

Annex B

Medical Institution Waste – Survey Results

The medical institution survey data for Kandy, Matale, Negombo, Chilaw, Gampaha, Nuwara Eliya and Badulla comes from the JICA Study undertaken for seven towns in Sri Lanka.

1. Kandy

There are eight hospitals within the Kandy Municipal Area (KMA), as well as a number of medical centres/dispensaries. A new private hospital (Aloka hospital) is currently in the early stages of construction along William Gopallawa Rd, although Kandy Municipal Council (KMC) is contesting whether this development should go ahead. The Abeysekera Maternity Hospital has closed and now functions as an international school. The main survey findings, including medical institution statistical data are summarized in Tables 1 and 2 and below:

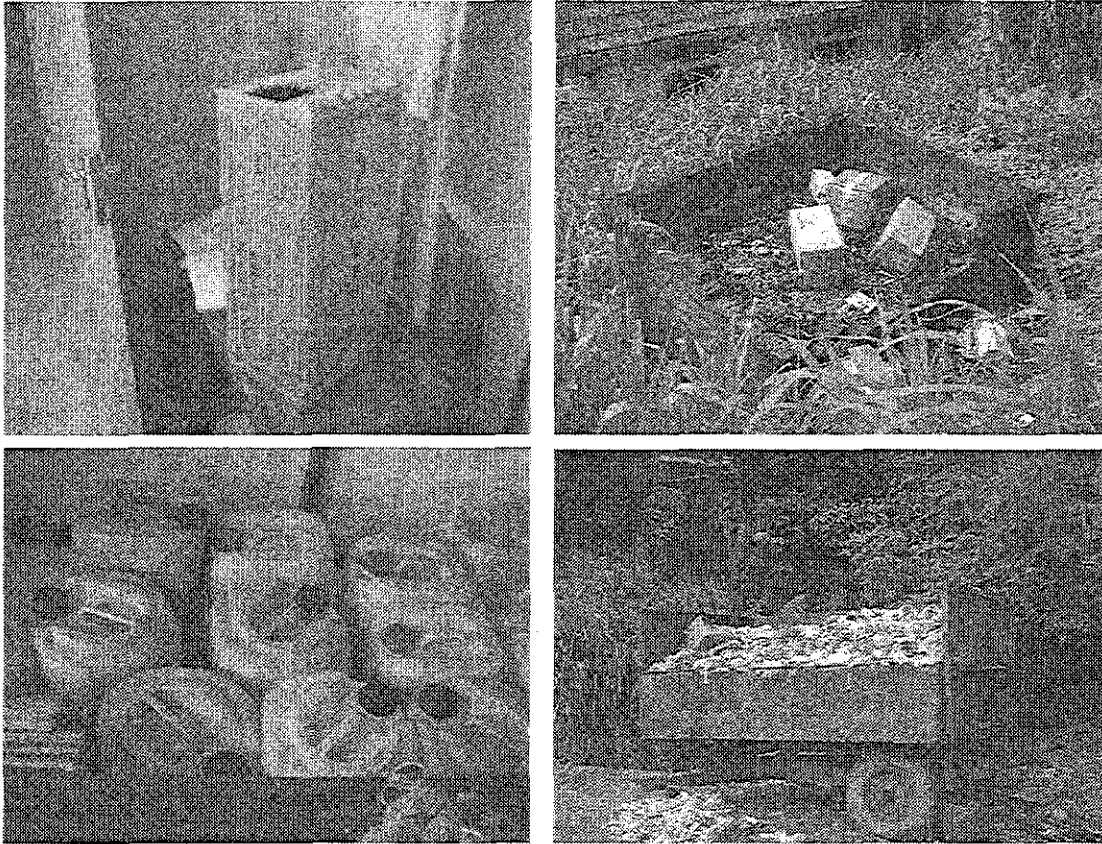
- (a) The combined medical institution facilities in Kandy are extremely large representing:
 - A total of 3,108 beds.
 - Average bed occupancy equivalent to 2,783 beds per day.
 - Average total clinical and outpatients of 5,082 patients per day.
 - Total staff of 4,790.Corresponding medical institution waste generation is estimated to be 4.9T/d, equivalent to 0.388 kg/(staff+patients).d.
- (b) Medical institution waste is highly organic with food/kitchen waste being the most common waste type, followed by paper, garden and healthcare hazardous waste.
- (c) Most normal waste is collected by KMC or Carekleen (Kandy General hospital only), although Peradeniya Teaching hospital and Kandy General hospital each dispose of around 30kg/d of their kitchen waste to the Peradeniya University and Ampitiya seminary piggeries respectively.
- (d) Only two medical institutions have an incinerator, which are used for the disposal of their healthcare hazardous waste.
 - The Dental hospital incinerator is a two chamber (0.84m³ total volume) incinerator. It is 3.5 years old and maintained by Peradeniya University. Its capacity is estimated to be at least 15-30kg per 6 hours, based on stated ash generation of around 6kg per two days by hospital waste management staff¹. It has a 7.6m high chimney, which is significantly shorter than the intended design height due to the presence of an overhead electricity cable during construction which has now been relocated underground. This means it can not be operated when teaching classes are being held in the third floor lecture room due to the resulting nuisance to students.
 - The Suwasevana incinerator has a capacity of 2kg/h, chimney of 3.7m height and normally operates for around 2h/d. It is relatively old.
- (e) Inadequate collection and disposal of healthcare hazardous waste is a serious problem, with significant quantities of healthcare hazardous waste being produced by both Kandy General and Peradeniya Teaching hospitals. Currently, these wastes are normally disposed of by burning and/or burial, except for the two medical institutions having incinerators. Two medical institutions also use autoclaves for the treatment of specimens and cultures prior to disposal.
- (f) Many medical institutions reuse waste containers. For example:
 - Saline bottles are reused, by cutting off the top and using as a container for collecting sputum samples.
 - Penicillin bottles are re-used for blood and urine specimen collection.
 - Cardboard boxes are used as sharps storage containers.
 - Plaster of paris tins are used as carbon dioxide jars.

