WEEKLY EPIDEMIOLOGICAL REPORT

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Climate Change and Human Health – Part I

In 2008, World Health Day focuses on the need to protect health from the adverse effects of climate change. WHO selected this theme in recognition that climate change is posing ever growing threats to global public health security.

Climate change is a significant and emerging threat to public health, and changes the way we must look at protecting vulnerable populations.

The most recent report of the Intergovernmental Panel on Climate Change confirmed that there is overwhelming evidence that humans are affected by the global climate, and highlighted a wide range of implications for human health. Climate variability and change cause death and disease through natural disasters, such as heatwaves, floods and droughts. In addition, many important diseases are highly sensitive to changing temperatures and precipitation. These include common vector- borne diseases such as malaria and dengue; as well as other major killers such as malnutrition and diarrhoea. Climate change already contributes to the global burden of disease, and this contribution is expected to grow in the future.

The impacts of climate on human health will not be evenly distributed around the world. Developing country populations, particularly in Small Island States, arid and high mountain zones, and in densely populated coastal areas, are considered to be particularly vulnerable.

Fortunately, much of the health risk is avoidable through existing health programmes and interventions. Concerted action to strengthen key features of health systems, and to promote healthy development choices, can enhance public health now as well as reduce vulnerability to future climate change.

Weather and climate: changing human exposures

In discussing "climate change and health" we must distinguish between the health impacts of several meteorological exposures: weather, climate variability and climate change

Weather is the continuously changing condition of the atmosphere, usually considered on a time scale that extends from minutes to weeks. Climate is the average state of the lower atmosphere, and the associated characteristics of the underlying land or water, in a particular region, usually spanning at least several years. Climate variability is the variation around the average climate, including seasonal variations and large-scale regional cycles in atmospheric and ocean circulations such as the El Niño/ Southern Oscillation (ENSO) or the North Atlantic Oscillation.

Climate change occurs over decades or longer time-scales. Until now, changes in the global climate have occurred naturally, across centuries or millennia, because of continental drift, various astronomical cycles, variations in solar energy output and volcanic activity. Over the past few decades it has become increasingly apparent that human actions are changing atmospheric composition, thereby causing global climate change .

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The Climate System : Earth's climate is determined by complex interactions between the Sun, oceans, atmosphere, cryosphere, land surface and biosphere. The Sun is the principal driving force for weather and climate.
The uneven heating of Earth's surface (being greater nearer the equator) causes great convection flows in both the atmosphere and oceans, and is thus a major cause of winds and ocean currents.

Five concentric layers of atmosphere surround this planet. The lowest layer (troposphere) extends from the ground level to around 10-12 km altitude on average. The weather that affects Earth's surface develops within the troposphere. The next major layer (stratosphere) extends to about 50 km above the surface. The ozone within the stratosphere absorbs most of the sun's higher-energy ultraviolet rays. Above the stratosphere are three more layers: mesosphere, thermosphere and exosphere.

Overall, these five layers of the atmosphere approximately halve the amount of incoming solar radiation that reaches Earth's surface. In particular, certain "greenhouse" gases, present at trace concentrations in the troposphere (and including water vapour, carbon dioxide, nitrous oxide, methane, halocarbons, and ozone), absorb about 17% of the solar energy passing through it. Of the solar energy that reaches Earth's surface, much is absorbed and reradiated as longwave (infrared) radiation. Some of this outgoing infrared radiation is absorbed by greenhouse gases in the lower atmosphere, which causes further warming of Earth's surface. This raises Earth's temperature by 33ºC to its present surface average of 15ºC. This supplementary warming process is called "the greenhouse effect" .

Greenhouse Gases : Human-induced increases in the atmospheric concentration of GHGs are amplifying the greenhouse effect. In recent times, the great increase in fossil fuel burning, agricultural activity and several other economic activities have greatly augmented greenhouse gas emissions. The atmosphere concentration of carbon dioxide has increased by one-third since the inception of the industrial revolution .

Climate change will erode foundations of health

Scientists tell us that evidence of Earth warming is "unequivocal." Increases in global average air and sea temperature, ice melting and rising global sea levels all help us understand and prepare for the coming challenges. In addition to these observed changes, climate-sensitive impacts on human health are occurring today. They are attacking the pillars of public health and are providing a glimpse of the challenges public health will have to confront on a large scale .

The core concern is succinctly stated: climate change endangers human health .The warming of the planet will be gradual, but the effects of extreme weather events -- more storms, floods, droughts and heat waves -- will be abrupt and acutely felt. Both trends can affect some of the most fundamental determinants of health: air, water, food, shelter and freedom from disease.

Human beings are already exposed to the effects of climate-sensitive diseases and these diseases today kill millions. They include malnutrition, which causes over 3.5 million deaths per year, diarrhoeal diseases, which kill over 1.8 million, and malaria, which kills almost 1 million.

Examples already provide us with images of the future:

- **European heat wave, 2003:** Estimates suggest that approximately 70 000 more people died in that summer than would have been expected.
- **Rift Valley fever in Africa:** Major outbreaks are usually associated with rains, which are expected to become more frequent as the climate changes.
- **Hurricane Katrina, 2005:** More than 1 800 people died and thousands more were displaced. Additionally, health facilities throughout the region were destroyed critically affecting health infrastructure.
- **Malaria in the East African highlands:** Over the last 30 years, warmer temperatures have also created more favourable conditions for mosquito populations in the region and therefore for transmission of malaria.
- **Epidemics of cholera in Bangladesh:** They are closely linked to flooding and unsafe water.

