WEEKLY EPIDEMIOLOGICAL REPORT

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Radiation and Life *(Part 2)*

The types, sources of radiation and effects of radiation to the humans were discussed in the previous article. This article discuses on the nuclear disasters, there implications to the people and how to prepare for them.

A nuclear or radiation accident is defined as an event that has led to significant consequences to people, the environment or the facility. The consequences to human could be deaths, short term illnesses or long term illnesses like cancers. On the other hand the surrounding environment gets contaminated largely resulting in inability to use the environment for years. Nuclear weapon accidents are also included in to this definition.

The nuclear accidents can be categorized into seven levels depending on the severity of accidents while level 1 is an event beyond the authorized operating regime, but not involving significant failures in safety provisions, significant spread of contamination or overexposure of *workers* and level seven is an *accident* involving a major release of *radioactive material* with widespread health and environmental effects.

The prime example of a "major nuclear accident (Level seven)" is one in which large amounts of radiation were released, e.g. the Chernobyl Disaster in 1986. Adding to this, the nuclear disaster which happened in Fukushima in Japan following the earthquake and Tsunami in 2011 March is also reached a state similar to the Chernobyl accident.

In the case of a nuclear accident, the level of radiation hazard for the population depends upon the quantity and type of radiation released into the environment, the distance of the populated areas from the source of radioactive release, the type of buildings and the density of population, meteorological conditions at the time of the accident, season of the year, character of agricultural development in the area, water supplies and nutritional habits and status of the population.

During a major nuclear accident, the following three phases are identified:

- **Early Phase** – from the threat of a serious release to the first few hours after the beginning of a release;
- **Intermediate phase** – from the first few hours after the start of the release to one or two days; and
- **Recovery Phase** – may extend from some weeks to several years.

Criteria for decision-making on the implementation of counter measures to protect the population from radioactive materials released due to a nuclear accident depend on the phase of the accident.

Strategic response to a major nuclear accident

Several key principles specific to radiation are important in planning for response to a radiation incident, including planning for population monitoring.

In general the first priority is to limit the exposure to radiation which occurs, primarily, through radioactive fallout, either by evacuation or by sheltering the affected population. Depending on the strength of the explosion or release and the prevailing meteorological conditions (e.g. wind and precipitation), a radius of between 30 and several hundreds of kilometers from the explosion epicentre should be declared a priority area for action. Sheltering may be considered a preliminary solution before evacuation. Suitable sheltering sites are refuges, caves, mines, and, in general, any place where there is a barrier of solid substances between radiation and humans. Radiation-free air, water and food will be required to diminish the hazard. Victims of radiation from nuclear explosions should be moved as quickly as possible to an appropriate medical establishment. In some types of incidents, hundreds or even thousands of people may need to be examined for external

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or internal contamination. Such examinations require specialized equipment. The scope of, and the need for decontamination will depend on whether there is evidence of body surface contamination. The person will require thorough showering and the provision of uncontaminated clothing. Any illness should be treated immediately.

Where there is evidence of internal contamination with radio -active iodine (I^{131}), stable iodine prophylaxis is needed to avoid excessive thyroid radiation doses and, especially in young people, to reduce the risk of thyroid cancer in later life. When radionuclide contamination spans national boundaries, international and national authorities would normally take the lead role in radiation emergencies. However local authorities can play a key role in the alleviation of health consequences of radiation emergencies.

Role of the local authority

Central government authorities play a large part in all but very minor radiation emergencies. Affected individuals will often turn first to the local authority for advice, treatment and reassurance. Preparation and planning for radiation emergencies should not be viewed as the concern of central governments only. Local authorities that are prepared and have planned for radiation emergencies can assist in the solution of public health problems in a number of ways.

Before an emergency they can:

- Inform and train doctors and other front-line professionals to whom the public are likely to turn in an emergency.
- Inform the public about the possibility of an emergency, its probable consequences and the probable remedial actions.

During an emergency they can:

- Provide information, guidance and reassurance to the public.
- Provide stable iodine prophylaxis where appropriate.
- Ensure the availability of immediate medical treatment to those who require it.
- Provide advice on the safety of food and beverages.