¹ Assuming ash = 10-20% of input waste.

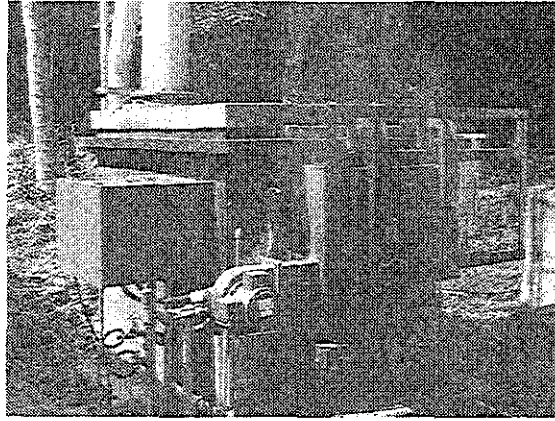
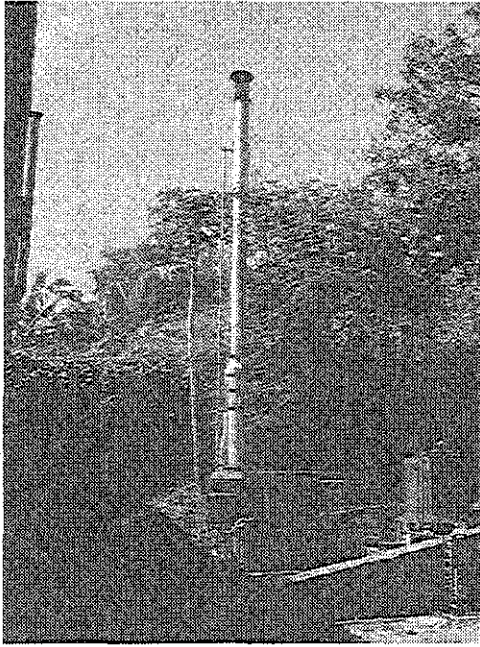
- (g) Both Kandy General and Peradeniya hospitals recycle most of their used plastic, glass and metal bottles/containers while Kandy General hospital also recycles newspaper and Peradeniya hospital coconut shells. These items are stored and then advertised for sale by tender at intervals ranging from three months to five years. Patients records and x-rays are kept for five years and then also sold by tender. Indicative data on the quantities of materials sold by tender was obtained from Peradeniya Hospital. Over 7 months, they sold 67,750 containers (plastic, glass and metal containers of various sizes), 605 kg of tins and 91 kg of cardboard. Kandy General hospital is likely to sell larger quantities of recyclable materials. However, no data could be obtained to verify this, other than them selling 200-300kg/mth of newspaper. Sale prices range from:
- Small plastic containers: 0.25-0.70 Rs ea.
 - Large plastic containers: 15-20 Rs ea.
 - Small glass bottles: 0.20-0.60 Rs ea.
 - Small tins: 0.10-0.30 Rs ea.
 - Large metal cans/tins: 5-20 Rs ea.
 - Cardboard: 0.75 Rs/kg
 - Coconut shells: 0.30 Rs ea.
- Total average recycling quantities are estimated to be 67kg/d.
- (h) Three hospitals (Lakeside, Kandy Private and Suwasevana) all pay garbage collection workers an unofficial collection fee ranging from 75-500Rs/yr.
- (i) Three out of eight medical institutions are dissatisfied with the existing garbage collection service, the main reasons being:
- Poor discharge system (3);
 - Collection time is too early or too late (2);
 - Problems of handling healthcare hazardous waste (1).
 - Garbage collection point is too far away (1);
 - Garbage collection/sweeping is not properly done (1);
 - Garbage collection/sweeping frequency is too low (1);
 - Lack of recycling (1)
- (j) *Desired SWM improvements ranked in descending order are:*
- | | WAR ² |
|--|------------------|
| • Improved collection and disposal of hospital hazardous waste | 7.5 |
| • More reliable garbage collection service | 5.0 |
| • Improved garbage discharge system | 4.5 |
| • Greater recycling/composting of garbage | 4.5 |
| • Education to change peoples' bad habits | 3.5 |
- Three hospitals (Peradeniya, Katugastota, Kandy General) specifically requested the provision of an incinerator, while the Dental hospital incinerator's chimney requires extension. The capacity of the two existing incinerators in the city is likely to be too small for any sharing arrangement between medical institutions to be feasible.
- These requests could possibly be addressed by constructing an incinerator at either the Kandy General or Peradeniya Teaching Hospitals for use by all medical institutions within KMA for the incineration of clinical, body parts, sharps and other infectious wastes, as appropriate. This matter is beyond KMC's jurisdiction, but KMC can recommend such a proposal to the Ministry of Health for further consideration.
- (k) Only two medical institutions were willing to pay for improved SWM services: Lakeside Adventist Hospital (>2000 Rs/mth) and Suwasevana Hospital 251-500 Rs/mth).

