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Climate Change and Human Health – Part II

The effects of climate change on health ; To a large extent, public health depends on safe drinking water, sufficient food, secure shelter, and good social conditions. A changing climate is likely to affect all of these conditions. Reviews of the likely impacts of climate change by the IPCC suggest that a warming climate is likely to bring some localized benefits, such as decreased winter deaths in temperate climates, and increases in food production in some, particularly high altitude, regions. Public health services and high living standards would protect some populations from specific impacts; for example it is unlikely that climate change would cause malaria to become re-established in northern Europe or North America. Overall, however, the health effects of a rapidly changing climate are likely to be overwhelmingly negative, particularly in the poorest communities, which have contributed least to greenhouse gas emissions. Some of the health effects include:

- Increasing frequencies of heatwaves: recent analyses show that human-induced climate change significantly increased the likelihood of the European summer heatwave of 2003.
- More variable precipitation patterns are likely to compromise the supply of freshwater, increasing risks of water-borne disease.
- Rising temperatures and variable precipitation are likely to decrease the production of staple foods in many of the poorest regions, increasing risks of malnutrition.
- Rising sea levels increase the risk of coastal flooding, and may necessitate population displacement. More than half of the world's population now lives within 60km of the sea.
- Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases, and to alter their geographic range, potentially bringing them to regions that lack population immunity and/or a strong public health infrastructure.

Measurement of health effects from climate change can only be very approximate. Nevertheless, a WHO quantitative assessment, taking into account only a subset of the possible health impacts, concluded that the effects of the climate change that has occurred since the mid-1970s may have caused over 150 000 deaths in 2000. It also concluded that these impacts are likely to increase in the future.

Climate, weather, El Niño and infectious diseases : Both temperature and surface water have important influences on the insect vectors of vector-borne infectious diseases. Of particular importance are vector mosquito species, which spread malaria and viral diseases such as dengue and yellow fever. Mosquitoes need access to stagnant water in order to breed, and the adults need humid conditions for viability. Warmer temperatures enhance vector breeding and reduce the pathogen's maturation period within the vector organism. However, very hot and dry conditions can reduce mosquito survival.

Malaria, today, is mostly confined to tropical and subtropical regions. The disease's sensitivity

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to climate is illustrated by desert and highland fringe areas where higher temperatures and/or rainfall associated with El Niño may increase transmission of malaria . In areas of unstable malaria in developing countries, populations lack protective immunity and are prone to epidemics when weather conditions facilitate transmission.

Dengue is the most important arboviral disease of humans, occurring in tropical and subtropical regions, particularly in urban settings. ENSO affects dengue occurrence by causing changes in household water storage practices and in surface water pooling. Between 1970 and 1995, the annual number of dengue epidemics in the South Pacific was positively correlated with La Niña conditions (i.e., warmer and wetter) .

Rodents, which proliferate in temperate regions following mild wet winters, act as reservoirs for various diseases. Certain rodent-borne diseases are associated with flooding, including leptospirosis, tularaemia and viral haemorrhagic diseases. Other diseases associated with rodents and ticks, and which show associations with climatic variability, include Lyme disease, tick borne encephalitis, and hantavirus pulmonary syndrome.

Many diarrhoeal diseases vary seasonally, suggesting sensitivity to climate. In the tropics diarrhoeal diseases typically peak during the rainy season. Both floods and droughts increase the risk of diarrhoeal diseases. Major causes of diarrhoea linked to heavy rainfall and contaminated water supplies are: cholera, cryptosporidium, E.coli infection, giardia, shigella, typhoid, and viruses such as hepatitis A.

Temperature extremes: heatwaves and cold spells

Extremes of temperature can kill. In many temperate countries, death rates during the winter season are 10-25% higher than those in the summer. In July 1995, a heatwave in Chicago, US, caused 514 heat related deaths (12 per 100,000 population) and 3300 excess emergency admissions.

Most of the excess deaths during times of thermal extreme are in persons with preexisting disease, especially cardiovascular and respiratory disease. The very old, the very young and the frail are most susceptible. In terms of the amount of life lost, the mortality impact of an acute event such as a heatwave is uncertain because an unknown proportion of deaths are in susceptible persons who would have died in the very near future.

Global climate change will be accompanied by an increased frequency and intensity of heat waves, as well as warmer summers and milder winters. Predictive modelling studies, using climate scenarios, have estimated future temperature-related mortality. For example, the annual excess summertime mortality attributable to climate change, by 2050, is estimated to increase several-fold.

