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# ASSESSMENT OF HEALTH CARE WASTE MANAGEMENT PRACTICES IN THREE DISTRICTS IN UGANDA

**AIDSTAR-One**  
AIDS SUPPORT AND TECHNICAL ASSISTANCE RESOURCES

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## **AIDS Support and Technical Assistance Resources Project**

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# ACRONYMS

AIDSTAR-One	AIDS Support and Technical Assistance Resources, Sector I, Task Order 1
GLSL	Green Label Services Ltd.
HC	health center
HCW	health care waste
HCWM	health care waste management
Kg	kilogram
MOH	Ministry of Health
NGO	nongovernmental organization
PEP	post-exposure prophylaxis
PHP	private health service provider
PNFP	private not-for-profit
PPE	personal protective equipment
PPP	public-private partnership
SDA	service delivery area
USAID	U.S. Agency for International Development
USG	U.S. Government
WHO	World Health Organization



# EXECUTIVE SUMMARY

The World Health Organization (WHO) has called upon governments to address the problem of health care waste, which if poorly handled poses a risk of transmitting infectious diseases (including HIV) and of contaminating the environment (WHO 2012). The Government of Uganda is seeking to develop health care waste management (HCWM) strategies that comply with international standards, stating that HCWM should be part of the overall management of health care facilities (Ministry of Health [MOH] 2008).

To that end, the U.S. Agency for International Development (USAID) and the Government of Uganda aimed to provide a lasting solution to waste disposal challenges in eastern Uganda using a sustainable approach to improve the working environment of health workers and prevent exposures that can result in transmission of new infections. USAID, through AIDS Support and Technical Assistance Resources, Sector I, Task Order 1 (AIDSTAR-One), established a centralized waste treatment and disposal facility through a public-private partnership (PPP) with Green Label Services Ltd. (GLSL) and the MOH, coupled with training of health care workers in HCWM in six districts in the Eastern Region: Kamuli, Iganga, Bugiri, Mbale, Kapchorwa, and Sironko.

To measure existing HCWM practices in the districts and capture changes ensuing from project activities, AIDSTAR-One developed a baseline survey and follow-up survey that were conducted in three of the districts. The surveys also detailed the quantities and categories of hazardous waste collected and buy-in from public sector and private sector facilities in and beyond the project area.

## ASSESSMENT OF HCWM IN EASTERN REGION

The baseline and endline studies included observations of 50 hospitals and health centers (31 public, 17 private not-for-profits [PNFPs], and 2 private health service providers [PHPs]) in 239 service delivery areas (such as clinics, operating rooms, laboratories, and specialty service areas), and interviews with 90 facility managers and waste handlers in Bugiri, Iganga, and Mbale Districts. Data on waste transfer to GLSL for final disposal were obtained from record reviews.

The baseline and follow-up surveys assessed changes in the following areas:

- *Guidance:* Availability of HCWM guidelines, posters, job aids, and manuals
- *Staffing:* Presence of a designated HCWM focus person and waste handlers at each facility
- *Health worker training:* Proportion of workers receiving training on HCWM at each facility
- *Safety:* Safety provisions for health workers, including personal protective equipment (PPE), prevalence of needle stick and other injuries, and availability of post-exposure prophylaxis (PEP) and safety boxes for used syringes
- *Onsite waste management:* Segregation and treatment of infectious waste at facilities
- Waste disposal practices
- *Central HCWM facility use:* Utilization (by facilities in all six intervention districts) of the centralized waste management system in Iganga, including private and public facilities, volume collected, and use of the incinerator's capacity

## STUDY FINDINGS

Overall, the follow-up study found significant improvements in facility-based HCWM, worker training, and safety: For example, according to the endline survey, 90 percent or more of the 50 facilities observed used safe practices for disposing of infectious, sharps, and anatomical waste. However, improvements often fell short of the desired 100 percent compliance. In some cases, problems in the supply chain also contributed to shortfalls in achieving compliance with WHO standards.

*Guidance:* At endline, 35 of the 50 facilities surveyed (70 percent) had some type of HCWM guidance, including posters and manuals, an increase from baseline (35 facilities).

*Staffing:* Forty facilities (80 percent, a slight increase from 76 percent at baseline) reported having a designated staff person for HCWM; each of these designated individuals mentored colleagues on segregating waste. All facilities but one had designated waste handlers at follow-up, while at baseline, one hospital and one health center lacked designated handlers.

*Health worker training:* At endline, 34 facilities reported that all health workers had received training in HCWM, a significant increase over baseline (20 facilities). Lower-level facilities were more likely to have staff without HCWM training, mainly due to high turnover.

*Safety:* The MOH recommends heavy gloves, masks, boots, goggles, and overalls as PPE for each waste handler. Slightly more facilities provided a full complement of PPE at endline compared with baseline (13 versus 10), suggesting that waste handlers continue to be at risk of injury. Reported injuries (needle sticks or other exposures) over the past 6 months decreased from 12 to 8, a statistically significant difference, with greater decreases in Iganga District. However, just over half of the observed facilities had PEP available onsite, both at baseline and endline, meaning that those exposed would need to seek services at another location. Also, half of the facilities reported stockouts of 2 ml and 5 ml needles and syringes during both surveys, and stockouts of safety boxes increased over baseline. These stockouts are due to an irregular supply from the National Medical Stores.