² WAR = weighted average rank

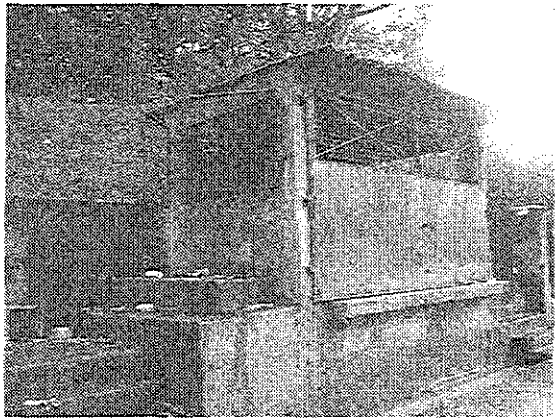
- (1) All medical institutions except Lakeside Adventist Hospital are very willing to cooperate in separating their waste into different categories, with one hospital (Peradeniya teaching hospital) partially doing this already.



Kandy General Hospital: Top left – improved cardboard box “sharps bin”; top right – on-site open burning of sharps; bottom right – plastic containers stored for auction; bottom left – stationary trailer garbage collection point



Dental Hospital Incinerator



Peradeniya Hospital: Top left – hospital normal garbage bins; top right – hospital garbage bin; bottom left – open burning of cardboard boxes, saline bottles and sharps; bottom left – some needles and syringes present on the ground near the burning pit.

Table Annex B-1 : KMA Hospital General Statistics and Waste Generation

Hospital	Type	No of Beds	Bed occupancy (%)	Out-patients (no/d)	Clinical patients (no/d)	Staff	Waste composition	Normal waste (kg/d)	Clinical waste (kg/mth)	Body parts (kg/mth)	Sharps (per month)	Highly infectious (/mth)	Other
Kandy General	Govt	2003	93	879	1,426	2,700	F/K>HH>P	2,700	900	ND	65 boxes	60 boxes	DM, MT, P, AC, R (R: 30kg/mth)
Peradeniya Teaching	Govt	830	80	782	580	1,400	F/K>P>M >Ga>HH	1,200	600	450	600 kg	360 kg	DM, MT, Pt, AC
Peradeniya Dental	Govt	36	100	150	60	130	F/K>P>PI> Ga	198	25	10-15	No = 55	Small	Chemicals (265L/mth)
Katugastota District	Govt	45	96	450	450	48	F/K>P>PI> HH	132	5	Small	ND	0	ND
Kandy Nursing Home	Private	24	100	55	0	80	Ga>F/K> HH	49	Small	5-6	15-20 kg	0	ND
Lakeside Adventist	Private	35	80	150	0	82	Not ranked	96	Small	ND	ND	ND	ND
Kandy Private	Private	35	100	25	0	100	F/K>GI> Ga>P	83	Small	2	ND	0	MT
Suwasevana	Private	100	90	75	0	250	F/K>P>PI> O>HH	276	Small	30	No = 600	ND	ND
Total		3,108		2,566	2,516	4,790		4,734	> 1,530	>500	>700 kg	>400 kg	Small

Notes:

1. Data for hospitals obtained from interviews with relevant staff members of each institute.
2. Average total number of beds occupied = Sum of (number of beds x bed occupancy rate) for all hospitals = 2783
3. Abbreviations: F/K = food/kitchen waste, Ga = garden, GI = glass, HH = healthcare hazardous waste, M = metal, O = other, P = paper, PI = plastic; AC = aerosol cans, DM = discarded medicines, MT = mercury thermometers, ND = no data, Pt = paint, R = radioactive waste.
4. An accuracy check has only been made on the amount of normal waste, with survey data being amended based on KMC waste collection data.

Table Annex B-2 : KMA Hospital Waste Disposal Practices

Hospital	Normal waste	Clinical waste	Body Parts and/or placentas	Sharps	Highly infectious	Other	WW-TP	Incinerator	Comments
Kandy General	Collected by Carekleen except for plastic, glass and metal bottles/ containers sold by tender & 30kg/d kitchen waste to Ampitiya seminary piggery	Specimens/ cultures autoclaved and disposed of as normal waste; IV sets, blood bags and HIV-suspected material burned in pit on-site	Body parts buried at Mahaiyawa cemetery; placentas collected by KMC Conservancy tractor	Collected separately in cardboard boxes and burned daily	As for clinical waste	As for normal waste	Yes ¹	No	Incinerator desired
Peradeniya Teaching	Collected by KMC except for 30kg/d kitchen waste to university piggery; plastic, glass and metal bottles/ containers and coconut shells sold by tender; garden waste burned/ open dumped	IV sets, saline and blood bottles stored and covered with soil 3 times/wk	Body parts, biopsies and placentas buried on site	Collected separately in cardboard boxes; stored, burned and covered with soil 3 times/wk	As for clinical waste	Discarded drugs and nuclear medicines burned	Yes ²	No ³	Incinerator desired
Peradeniya Dental	Collected by KMC	Incinerated				Collected/ incinerated	Yes	Yes	Chimney too low
Katugastota District	Collected by KMC	Burned			None	No data	No	No	Incinerator desired
Kandy Nursing Home	Collected by KMC	Wrapped in polythene bags and discharged with normal waste			None	No data	No	No	
Lakeside Adventist	Collected by KMC except for some plastic waste which is burnt on-site and minor recycling, with some plastic containers being returned to suppliers	All specimens and cultures autoclaved, then disposed of as normal waste or buried on site	Taken to cemetery for burial	Collected separately in cardboard boxes; burnt (Remi NB-01 needle burner) and disposed of as normal waste	See comments for clinical waste	No data	No ⁴	No	
Kandy Private	Collected by KMC or burned	Burned and buried			None	No data	No	No	
Suwasevana	Collected by KMC or burned	Burned or incinerated				Collected or burned/ incinerated	No	Yes	

Notes: 1 = WWTP (wastewater treatment plant) is present but no longer functioning; 2 = Sedimentation tank is out of service with alternative tank being used on a temporary basis; 3 = Peradeniya Teaching Hospital used to have an incinerator but this was abandoned about 2-3 years ago and is now overgrown; 4 = KMC has indicated they will not approve the hospital's expansion plans unless they install a WWTP.