After an emergency they can:

- Regulate the production and distribution of food.
- Organize the provision of long-term health care to the victims including the follow up them in a regular manner for a considerable time period.
- Support medical, psychological and social recovery.

Psychosocial issues will present significant challenges to public health and medical practitioners both during and after a radiological emergency incident. Planning and preparing to deal with psychosocial issues is critically important for efficiently managing and monitoring the affected population and engaging in other response efforts. There should be proper planning and strategies for assisting both affected individuals and their families and public health workers. In the aftermath of a radiation emergency, state and local agencies should be prepared to distribute materials on the effects of radiation incidents and how to cope with them.

Communications

The task of communicating about radiation and related emergency issues is extremely challenging. The information provided to stakeholders may range from informative to authoritative. Effectively communicated health messages can influence individual citizens, health care providers and other professionals, and policy makers at all levels as they make health protection decisions; therefore, these messages can have a direct and highly significant effect on the health and safety of large segments of the population.

For any levels or amounts of exposure, people will want to know what health effects they may have in the future. There should be a pre-plan of communication strategy to lessen people's understandable fears and anxiety. There should be an effective and credible communication strategy to explain that the overwhelming majority of radiation exposures will not result in any measurable health effects.

Authorities should be aware that communication and public information staff establishes a network of qualified public health media contacts and trains key public health spokespersons for media announcements or interviews and prepares to communicate with special populations.

The Fukushima nuclear reactor disaster and its implications to public health

On March 11, 2011 a magnitude 8.9 earthquake struck off the Northeastern coast of Japan causing severe damage and triggering a devastating Tsunami. The destruction also crippled operations at the Fukushima Dai-ichi nuclear plant raising the threat of a nuclear disaster. Disabling the cooling system made the destruction of containers of reactors leading to release of radioactive material to the air. Efforts to reduce temperature by using water and releasing them to the nearby sea caused the pollution of sea water also.

The presence of radioactivity in some vegetables and milk has been confirmed in Japan and some of the initial food monitoring results show radioactive iodine detected in concentrations above Japanese regulatory limits.

Although radioactive iodine in food is of immediate concern, it has a relatively short half-life and will naturally decay over a short time frame. Radioactive caesium has also been detected in food. In contrast to radioactive iodine, radioactive caesium can linger in the environment for many years and could continue to present a longer term problem for food, and food production, and a threat to human health.

By far the contamination of foods and water produced in other countries are well below acceptable levels and would not pose a health concern to those who eat the food. There is no health risks to people living in other countries also from radioactive material released into the atmosphere from the Japanese nuclear power plants. Radiation levels measured to date in other countries are far below the level of background radiation that most people are exposed to in every day circumstances.

Sources

- *Radiation and Life, World Nuclear Association, 2011*
- *Population monitoring in radiation emergencies: a guide for state and local public health planners: National Center for Environmental Health. CDC.2010. http://emergency.cdc.gov/radiation/pdf/population-monitoring-guide.pdf*
- *FAQs: Japan nuclear concerns: World Health Organization.2011*

This article was compiled by Dr. Pubudu Chulasiri, Medical Officer – Epidemiology Unit

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Table 1: Vaccine-preventable Diseases & AFP

05th – 11th March 2011(10th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2011	Number of cases during same week in 2010	Total number of cases to date in 2011	Total number of cases to date in 2010	Difference between the number of cases to date in 2011 & 2010
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	01	00	00	00	00	00	01	00	02	02	21	21	0 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	-
Measles	03	01	00	00	00	01	00	00	00	05	01	20	30	- 33.3 %
Tetanus	00	00	00	00	00	00	00	00	00	00	00	04	06	- 33.3 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	06	17	- 64.7 %
Tuberculosis	191	05	00	04	17	57	2	7	41	314	215	1863	1981	- 5.9 %

Table 2: Newly Introduced Notifiable Disease

05th – 11th March 2011(10th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2011	Number of cases during same week in 2010	Total number of cases to date in 2011	Total number of cases to date in 2010	Difference between the number of cases to date in 2011 & 2010
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	23	12	14	05	07	12	19	03	19	114	66	1040	757	+ 37.4 %
Meningitis	03 GM=3	00	04 GL=2 MT=2	01 JF=1	00	02 KN=2	04 AP=4	01 MO=1	00	15	20	208	353	- 41.1 %
Mumps	05	14	01	00	04	10	11	03	03	51	14	419	174	+ 140.8 %
Leishmaniasis	00	00	00	00	00	01 KN=1	21 AP=14 PO=7	00	00	22	08	125	79	+ 58.2 %

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.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps.