*Onsite waste management:* Waste management at facilities includes appropriate segregation of different types of waste, use of safety boxes, and removal of loose waste and sharps in and around the facility. Less than 5 percent of service delivery areas had both color-coded bins and their accompanying liners (in part because there were often insufficient liners). Waste segregation took place at nearly three-fourths (72.7 percent) of service points, and safety boxes were used for sharps at 82 percent of service points. Loose biological waste was present inside at nearly one-quarter (24 percent) of sites observed, though this is an improvement from the observation at baseline (31 percent); nearly half of facilities observed at endline had biological waste littering the facility grounds. In interviews, staff explained that these problems were due to lack of color-coded bins or liners, knowledge gaps, staff turnover, and negligence, among other reasons. Treatment of infectious laboratory waste improved: At endline, over half of facilities observed treated this waste before final disposal compared with 35 percent at baseline.

*Waste disposal practices:* At endline, just over half used unsafe practices for disposal of domestic and effluent waste. Facilities performed better with sharps and infectious waste, with 90 percent or more of facilities performing safe disposal; all facilities that generated anatomical waste disposed of it safely. While safe disposal was not universal at endline, all observations showed improvements over baseline. Overall, the most common method of final disposal was transportation offsite.

*Central HCWM facility use:* At endline, 243 facilities in the 6 project districts (175 public and 69 PNFPs) used the GLSL central treatment and disposal facility at Iganga between January and March 2013, slightly more than at baseline (241 facilities). No PHPs used the Iganga facility. The volume disposed of increased from 19,616 kilograms (kg) at baseline to 33,706 kg at follow-up. For the six districts, this represents about a 3 percent use of the incinerator's total capacity—up from about 2 percent at baseline.

Ten non-project districts (250 facilities) also used the Iganga facility. Together, all facilities used approximately 35 percent of the incinerator's capacity.

## RECOMMENDATIONS

Findings from the study suggest recommendations for improving the safety and sustainability of HCWM:

- *Logistical capacity:* The MOH should work with partners and suppliers, especially the National Supply Stores, to ensure that essential equipment is available. In some cases, facility managers should plan for extra supplies in case of stock shortages.
- *Policies and guidelines:* Managers should ensure that guidance and job aids are available at all facilities.
- *Staffing and leadership in HCWM:* All facilities should have a designated staff member or committee to ensure that HCWM is prioritized throughout the facility and to provide supportive supervision as needed.
- *Training for health workers:* Facility managers should ensure that all staff receive training, taking into account complexities, such as turnover and shift work. Also, opportunities for strengthening awareness of HCWM may be maximized by including the topic in pre-service curricula, providing in-service training, and organizing workshops on HCWM.
- *Preventing injuries:* Facility managers should monitor the circumstances leading to needle sticks and exposure to contaminated fluids and target these for education and mitigation. All facilities should provide full complements of protective equipment for each waste handler.
- *Waste segregation:* Both the MOH and facility managers should ensure that sufficient supplies are available for waste segregation at all facilities.
- *Safe waste disposal:* The MOH and facilities should target and eliminate unsafe disposal practices.
- *Increase utilization of centralized HCWM services:* The MOH and partners should encourage PHPs to use centralized waste management facilities.



# INTRODUCTION

According to the World Health Organization (WHO), health care activities generate large quantities of waste, of which 20 percent is considered hazardous. Hazardous medical waste, which includes contaminated needles and bandages, body parts and fluids, and laboratory products such as pharmaceuticals, pose the potential of injury and transmission of communicable diseases, including HIV, to individuals. If improperly disposed of, this waste can contaminate drinking water, release toxins in the air, and cause exposure to pathogens. To prevent this exposure, WHO recommends that countries develop comprehensive management and disposal systems for health care waste, including defining responsibilities, allocating resources, raising awareness of the risks of health care waste, and developing safe strategies to manage health care waste while protecting people from the risks of handling, storing, transporting, treating, and disposing of waste (WHO 2012).

The Government of Uganda is seeking to address WHO's recommendations. Health service delivery in Uganda is decentralized and administered through 112 districts, 254 health subdistricts, and over 3,000 health units. According to the Ministry of Health (MOH), Uganda has a total of 122 hospitals, 165 level IV health centers (HC IV), 904 level III health centers (HC III), and 2,273 level II health centers (HC II), of which over 90 percent are public facilities, while the rest are private health service providers (PHPs) or private not-for-profits (PNFPs) (MOH 2007). In addition, there are many pharmaceutical retail outlets owned by the government, private sector, and nongovernmental organizations (NGOs). These service delivery areas generate hazardous waste, which may be contributing to the infectious diseases that account for 60 to 80 percent of Uganda's disease burden (MOH 2008).

Various types of health care waste (HCW) are generated in significant, and increasing, volumes. For example, a 2010 assessment of 99 health facilities at all levels throughout 18 districts showed that on average, each hospital generated 92 kg of waste per day, 40 percent of which was hazardous. An HC IV generated 42 kg of waste, while an HC III and an HC II generated 25 kg per day and 20 kg per day, respectively. Moreover, very few of these facilities had acceptable facilities of final waste disposal.

The Government of Uganda has stated that health care waste management (HCWM) should be part of the overall health care facility management system and is an element of the quality of the services provided (MOH 2008). However, numerous challenges have been identified in HCWM at the district and health facility levels, including lack of acceptable methods of final waste disposal, inadequate coordination of existing individual efforts, missed opportunities in leveraging potential resources to improve HCWM, inability to quantify HCW for planning its management, lack of realistic budgets and plans, the introduction of new services at lower levels without planning for waste disposal, and lack of advocacy. This is coupled with gaps in HCWM, which include lack of a functioning supply chain for items like safety boxes, waste bins, and bin liners; lack of supportive supervision; and unclear obligations for waste handlers and waste handling firms where they exist.

