



WEEKLY EPIDEMIOLOGICAL REPORT

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Solid Waste Management in Disaster Management (Part II)

This is the second and last in the series of articles on Solid waste Management in Disaster management.

Waste management options

The main waste management options are waste reduction, waste reuse, repair and recycling. In situations where these options are difficult to utilize or when there is waste remained to be managed even after these options are used, there are other methods of waste management to be considered such as burial and incineration.

Waste reduction is reducing the generation of waste. Initially, the sources of waste generation are identified and behaviours of the population which lead to waste generation are assessed. Based on the information gathered, ways in which waste generation can be minimized are formulated. Then the behavior of the people is influenced to reduce waste generation through improving awareness.

In waste reusing, waste which otherwise be thrown away, are used for different tasks and purposes. For example, plastic containers can be used for storage and plastic sheets can be used for roofing.

Recycling and composting are parts of an overall waste management system. However, it is more suitable and feasible to be used at the latter part of the disaster management process rather than in the initial stage. First, the waste should be segregated into three categories as inorganic,

organic and non-recyclable. Organic waste can be composted. For non-recyclable waste, other options like land filling, incineration and burial can be considered. Recycling and composting will provide more opportunities for the affected population to get involved in the process and it will also be psychologically beneficial to deal with the traumatizing situation.

Waste hierarchy

Waste hierarchy is a hierarchy of the above mentioned methods. However, in a disaster situation, it is difficult to proceed along the hierarchy as there can be immediate risks posed by solid waste, where quick removal of them is a priority. Therefore, an effective solid waste management system should utilize all the above methods appropriately and timely.

Waste reduction and minimization

Waste reuse/ repair

Recycling/ composting

Landfill/ burial/ incineration

Waste management at household level

The two main steps in waste management at household level is collection, containment and storage followed by disposal. For collection, containment and storage, family bins can be used. However, in the initial stage, they will have to be provided to each family because an intensive

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collection and transportation system is needed and the number of bins required is likely to be numerous at this stage. Thereafter, at the latter part of disaster management, they can be encouraged to use their own garbage bins like simple plastic buckets with handle and lids, sacks which can be securely tied, plastic bags which can be secured etc.

People should be advised to separate hazardous waste before storage. Appropriate facilities have to be provided to dispose them immediately. It is also important to make them aware that the bins have to be adequately covered and storage time has to be as short as possible. Otherwise waste can get decomposed especially in tropical, humid conditions which can increase insect breeding and smells.

After collection, containment and storage of waste, the previously mentioned waste management options can be applied. However, the remaining waste has to be disposed at communal level or household level. Burial and incineration are two options to dispose waste at household level.

A household pit should be located more than 10 meters away from dwelling and more than 15 meters away from water sources. The base of the pit should approximately be 1.5 meters above water table and ideal depth of the pit should be 1-1.5 meters. It is important to regularly cover the pit with soil or ash. Ideally, a fence around the pit will help to avoid accidents and scavenging. When the pit is filled up to the surface, waste inside should be compacted and covered with soil. Problems associated with this method are emission of hazardous gases like Methane from organic material, possible increase in rodent population if the pit is not adequately covered and smelling.

Burning or incineration should only be used as the last option. This could ideally be undertaken in a pit, covered with soil. The site of incineration should be a considerable distance away from dwellings. However, incineration can be associated with risks like fire, emission of gases particularly CO₂ and uncomfortable smoke.

Waste management at communal level

Waste management at communal level is comprised of collection and containment, waste transfer and waste disposal.

For collection and containment, adequate collection points should be provided within an appropriate distance from households. However, they should ideally be at least 15 meters away from dwellings. The collection points should be capacitated enough to collect waste from several households. In the initial stage, one 100 liter container will be adequate for 10 families.

The storage containers should be resilient enough so that they cannot be easily turned over. They should ideally be non inflammable. The main problem associated with these containers is quick overflowing of waste. To minimize this, waste can be reused in possible situations. Otherwise, compacting and shredding of non reusable material are options.

In some situations where waste cannot be disposed at the same site of collection, waste needs to be transferred to a different location. Ideally, large amounts of waste should be emptied daily and small amounts should be emptied twice weekly. Animal carts, hand carts, ordinary trucks and specialized waste collection trucks are some of the methods which can be used to transfer waste.

Burial and incineration are the options to dispose waste at communal level, where recycling and reusing are not applicable.

For burial of waste, communal pits are used. They should be located more than 30 meters away from dwellings as well as 30 meters away from water sources. Main determinant of the pit size is the population size. Usually pit size is calculated by,

Volume of the pit= volume of waste produced per person per day x population x number of days until camp closure or 6m³ is adequate for 50 people. When determining the depth of the pit, pit base should be at least 5 meters above ground water level at the end of the rainy season. The sides of the pit should be stable and at 45 degrees. Main problem associated with these pits is leachate from the pit, contaminating ground water. To prevent this, the pit can be lined with clay as clay is impermeable for leachate. It is also important to cover the pit with clay. Once the pit is filled, it should be compacted and covered with soil. No medical waste should be buried in these pits.

Incineration should be considered when, all plastic products are removed, incineration takes place downwind of dwellings and local area is not suitable for burial. Barrel type or garden type incinerators are better than open incineration as former methods reach higher temperature thus improving efficacy. Incineration is also recommended for medical and hazardous waste.

