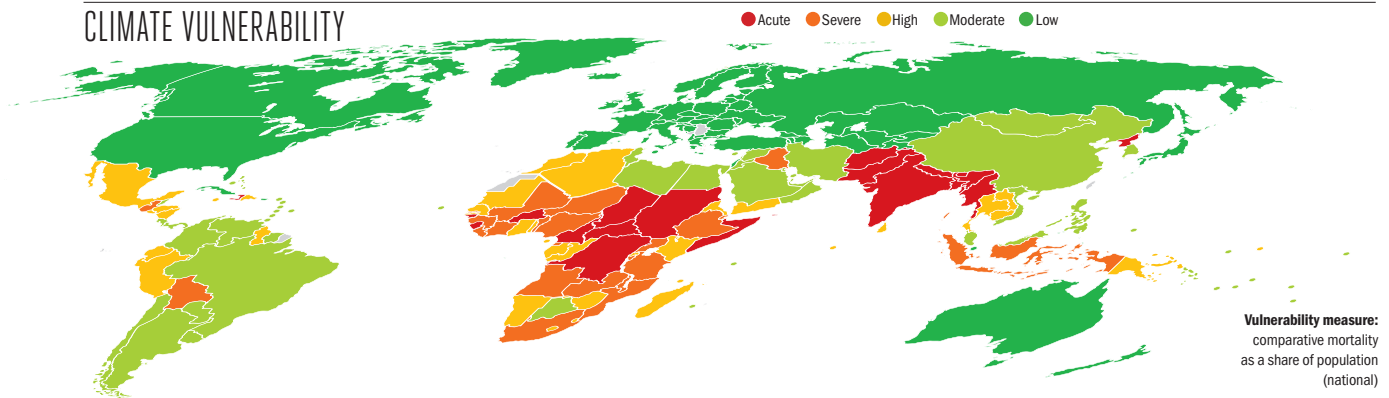
				
COUNTRY	2010	2030	2010	2030
ACUTE				
Afghanistan	5,750	7,500	5,000	6,500
Bangladesh	9,750	15,000	10,000	15,000
Bhutan	60	150	65	150
Burkina Faso	1,750	1,750	800	850
Cameroon	1,500	1,750	750	800
Central African Republic	250	400	150	250
Chad	1,250	1,500	650	700
DR Congo	4,750	7,500	3,000	4,750
Guinea-Bissau	200	200	85	90
Haiti	600	800	750	1,000
India	100,000	250,000	150,000	250,000
Myanmar	5,250	7,750	5,750	8,500
Nepal	2,000	2,500	2,000	2,750
North Korea	1,750	2,500	2,000	2,750
Pakistan	10,000	25,000	9,750	20,000
Sierra Leone	650	700	300	350
Somalia	1,750	2,000	1,500	1,750
Sudan/South Sudan	3,250	4,000	2,750	3,500
SEVERE				
Angola	1,750	2,000	850	900
Benin	600	650	300	300
Bolivia	300	650	400	850
Burundi	400	600	250	400
Cote d'Ivoire	850	1,250	550	850
Djibouti	40	50	35	45
Equatorial Guinea	50	50	25	25
Ethiopia	3,250	5,250	2,000	3,250
Gambia	85	90	40	45
Guatemala	500	1,000	650	1,500
Guinea	800	850	400	400
Indonesia	7,500	10,000	9,500	15,000

				
COUNTRY	2010	2030	2010	2030
LOW				
Iraq	850	2,000	750	1,750
Liberia	250	250	100	150
Malawi	650	1,000	400	650
Mali	1,250	1,500	650	700
Mozambique	1,000	1,750	650	1,000
Niger	1,500	1,750	750	800
Nigeria	10,000	10,000	5,250	5,500
South Africa	1,250	1,750	700	1,250
Tanzania	1,500	2,500	950	1,500
Timor-Leste	35	50	35	55
Uganda	1,500	2,250	850	1,250
Zambia	600	900	350	550
HIGH				
Algeria	550	600	250	300
Cambodia	200	300	900	1,250
Comoros	35	35	15	20
Congo	150	200	80	150
Dominican Republic	100	200	250	450
Ecuador	200	350	250	450
El Salvador	75	150	150	350
Eritrea	85	150	50	80
Gabon	40	45	20	20
Ghana	900	950	450	450
Guyana	10	15	25	30
Honduras	80	150	200	350
Jamaica	35	65	85	150
Kenya	800	1,250	500	750
Laos	85	100	350	500
Lesotho	30	50	20	30
Madagascar	600	650	300	300
Maldives	5	10	5	10
Marshall Islands	1	1	1	5