2. Matale

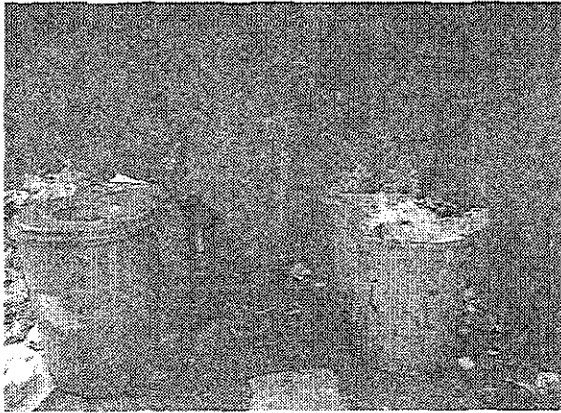
There are three (one government and two private) medical institutions within the Matale Municipal Area (MMA), as well as a number of medical centres/dispensaries. The main survey results, including medical institution statistical data are set out in Tables 3 and 4 and summarized below:

- (a) The combined medical institution facilities in Matale comprise:
 - A total of 535 beds.
 - Average bed occupancy equivalent to 483 beds per day.
 - Average total clinical patients and out-patients of 998 patients/day.
 - Total staff of 641.Corresponding medical institution waste generation is estimated to be 0.70T/d, equivalent to 0.328kg/(staff+patients).d.
- (b) Medical institution waste is highly organic with food/kitchen waste being the most common waste type, followed by cardboard and garden waste, paper, plastic and healthcare hazardous waste.
- (c) Most of the normal waste is collected by MMC.
- (d) Inadequate collection and disposal of healthcare hazardous waste is a serious problem, with small but significant quantities of healthcare hazardous waste being produced by Matale Base Hospital. Currently, most of these wastes are normally disposed of by burning/burial, although a very small quantity is sometimes discharged for collection by MMC (e.g. body parts, placentas for burial at the cemetery). No medical institutions have an incinerator.
- (e) The Base Hospital reuses waste containers. For example:
 - Penicillin bottles are re-used for blood and urine specimen collection.
 - Cardboard boxes are used as sharps storage containers.
 - Savlon bottles are collected and return to suppliers for refilling.
- (f) The Base Hospital recycles some of their used plastic, some glass bottles/ containers, tins and cans. These items are stored and then advertised for sale by auction at intervals ranging from two to five years. X-rays are kept for five years and then also sold by tender. However, no data could be obtained to verify these comments. Instead, recycling quantities were estimated on a pro rata basis from Peradeniya Teaching Hospital data, multiplied by a 0.5 factor to account for less materials being recycled here than at Peradeniya hospital.
- (g) The three medical institutions are dissatisfied with the existing garbage collection service, the main reasons being:
 - Garbage collection/sweeping is not properly done (3).
 - Irregular garbage collection/sweeping (3).
 - Poor discharge system (2).
 - Collection time is too early or too late (2).
 - Problems of handling healthcare hazardous waste (1).
 - No proper collection and disposal system (1).
- (h) Desired SWM improvements ranked in descending order are:
 - Improved collection frequency (weighted average rank (WAR) = 5).
 - Shorter distance to garbage collection point (WAR = 3.5).

- Greater recycling/composting of garbage = Improved garbage discharge system = control of stray animals (WAR = 2).
- Special methods for handling of healthcare hazardous waste (WAR = 1.5).

The collection and disposal of healthcare hazardous waste could possibly be improved by constructing an incinerator at the Matale Base Hospital for use by all three medical institutions within MMA for the incineration of clinical, body parts, sharps and other infectious wastes, as appropriate. This matter is beyond MMC's jurisdiction, but MMC can recommend such a proposal to the Ministry of Health for further consideration.

- (i) None of the medical institutions were willing to pay for improved SWM services but all three medical institutions are very willing to cooperate in separating their waste into different categories.



Matale Base Hospital garbage collection.

Table Annex B-3 : MMA Medical institution General Statistics and Waste Generation

Medical institution	Type	No of Beds	Bed occupancy (%)	Out-patients (no/d)	Clinical patients (no/d)	Staff	Waste composition	Normal waste (kg/d)	Clinical waste (kg/mth)	Body parts (kg/mth)	Sharps (kg/mth)	Highly infectious (kg/mth)	Other
Base hospital	Govt	520	90	704	292	632	F/K>Ga>P>PI>GI>HH	668	96	12	60 (12 boxes)	Small	MT (small)
Majan Medical Centre	Pvt	6	100	1	0	3	P>F/K>PI>HH	2	1	1	30	1	DM, AC (small)
K.M.P. Nursing Home	Pvt	9	100	1	0	6	F/K>Ga>HH	5	1	0.2	25	0	DM, MT, Pt (small)
Total		535	90.3	706	292	641		675	98	13.2	115	small	Small

Notes:

1. Data for medical institutions obtained from interviews with relevant staff members of each institute.
2. Average total number of beds occupied = Sum of (number of beds x bed occupancy rate) for all medical institutions = 483
3. Abbreviations: F/K = food/kitchen waste, Ga = garden, GI = glass, HH = healthcare hazardous waste, O = other, P = paper, PI = plastic; AC = aerosol cans, DM = discarded medicines, MT = mercury thermometers, ND = no data, Pt = paint.
4. An accuracy check has only been made on the amount of normal waste for the Base Hospital, with survey data being amended based on MMC waste collection data.

