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Health Care Waste Management Strategies at Sangini Outlets

Submitted by: Health Care Foundation Nepal

February 2014

USAID Contract No. AID-367-C-10-00001

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Deliverables:

- HCWM Strategy
- Monitoring and Evaluation Strategy
- Sustainability Strategy
- Training Strategy
- Training Manual Outline
- Job Aids
- Estimated budget

Health Care Waste Management Program

Health Care Foundation Nepal (HECAF)

February 2014

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About the Document:

This document was prepared by Health Care Waste Management Program of Health Care Foundation Nepal (HECAF) upon the completion of the project "Health Care Waste Management in Sangini Outlets of Mugu, Syangja and Sunsari districts of Nepal". The document consists of the particulars listed below:

- Health Care Waste Management Strategy Document
- Monitoring and Evaluation Strategy Document
- Sustainability Strategy Document
- Training Strategy Document
- Training Manual Outline
- Job Aids
- Estimated Budget and Logistics Sheets

Health Care Waste Management Strategy

1 Health Care Waste Management Strategy for Sangini Outlets

1.1 *Introduction*

Health care waste is one of the most pressing issues in the health sector at the moment. The World Health Organization (WHO) defines health care waste as all waste generated within health care facilities, research centers and laboratories related to medical procedures. 85% of the waste produced from health care facilities can be categorized as non risk waste and the remaining waste is categorized as infectious waste (10%) and hazardous waste (5%). The latter 15% may pose risk to the public and to the environment. Most health care facilities in developing countries burn health care waste or dump it in the municipal waste stream. For these reasons, the institution of proper health care waste management (HCWM) systems is a necessity for all nations of the world.

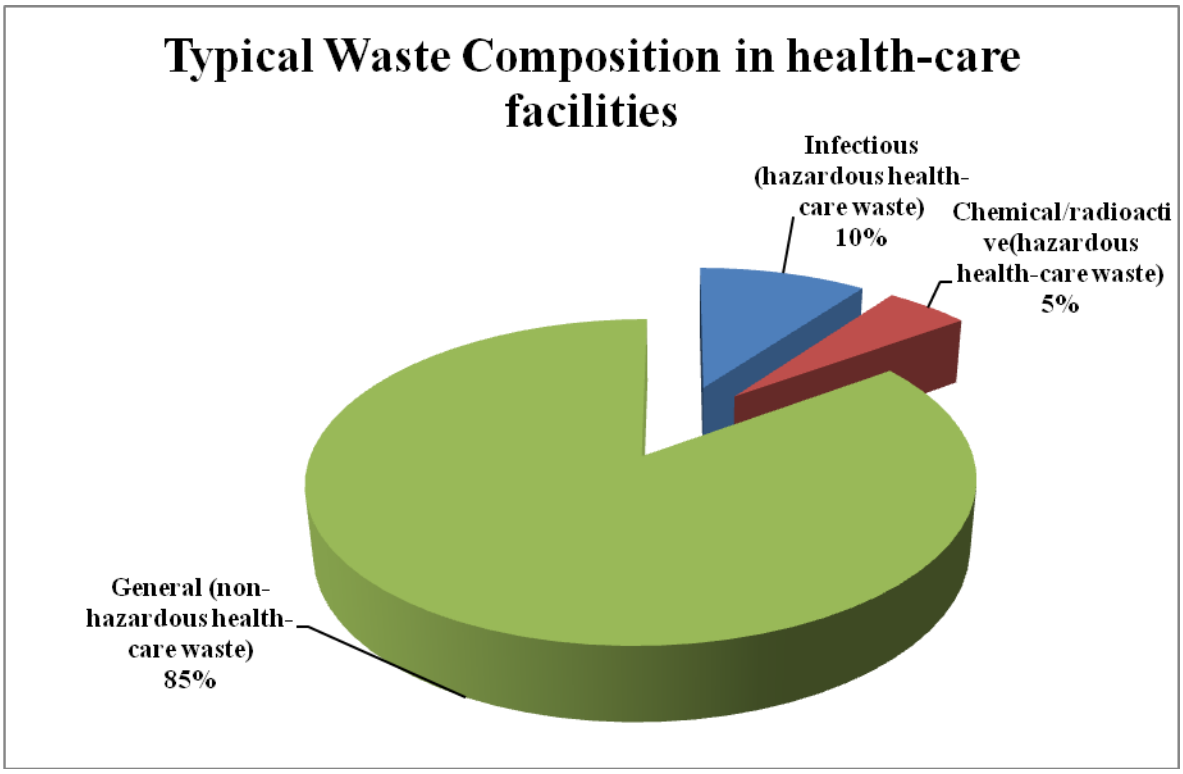


Figure 1: Waste composition in health care facilities, WHO estimation

Sangini outlets are private facilities that administer injectable contraceptives made available to them by the Contraceptive Retails Sales (CRS) center. These outlets use a lot of syringes and have no proper means of managing the infectious waste they generate. Most of the syringes that come out of these outlets are burnt or just open dumped. The contaminated needles pose various risks to public health. HECAF has prepared a comprehensive HCWM strategy to mitigate existing risks.

1.2 *Objective*

Our primary objective is to provide a framework for actions to implement safe HCWM systems at all Sangini outlets in Nepal such that waste generated at the outlets inflicts no harm to public and environmental health.

1.3 *Guiding principles*

The envisioned strategy is driven by the following principles:

- **Waste minimization**: Health care facilities can and should generate less waste by embracing reduce, reuse and recycle strategies
- **Safe injection**: Health care facilities can and should make provisions to prevent needle-related injuries to staff and public
- **Non-burn principle**: Health care facilities should not burn any of their waste to avoid production of Persistent Organic Pollutants (POPs) such as dioxins and furans
- **Participation**: HCWM must use a participatory approach throughout planning and implementation—that is, health care facility staff must be involved in understand and selecting strategies from the earliest planning stages through completion and implementation. This strategy builds buy-in and ensures that staff will follow HCWM procedures carefully.
- **Training and capacity building:** Safe HCWM requires a well-trained workforce that understands the reasons for HCWM practices for their own safety and the safety of the public. Only with a capable workforce will optimum efficiency be achievable
- **Technological Enhancement:** HCWM should use green technology and local resources to reduce its carbon footprint

1.4 *Key strategies that will help achieve the objective*

- Cooperation with local level and central government agencies, nongovernmental organizations, CBOs, CSOs, public and relevant stakeholders to develop an institutional framework for the implementation of HCWM systems at Sangini Outlets
- Capacity building and strengthening of service providers at Sangini Outlets to increase awareness and eventually induce positive behavior change regarding HCWM
- Targeted, phased implementation of new HCWM systems in Sangini outlets all over Nepal
- Regular quality enhancement using good information to identify technologies that are more environmentally friendly and can contribute to reduction of carbon footprint at national level
- Periodic monitoring and evaluation of the efficacy of the HCWM systems in place

1.5 *Institutional framework*

The following institutional framework informs HCWM implementation at Sangini Outlets:

- The Department of Health Services (DoHS) coordinates implementation of all health programs in the country
- District Health Offices are responsible for implementation and monitoring of HCWM activities
- Sangini Outlets are private small scale outlets that function independently but are required to be responsive to policies regarding HCWM framed by the government or the district
- Contraceptive Retail Sales (CRS) Company coordinates with DoHS to provide contraceptives for sale and, in this capacity, conducts regular monitoring visits to evaluate the performance of the Sangini Outlets
- Family Health International (FHI) and HECAF will jointly implement all proposed HCWM systems in coordination with the local District Public Health Office (DPHO), municipality or VDC.