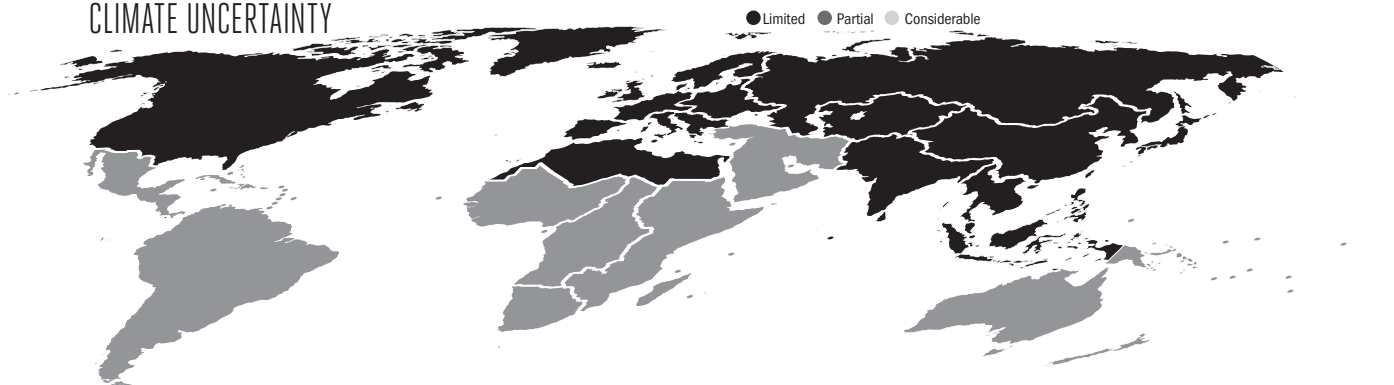
				
COUNTRY	2010	2030	2010	2030
Moderate				
Mauritania	150	150	75	75
Mexico	1,000	1,750	2,250	4,000
Morocco	500	600	450	500
Namibia	30	45	20	30
Nicaragua	70	150	90	200
Papua New Guinea	95	200	450	900
Peru	650	1,250	800	1,500
Rwanda	350	550	200	350
Sao Tome and Principe	5	5	1	1
Senegal	550	550	250	250
Sri Lanka	200	350	250	450
Swaziland	20	35	15	20
Thailand	1,000	1,500	1,250	2,000
Togo	250	300	150	150
Yemen	1,250	1,500	1,000	1,500
Zimbabwe	250	400	150	250
Moderate				
Antigua and Barbuda	1	1	1	1
Argentina	300	500	650	1,250
Bahamas	1	1	1	5
Bahrain	1	1	5	5
Barbados	1	1	5	5
Belize	1	5	5	10
Botswana	15	25	10	15
Brazil	1,250	2,500	3,000	5,500
Cape Verde	5	5	5	5
Chile	85	150	200	350
China	1,750	2,750	7,500	10,000
Colombia	250	450	500	950
Costa Rica	5	10	15	25
Cyprus	1	1	5	10
Dominica	1	1	1	1



CLIMATE VULNERABILITY



CLIMATE UNCERTAINTY



COUNTRY	2010		2030		COUNTRY	2010		2030		COUNTRY	2010		2030	
	2010	2030	2010	2030		2010	2030	2010	2030		2010	2030	2010	2030
Egypt	600	750	550	650	United Arab Emirates	5	10	20	35	Japan				
Fiji	5	5	15	25	Uruguay	25	40	55	90	Kazakhstan				
Grenada	1	1	1	1	Vanuatu	1	1	5	10	Kyrgyzstan				
Iran	200	400	900	1,750	Venezuela	90	150	200	400	Latvia				
Jordan	20	45	85	200	Vietnam	200	250	850	1,250	Lithuania				
Kiribati	1	1	5	5	LOW									
Kuwait	1	5	10	15	Albania					Luxembourg				
Lebanon	5	15	30	55	Armenia					Macedonia				
Libya	15	20	70	80	Australia					Malta				
Malaysia	75	100	350	450	Austria					Moldova				
Mauritius	5	5	1	1	Azerbaijan					Netherlands				
Micronesia	1	1	5	5	Belarus					New Zealand				
Mongolia	5	15	35	60	Belgium					Norway				
Oman	1	5	5	20	Bosnia and Herzegovina					Poland				
Palau				1	Brunei					Portugal				
Panama	20	35	50	85	Bulgaria					Romania				
Paraguay	40	90	95	200	Canada					Russia				
Philippines	550	700	2,250	3,250	Croatia					Singapore				
Qatar		1	1	1	Cuba					Slovakia				
Saint Lucia	1	1	1	1	Czech Republic					Slovenia				
Saint Vincent	1	1	1	5	Denmark					Spain				
Samoa	1	1	5	10	Estonia					Sweden				
Saudi Arabia	55	150	250	550	Finland					Switzerland				
Seychelles	1	1	1	1	France					Tajikistan				
Solomon Islands	5	5	15	20	Georgia					Turkey				
South Korea	55	90	250	400	Germany					Turkmenistan				
Suriname	1	5	5	10	Greece					Ukraine				
Syria	50	100	200	450	Hungary					United Kingdom				
Tonga	1	1	1	5	Iceland					United States				
Trinidad and Tobago	5	10	15	25	Ireland					Uzbekistan				
Tunisia	75	85	300	350	Israel									
Tuvalu				1	Italy									