Table Annex B-4 : MMA Medical institution Waste Disposal Practices

Medical institution	Normal waste	Clinical waste	Body Parts and/or placentas	Sharps	Highly infectious	Other	WWTP	Incinerator	Comments
Base Hospital	Collected by MMC except for plastic/metal tins/containers and x-rays, which are sold by auction	Buried on site	Placentas and body parts buried on site or taken to cemetery	Collected separately in cardboard boxes and burned	As for clinical waste		No	No	Incinerator desired, training
Majan Medical Centre	Collected by MMC	Collected by MMC	No data	Collected separately in bags and burned	Burned	Discarded drugs burned	Yes	No	Recycling, legal actions against law breakers
K.M.P Nursing Home	Take to MMC collection point	As for normal waste			None	No data	No	No	Recycling

3. Negombo

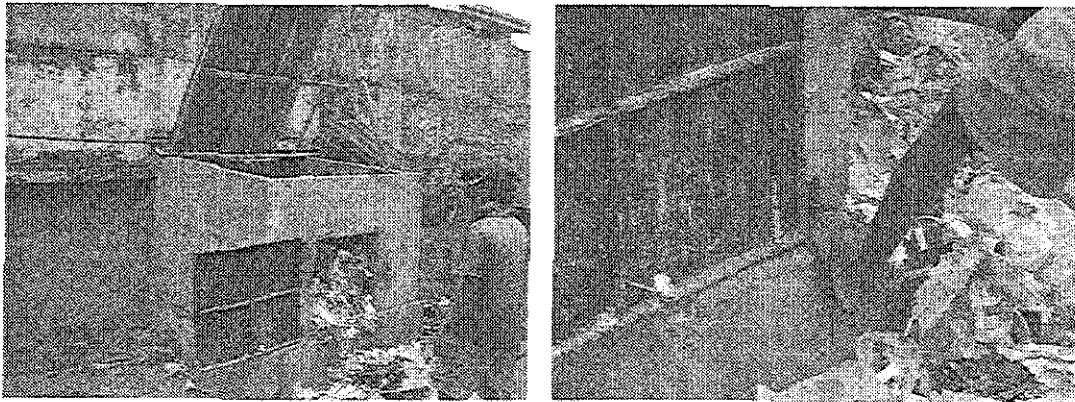
There are five medical institutions within the Negombo Municipal Area (NMA), as well as a number of medical centres/dispensaries. The Maternity Hospital at Thaladena now functions as a Central dispensary. The main survey findings, including medical institution statistical data are set out in Tables 5 and 6 and summarized below:

- (a) The combined medical institution facilities in Negombo are :
- A total of 510 beds.
 - Average bed occupancy equivalent to 452 beds per day (89%).
 - Average total clinical and outpatients of 1,550 patients per day.
 - Total staff of 474.
- Corresponding medical institution waste generation is estimated to be 0.88T/d, equivalent to 0.356kg/(staff+patients).d.
- (b) Paper is the most common waste type, followed by plastic, cardboard, food/kitchen, garden and healthcare hazardous waste.
- (c) Most normal waste is collected by the Negombo Municipal Council (NMC), except for the *Dissanayake Private hospital and Central dispensary (Thaladena)*, who are not provided with a collection service and dispose of around 64kg/d of their waste mainly by burning.
- (d) Currently, most of the healthcare hazardous wastes are normally disposed of by burning and/or burial on-site, except for the *Manthri Nursing Home and Ave Maria Hospital* who dispose some-all of their hazardous wastes with normal garbage. However, the *Manthri Nursing Home* does use a needle burner for sterilizing its sharps before disposal. No medical institutions have an incinerator.
- (e) Two out of the three medical institutions whose waste is collected by NMC are satisfied with the present waste collection system. The *Base hospital* is not satisfied, mainly complaining about the condition of the NMC trailer they currently use.
- (f) The *Base Hospital* reuses waste containers. For example:
- Saline bottles are reused as containers for collecting urine.
 - Penicillin bottles are re-used for blood and urine specimen collection.
 - Cardboard boxes are used as sharps storage containers.
- (g) The *Base hospital* recycles some of their used plastic/glass/metal containers/bottles and coconut shells. These items are stored and then advertised for sale by auction 2-3 times per year. Indicative data on the quantities of materials sold by tender was obtained from *Base Hospital*, showing they recycle around 20kg/mth of plastics, 300 saline bottles/mth, 1,500 bottles/mth and 2,400kg/mth of coconut shells. About 240kg/mth of cardboard boxes are reused internally as described above (included in recycling).
- (h) Two medical institutions (*Manthri and Ave Maria hospitals*) pay garbage collection workers an unofficial collection fee ranging from 3,500-6,000Rs/yr.
- (i) Desired SWM improvements ranked in descending order are (numbers shown are weighted average ranks (WAR) for desired improvements):
- | | |
|--|-----|
| • Improved garbage discharge system | 7.0 |
| • Improved collection frequency | 6.0 |
| • Education to change peoples' bad habits | 4.0 |
| • Greater recycling/composting of garbage | 3.5 |
| • Shorter distance to garbage collection point | 3.0 |