WHO calls on all donors to support implementation of activities to eliminate the risks posed by unsafe handling of HCW. The U.S. Government (USG), through the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and the U.S. Agency for International Development (USAID), has responded by providing technical assistance in HCWM to its implementing partners in health through the PEPFAR through USAID-funded AIDS Support and Technical Assistance Resources, Sector I, Task Order 1 (AIDSTAR-One) Project. The assistance is aimed at creating capacity among the USG partner organizations and their health workers to better manage HCW generated at their facilities. The assistance

also focuses on avoiding risks of exposure to and subsequent transmission of infections to service providers, patients, and community members.

In Uganda, between 2009 and 2011, AIDSTAR-One supported over 12 USG implementing partner organizations across the country to plan for and address HCWM. The activities implemented included:

- Assessing HCWM practices among service providers
- Using generated data to develop HCWM plans
- Building capacity through training and problem solving, targeting both managers and service providers
- Providing technical supportive supervision to improve individual staff performance and performance review meetings

These activities led to improvements in HCWM practices at a number of health facilities, for example, increased awareness about the need to address HCWM and increased allocation of resources for HCWM commodities and supplies. Increased knowledge about HCWM among service providers also led to a greater number of facilities segregating waste at the source, along with overall improvements in the methods used for disposing of waste.

However, the Eastern Region of Uganda continues to struggle with high outpatient attendance with no appropriate facilities for disposing of generated waste. In addition, the region has been scaling up health service provisions under programs for HIV testing and counseling, preventing mother-to-child transmission of HIV, detection and treatment of tuberculosis and malaria, and palliative care, among others, and therefore generating ever-increasing volumes of waste.

USAID and the Government of Uganda sought to provide a sustainable solution to waste disposal challenges in eastern Uganda. In 2012, USAID supported a project to address HCWM in this region. USAID supported AIDSTAR-One to develop a public-private partnership (PPP) between the Ugandan MOH and a local waste handling service provider (Green Label Services Ltd. [GLSL]) in the establishment and operationalization of a centralized waste treatment and disposal facility in eastern Uganda. AIDSTAR-One conducted capacity building to increase GLSL's ability to handle large quantities of HCW of various types, minimize environmental pollution, and reduce the potential for transmission of infections. This was coupled with training on HCWM for health care workers in six districts in the Eastern Region: Bugiri, Iganga, Kamuli, Mbale, Kapchorwa, and Sironko.

Since handling waste through a PPP is a relatively new practice in Uganda, there was a need to evaluate progress made toward achieving the desired outcomes. Information generated will be used to inform policymakers and make necessary modifications to the PPP business plan, with a view to making the plan more efficient, environmentally friendly, and sustainable. Thus, in 2012, AIDSTAR-One conducted a baseline cross-sectional, facility-based survey and record review of waste transfer and treatment data to understand prevailing HCWM practices and establish benchmarks in three of the six participating districts (Bugiri, Iganga, and Mbale). Following the baseline survey, AIDSTAR-One provided technical support to the participating districts. In 2013, to assess changes resulting from the intervention, AIDSTAR-One conducted an endline survey in the same three districts.

This report presents findings from the follow-up survey on HCWM. The document discusses changes in both HCWM at facilities in the target districts and within the GLSL facility. Results shown are compared with the baseline.

# OBJECTIVES

The study's overall objective was to evaluate the status of HCWM in the health care facilities of three of the six targeted districts in eastern Uganda. The specific objectives of the study were to evaluate facilities at all levels in terms of:

- 1) Availability of guidance (national policy, norms, and guidelines)
- 2) Degree of staff training in HCWM
- 3) Availability and management of injection equipment
- 4) Availability of equipment and materials for collecting, transporting, and removing HCW, as well as protective equipment for health and waste management workers
- 5) HCWM practices and prevalence of best practices<sup>1</sup> in HWM
- 6) Quantities (kg) of hazardous waste collected monthly, according to type of waste
- 7) Utilization of the central incinerator in terms of waste disposal
- 8) Level of public sector and private sector buy-in for use of centralized waste treatment and final waste disposal facility, including outside the six project districts

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<sup>1</sup> A **best practice** is a technique or methodology proven through experience and research to reliably lead to a desired result.



# METHODOLOGY

The study was a follow-up survey conducted July 2013 in three districts (Bugiri, Iganga, and Mbale) randomly selected from the six districts where AIDSTAR-One provided HCWM technical assistance. The research also entailed a record review from the GLSL centralized waste treatment and disposal facility to determine the volume of waste being collected and treated according to guidelines, and the number of groups using the facility.

All health facilities that took part in the baseline assessment were targeted for the follow-up evaluation. A total of 50 health facilities (and numerous service delivery points within facilities) were visited during the follow-up.

## SAMPLING FRAME

Health facilities were listed by district, level of service delivery, and type of ownership (public or private health service providers). Facilities were selected from a list of USG-supported facilities through a combination of purposeful and random sampling techniques to reach a sample size of 50 facilities (Appendix 4). All hospitals (4) and HC IVs (6) were purposively selected. Lower levels—HC IIIs (23) and HC IIs (17)—were randomly selected.

Data were also extracted from the monthly records of the waste treatment and disposal facility operated by GLSL, in Iganga District.

## DATA COLLECTION PROCEDURE

**Facility-based questionnaire:** Data were obtained from health facilities using a standard HCWM questionnaire (Appendix 1). This tool was developed by AIDSTAR-One to meet WHO-recommended criteria for assessing HCWM practices. The key areas earmarked by WHO for action at the national and local levels are 1) availability of a national policy for safe HCWM; 2) a comprehensive HCWM system; and 3) awareness-raising and training for management of HCW (WHO 2000). The questionnaire assessed the following:

- Facility HCWM practices and their alignment with recommended best practices
- Organizational structure for HCWM, including availability of policies/guidelines
- Capacity building for HCWM
- Risks associated with handling waste
- Availability of safety boxes
- HCWM practices among health workers at service delivery points
- Segregation and handling of waste
- Occupational safety, including access to post-exposure prophylaxis (PEP)
- Treatment of sharps and non-sharp infectious waste
- Final waste disposal practices

In addition to observations, interviews were conducted with facility managers and waste handlers.