The extent of winter-associated mortality directly attributable to stressful weather is less easy to determine. In temperate countries undergoing climate change, a reduction in winter deaths may outnumber the increase in summer deaths. Without better data, the net impact on annual mortality is difficult to estimate. Further, it will vary between populations.

Natural disasters : The effects of weather disasters (droughts, floods, storms and bushfires) on health are difficult to quantify, because secondary and delayed consequences are poorly reported. El Niño events influence the annual toll of persons affected by natural disasters . Globally, disasters triggered by droughts occur especially during the year after the onset of El Niño.

Globally, natural disaster impacts have been increasing. An analysis by the reinsurance company Munich Re found a tripling in the number of natural catastrophes over the last ten years, compared to the 1960s. This reflects global trends in population vulnerability more than an increased frequency of extreme climatic events. Developing countries are poorly equipped to deal with weather extremes, even as the population concentration increases in high-risk areas like coastal zones and cities. Hence, the number of people killed, injured or made homeless by natural disasters has been increasing rapidly.

Conclusion ; The increasing trend in natural disasters is partly due to better reporting, partly due to increasing population vulnerability, and may include a contribution from ongoing global climate change. Especially in poor countries, the impacts of major vector-borne diseases and disasters can limit or even reverse improvements in social development. Even under favorable conditions recovery from major disasters can take decades.

Short-range climatic forecasts may help reduce health impacts. But early warning systems must also incorporate monitoring and surveillance, linked to adequate response capacities. Focusing attention on current extreme events may also help countries to develop better means of dealing with the longer-term impacts of global climate change, although this capacity may itself decline because of cumulative climate change. For example, increased food imports might prevent hunger and disease during occasional drought, but poor, food-insecure, countries may be unable to afford such measures indefinitely in response to gradual year-by-year drying.

Source :

Climate change and human health - risks and responses. Summary. WHO, 2003, ISBN 9241590815
[http://WHO Climate change and human health - risks and responses_ Summary- 1.htm]

Climate and Health - WHO fact sheet [No266]
[http:// WHO Cilmate and Health.htm]

This article was compiled by Dr Samitha Ginige - Consultant Epidemiologist.

Table 1: Vaccine-preventable Diseases & AFP

29th March - 4th April 2008 (14th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2008	Number of cases during same week in 2007	Total number of cases to date in 2008	Total number of cases to date in 2007	Difference between the number of cases to date between 2008 & 2007
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	01 CB=1	01 NE=1	00	00	00	00	00	00	01 RP=1	03	03	21	26	-19.2%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	00.0%
Measles	00	01	01	01	00	00	00	00	01	04	02	35	19	+84.2%
Tetanus	00	00	00	00	00	00	00	00	00	00	01	11	10	+10.0%
Whooping Cough	01 CB=1	00	00	00	00	02 PU=2	00	00	00	03	00	11	13	-15.4%
Tuberculosis	146	44	08	05	06	22	04	14	12	271	173	2427	2550	-4.8`%

Table 2: Newly Introduced Notifiable Diseases

29th March - 4th April 2008 (14th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2008	Number of cases during same week in 2007	Total number of cases to date in 2008	Total number of cases to date in 2007	Difference between the number of cases to date between 2008 & 2007
	W	C	S	N	E	NW	NC	U	Sab					
Chicken-pox	42	18	18	23	03	14	11	10	18	157	56	1714	900	+90.4%
Meningitis	08 GM=4 CO=4	09 KD=2 ML=1 NE=6	04 GL=3 MT=1	01 VA=1	00	06 KR=4 PU=2	02 PO=2	02 BD=1 MO=1	04 KG=4	36	00	502	49	+924.5%
Mumps	03	14	05	00	04	13	04	01	06	50	23	665	288	+130.9%

Key to Table 1 & 2

Provinces: W=Western, C=Central, S=Southern, N=North, E= East, NC=North Central, NW=North Western, U=Uva, Sab=Sabaragamuwa.

DPDHS Divisions: CB=Colombo, GM=Gampaha, KL=Kalutara, KD=Kandy, ML=Matale, NE=Nuwara Eliya, GL=Galle, HB=Hambantota, MT=Matara, JF=Jaffna, KN=Killinochchi, MN=Mannar, VA=Vavuniya, MU=Mullaitivu, BT=Batticaloa, AM=Ampara, TR=Trincomalee, KM=Kalmunai, KR=Kurunegala, PU=Puttalam, AP=Anuradhapura, PO=Polonnaruwa, BD=Badulla, MO=Moneragala, RP=Ratnapura, KG=Kegalle.