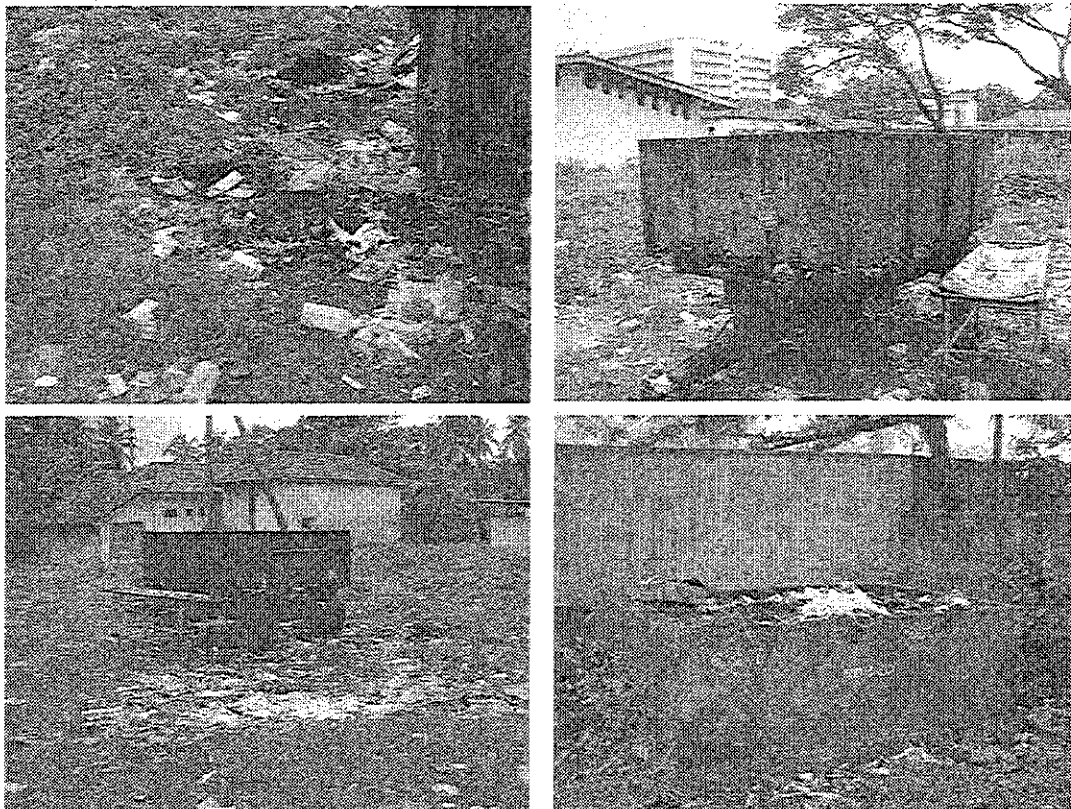
- Inspection of waste management systems in institutes by NMC 2.5
- Improved collection and disposal of hospital hazardous waste 2.0
- Improvement of landfill operation 2.0

The collection and disposal of healthcare hazardous waste could possibly be improved by constructing an incinerator at the Negombo Base Hospital for use by all medical institutions within NMA for the incineration of clinical, body parts, sharps and other infectious wastes, as appropriate. This matter is beyond NMC's jurisdiction, but NMC can recommend such a proposal to the Ministry of Health for further consideration. If this is not possible, a covered trailer should at least be provided for storage and transportation of the Base Hospital's waste. NMC have requested the Health Authorities to provide such a trailer but have yet to receive a response.

- (j) Three medical institutions were willing to pay for improved SWM services: Ave Maria Hospital (2,000Rs/mth), Dissanayake Hospital (2,500Rs/mth) and Manthri Nursing Home (2,000Rs/mth).
- (k) All medical institutions are very willing to cooperate in separating their waste into different categories for recycling, if requested.



Ave Maria Hospital – note syringe by labourers foot in photo on right.



Negombo Base Hospital: Top and bottom left – stationary trailer; bottom right – sharps and clinical waste burning area.

Table Annex B-5: NMA Medical institution General Statistics and Waste Generation

Medical institution	Type	No of Beds	Bed occupancy (%)	Out-patients (no/d)	Clinical patients (no/d)	Staff	Waste composition	Normal waste (kg/d)	Clinical waste (kg/mth)	Body parts (kg/mth)	Sharps (per month)	Highly infectious (/mth)	Other
Base Hospital	Govt	437	89	804	325	355	F/K>PI>P>HH	509	1350	Pla - 300 Oth - 8	1050kg	Small	Small
Govt Central Dispensary, Thalahena	Govt	4	0	70	100	4	Ga>PI>P>F/K>HH	10	4	0	0	0	0
Ave Maria Hospital	Private	40	90	87	30	40	P>F/K>GI>PI>HH	175	Small	ND	ND	Small	0
Dissanayake Hospital	Private	20	90	12	0	50	PI>P>Ga>H>F/K	54	10	Pla - 4 Oth - 1	20 (no)	Small	0
Manthri Nursing Home	Private	9	98	120	1.7	25	P>PI>HH	10	30	Pla - 4 Oth - 0	Small	0	0
Total		510	89	1093	457	474		758	1,394	Pla - 308 Oth - 9	~1,060 kg	Small	Small

Notes:

1. Data for medical institutions obtained from interviews with relevant staff members of each institute.
2. Average total number of beds occupied = Sum of (number of beds x bed occupancy rate) for all medical institutions = 452.
3. Abbreviations: F/K = food/kitchen waste, Ga = garden, GI = glass, HH = healthcare hazardous waste, P = paper, PI = plastic; ND = no data, Pla = placentas.
4. An accuracy check has only been made on the amount of normal waste, with survey data being amended based on NMC Supervisor comments.