To garner support from a large stakeholder base, the following additional institutional components are proposed:

- A district level HCWM Committee will be formed, to be chaired by the Chief of the DPHO and to consist of representatives from the DPHO, Municipality/VDC, Sangini Outlets, CRS Company, local NGOs and other relevant stakeholders
- DPHO will also oversee and monitor the implementation of HCWM activities at Sangini Outlets and enforce policies and rules regarding HCWM. DPHO will eventually replicate such systems at other health care facilities.
- Service providers of Sangini Outlets will be responsible for HCWM at their respective facilities
- Local large scale hospitals and medium size health care facilities will participate in the treatment and disposal of HCWM as hub centers—that is, health care waste from Sangini Outlets may be transported to them so that the waste can be disposed of safely and effectively. Where that is unfeasible, small scale Primary Health Centers, Health Posts and Sub-health Posts will serve as hub centers for HCWM
- Local governments, municipalities and VDCs will participate as co-partners and will aid in enforcement of policies pertaining to HCWM
- Local NGOs will aid in implementation of HCWM systems by increasing awareness about the dangers of health care waste.

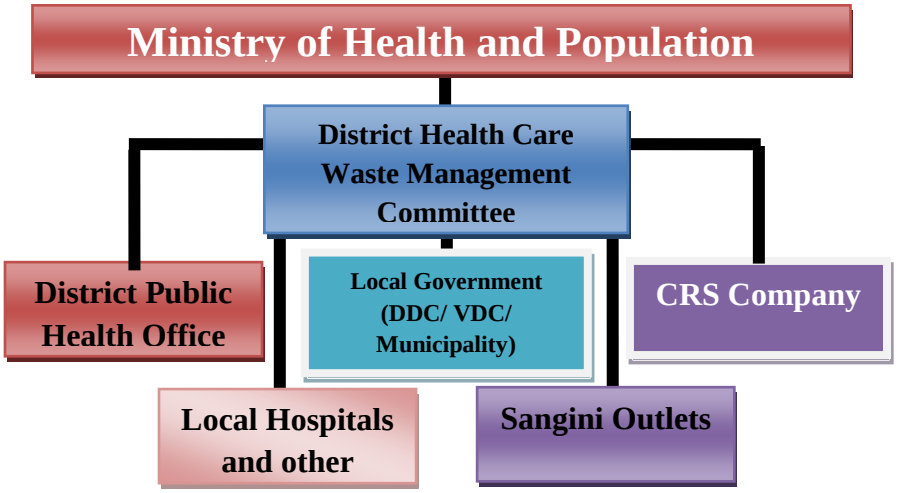


Figure 2: Institutional framework for health care waste management at sangini outlets

1.6 *Envisioned roles of various institutions*

Table 1: Roles of various institutions for managing health care waste generated from Sangini outlet

S No	Institutions and agencies	Key roles and responsibilities
1	District Level Coordination Committees	• Endorses the action plan for implementation of HCWM at Sangini outlets • Makes policy recommendations to responsible agencies to facilitate the implementation of HCWM at Sangini Outlets • Endorses HCWM guidelines and approves all HCWM related activities at Sangini Outlet • Disseminates knowledge and actively participates in awareness raising activities regarding HCWM at Sangini Outlets • Makes provisions for monitoring and evaluation of implemented HCWM systems in their respective districts
2	District Public Health Offices	• Facilitates the implementation of HCWM in all Sangini Outlets in their respective districts • Through its health inspectors, actively monitors and evaluates the implementation process • Acts as a source for knowledge dissemination and awareness raising
3	Local Government (DDC/ Municipality and VDC)	• Provides support for coordination with stakeholders • Enforces relevant policy regarding HCWM • Co-partners the initiative with DPHO • Is responsible for monitoring and evaluation
4	FHI	• Provides financial and technical support • Facilitates coordination with relevant line agencies • Facilitates coordination with affiliated CRS outlet networks • Assists with monitoring and evaluation
5	HECAF	• Carries out research, data collection and other activities necessary to evaluate HCWM Sangini outlets • Designs new effective and efficient HCWM systems for Sangini Outlets • Coordinates stakeholders and decision-making • Provides technical support to implement HCWM in Sangini Outlets • Sensitizes all involved and relevant stakeholders about HCWM • Builds capacity of service providers at Sangini Outlets

		• Organizes awareness raising events on HCWM • Prepares an up to date report of activities and presents them to FHI and other relevant agencies as necessary • Carries out a Technical Audit and Evaluation of Implemented HCWM systems
6	Sangini outlets	• Carry all HCWM activities at the outlets • Responsible for collection and transport of all waste generated • Carry our record keeping of amounts of waste generated according to recommended categories and reports to CRS • Maintain waste collection equipment and treatment facility (where applicable) and carry out necessary logistical replacement of equipment
7	CRS Company	• Conducts regular monitoring visits of Sangini Outlets • Coordinates with HECAF for implementation and technical intervention post-implementation if necessary. • Coordinates with DPHO for review • Shares knowledge regarding status of HCWM at Sangini Outlets after monitoring visits
8	Other Hospitals and Small Health Facilities	• Participate in the initiative • Facilitate set up of Central Treatment Facility (a HCWM hub)

1.7 *Proposed action plan*

1. **Coordination with stakeholders**: The stakeholders will meet with relevant government agencies and officials such as the DPHO, Chief District Officer, Local Development Officer and others to garner support for the implementation of safe HCWM practices in Sangini Outlets. Other coordination meetings will be organized for service providers, other governmental agencies working in the health sector and relevant stakeholders
2. **Formation of a District Level health care waste coordination committee**: A District Level Health Care Waste Coordination Committee will be formed for better coordination for HCWM activities. The committee will be chaired by the Chief of the DPHO and will include

members from municipalities, VDC's, Sangini outlets, CRS companies, other NGOs and relevant stakeholders

3. **Selection of demonstration sites:** Model systems will be developed in each district. Site selection will be based on location, space availability and willingness to take a lead
4. **Sensitization:** Sensitization efforts in the form of formal and informal orientations and discussions will be organized for service providers at the Sangini Outlets that are selected as demonstration sites. The trainings and orientations will introduce service providers to the current scenario of HCWM in Nepal and the hazards of improper health care waste management. Orientations and interactions will also be conducted to sensitize government officials and all relevant stakeholders.
5. **Trainings/capacity building:** Various hands-on practical trainings will be organized to build the capacity of health care workers and other related professionals. The trainings will include theoretical sessions that will introduce trainees to the dynamics between waste and environment, occupational health and safety (that is, the danger to health facility workers of improper HCWM), and the public hazards of improper HCWM. Trainees will also participate in practical sessions on how to use the segregation systems, needle destroyers, recycling systems, waste handling and autoclaving.
6. **Equipment procurement:** The project will procure required equipments for the proposed HCWM systems through a transparent bidding system. Local vendors and local resources will be given priority during the process.
7. **System Implementation:** With consent from the selected Sangini Outlets, the project will implement the HCWM systems. Various model of HCWM will be designed and will be used as per their efficacy, applicability and their cost effectiveness. Please refer to Annexes 1, 2 and 3 for diagrammatic representations. The waste management systems will follow designated standard guidelines:
    a. **Waste segregation:** Following WHO guidelines, waste will be segregated into general waste, infectious waste, pharmaceutical waste and sharps waste. Syringes will be destroyed using a needle cutter and the waste generated through this process will subsequently be disinfected using an autoclave.

b. **Collection and Handling:** Frequency of collection will be determined as per need. A full set of Personal Protective Equipment (PPE) including cap, mask, eye protective, apron, gloves, and other equipment will be mandatory for all workers involved in managing health care waste.

