WEEKLY EPIDEMIOLOGICAL REPORT

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Indoor air pollution - An overlooked misery (Part II)

This is Part II of an article on the nature and extent of health effects of indoor air pollution which has a large impact on human health especially those living in developing countries.

The health effect of air pollution is determined not only by the level of pollution but also by the time people spend breathing polluted air, i.e. the exposure level. Unprocessed solid biomass fuels release at least 50 times more noxious pollutants than gaseous fuels. The time they spent daily for cooking may vary from less than one hour to several hours. In developing countries, traditionally women are responsible for food preparation and cooking. Therefore, disproportionately, they are exposed more than men. As children especially infants and young children often accompany their mothers at home, they get heavily exposed. The next vulnerable group would be elderly and sick, who usually stay at home throughout the day.

Since the immune system of the infants is not fully developed, their respiratory tract is more susceptible to the effects of inflammation. Young children breathe faster than adults elevating relative intake of pollutants. Malnutrition which is strongly associated with poverty may impair an optimum development of the immune system making them more vulnerable to pollutants. Elderly are also at a greater risk of health effects of indoor air pollution since they are more likely to suffering from chronic illnesses and are having a compromised immune system.

It has been estimated that 2.7 – 2.8 million women and children die each year from indoor air pollution in developing nations. Out of all, 28% deaths due to indoor air pollution occurs in India. Since only a few studies are carried out in Sri Lanka there are no exact evidence to recognise where we stand.

There is consistent evidence that exposure to biomass smoke increases the risk of a range of illnesses both in children and adults. The main conditions among them are acute respiratory tract infections, particularly pneumonia, chronic bronchitis and chronic obstructive pulmonary disease. There is also evidence that exposure to coal smoke at in the home markedly increases the risk of lung cancer, particularly among women.

There is new evidence which suggest that indoor air pollution in developing countries may also increase the risk of other important health problems such as low birth weight, perinatal mortality, bronchial asthma, middle ear infections in children, tuberculosis, nasopharyngeal and laryngeal cancer, and cataract in adults. These health outcomes are either direct or indirect effects on the human body. For example, toxic substances in biomass smoke can be carcinogenic. There is evidence that some toxicants can cause cataracts. In addition, some pollutants may cause the victim more vulnerable to secondary infections such as tuberculosis or other bacterial infections indirectly influencing on the health of exposed victims.

Extended exposure to high levels of biomass smoke can impair the clearing ability of the lung making them more susceptible to infec-

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tions. Most of the pollutants generated as a result of biomass fuel combustion are capable of irritating the airways and lungs, reducing the resistance to infection and increasing the risk of cancer. There is clear research evidence that exposure to smoke from wood stoves increases the risk of acute respiratory tract infection among infants and young children. The risk of dying from respiratory tract infection is also increased if a child has been sleeping in a room with an open cook stove.

Among adult women there is evidence that exposure to open cook stove is strongly linked with chronic lung diseases. It is also found that active tuberculosis infection is more prevalent among people living in houses where bio fuels are used for cooking than in houses where cleaner fuels are used. Pulmonary tuberculosis can be aggravated by exposure to smoke.

Benzo(*a*)pyrene is a know carcinogen and is found in large quantities in cooking smoke.

Interventions should be able to reduce exposure to indoor air pollution while meeting domestic energy requirements and cultural needs, at the same time improving safety, fuel efficiency and environmental protection. They should be affordable and sustainable.

Exposure can be reduced by means of improved stoves, better housing , cleaner fuels, and behavioural changes. A long term solution to the problem would be use of cleaner fuels especially liquefied petroleum gas. But, purely because of economic reasons, poor communities may not be able to make this transition for many more years to come.

Within the existing conditions to prevent health hazards associated with household air pollution, public awareness tends to play an important role. Harmful effects of household smoke, how to reduce exposure and prevent harmful effects and best practices of cooking including how a household stove can be converted into a more efficient stove etc., should be addressed in such a public awareness programme.

Inadequate ventilation within houses thereby reducing air exchange between indoor and outdoor can aggravate health effects of household air pollution. Any mechanism that will disperse the pollutants rather than leaving them stagnating, will minimizes the risk associated with air pollution. When building new houses this issue should be addressed. Modification of housing designs by enlarging existing windows or installing new windows would be necessary to improve ventilation in existing houses. Construction of chimneys, flues or installing hoods also would be appropriate solutions to reduce indoor air pollution.

Simple modification of domestic behaviours will also be important in reducing or minimizing the generation of pollutants and getting exposed to them. For example, if mothers carry their infants or toddlers while cooking, it will increase children getting exposed to polluted environment. Keeping them away from cooking area is the simplest behavioural modification mothers can adhere to. Outdoor cooking also will minimize exposure. Another measure that can be taken is as in our traditional housing system, to have a separate kitchen, away from the home. However, this will not be a practical measure for some people especially those living in an urban slum area where they are pressed for land and space.

Many people are used to cook each meal of the day separately. This will prolong the time exposed to smoky environment. As well some of our cooking methods are lengthy. Introduction of quick food preparation methods and cooking several meals together will significantly cut off the time of exposure. The reduction of cost of food preparation would be an added advantage. Drying firewood before use and cutting wood into small pieces will improve the efficiency of cooking process. Extinguishing the fire immediately after the use will reduce emissions.