Table Annex B-6 : NMA Medical institution Waste Disposal Practices

Medical institution	Normal waste	Clinical waste	Body Parts and/or placentas	Sharps	Highly infectious	Other	WW-TP	Incinerator	Comments
Base Hospital	Collected by NMC except for plastic/glass/metal bottles/containers & coconut shells which are sold by auction, plus some cardboard boxes are reused.	Buried or burned in a cement tank on-site	Body parts and placentas are buried on-site.	Collected separately in cardboard boxes and burned daily	Collected separately and burned daily	Collect separately and burned	Yes	No	Closed trailer desired
Govt. Central Dispensary	Burned and buried on-site	Burned and buried on-site	None	None	None	None	No	No	
Ave Maria Hospital	Collected by NMC or burned	Collected by NMC	Placentas are buried on-site.	Collected by NMC	Collected by NMC	None	No	No	
Dissanayake Hospital	Burned on-site	Burned	Buried on-site	Burned	No answer	None	No	No	
Manthri Nursing Home	Collected by NMC	Collected by NMC	Placentas are buried on site	Collected by NMC	None	None	No	No	

4. Chilaw

There are three main medical institutions within the Chilaw Urban Area (CUA), as well as a number of medical centres/dispensaries. The main survey findings for these three medical institutions only, including medical institution statistical data, are set out in Tables 7 and 8 and summarized below:

(a) The combined medical institution facilities in Chilaw are :

- A total of 488 beds.
- Average bed occupancy equivalent to 380 beds per day (78%).
- Average total clinical and outpatients of 1,372 patients per day.
- Total staff of 569.

Corresponding medical institution waste generation is estimated to be 0.79T/d, equivalent to 0.339kg/(staff+patients).d.

(b) Food/kitchen waste is the most common waste type, followed by paper, plastic, other (not specified), garden, cardboard and glass waste. Healthcare hazardous waste was listed as the sixth most common waste type by two medical institutions.

(c) Most normal waste is collected by the Chilaw Urban Council (CUC), except for small quantities of plastic/glass bottles/containers recycled by the Chilaw Base Hospital and Chilaw Clinic, as described further below.

(d) Currently, the Base Hospital disposes of most of its healthcare hazardous wastes (clinical waste, body parts, placentas, sharps, highly infectious wastes) by burning and/or burial on-site, either in a pit or old local incinerator (theatre wastes). The Chilaw Clinic and St Mary's Nursing Home³ produce very small quantities of healthcare hazardous wastes which are discharged for collection by CUC except for body parts (Chilaw Clinic buries these on-site) and sharps which the St Mary's Nursing Home burns on-site.

(e) The Base Hospital reuses waste containers. For example:

- Saline and penicillin bottles are reused (e.g. as containers for blood and urine specimen collection).
- Cardboard boxes are used as sharps storage containers.

(f) The Base hospital recycles some of their used plastic/glass containers/bottles and coconut shells. These items are stored and then advertised for sale by auction at six month intervals for containers/bottles and approximately every two years for coconuts. Indicative data on the quantities of materials sold by tender was obtained from the Base Hospital, showing they recycle around 10,000 plastic containers, 500-1,000 glass syrup bottles and 10,000 glass vials per six months. The Chilaw Clinic also recycles around 1,000 glass bottles on an irregular basis.

(g) The Chilaw Clinic and St Mary's Nursing Home pay garbage collection workers an unofficial collection fee of 300 and 2,000Rs/yr respectively.

(h) None of the three medical institutions whose waste is collected by CUC are satisfied with the present waste collection system, the main reasons being the collection frequency is too low (2), collection is irregular (1) or not properly done (1), the collection point is too far away (1) and a lack of recycling (1).

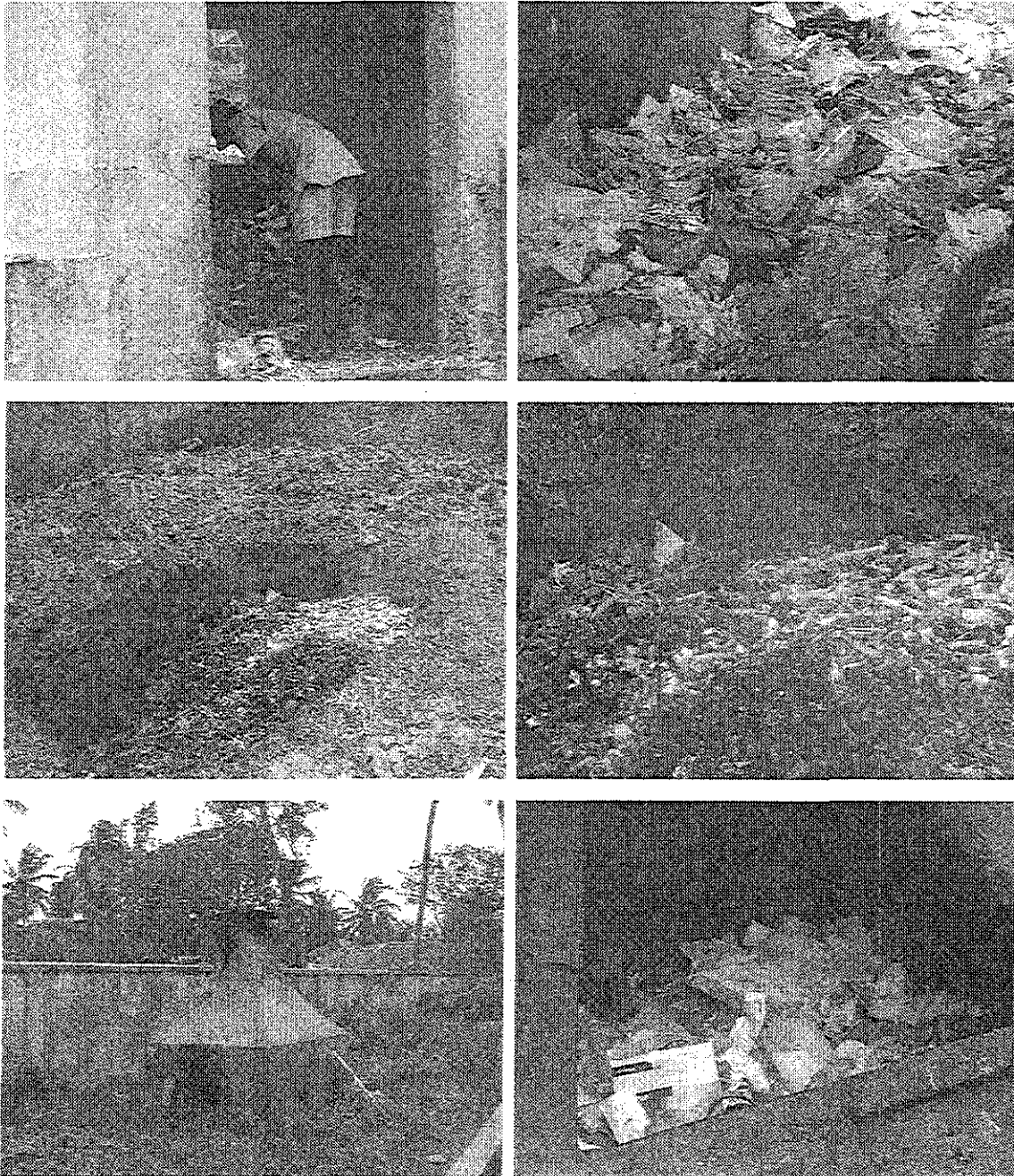
³ Sometimes referred to as Dr Washington's Hospital.