c. **Transportation**: Transportation systems will be developed as per WHO guidelines. In Mugu, where wheeled transportation is not possible, waste will be transported manually in designated puncture proof, leak proof, rigid containers. In case Sunsari and Syangja, vehicles customized according to WHO guidelines will be used to transfer waste to treatment facilities.

d. **Treatment:** Innovative technologies to manage health care waste will be used as is appropriate and useful in specific outlets. At locations where conditions allow, centralized waste treatment systems—or hubs—will be developed. Each hub will be furnished with an autoclave. At locations where a hub system isn't possible, decentralized treatment facilities with smaller autoclaves will be instituted. Where autoclaves are unfeasible, branded and validated pressure cookers will be used as a substitute. (Please refer to Annex for various models of HCWM)

e. **Storage:** After disinfection and/or appropriate treatment to remove risk to human health, all waste will be stored in containers that are readily available in local conditions. These may include rice sacks that would otherwise be sent for recycling. Regarding waste that is stored prior to being sent for recycling, If the volume is not significant, the outlet can collaborate on recycling with other local institutions

f. **Final Disposal:** When appropriate, general waste, including infectious waste that has been disinfected, will be sent for recycling. Briquettes of paper waste can be formed to facilitate disposal of these materials. Handicrafts can be made using plastic waste (this is often a good activity for patients requiring occupational therapy). Decontaminated needles will be encapsulated or buried to eliminate risk of needle pricks.

8. **Preparation of Standard Operating Procedures (SOP):** A statement of SOP will be prepared with technical guidance from the project team. The SOP will delineate detailed written instructions that provide uniformity to the performance of the HCWM system.
9. **Monitoring and Evaluation:** A monitoring and evaluation checklist will be developed. The frequency of monitoring and evaluation will be determined as per need. (please refer to the Monitoring and Evaluation Strategy for details)
10. **Replication:** After the consent of healthcare workers at other Sangini outlets, in coordination with local DPHO, the process will be replicated at all Sangini outlets.

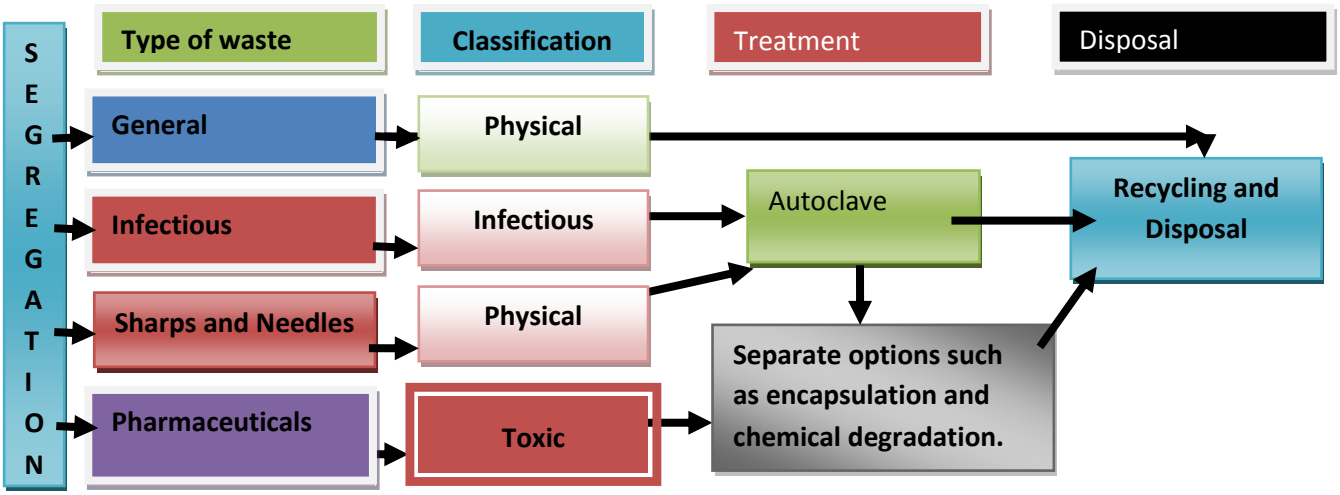


Figure 3: Comprehensive Health Care Waste Management Strategy for Sangini Outlets

Monitoring and Evaluation Strategy

2 Monitoring and Evaluation Strategy

A comprehensive monitoring and evaluation strategy will provide a framework for all monitoring and evaluation activities during implementation of HCWM in Sangini Outlets using the following framework:

2.1 Proposed monitoring and evaluation framework

1. **Establishment of milestones and indicators to measure changes**: Specific milestones and indicators will be established so that there is a common agreement on how improvements are determined. Milestones may be implementation of activities in the Action Plan or they may be achievement of specific criteria in a timely manner. Indicators may involved physical parameters (eg. waste collected or waste properly disposed of) and non physical parameters (eg. training completed or changes in outlet staff mentality as regards handling of health care waste)
2. **Baseline survey of state of HCWM:** A baseline survey of each Sangini outlet will be conducted. The survey will give a clear picture of the volume and weight of waste generated, current practices in handling and segregation, methods of treatment and disposal and the status of occupational safety in individual outlets. Such information will help plan for suitable HCWM systems; while an overall system will be offered, it will be tailored to respond to the individual needs and conditions of individual outlets.
3. **Regular Audit and Data Collection**: We will coordinate with DPHO to collect data to measure the efficacy of the implemented HCWM systems. Auditors will use the developed checklist to record their observations. The use of a standardized checklist will ensure that data relating to a standard set of markers will be collected and then can be used to evaluate progress in each outlet as well as to compared conditions at various outlets (refer to attached annex). We will report the findings to DPHO, the HCWM committee and other relevant stakeholders.
4. **Comparison with earlier stages to determine achievements:** The data collected by auditors will be analyzed and compared to earlier data to determine the success of the actions. The data analysis will also help plan for future actions.

5. **Action**: If the achievements don't meet or exceed the set goals, activities will be planned to remedy the gap. Various refresher trainings, systemic upgrades and maintenance activities will be conducted as required.

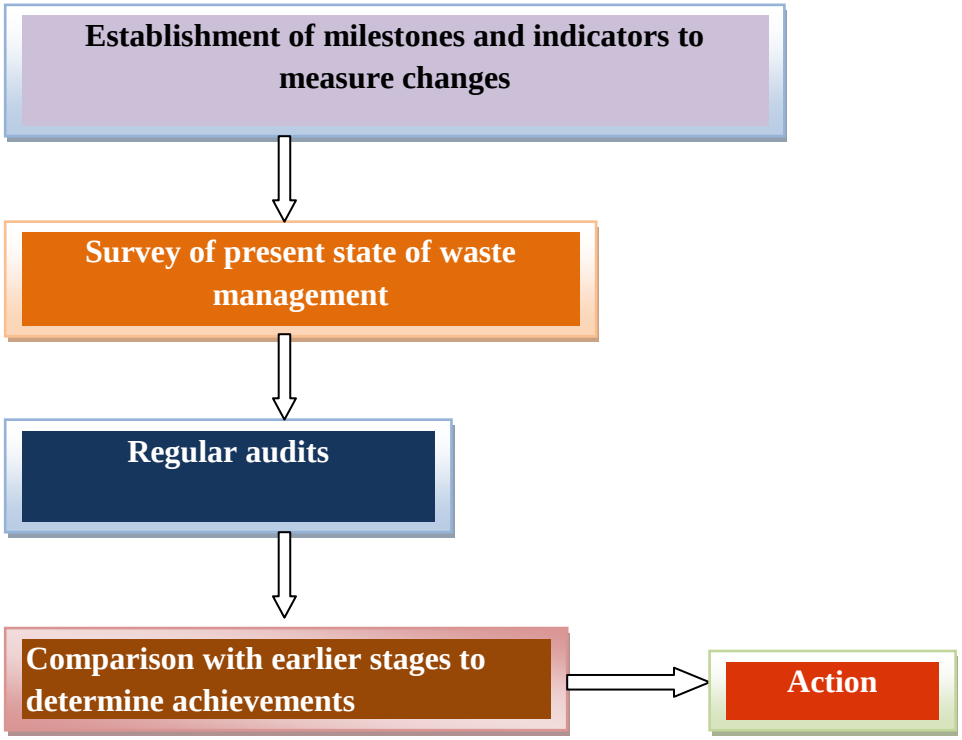


Figure 4: Proposed Monitoring and Evaluation framework

2.2 Monitoring indicators

We will use the following indicators to determine the progress of various activities to improve HCWM in Sangini Outlets:

Indicators related to the physical nature of waste:

- Cleanliness of buckets
- Efficacy of segregation practices
- Labeling of segregation bins
- Placement of segregation bins
- Functioning of waste processing equipment

Indicators related to occupation health and safety:

- Number of outlet staff trained in proper waste management
- Effective and consistent use of Personal Protective Equipment by staff
- Number of needle prick injuries
- Implementation of hand washing practices and frequency of use of such practices

Indicators related to the environment:

- Carbon Footprint of the outlets.
- Reduction of waste burning

Indicators related to the society:

- Public response (qualitative)
- Staff attitudes

Please see the Monitoring and Evaluation Checklist on the next page.

2.3 *Monitoring and evaluation checklist*

Health Care Waste Management Monitoring Checklist

S.No.	Observation	Name of site		Name of site		Name of site	
		Date:		Date:		Date:	
		Observed By:		Observed By:		Observed By:	
		Y/N	Remarks	Y/N	Remarks	Y/N	Remarks
1	Average number of syringe provided/week						
2	Correct buckets placement						
3	Color coding ok						
4	Buckets clean						
5	Trolley clean						
6	Labeling ok						
7	Buckets overflow						
8	Waste spilled outside the bin						
9	Sharp container available						
9.1	*Sharps outside container*						
9.2	*Recapped syringe found*						
9.3	*Sharp container overflow*						
10	Needle destroyer/ cutter avaialble						
11	Needle destroyer/ cutter functioning						
12	Segregation Practice						
12.1	*Infectious in General*						
12.2	*Sharps in General*						
12.3	*Sharps in Infectious*						
12.4	*General in Infectious*						
12.5	*General in Sharp*						
12.6	*Infectious in Sharp*						
13	*Utility gloves avaliable*						
14	Soap available at hand washing area						
15	Service provider got needle stick injury in last one year						
16	Trained on HCWM in last one year						
17	Service provider immunized (Hep B)						

3

Sustainability Strategy

3. Sustainability strategy for health care waste management at Sangini outlets

The primary objective of the sustainability strategy is to provide a framework to implement activities that will ensure the longevity of HCWM systems at Sangini Outlets without compromising their efficacy. The strategy will address the following issues:

- How will funds be obtainable for operation and maintenance of the systems?
- How can the effectiveness of the HCWM system be maintained over time after its initial implementation?
- What policies will stabilize effective implementation?

Key activities that will be conducted to ensure sustainability are:

- **Policy making:** At the national level, the ambiguity of language used in the Solid Waste Management Act of 2011 in regard to HCWM leaves huge loopholes for proper management. At the district level, HCWM committees will make policy recommendations to ensure that policies that are formulated by the Ministry of Health and Population are ones that are effective in dealing with health care waste under the conditions that exist in their district. The Ministry, in turn be responsive to local responsible agencies. The CRS Company will formulate its own policies and forms of enforcement regarding HCWM at its network of Sangini Outlets. Each Sangini Outlet will also formulate its own policies and guidelines on waste management.
- **Capacity building:** To ensure that implemented HCWM systems function with maximum efficiency, capacity building of service providers will be carried out intensively. The HCWM Committee and officials at the DPHO will be oriented and sensitized about HCWM through specialized trainings. Various local technicians will be trained on the maintenance of autoclaves, where appropriate. The workforce of CRS will be trained as well to incorporate proper waste management principles into their work of planning and implementation.
- **Ownership development:** During implementation, Sangini Outlets will be asked to contribute a percentage of incurred costs in cash or in-kind services to develop ownership of the HCWM system. Similarly, Hospitals and health centers where a hub treatment facility is set up will also contribute a percentage of the costs incurred. As the process of effective HCWM is a participatory one, all stakeholders at every level must develop ownership of the system.

- **Social recognition**: The HCWM committee will recognize outlets that demonstrate a strong and committed HCWM system through various awards and recognitions at the district and national levels. In addition, the satisfaction and sense of security in a safe and clean environment will contribute to the longevity and efficacy of the system.
- **Revenue generation:** With recommendations and policy backing from local governments and the HCWM committee, the hub treatment facility will charge fees for treating the risk waste of the Sangini Outlets (and other health care facilities as well). The fees will be used to pay electricity bills and any other maintenance costs that are incurred at the treatment facility. Sale of recyclables will also generate income for hub centers, which they will then use to maintain the system and replace damaged equipment. The HCWM committees will also recommend budget allocation for HCWM during district budget allocation.

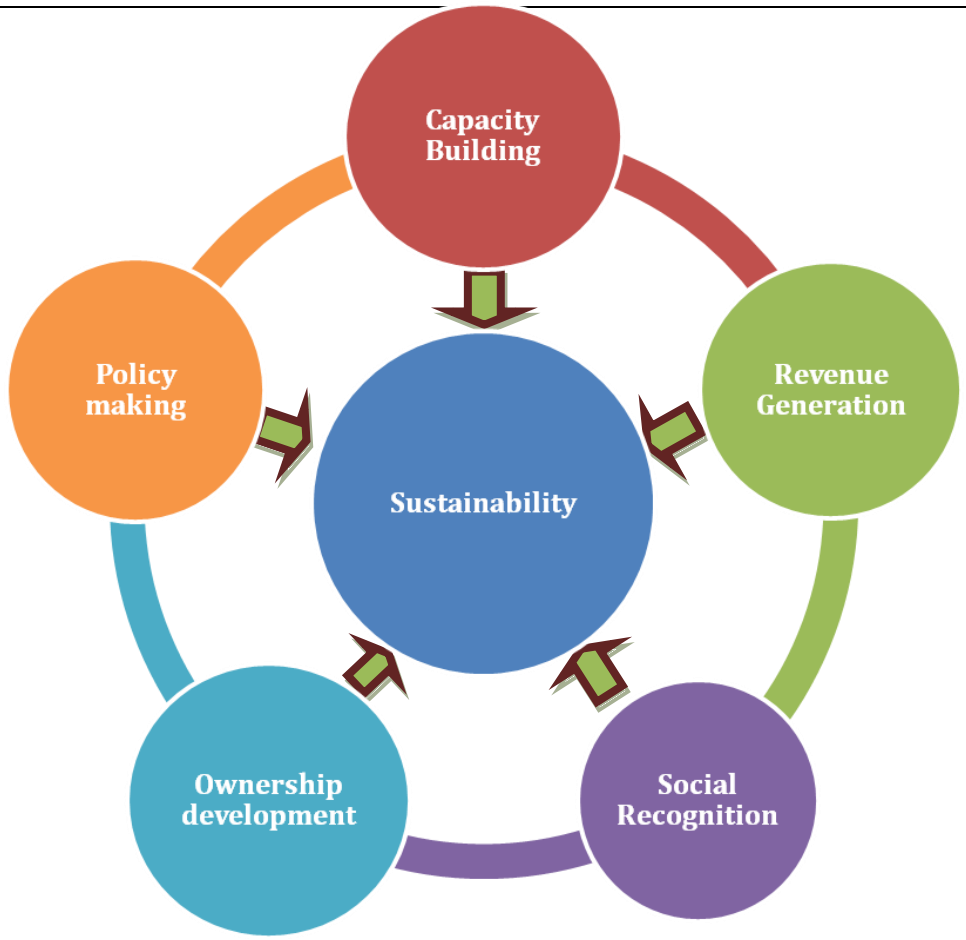


Figure 5: Sustainability strategy for HCWM at sangini outlets

4

Training Strategy

Training Manual Outline

4. Training strategy for service providers working at Sangini Outlets

Training is an essential part of behavior change. A variety of stakeholders need to change their behavior if a new HCWM system is to be effective. These include health care workers, service providers, waste handlers and administrators. Training will provide the full range of stakeholders with the vision, direction, competence and ability to institute safe HCWM.