These trends and events cannot be attributed solely to climate change but they are the types of challenges we expect to become more frequent and intense with climate changes. They will further strain health resources which, in many regions, are already under severe stress.

Although climate change is a global phenomenon, its consequences will not be evenly distributed. In short, climate change can aggravate problems that are already huge, largely concentrated in the developing world, and difficult to control.

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]

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

Part II of this article will be continued in the next issue

Table 1: Vaccine-preventable Diseases & AFP

22nd – 28th March 2008 (13th 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	00	00	00	00	00	00	00	00	01 RP=1	01	01	18	20	-10.0%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	00.0%
Measles	00	00	01	00	00	00	00	00	00	01	03	30	16	+87.5%
Tetanus	00	00	00	00	00	00	00	00	00	00	00	11	09	+22.2%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	02	08	15	-46.7%
Tuberculosis	86	09	09	31	00	00	02	00	10	151	158	2156	2377	-9.3`%

Table 2: Newly Introduced Notifiable Diseases

22nd – 28th March 2008 (13th 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	25	23	17	34	12	11	14	06	24	166	54	1526	817	+86.8%
Meningitis	05 GM=3 CO=1 KL=1	03 KD=1 ML=1 NE=1	05 GL=3 HB=2	01 VA=1	01 KM=1	07 KR=5 PU=2	02 PO=2	02 BD=2	06 KG=5 RP=1	32	01	451	49	+820.4%
Mumps	08	18	07	00	19	05	03	03	05	68	46	604	250	+141.6%

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

22nd – 28th March 2008 (13th 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	11	00	00	00	00	00	00	00	00	00	00	00	00	00
Total number to date in 2008	53	23	04	06	00	00	02	02	00	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

22nd – 28th March 2008 (13th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephal-itis		Enteric Fever		Food Poisoning		Leptos-pirosis		Typhus Fever		Viral Hepatitis		Human-Rabies		Returns Re-ceived Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	54	492	04	45	00	04	01	45	00	56	49	110	00	01	05	41	00	01	**92**
Gampaha	15	308	04	46	00	03	01	20	49	65	10	86	01	02	01	39	00	01	**86**
Kalutara	07	152	03	102	00	06	01	33	04	15	13	89	00	02	00	15	00	00	**83**
Kandy	03	68	04	68	00	02	00	15	01	22	05	55	05	31	03	53	00	00	**72**
Matale	02	31	05	73	00	00	00	14	00	02	09	156	00	01	01	12	00	00	**75**
Nuwara Eliya	01	06	07	60	00	00	12	81	00	107	01	11	03	27	02	50	00	01	**100**
Galle	00	36	03	35	00	08	00	10	00	42	14	91	00	07	00	04	00	02	**100**
Hambantota	01	39	01	27	00	03	00	05	00	06	05	32	05	31	00	03	00	00	**91**
Matara	03	75	03	59	00	02	00	19	00	02	10	87	04	61	00	03	00	01	**82**
Jaffna	00	32	01	41	00	01	09	138	00	02	00	00	02	105	00	17	00	00	**63**
Kilinochchi	00	00	00	02	00	00	00	00	00	00	00	01	00	00	00	01	00	00	**25**
Mannar	03	20	00	07	00	06	03	80	00	00	00	00	00	00	00	09	00	00	**50**
Vavuniya	00	10	00	12	00	01	00	01	02	06	01	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	**40**
Batticaloa	03	55	02	22	00	01	02	07	00	17	00	00	00	01	02	47	02	05	**82**
Ampara	00	06	02	66	00	00	01	02	00	00	00	06	00	00	00	01	00	00	**57**
Trincomalee	08	123	03	25	00	00	00	04	00	01	01	07	00	09	00	08	00	00	**90**
Kurunegala	16	159	06	107	01	07	01	17	00	02	04	19	01	13	00	14	02	03	**94**
Puttalam	13	170	01	32	00	02	01	39	00	03	00	02	00	14	01	16	00	02	**78**
Anuradhapur	03	84	01	23	01	04	00	08	00	04	00	24	00	09	01	06	00	00	**74**
Polonnaruwa	01	27	00	32	00	01	01	14	00	04	00	07	00	00	02	12	00	00	**100**
Badulla	02	20	04	114	00	03	03	37	00	01	01	09	10	44	03	49	00	01	**67**
Monaragala	02	24	07	64	00	01	00	14	01	09	07	23	05	44	00	07	00	00	**91**
Ratnapura	04	88	07	70	02	15	00	35	00	42	05	38	01	46	01	28	00	00	**75**
Kegalle	09	95	08	152	02	15	03	14	00	00	11	39	04	28	48	175	00	00	**100**
Kalmunai	04	12	02	52	00	01	01	03	00	03	00	00	00	01	00	10	00	00	**54**
SRI LANKA	**154**	**2132**	**78**	**1337**	**07**	**86**	**40**	**660**	**57**	**411**	**146**	**894**	**41**	**477**	**70**	**626**	**04**	**17**	**80**

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 5 April , 2008 Total number of reporting units =290. Number of reporting units data provided for the current week: 213

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