**GLSL record review:** Data were extracted from the GLSL waste transfer forms and incineration logs (Appendixes 2 and 3) for the previous seven months to determine:

- Average volume of waste collected per month, segregated by facility ownership and type of waste
- Number of public and private health facilities located within the six project districts using the centralized waste treatment and disposal facility
- Number of health facilities outside the six project districts using the facility
- Capacity of the incinerator used for disposing of HCW

**Data collection and analysis:** Data were collected from July 29 to August 9, 2013, in the three districts of Bugiri, Iganga, and Mbale. Ten research assistants and three supervisors were identified and trained to participate in the collection of data in the health care facilities and at the waste treatment and disposal site in Iganga. The trained supervisors worked with AIDSTAR-One Uganda staff to provide overall coordination and supervision for data collection.

At the waste treatment and disposal site, data were collected by review of GLSL forms using the study waste collection and disposal tools (Appendixes 3 and 4).

Facility data were entered in an EpiData pre-designed database with programmed logic and consistency checks to minimize data entry errors. The data were double-entered by two trained data clerks. This was followed by validation and cleaning via manual checking of questionnaires. Once the two entries were the same, data were exported into STATA 10 for analysis.

Tables were generated for key responses and where appropriate aggregated by health facility level. Data collected from GLSL were entered into Excel spreadsheets and summarized to obtain average monthly figures. Indicators from the record review were extracted from the spreadsheet summary.

## **ETHICS AND CONFIDENTIALITY**

Approval to conduct the study was obtained from the Uganda National Council for Science and Technology.<sup>2</sup> Participants provided their consent (Appendix 5).

To ensure confidentiality protection and to minimize risk, no names or other identifying information were collected from the persons interviewed or observed. To protect confidentiality of all respondents, facilities were not identified by name or location in this report.

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<sup>2</sup> Reference no. 28888

# RESULTS

A total of 50 health facilities were assessed at both baseline and follow-up. The distribution of the sample by level of service delivery and type of ownership are shown in Table 1.<sup>3</sup>

The survey units and target populations of the HCWM evaluation were the hospitals and lower-level health care facilities. At both baseline and follow-up, 239 observations on waste segregation and treatment of infectious waste were made in various areas and departments, including laboratory, maternity, operating theater, general wards, pediatric wards, dental, immunization, and outpatient clinics. Table 2 shows interview participants (waste handlers and health facility managers) according to facility level.

**Table 1. Facilities Sampled, by Type of Ownership**

Ownership	Baseline				Follow-up			
	Public	PNFP	PHP	Total	Public	PNFP	PHP	Total
Facility managers	31	17	2	50	31	17	2	50
Waste handlers	26	11	1	38	26	12	2	40

**Table 2. Facility Staff Sampled, by Type of Health Facility**

Target population	Baseline		Total	Follow –up		Total
	Hospitals	Lower level		Hospitals	Lower level	
Facility managers	4	46	50	4	46	50
Waste handlers	3	35	38	4	36	40

## HEALTH CARE WASTE MANAGEMENT GUIDELINES AND STAFFING

Provision of HCW guidelines is a key step in establishing good practices for a safe and sustainable HCWM system. Of the 50 facilities surveyed, 35 (70 percent) had a copy of the HCWM guidelines available on the day of the follow-up survey; this was confirmed by observation in all instances. Commonly available guidelines include waste segregation posters, the *Making Medical Injections Safer* manual, and HCWM training manuals. This represents an increase: At baseline, 30 (60 percent) of the 50 facilities had a copy of the HCWM guidelines available on the day of assessment.

<sup>3</sup> See Appendix 6 for a full list of participating facilities.

# ORGANIZATION OF HEALTH CARE WASTE MANAGEMENT

Assignment of responsibility for duty of care is essential to safe management of waste. In interviews with facility managers, 40 (80 percent) reported having a designated staff member for HCWM. In all 40 instances, researchers confirmed that the designated HCWM personnel mentored colleagues on segregating HCW. Commonly-mentioned mentorship avenues were continued medical education, supportive supervision, and on-the-job training. This was a slight increase from baseline, when 38 facilities (76 percent) reported having a designated staff member; of these, 32 (84 percent) confirmed that the designated HCWM personnel mentored colleagues on segregating HCW.

*Staffing:* The number of designated waste handlers working at the health facilities varied by level of service delivery, as shown in Table 3. The median number of waste handlers did not significantly vary for baseline and follow-up. At baseline, hospitals reported a median of 14 waste handlers, while HC IIs generally had 1 handler. In the baseline, one hospital and one HC II did not have designated waste handlers; in the follow-up, only one HC II did not have a designated waste handler.