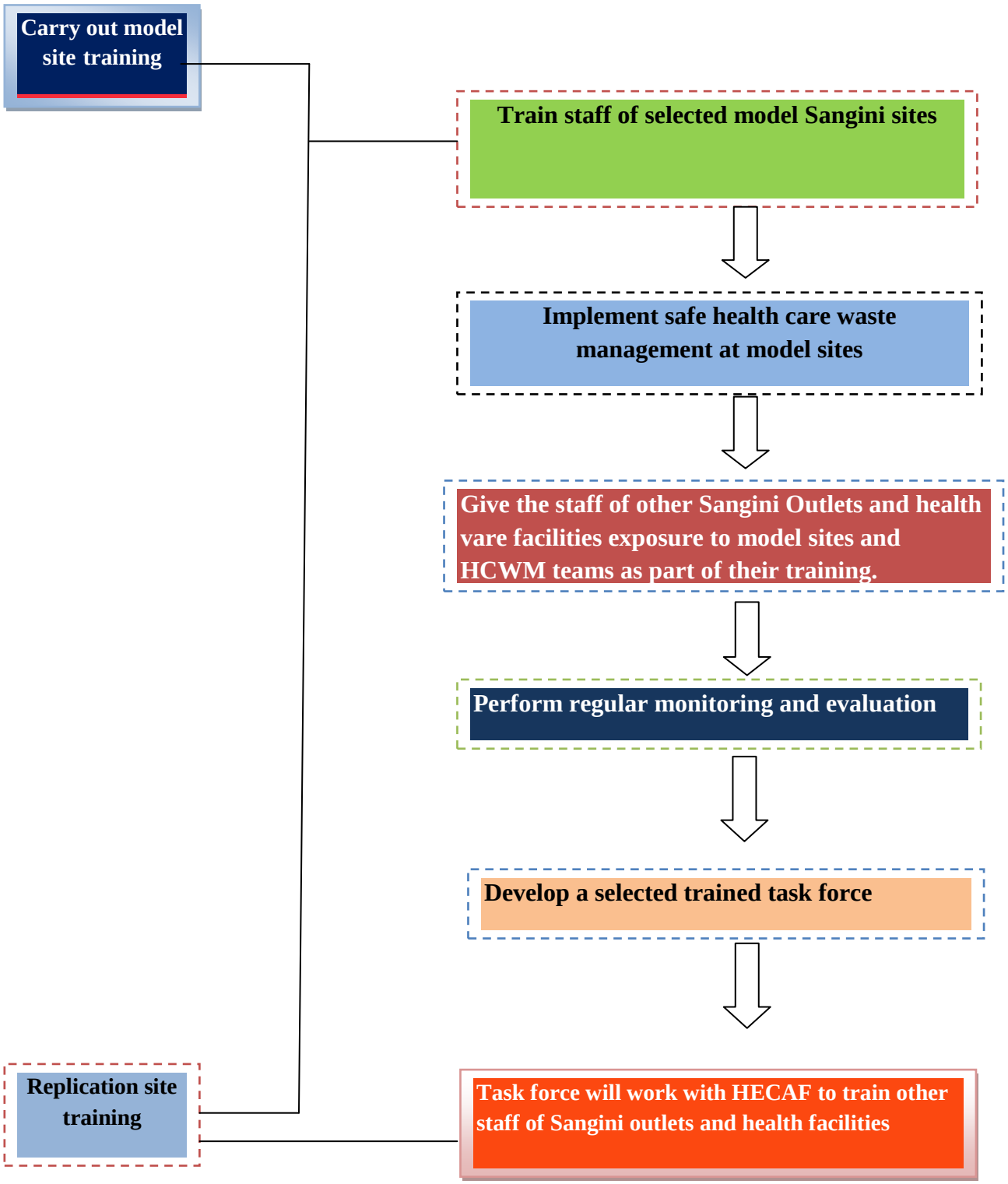
Rather than using a lecture-based model, we will explore new ways of learning that are effective in equipping stakeholders with practical skills. These include hands-on training sessions, demonstrations, and observational visits to model sites will be organized. It is our goal to make training inspiring, effective and fun. A training outline and methodology have been provided in the "Training manual outline for service providers working at Sangini outlets of Nepal". We are establishing training using the following principles:

- **Performance driven model**: The training curriculum will be designed to ensure that those trained can demonstrate high levels of competence.
- **Skill-building:** Training will focus on skills such as segregation, safe injection and autoclaving, which require practice to do correctly. Practical session in these and other skills will be included in the training curriculum.
- **Comprehensive organizational learning:** Because stakeholders on all levels within the system require training in order for HCWM to be effective, we will hold session in which related stakeholders learn together. As people with various roles in the system understand the entire system, they will realize how their small part fits into the whole and how their own failure to institute actions can undermine the greater goals.
- **Evaluation:** We will carry out pre- and post-training evaluation using a standard questionnaire to ensure that trainees are learning the required ideas and skills. Evaluation will reinforce learning.
- **User adoption:** To be useful, information and skills learned during training must be put into action. Our curriculum will reinforce this and ensure that trainees understand the crucial nature of their part in the larger system, while also clarifying how their actions safeguard their own well being and bring value to their communities.
- **Team-based workforce**: The training will underline the importance of team-based action . We will select the most effective and efficient team from a model site and engage them

in training other teams in order to replicate the system in additional Sangini outlets in each district.

- **Cluster model**: We will use a cluster model of training so that a group of Sangini outlets and other health care facilities can all learn the new HCWM system effectively within a district. In this way, they can reinforce one another's success.
- **Yearly refresher training:** CRS will incorporate regular refresher training on HCWM as part of its yearly action plan. This is reinforce what staff members hae learned and also gives new employees a chance to receive full training in the HCWM system.

4.1 *Training Implementation Strategies*



Training of the staff of model sites: First, a small number of the staff of selected model sites will be trained in safe HCWM using skill–building, practical task-based learning.

- **Implementation of safe HCWM at a model site**: Safe HCWM system will be implemented at selected model Sangini Outlets.
- **Regular monitoring and evaluation:** Staff will be monitored for their knowledge and skill. An intervention plan will be prepared to correct weaknesses based on the evaluations.
- **Replication via HCWM task forces:** Leaders and inspired members of the model site team will be selected as members of a district HCWM Task Force, which will work closely as a local partner with the training technical team in order to train their colleagues at other Sangini Outlets and health care facilities. Eventually, the Task Force will become a valuable asset for the district and nation to implement and manage HCWM systems.