Special Surveillance: Acute Flaccid Paralysis.

Leishmaniasis is notifiable only after the General Circular No: 02/102/2008 issued on 23 September 2008. .

Dengue Prevention and Control Health Messages

Check the roof gutters regularly for water collection where dengue mosquitoes could breed.

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

05th – 11th March 2011(10th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	73	863	4	53	0	2	3	46	0	4	9	65	2	3	1	10	0	1	**69**
Gampaha	36	304	4	26	3	5	2	15	0	8	60	147	2	9	3	20	0	1	**33**
Kalutara	11	129	2	35	0	2	2	18	0	6	8	37	0	0	0	1	0	0	**58**
Kandy	12	70	12	102	0	3	0	11	0	3	3	24	3	26	5	16	0	0	**48**
Matale	0	32	6	32	0	2	2	5	0	3	5	43	3	4	0	2	0	0	**67**
Nuwara	1	15	5	50	0	1	0	11	0	12	1	9	0	22	0	2	0	0	**38**
Galle	3	35	0	18	1	1	0	2	0	4	1	14	0	10	1	6	0	0	**47**
Hambantota	4	37	0	9	0	2	0	1	3	4	56	106	0	14	0	0	0	0	**33**
Matara	10	49	4	16	0	0	0	5	0	0	46	79	2	19	1	3	0	1	**53**
Jaffna	10	108	11	37	1	2	10	71	0	9	0	2	23	122	0	10	0	1	**73**
Kilinochchi	4	11	0	3	0	1	0	3	0	0	0	1	0	4	0	1	0	0	**50**
Mannar	2	1	0	3	0	0	0	6	0	0	0	7	2	26	0	0	0	0	**40**
Vavuniya	10	28	6	11	2	6	0	4	0	0	6	30	0	1	0	0	0	0	**75**
Mullaitivu	0	3	0	7	1	1	0	1	0	0	0	3	0	0	0	0	0	0	**25**
Batticaloa	35	126	7	92	1	2	0	2	0	0	1	7	0	0	0	1	0	1	**29**
Ampara	2	19	1	27	0	0	0	5	0	15	1	21	0	0	0	2	0	0	**71**
Trincomalee	6	35	0	68	0	0	0	1	0	4	2	34	0	1	0	3	0	0	**45**
Kurunegala	18	107	3	73	0	4	3	34	0	24	234	844	3	21	1	10	0	0	**43**
Puttalam	18	168	3	51	0	0	0	5	0	1	4	23	0	4	0	1	0	1	**33**
Anuradhapu	3	46	1	30	0	1	0	2	2	4	32	132	0	7	0	3	0	0	**47**
Polonnaruw	4	50	0	19	0	1	1	3	0	8	3	31	0	0	1	3	0	0	**43**
Badulla	1	48	2	29	0	0	1	14	0	0	4	14	1	6	1	12	0	0	**67**
Monaragala	4	46	1	21	1	1	0	10	3	3	11	35	2	19	10	16	0	0	**55**
Ratnapura	6	89	16	109	0	3	1	8	0	5	6	63	0	13	0	15	0	0	**50**
Kegalle	7	48	1	23	0	5	0	18	1	5	12	48	0	4	2	20	0	0	**55**
Kalmunai	0	6	7	88	0	0	0	0	1	1	0	2	0	0	0	1	0	0	**46**
SRI LANKA	**280**	**2487**	**96**	**1032**	**10**	**45**	**25**	**301**	**10**	**123**	**505**	**1821**	**43**	**335**	**26**	**158**	**00**	**06**	**49**

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 11th March, 2011 Total number of reporting units =320. Number of reporting units data provided for the current week: 159
A = Cases reported during the current week. **B** = Cumulative cases for the year.

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Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to **chepid@sltnet.lk.**

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