**Table 3. Median Number of Waste Handlers by Level of Service Delivery**

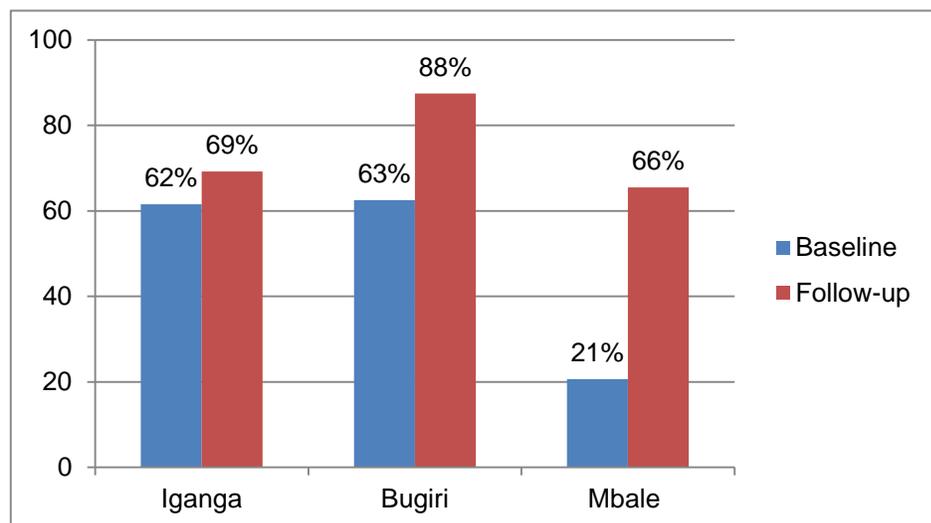
	<b>Baseline</b>	<b>Follow-up</b>
Level of service delivery	Median number of waste handlers	Median number of waste handlers
Hospital (V)	14	12
HC IV	3	3
HC III	2	2
HC II	1	2

Source: Interviews with facility managers

## CAPACITY BUILDING

Training health workers about HCWM minimizes the likelihood of an accidental exposure to blood or body fluids. Since even one untrained staff member can create a risky environment for all staff and clients, it is recommended that facilities strive to have all (100 percent) staff trained in HCWM. At follow-up, 34 (68 percent) facility managers reported that all health workers, including waste handlers, had received training in HCWM. This represents a statistically significant increase (28 percent,  $p < 0.0001$ ) from baseline, when 20 (40 percent) facility managers reported that all personnel had received at least one training in HCWM. Further analysis by district showed that the most significant change occurred in Mbale District (see Figure 1).

**Figure 1. Facility Staff Trained in Waste Management, Baseline and Follow-Up**



Source: Interviews with facility manager

The mean number of staff without HCWM training was compared with the mean number of total facility staff, based on the health facility management report (Table 4). Results showed that the training gap varied by level of service delivery. Lower-level facilities were more likely to have more staff untrained in HCWM. Comparing baseline and follow-up findings, the average proportion of untrained staff diminished for hospitals and HC IVs and HC IIIs. High turnover and new recruitment may explain why staff members at lower-level facilities were untrained.

**Table 4. Mean Facility Staff Totals Compared with Mean Number of Staff without HCWM Training, by Level of Service Delivery**

Level of service delivery	Mean number of untrained staff	Mean number of all staff	Average % untrained
Hospital (n=4)	30.5	202	15.1%
HC IV (n=6)	14	36	38.9%
HC III (n=23)	9	16	56.3%
HC II (n=17)	7	11	63.6%
<b>Follow-up</b>			
Hospital (n=4)	3	208	1.4%
HC IV (n=6)	12.3	42.8	29.0%
HC III (n=23)	8	20	40%
HC II (n=17)	8.5	12	70.8%

Source: Interviews with facility managers

## HEALTH WORKER SAFETY

The production, segregation, transportation, treatment, and disposal of HCW involve the handling of potentially hazardous materials. Protection against personal injury is therefore essential for all workers. The individuals responsible for management of HCW should ensure that all risks are identified and that suitable protection from those risks is provided. A key occupational health and safety measure is provision of personal protective equipment (PPE) (i.e., heavy duty gloves, gum boots, and overalls) by employers. At follow-up, 13 (26 percent) of the 50 facility managers reported having full PPE for waste handlers. Compared with the baseline, where 10 (20 percent) reported availability of satisfactory PPE for waste handlers, there was a slight improvement on this indicator.

The most commonly available PPE included heavy duty gloves and rubber boots. Overalls, masks, and goggles were less commonly available. Because overalls protect waste handlers' clothing and are recommended by the MOH, it is important that facility management include them in the priority supplies. Several cases were noted where handlers were using surgical latex gloves, which do not protect waste handlers from cuts or needle stick injuries.

***Prevalence of needle stick injuries or other exposure to body fluids in the last six months:*** Eight facility managers (16 percent) reported that there had been a needle stick injury or an exposure to blood or body fluids in the six months prior to the survey. The needle stick injuries were distributed among the 3 districts, and 5 percent occurred in Mbale. At baseline, 12 (24 percent) facility managers reported injuries or exposures in the past six months. The difference in the injuries at baseline and follow-up was statistically significant (24 percent versus 16 percent,  $p=0.001$ ). Further analysis by district shows that compared with the baseline, there was a decline (38 percent to 12 percent) in the prevalence of needle stick injuries in Iganga District, but the prevalence in Mbale did not change.

Comparison of prevalence of needle stick injuries or exposure to blood or body fluids showed a slight variation depending on whether the facility had achieved full coverage for staff training in HCWM.

***Availability of post-exposure prophylaxis:*** The analysis of PEP availability was restricted to hospitals and HC IIIs and HC IVs ( $n=33$ ). Eighteen facilities (54.5 percent) had PEP available on-site. At follow-up, 19 (57.6 percent) facilities reported having on-site PEP services. Analysis by level of service delivery showed that one hospital did not have on-site PEP services. For both baseline and follow-up, 50 percent of the health facilities that reported needle stick injuries or exposure to blood or body fluids did not have PEP on-site.