5 Training manual outline for service providers working at Sangini Outlets

1. Introduction
2. Objective
3. Pre and post test questionnaire
4. Training design
5. Scope of training curriculum
6. Training modules

6.1. Module 1: Health and environment

6.1.1. We and our environment

6.2. Module 2: Health care waste management

6.2.1.1. Introduction to health care waste

6.2.1.2. Current situation of health care waste management

6.2.1.3. Safe health care waste management

6.3. Module 3: Occupational and public health aspects of health care waste management

6.3.1.1. Occupational and public health problem of health care waste management

6.3.1.2. Safe injection

6.3.1.3. Universal precaution and infection prevention

6.4. Module 4: Practical health care waste management

6.4.1.1. Hands-on practical health care waste management

6.4.1.2. Group work and discussion

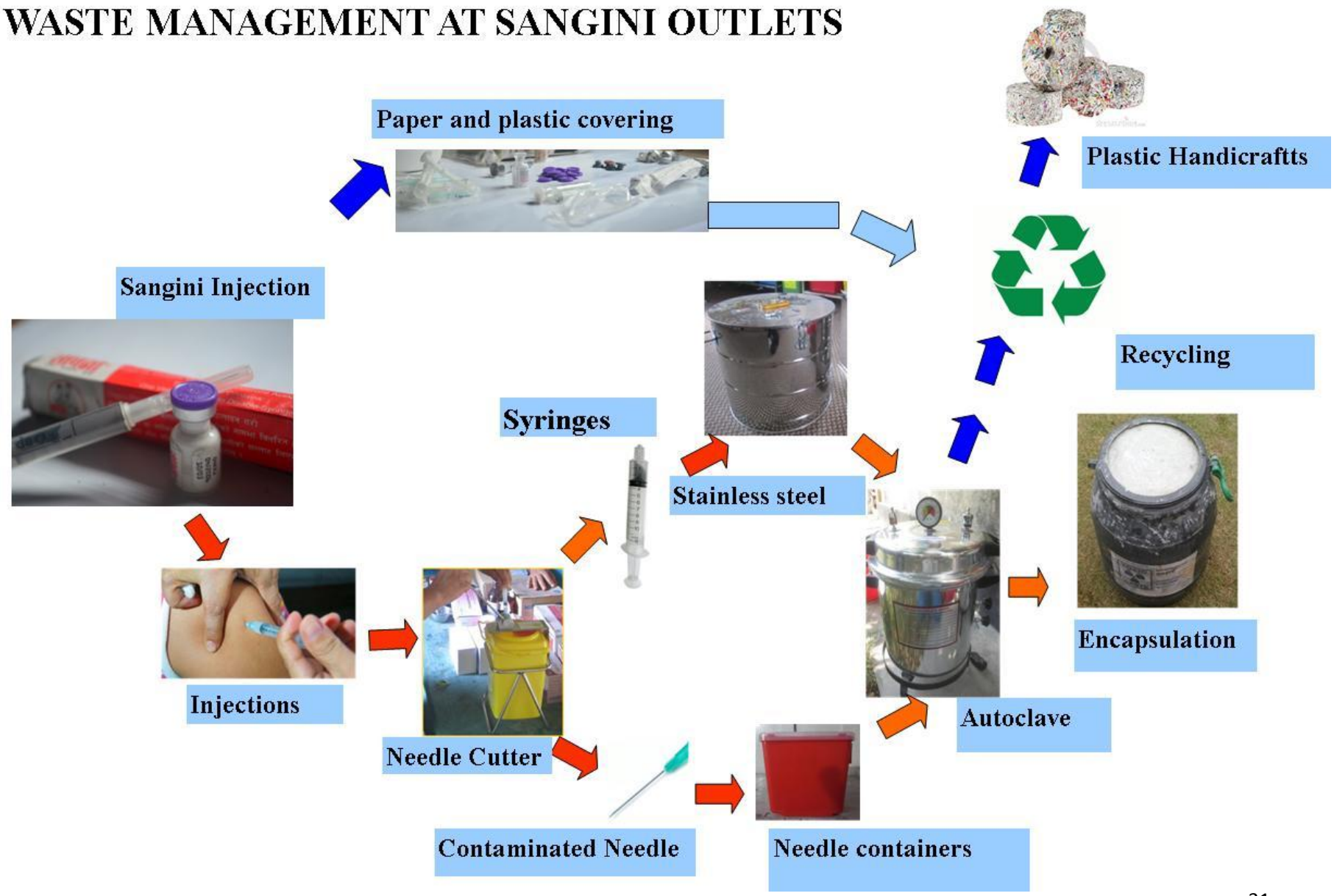
Job Aids

6 Job Aids for HCWM at Sangini Outlets

Health Care Waste Management at Sangini

Waste category	General	Infectious	Sharps	Pharmaceuticals
Waste Containers				
Label				
Types of Waste (switch places)	Paper, plastic, unbroken glass, bottles, cans, saline bottle	Gauze, cotton, gloves, syringe without needles and other soft infectious waste, I/V lines	Cut needle, broken glass, slides, blade, razor, scalpel and other sharps	Date expired medicine. Left over and used bottle of medicine
Symbol (Switch)				
Treatment	No treatment	Autoclave	Autoclave	Chemical Degradation (if necessary only)
Disposal	Recycling, Landfill	Recycling, Vermi composting, Landfill	Encapsulation, Pit Burial, Landfill	Encapsulation, Landfill

WASTE MANAGEMENT AT SANGINI OUTLETS



Estimated budget

7 Estimated budget and logistics for three different HCWM model for Sangini outlets

Estimated cost for instilation of waste management system at Sangini Outlets

Option 1: Hub Waste Management Model (Assuming that a 15 bed hospital acts as a hub)

Conditions

Estimated risk waste/outlet: 0.8 kg/day (reference from FHI/IHS sites assessment report, 2010)
30 outlets will be accomodated in a hub center
Total waste generation from the 30 outlets: 12 kg,/day
Estimated risk waste generation from the 15 bed hospital: 2 kg./day (reference from HCWM assessment report Mugu district hospital)
Total risk waste that needs to be autoclaved: 14kg./day
If health care facilities are scattered in cluster and common treatment facility is possible to implement
Number of hub depends on avaialble government and private health care facilties as well as their interest to take lead
Space for treatment facility has to be provided by hub facility
Treatment facility construction costs excluded.

Estimated cost for one sangini outlet				
S.No	**Particulars**	**Unit**	**Unit Cost**	**Total cost**
1	Red Pedal (15 L)	1	500.00	500.00
2	Red (5 L)	1	200.00	200.00
3	Black (15 l)	1	500.00	500.00
4	Light Blue (15 L)	1	500.00	500.00
5	Needle Destroyer (0.8 L)	1	6000.00	6000.00
6	Bucket Label	100	20.00	2000.00
7	Plastic Bags	30	150.00	4500.00
8	Personal Protective Equipments	2	2000.00	4000.00
9	Utility Gloves	40	100.00	4000.00
10	Metal stand	1	3000.00	3000.00
11	Syringe collection drum	2	5000.00	10000.00
	Total cost			**35200.00**
	Contingency cost (15% of total)			**5280.00**
	Grand Total			**40480.00**
Estimated cost for one hub treatment center (Assuming that a 15 bed hospital acts as a hub)				
1	Autoclave (60 L)	1.00	60,000.00	60,000.00
2	Shredder (syringe shreeder)	1.00	40,000.00	40,000.00
3	Buckets	10.00	2,500.00	25,000.00
4	Storage bins	5.00	3,000.00	15,000.00
5	Needle cutter	2.00	8,000.00	16,000.00
6	PPE	10.00	2,000.00	20,000.00
7	Transportation trolley	2.00	20,000.00	40,000.00
8	Drums	2.00	5,000.00	10,000.00
9	Autoclave testing kit			20,000.00
	Total cost			**246,000.00**
	Contingency cost (15% of total)			**36,900.00**
	Grand Total			**282,900.00**

Option 2: CRS Area waste treatment model

Estimated risk waste/outlet: 0.8 kg/day (reference from FHI/IHS sites assessment report, 2010)

Assuming that total outlets of each region will be accomodated in treatment center

Treatment facility construction costs excluded.