- (i) Desired SWM improvements ranked in descending order are (numbers shown are weighted average ranks (WAR) for desired improvements):
- Improved garbage discharge system 5.5
 - Greater recycling/composting of garbage 4.0
 - Improved collection frequency 3.0
 - Education to change peoples' bad habits 3.0
 - Shorter distance to garbage collection point 2.0
 - Improved collection and disposal of hospital hazardous waste 2.0

The Base Hospital would also like a proper incinerator, while it needs financial assistance to implement the colour coded garbage discharge system recommended by the Ministry of Health and to provide hospital labourers with appropriate garbage collection equipment (e.g. gloves).

The collection and disposal of healthcare hazardous waste could possibly be improved by constructing a proper incinerator at the Chilaw Base Hospital for use by all three medical institutions within CUA for the incineration of clinical, body parts, sharps and other infectious wastes, as appropriate. This matter is beyond CUC's jurisdiction, but CUC can recommend such a proposal to the Ministry of Health for further consideration.

- (j) The two private medical institutions were both willing to pay for improved garbage collection services: Chilaw Clinic (1,200Rs/mth), and St Mary's Nursing Home (2,000Rs/mth). The Base Hospital said that this question should be referred to the Deputy Director of Health Services, Western Province for a response.
- (k) The Base Hospital and St Mary's Nursing Home are very willing to cooperate in separating their waste into different categories for recycling, if requested, while the Chilaw Clinic said the medical institution owner should be contacted for a response to this question.



Chilaw Base Hospital: Top – hospital concrete garbage collection bin; middle – pit where sharps and some other hospital hazardous waste is burnt; bottom – old local incinerator used for burning theatre wastes.

Table Annex B-7 : CUA Medical institution General Statistics and Waste Generation

Medical institution	Type	No of Beds	Bed occupancy (%)	Out-patients (no/d)	Clinical patients (no/d)	Staff	Waste composition	Normal waste (kg/d)	Clinical waste (kg/mth)	Body parts (kg/mth)	Sharps (per month)	Highly infectious (/mth)	Other
Base Hospital	Govt	460	77	774	418	531	F/K>P>Pl	673	Clin + BP: 960 Plac: 432		259	34	Small
Chilaw Clinic	Private	8	100	60	10	6	O>Gl>Pl>P	20	Small	Small (no plac)	Small	0	Small
St Mary's Nursing Home	Private	20	100	100	10	32	F/K>Ga>P>Pl	25	0.8	BP: 1 Plac: 5	Small	0	Small
Total		488	78	934	438	569	F/K>P>Pl>O	718	Clin + BP: ~962 Plac: 437		~259	34	Small

Notes:

1. Data for medical institutions obtained from interviews with relevant staff members of each institute.
2. Average total number of beds occupied = Sum of (number of beds x bed occupancy rate) for all medical institutions = 452.
3. Abbreviations: F/K = food/kitchen waste, Ga = garden, Gl = glass, HH = healthcare hazardous waste, O = other, P = paper, Pl = plastic; BP = body parts, Clin = clinical, Plac = placentas.
4. An accuracy check has only been made on the amount of normal waste, with survey data being amended based on CUC data, as required.

Table Annex B-8 : CUA Medical institution Waste Disposal Practices

Medical institution	Normal waste	Clinical waste	Body Parts and/or placentas	Sharps	Highly infectious	Other	WW-TP	Incinerator	Comments
Base Hospital	Collected by CUC except for some recycling of plastic/glass containers/bottles and coconut shells.	Burned on site	Body parts are burned on-site, while placentas are buried on-site.	Burned on site	Burned on site	No answer	Yes (see note)	No	Would like proper incinerator and financial support to set up colour coded waste discharge system.
Chilaw Clinic	Collected by CUC except for some recycling of glass bottles.	Collected by CUC	Buried on site	Collected by CUC	Not applicable	No answer	No	No	
St Mary's Nursing Home	Collected by CUC.	Collected by CUC	Collected by CUC	Burned on site	Not applicable	No answer	No	No	

Note: The Base Hospital burns healthcare hazardous wastes on-site either in a pit or local incinerator (refer photos). It's wastewater treatment plant (WWTP) has been out of service for about three years (CUC PHI).