***Stockouts of syringes and safety boxes:*** Uganda's health policy specifies single-use needles for injections. If frequently used sizes of needles and syringes are out of stock, their absence puts pressure on health workers to re-use available supplies, which increases the risk of infecting other patients or requires patients to seek injections at other facilities, which may jeopardize their treatment. The research teams reviewed stock cards to establish if there had been any stockouts of 2 ml or 5 ml needles and syringes over the previous six months before the evaluation. Only updated stock cards were reviewed; these were available in 49 of the 50 health facilities surveyed. This was a slight improvement in performance on this indicator: At baseline, 47 of the 50 facilities had updated stock cards.

At follow-up, 23 (47 percent) of the 49 health facilities had experienced stockouts of needles and syringes in both sizes, reportedly lasting between one and eight weeks. At baseline, 22 (47 percent) of the 47 health facilities that had updated stock cards reported needle and syringe stockouts.

Twelve (24 percent) follow-up facilities reported stockouts for safety boxes in the previous six months prior to the survey—an increase from baseline (seven facilities or 14 percent); the difference is statistically significant ( $p<0.001$ ). This can be explained by the lack of regular supply of these commodities from National Medical Stores.

# OBSERVATIONS ON WASTE SEGREGATION AND TREATMENT OF INFECTIOUS WASTE

Failure to segregate waste makes waste management unnecessarily expensive. Costly methods are used for the treatment and disposal of unsegregated waste. A total of 239 service delivery areas were surveyed at both baseline and endline.

The results showed evidence of improvement over time for some indicators (Table 5).

**Table 5. Observations on On-site Waste Segregation and Treatment of Infectious Waste\***

Area of assessment	N	Baseline		N	Follow-up	
		Number	%		Number	%
Are color-coded bins and liners provided in this service delivery area?	235 <sup>a</sup>	21	8.9	239	11	4.6
Does this service delivery area use safety boxes to dispose of sharps waste?	219 <sup>b</sup>	169	77.2	239	197	82.4
Are sharps being disposed of into the safety box immediately after use?	169	86	73.5	197	135	74.8
Are posters on waste management available?	239	85	35.6	239	119	49.7
Is waste being segregated according to recommended color codes at the point of generation?	21	14	66.7	11	8	72.7
Is there loose biological waste or sharps littered around waste bins or on the floor?	233 <sup>c</sup>	73	31.3	239	57	23.8

**Source:** Observations of waste segregation and treatment of infectious waste

\* Percentages are based on valid cases, i.e., instances where observations were made on the indicator.

<sup>a</sup> 4 missing values

<sup>b</sup> 20 missing values

<sup>c</sup> 6 missing values

**Availability of color-coded bins and bin liners:** For effective waste segregation, staff must be provided with well labelled color-coded bins and bin liners. These should be positioned in points close to the service area. In the final evaluation, 11 (4.6 percent) of the 239 service delivery areas surveyed had both color-coded bins and bin liners available, down from baseline, when 21 (8.9 percent) service delivery areas had appropriate disposal bins and liners. In most instances, the research team noted that color-coded bins were available, but color-coded bin liners were lacking. Health facilities are still grappling with this indicator, as National Medical Stores have not supplied sufficient bins and liners.

**Use of safety boxes to dispose of sharps waste:** Poorly managed sharps waste exposes health workers and the general community to injuries, infection, and environmental pollution. Efficient, safe, and environmentally-acceptable management and disposal of this waste ensure that sharps are contained and minimize risks of needle stick injuries and air and groundwater pollution. On the day of the survey, safety boxes for sharps waste disposal were available in 197 (82.4 percent) of the 239 service areas observed. Analysis showed that public and private for-profit owners were less likely to provide the safety boxes.

Sharps were observed being disposed of into the safety box immediately after use in 135 (74.8 percent) service delivery areas. Where safety boxes were not available, facilities improvised with normal paper boxes for immediate disposal of sharps. Health facilities scored highly on this indicator, and this best practice should be encouraged and supported.

***Availability of waste management posters:*** Posters on waste management were available in 119 (49.7 percent) of the 239 service delivery areas observed. There were two common types: charts on waste segregation and charts on safe handling of waste in laboratories. The endline findings showed improvement on this indicator compared with baseline, where posters on waste management were available in 36 percent of service delivery areas ( $p=0.001$ ).

***Waste segregation according to recommended color codes at the point of generation:*** Waste segregation at the point of generation is important for safe management of HCW. The national HCWM guidelines specify the national color-coded waste segregation system. Of the 11 health facilities that had color-coded bins and bin liners on the day of the survey, 8 (72.7 percent) were segregating waste according to the recommended color codes. This represents an increase from baseline, where 11 of 21 facilities (66.7 percent) that had color-coded bins were segregating waste as recommended. Survey participants cited lack of the color-coded bins and bin liners, insufficient knowledge on HCWM, and negligence, among other factors, as barriers to correct waste segregation.

***Presence of loose biological waste or sharps inside the health facility:*** Biological and sharps littered around waste bins or on floors pose a risk of injuries and infections. Such waste was present in 57 (23.8 percent) of the 239 service delivery areas observed. This is an improvement over baseline, when 73 (31.3 percent) of the 233 service delivery areas observed had sharps or biological waste on the floor or around waste bins.

***Presence of loose biological waste outside the health facility:*** The data collection team evaluated the grounds outside 48 of the 50 health facilities. Loose biological waste was observed at 22 (46 percent) facilities—an increase from baseline, when waste was observed at 18 (37 percent) of the 49 health facilities evaluated for this indicator.

***Treatment of infectious laboratory waste before final disposal:*** Observations on treating infectious waste from laboratories before final disposal were made at 45 of the 50 health facilities assessed. Twenty-four facilities (53 percent) treated waste from laboratories before final disposal—a statistically significant improvement ( $p<0.001$ ) over baseline, when 14 of 40 facilities assessed (35 percent) were treating waste from laboratories before final disposal.