Assuming that space for treatment facility will be provided by the area office of CRS company

Estimated cost for one sangini outlet				
S.No	**Particulars**	**Unit**	**Unit cost**	**Total cost**
1	Red Pedal (15 L)	1	500	500
2	Red (5 L)	1	200	200
3	Black (15 l)	1	500	500
4	Light Blue (15 L)	1	500	500
5	Needle Destroyer (0.8 L)	1	6000	6000
6	Bucket Label	100	20	2000
7	Plastic Bags	30	150	4500
8	Personal Protective Equipments	2	2000	4000
9	Utility Gloves	40	100	4000
10	Metal stand	1	3000	3000
11	Syringe collection drum	2	5000	10000
	Total cost			35200
	Contingency cost (15% of total)			5280
	Grand Total			40480
S.No	**Particulars**	**Unit**	**Unit cost**	**Total**
1	Autoclave (175 L)	1.00	4,000,000.00	4,000,000.00
2	Shredder (syringe shredder)	1.00	40,000.00	40,000.00
3	Buckets	10.00	2,500.00	25,000.00
4	Storage compartment	10.00	20,000.00	200,000.00
5	Needle cutter	2.00	8,000.00	16,000.00
6	PPE	10.00	2,000.00	20,000.00
7	Transportation trolley	2.00	20,000.00	40,000.00
8	Drums	2.00	5,000.00	10,000.00
9	Autoclave testing kit	5.00	5,000.00	25,000.00
	Total cost		4,102,500.00	4,376,000.00
	Contingency cost (15% of total)		615,375.00	656,400.00
	Grand total		4,717,875.00	5,032,400.00

Option 3: Outlet Waste Management model

Estimated risk waste/outlet: 0.8 kg/day (reference from FHI/IHS sites assessment report, 2010)

Assuming that transportation of risk waste for treatment elsewhere is unfeasible

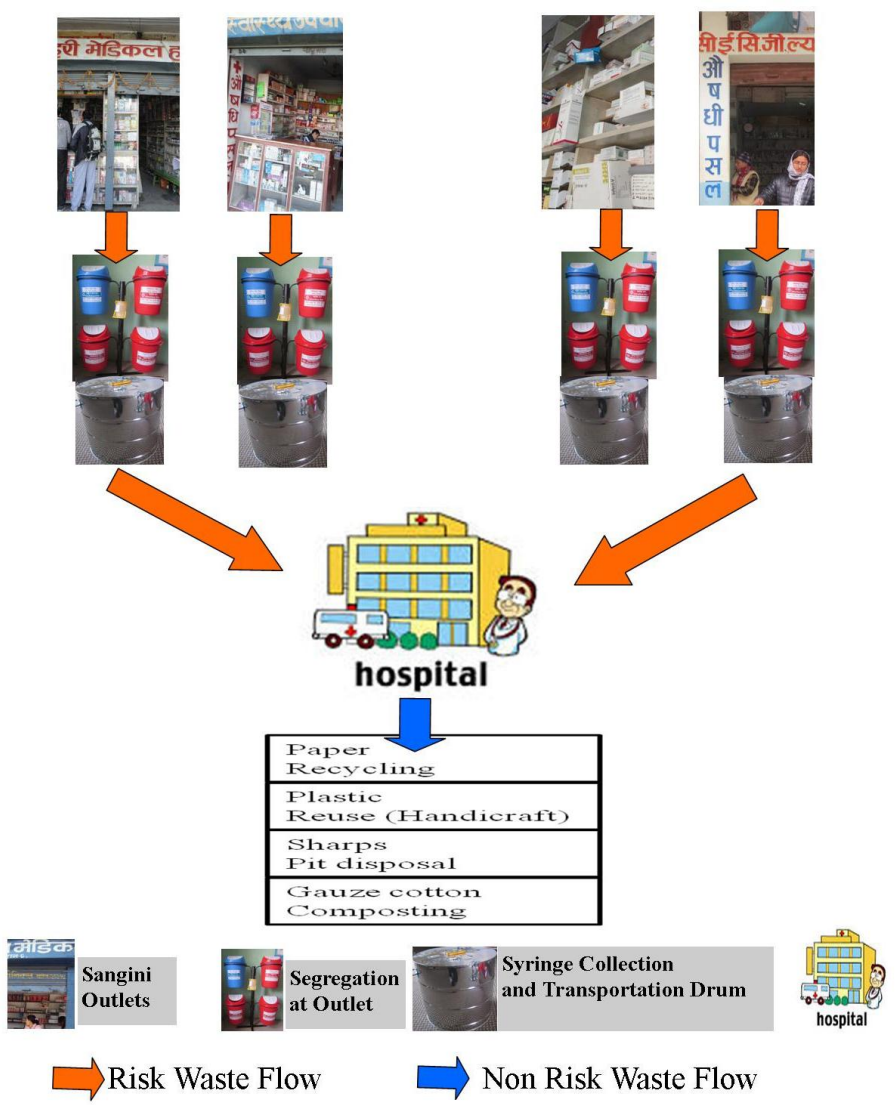
Treatment facility construction costs excluded.

Assuming that sangini outlets has space for waste treatment

Estimated cost for one sangini outlet				
S.No.	**Particulars**	**Unit**	**Unit Cost**	**Total cost**
1	Red Pedal (15 L)	1	500.00	500.00
2	Red (5 L)	1	200.00	200.00
3	Black (15 l)	1	500.00	500.00
4	Light Blue (15 L)	1	500.00	500.00
5	Needle Destroyer (0.8 L)	1	6000.00	6000.00
6	Bucket Label	100	20.00	2000.00
7	Plastic Bags	30	150.00	4500.00
8	Personal Protective Equipments	2	2000.00	4000.00
9	Utility Gloves	40	100.00	4000.00
10	Metal stand	1	3000.00	3000.00
11	Syringe collection drum	2	5000.00	10000.00
12	Autoclave (20 lit)	1	20000.00	20000.00
13	Autoclave testing kit	3	1500.00	4500.00
	Total cost			**59700.00**
	Contingency cost (15% of total)			**8955.00**
	Grand total			**68655.00**