The other issue that has to be addressed is the improvement of efficiency of stoves. The most popular type of stove that uses firewood for cooking in Sri Lanka is the customary three-stone stove. Since its nature of open fire, the efficiency of this type of stove is as low as 10-15%. Therefore, the energy wastage and subsequently the level of exposure are high.

Designing stoves to have a more complete combustion will decrease indoor air pollution. Using efficient stoves have other benefits also. For example, it will reduce cooking time allowing women to have spare time for other activities. It also will reduce other hazards like burns and injuries. Reduced fuel wood consumption will have economic and social benefits, at family level and also will have macro level benefits such as reducing deforestation.

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This article was prepared by Dr Sudath Samaraweera, Consultant Community Physician.

Table 1: Vaccine-preventable Diseases & AFP

29th November - 5th December 2008 (49thWeek)

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	01 KR=1	00	00	00	01	01	92	83	+10.8%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	01	00	-
Measles	00	00	00	00	00	00	00	00	00	00	00	107	77	+39.0%
Tetanus	00	00	00	00	00	00	00	00	00	00	00	36	32	+12.5%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	48	45	+06.7%
Tuberculosis	59	25	07	19	20	00	00	00	87	217	310	7952	9340	-14.9%

Table 2: Newly Introduced Notifiable Disease

29th November - 5th December 2008 (49thWeek)

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	30	12	12	00	02	04	03	11	12	86	55	5189	3213	+61.5%
Meningitis	04 CB=2 GM=1 KL=1	01 KD=1	04 GL=1 HB=2 MT=1	00	00	00	01 AP=1	00	04 RP=1 KG=3	14	25	1234	714	+72.8%
Mumps	01	09	01	00	00	01	00	00	07	19	47	2761	2072	+33.3%

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 November - 5th December 2008 (49thWeek)

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	00	00	00	00	00	00	00	00	00	00	00	00	00	00
Total number to date in 2008	124	160	09	25	00	00	06	10	01	09	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 November - 5th December 2008 (49thWeek)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encepha-litis		Enteric Fever		Food Poison-ing		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	20	1529	6	278	0	15	5	185	0	139	8	1028	1	8	1	113	0	0	**69**
Gampaha	13	923	0	220	0	20	0	60	0	104	10	812	0	7	1	190	0	7	**64**
Kalutara	8	455	10	343	0	14	3	77	0	44	9	645	0	4	1	45	0	2	**50**
Kandy	6	323	6	312	0	10	0	64	1	100	4	507	2	98	0	126	0	2	**68**
Matale	5	167	2	223	0	4	0	53	0	16	6	771	0	2	0	30	0	0	**58**
Nuwara	1	29	14	297	1	6	2	255	0	168	2	72	0	43	1	108	0	1	**85**
Galle	3	104	10	208	1	23	0	18	0	50	6	432	1	16	0	8	0	5	**76**
Hambantota	13	112	9	135	0	8	0	8	0	20	0	122	0	98	0	17	0	1	**73**
Matara	7	340	6	224	0	14	0	36	0	15	8	484	1	228	0	14	0	1	**59**
Jaffna	0	60	0	150	0	4	0	257	0	20	0	1	0	159	0	41	0	0	**0**
Kilinochchi	0	1	0	160	0	0	0	1	0	4	0	2	0	0	0	2	0	0	**0**
Mannar	0	25	0	27	0	6	0	158	0	0	0	0	0	1	0	16	0	1	**0**
Vavuniya	0	12	1	71	0	3	0	15	2	25	0	6	0	1	0	5	0	0	**50**
Mullaitivu	0	0	0	61	0	0	0	16	0	13	0	0	0	1	0	10	0	1	**0**
Batticaloa	1	87	1	226	1	8	1	32	0	30	1	12	0	0	0	95	0	10	**45**
Ampara	0	33	1	265	0	0	0	9	0	285	0	25	0	0	0	14	0	0	**29**
Trincomalee	0	185	0	120	0	1	0	13	0	14	1	33	0	17	0	15	0	0	**30**
Kurunegala	4	349	7	257	0	16	1	55	0	29	2	683	2	32	2	83	0	9	**68**
Puttalam	0	284	6	167	0	10	0	159	0	41	0	66	0	38	0	34	0	5	**44**
Anuradhapu	0	120	8	159	0	10	0	12	40	56	2	251	0	11	1	16	0	3	**42**
Polonnaruw	0	64	3	138	0	1	0	28	2	25	15	95	0	1	0	21	0	0	**57**
Badulla	0	102	3	502	0	9	0	126	0	112	0	72	4	125	7	178	0	1	**87**
Monaragala	0	60	0	354	0	4	1	55	0	123	0	94	0	105	4	59	0	2	**45**
Ratnapura	1	288	4	415	0	33	0	53	0	84	3	245	0	82	1	61	0	0	**56**
Kegalle	14	436	3	310	0	25	0	86	0	17	4	570	3	72	1	518	0	1	**64**
Kalmunai	0	38	6	318	0	2	1	17	0	16	0	3	0	3	0	27	0	0	**38**
SRI LANKA	**96**	**6126**	**106**	**5940**	**3**	**246**	**14**	**1848**	**45**	**1550**	**81**	**7031**	**14**	**1152**	**20**	**1846**	**0**	**52**	**55**

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 13 December, 2008 Total number of reporting units =309. Number of reporting units data provided for the current week: 171

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