## FINAL WASTE DISPOSAL PRACTICES

The research team determined final waste disposal methods for each type of waste, grouping methods into general categories of “safe” and “unsafe.”

Safe final disposal was described as high/medium incineration followed by placing ash in an ash pit; dumping in a protected HCW pit, including a placenta or needle pit; burning in a shallow pit followed by burial; use of sanitary landfill (for municipal waste); and transportation offsite.

Unacceptable (unsafe) final disposal was described as low temperature incineration;<sup>4</sup> open burning on the ground; open burning in a hole or enclosure; burial; dumping in an unprotected pit; or dumping in an unsupervised area.

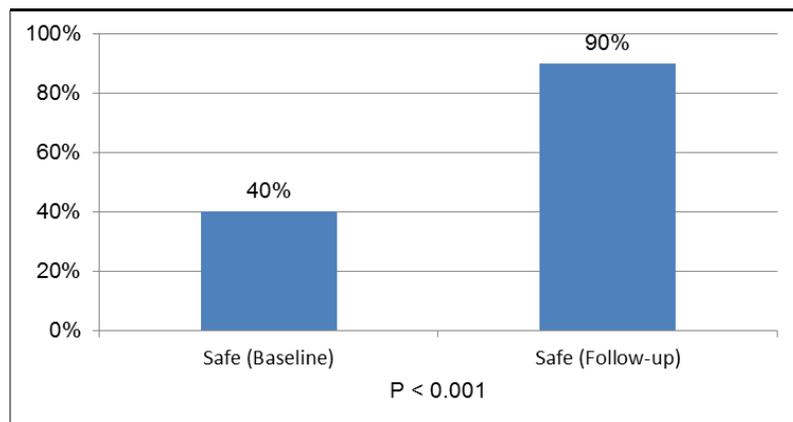
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<sup>4</sup> According to WHO, incinerators should operate at 850-1100 degrees Celsius (1562-2012 degrees Fahrenheit) for safe final disposal (WHO 2012).

**Domestic waste:** Over half (28 or 56 percent) of the 50 health facilities assessed commonly used unsafe practices for disposing of domestic, or general, waste. These include burning in a shallow pit (28 facilities) and burning on open ground (9 facilities). This is an improvement over baseline, when 44 (88 percent) of 50 facilities observed used unsafe practices, including burning in shallow pits (50 percent), dumping in an unprotected pit (14 percent), and dumping and burning in open ground.

**Sharps waste:** Of the 50 health facilities observed at endline, 45 (90 percent) utilized safe final disposal practices for sharps waste, mainly through transportation offsite. This was reported by 44 (88 percent) facilities. Five facilities (10 percent), all PHPs, reported using low temperature incineration, which is considered less than optimal. This represents a statistically significant improvement over baseline, when 40 percent of the 50 facilities observed used safe sharps waste disposal practices ( $p < 0.001$ ).

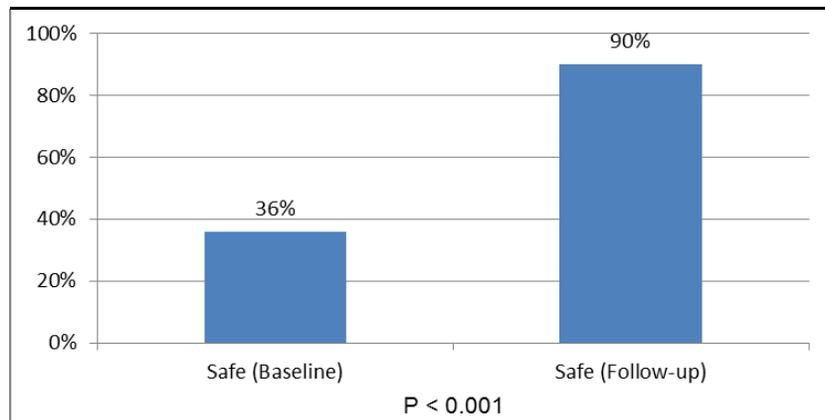
**Figure 2. Sharps Waste Disposal Practices**



**Source:** Observation and interviews with facility managers

**Infectious waste:** Forty-five, or 90 percent, of the 50 health facilities observed used safe final disposal practices for disposing of infectious waste. Most sites (90 percent) used transportation offsite. Three facilities reported using low temperature disposal, and the other two reported dumping in an unprotected deep pit and dumping in a shallow pit. This was a statistically significant improvement from baseline ( $p < 0.001$ ), when 18 (36 percent) of 50 facilities observed utilized safe infectious waste disposal methods, using mainly transportation offsite, which was used by 11 (22 percent) facilities. The most common unsafe practices at baseline were low temperature incineration (40 percent), burning in a shallow pit (12 percent), and dumping in unprotected deep pit (8 percent).