Sources

1. *Domestic and Refugee Camp Waste Management Collection and Disposal* available at <file:///C:/Users/Admin/Downloads/tbn15-domestic-refugee-camp-waste-management-collection-disposal-210508-en.pdf>

Compiled by Dr. S.A.I.K. Sudasinghe of the Epidemiology Unit

Table 1: Selected notifiable diseases reported by Medical Officers of Health 18th - 24th June 2016 (26th Week)

RDHS Division	Dengue Fever		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Chickenpox		Meningitis		Leishmaniasis		WRCD	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	T*	C**
Colombo	249	6528	3	67	0	2	3	33	1	21	9	101	0	4	1	18	0	0	7	207	0	23	0	0	25	56
Gampaha	0	1983	0	33	0	5	0	12	0	5	0	125	0	7	0	16	0	0	0	182	0	20	0	3	0	7
Kalutara	0	1265	0	38	0	3	0	16	0	16	0	246	0	4	0	13	0	0	0	113	0	35	0	0	0	21
Kandy	152	1357	5	102	1	13	0	11	1	28	3	79	0	58	1	38	0	0	3	103	0	27	0	6	83	96
Matale	22	239	3	30	0	1	0	10	0	2	1	56	1	13	0	13	0	1	0	22	0	47	0	15	54	92
NuwaraEliya	18	171	0	52	0	1	1	30	0	15	1	28	0	44	2	26	0	0	4	83	0	26	0	0	92	92
Galle	16	867	1	56	0	8	0	2	0	3	6	170	4	53	0	6	0	0	7	175	0	26	1	3	75	90
Hambantota	23	386	4	30	0	1	0	2	0	50	4	79	3	38	1	19	0	0	3	142	0	11	1	150	83	100
Matarata	59	484	7	64	4	10	0	5	0	35	8	114	0	27	0	17	0	0	1	103	2	13	8	128	100	100
Jaffna	12	1304	10	129	0	3	1	50	5	41	0	8	4	533	0	8	0	0	0	104	1	31	0	1	100	100
Kilinochchi	0	50	2	26	0	0	0	25	0	4	0	11	1	18	0	0	0	0	0	8	0	7	0	0	25	50
Mannar	1	95	0	11	0	4	1	15	0	4	0	8	0	37	0	0	0	0	0	7	0	1	0	0	40	80
Vavuniya	6	156	0	7	0	3	5	41	1	28	1	12	0	8	0	6	0	0	1	22	0	7	1	4	100	100
Mullaitivu	7	114	4	17	2	2	1	16	0	36	0	22	0	5	0	0	0	0	0	10	1	6	0	4	80	100
Batticaloa	8	316	12	161	0	0	0	19	0	88	0	31	0	4	0	9	0	0	0	62	0	5	0	1	79	93
Ampara	0	108	1	19	0	0	0	0	0	20	0	23	0	0	0	7	0	0	0	71	0	1	0	5	29	71
Trincomalee	8	287	3	36	0	1	0	10	0	24	1	22	0	18	1	32	0	1	2	106	0	8	0	3	67	92
Kurunegala	103	1129	18	154	0	7	0	1	0	6	8	99	3	18	1	17	0	2	11	182	4	35	2	52	83	97
Puttalam	28	631	4	31	0	2	0	4	0	0	0	33	0	57	0	0	0	0	2	45	0	25	0	2	77	77
Anuradhapur	9	306	1	36	0	1	1	4	0	22	7	198	1	21	0	11	0	0	0	139	2	22	3	117	58	79
Polonnaruwa	8	215	2	17	0	2	0	9	0	10	1	73	0	1	0	2	0	0	2	72	0	11	0	78	57	100
Badulla	28	359	4	70	0	10	0	5	1	20	0	83	2	54	3	82	0	0	4	107	3	107	0	2	65	94
Monaragala	10	181	4	37	0	1	0	2	0	10	1	140	6	78	3	102	0	2	1	39	0	17	0	24	100	100
Rainapura	81	1314	8	213	0	19	2	20	2	22	9	322	1	20	4	84	0	0	1	109	5	85	0	1	72	89
Kegalle	40	745	3	47	2	15	0	18	2	44	0	122	1	18	1	16	0	0	4	186	1	30	0	0	82	100
Kalmune	1	364	0	43	0	3	0	4	1	40	0	11	0	0	1	3	0	4	1	55	0	13	0	0	77	92
SRILANKA	889	20954	99	1526	9	117	15	364	14	594	60	2216	27	1138	19	545	0	10	54	2454	19	639	16	599	67	84

Source: Weekly Returns of Communicable Diseases (WRCD).

*T=Timeliness refers to returns received on or before 24th June, 2016. Total number of reporting units: 339. Number of reporting units data provided for the current week: 288. C**=Completeness

A = Cases reported during the current week. B = Cumulative cases for the year.

Table 2: Vaccine-Preventable Diseases & AFP

18th - 24th June 2016 (26th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2016	Number of cases during same week in 2015	Total number of cases to date in 2016	Total number of cases to date in 2015	Difference between the number of cases to date in 2016 & 2015
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	00	00	00	00	00	00	00	00	00	32	38	-16.1%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Mumps	00	01	00	01	02	01	00	01	01	07	04	214	203	5.4%
Measles	00	01	01	00	00	01	00	00	00	03	41	281	1274	78.1%
Rubella	00	00	00	00	00	00	00	00	00	00	00	06	06	0%
CRS**	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Tetanus	00	00	00	00	00	00	00	00	00	00	00	04	09	-55.5%
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	05	07	-28.5%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	03	30	44	-31.8%
Tuberculosis	121	46	19	17	07	10	15	09	16	260	236	4734	4711	+0.4%

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.
 RDHS 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, Neonatal Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps., Rubella, CRS, Special Surveillance: AFP* (Acute Flaccid Paralysis), Japanese Encephalitis
 CRS** =Congenital Rubella Syndrome
 AFP and all clinically confirmed Vaccine Preventable Diseases except Tuberculosis and Mumps should be investigated by the MOH

Dengue Prevention and Control Health Messages

Look for plants such as bamboo, bohemia, rampe and banana in your surroundings and maintain them

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