Table 3: Laboratory Surveillance of Dengue Fever

29th March - 4th April 2008 (14th Week)

Samples	Number tested		Number positive *		Serotypes									
					D_1		D_2		D_3		D_4		Negative	
	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH	GT	AH
Number for current week	06	01	01	00	00	00	00	00	01	00	00	00	00	00
Total number to date in 2008	59	24	05	06	00	00	02	02	01	00	00	00	02	00

Sources: Genetech Molecular Diagnostics & School of Gene Technology, Colombo [GT] and Genetic Laboratory Asiri Surgical Hospital [AH]

* Not all positives are subjected to serotyping.

NA= Not Available.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Whooping Cough, Human Rabies, Dengue Haemorrhagic Fever, Japanese Encephalitis, Chickenpox, Meningitis, Mumps.

Special Surveillance: Acute Flaccid Paralysis.

National Control Program for Tuberculosis and Chest Diseases: Tuberculosis.

Table 4: Selected notifiable diseases reported by Medical Officers of Health

29th March - 4th April 2008 (14th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephal -itis		Enteric Fever		Food Poisoning		Leptos-pirosis		Typhus Fever		Viral Hepatitis		Human-Rabies		Re-turns Re-ceive
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	41	541	04	50	03	07	00	45	01	57	11	126	00	01	03	45	00	01	**85**
Gampaha	31	347	02	50	01	05	02	22	00	65	12	98	00	02	03	44	00	01	**93**
Kalutara	12	170	07	109	00	06	00	34	00	15	14	105	00	02	00	15	00	00	**75**
Kandy	07	75	04	72	00	02	01	16	08	30	11	66	04	35	07	60	00	00	**88**
Matale	03	35	11	84	00	00	02	16	00	02	07	166	00	01	01	13	00	00	**75**
Nuwara Eliya	00	06	04	64	00	00	02	83	00	107	01	12	00	27	04	54	00	01	**92**
Galle	03	39	04	39	00	08	00	10	00	42	21	112	01	08	00	04	00	02	**94**
Hambantota	02	41	02	29	00	03	00	05	00	06	02	34	03	34	01	04	00	00	**91**
Matara	03	78	00	59	01	03	00	19	00	02	20	111	07	68	01	04	00	01	**88**
Jaffna	02	34	02	43	00	01	06	144	00	02	00	00	03	108	00	17	00	00	**88**
Kilinochchi	00	00	00	02	00	00	00	00	00	00	00	01	00	00	00	01	00	00	**50**
Mannar	00	20	00	07	00	06	06	86	00	00	00	00	00	00	00	09	00	00	**50**
Vavuniya	00	10	01	13	00	01	00	01	00	06	00	02	00	00	00	02	00	00	**100**
Mullaitivu	00	00	00	01	00	00	00	05	00	00	00	00	00	00	00	04	00	00	**80**
Batticaloa	07	62	01	23	00	01	01	08	00	17	01	01	00	01	01	48	00	05	**82**
Ampara	00	07	07	74	00	00	00	02	00	00	01	07	00	00	00	01	00	00	**100**
Trincomalee	11	136	01	28	00	00	01	05	00	01	00	07	01	10	00	08	00	00	**70**
Kurunegala	07	166	06	114	00	07	01	18	08	10	02	22	00	14	04	18	00	03	**100**
Puttalam	07	177	02	34	00	02	01	41	12	15	01	03	00	15	00	17	00	02	**78**
Anuradhapur	03	87	00	25	00	04	00	08	00	04	07	31	00	09	00	07	00	00	**84**
Polonnaruwa	03	30	02	34	00	01	02	16	00	04	03	10	00	00	00	12	00	00	**86**
Badulla	01	21	07	123	00	03	04	42	00	01	00	10	01	46	00	50	00	01	**93**
Monaragala	01	25	05	69	00	01	05	20	05	15	06	29	03	48	01	09	00	00	**91**
Ratnapura	01	93	03	79	02	18	01	36	00	42	05	49	01	50	00	29	00	00	**75**
Kegalle	09	104	11	163	00	15	03	17	00	00	06	45	01	29	23	198	00	00	**100**
Kalmunai	01	13	06	59	01	02	00	03	03	06	00	00	00	01	01	11	00	00	**77**
SRI LANKA	**155**	**2317**	**92**	**1447**	**08**	**96**	**38**	**702**	**37**	**449**	**131**	**1047**	**25**	**509**	**50**	**684**	**00**	**17**	**86**

Source: Weekly Returns of Communicable Diseases (WRCD).

***Dengue Fever / DHF** refers to Dengue Fever / Dengue Haemorrhagic Fever.

****Timely** refers to returns received on or before 12 April , 2008 Total number of reporting units =290. Number of reporting units data provided for the current week: 224

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