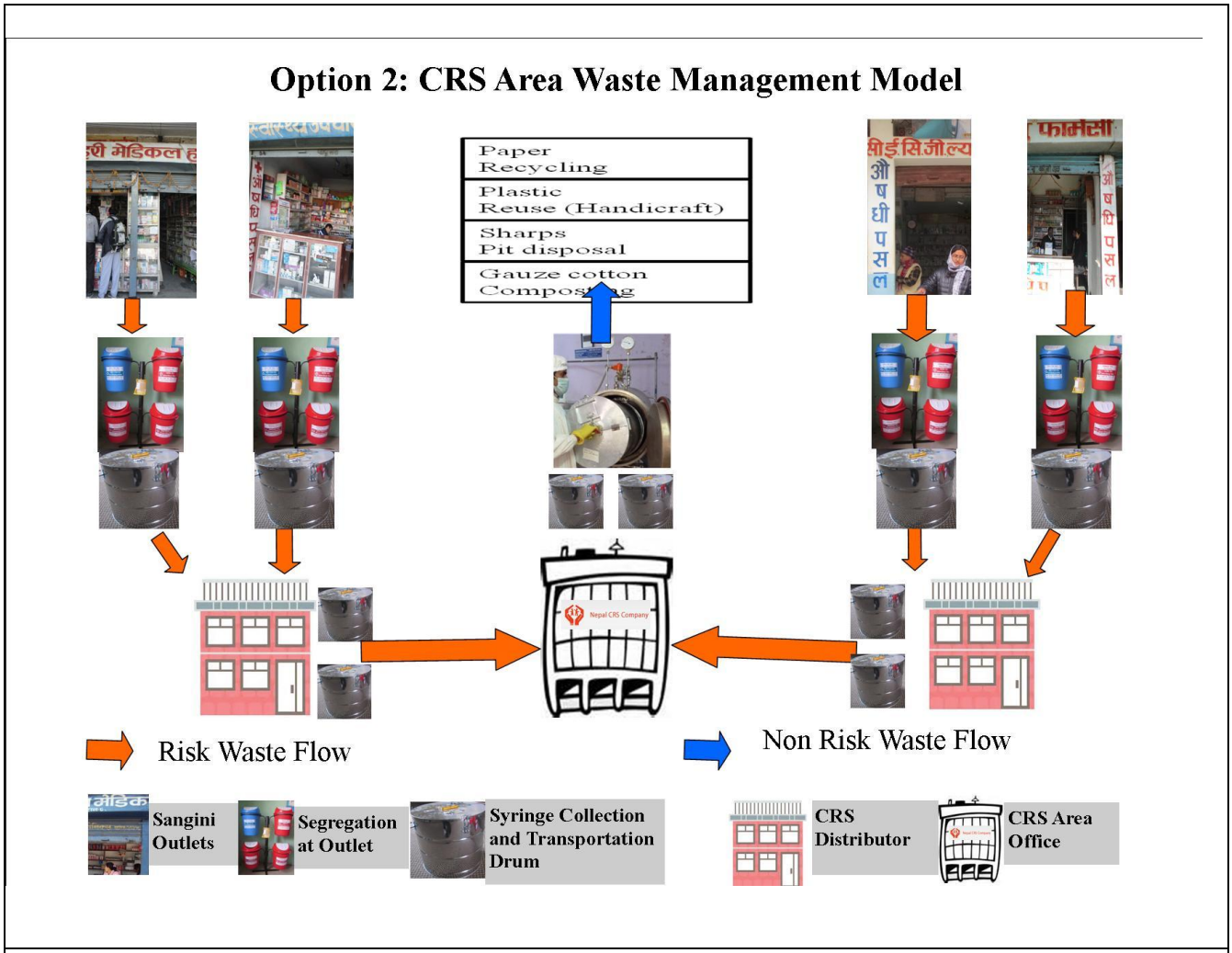
8 Annexes

8.1 *Option 1: Hub Waste Management Model*



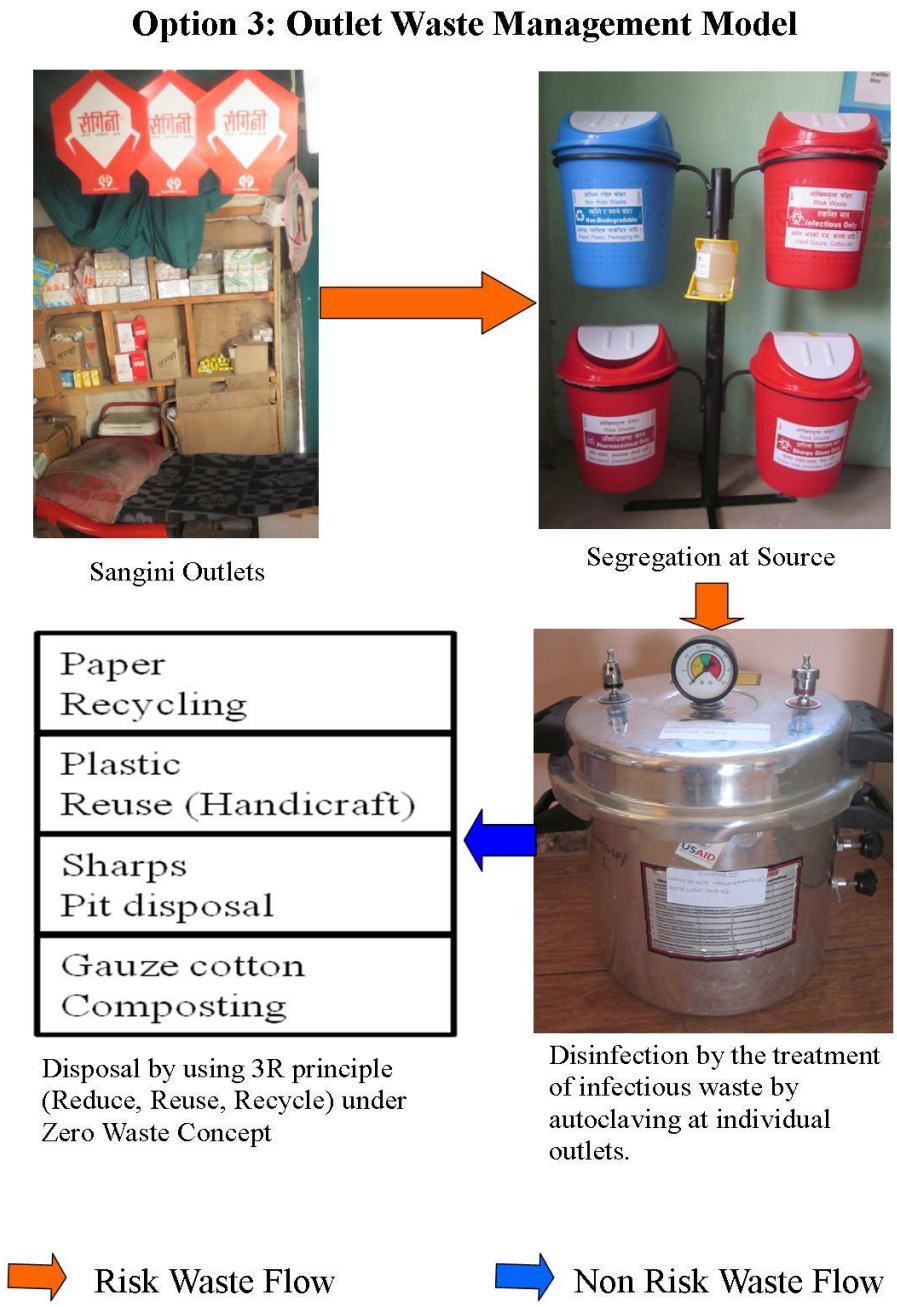
In Option 1, risk waste generated at Sangini Outlets is transported to a treatment facility at a hub center. The treatment center will be furnished with an autoclave which will disinfect the risk waste before being disposed of by the best possible option. The treatment center will be set up at a hub which can be a local/private hospital or a Health post/sub health post depending on the location.

8.2 *Option 2: CRS Area Waste Treatment Model*



In option 2, waste segregation is done at Sangini Outlets and the waste is transported to CRS distribution outlets. The outlets will then transport the waste to the central treatment center that is set up at the Area office of the CRS Company. The treatment center will be equipped with an autoclave, which will decontaminate all risk waste before it is disposed of using the best available option.

8.3 *Option 3: Outlet Waste Management Model*



In option 3, waste segregation is done at Sangini Outlets and waste is managed at the center itself. The waste treatment center will be furnished with a small scale autoclave if available. If an autoclave isn't available readily, a validated pressure cooker will be used.