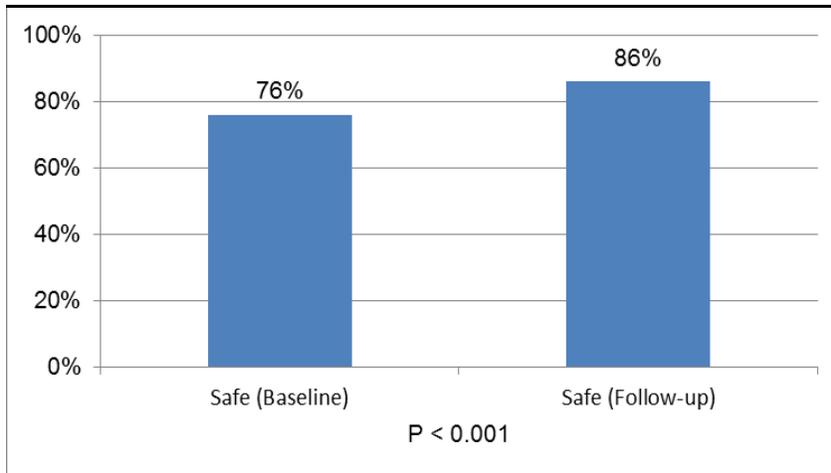
**Figure 3. Infectious Waste Disposal Practices**



**Source:** Observation and interviews with waste handlers and facility managers

**Pharmaceutical waste:** The majority (43 or 86 percent) of the 50 health facilities surveyed were using safe waste disposal methods for pharmaceutical waste. The seven health facilities that were using unsafe practices were further analyzed by ownership and practices; three were PNFs, three were PHPs, and one was public. Of the 43 that were practicing safe practices, 42 were transporting the waste offsite for final disposal (a method also used by facilities reporting safe practices at baseline), and one was using sanitary landfill burial. This represented a statistically significant increase from baseline, when 76 percent of facilities used safe disposal ( $p < 0.001$ ). Unsafe self-reported practices at endline included low temperature incineration (four facilities), dumping in a shallow pit (one facility), and burning in a shallow pit (one facility); these methods were also used at baseline.

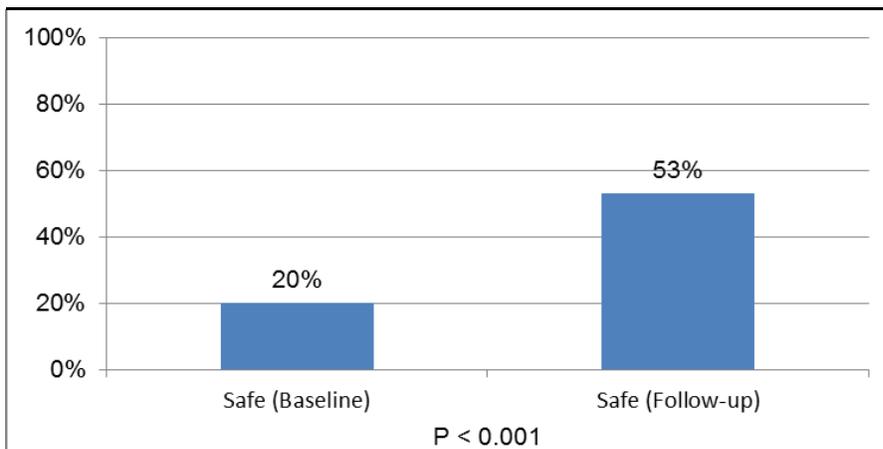
**Figure 4. Pharmaceutical Waste Disposal Practices (n=50)**



**Source:** Interview with waste handlers and facility managers

**Effluents:** According to the national HCWM guidelines, all liquid infectious waste should be discharged into the sewerage system only after being treated according to WHO standards, which include autoclaving or 10 minutes of chemical treatment using 0.5–10 percent hypochlorite solutions (MOH 2008). Of the 45 health facilities that generated effluent waste, 24 (53.3 percent) were treating the waste according to recommended standards. This represents an improvement over baseline, when 9 of the 45 facilities generating effluent waste (20 percent) reported treating effluents before disposal.

**Figure 5. Effluent Disposal Practices (n=50)**



**Source:** Observations on treatment of infectious waste

For disposal, 12 (26.7 percent) of the health facilities reported transporting effluent waste offsite, and 35 (77.7 percent) used other methods. Ten reported dumping in a protected placenta pit, and one used sanitary landfill burial. One site reported the unsafe practice of dumping in unprotected deep pit.

**Other methods of disposal for effluent waste:** At both baseline and follow-up, waste handlers and facility managers mentioned several alternative methods used to dispose of effluent waste. At follow-up, the most common methods were using sewers and pouring on open ground. Use of soak pits was more common at baseline and was the practice at 37 percent of the 45 facilities that were generating effluent waste.

## UTILIZATION OF IGANGA WASTE MANAGEMENT SITE

In October 2012, health facility waste collection was initiated in all six target districts—Bugiri, Kamuli, Kapchorwa, Iganga, Mbale, and Sironko—for final treatment and disposal at the Iganga site. Waste collection records were reviewed for all six project districts at the baseline and at follow-up. All six were assessed for this indicator, mainly because it would be difficult to split the data at the incineration stage.

### TARGETED PUBLIC AND PRIVATE FACILITIES USING THE IGANGA FACILITY

In the six project districts, a total of 243 health facilities were using the centralized waste treatment and disposal facility at Iganga as of July 2013. Of these, 175 are public and 68 are PNF. Data on use of the centralized waste treatment and disposal facility by PHPs could not be captured because the PHPs were handing over their waste to government facilities without appropriate record keeping. However, two new facilities were using the treatment and disposal facility (Table 6).

At baseline, a total of 241 health facilities were using the centralized waste treatment and disposal facility at Iganga as of November 2012. Of these, 171 (71 percent) were public and 70 (29 percent) PNF (Table 6).

**Table 6. Health Facilities Using the Iganga Waste Treatment and Disposal Facility**

Baseline					Follow-up			
District	Public	PNFP	PHP	Total	Public	PNFP	PHP	Total
Iganga	37	15	0	52	37	15	0	52
Kamuli	35	19	0	54	35	15	0	54
Bugiri	33	15	0	48	33	17	0	48
Mbale	28	11	0	39	29	4	0	39
Sironko	22	7	0	29	22	10	0	29
Kapchorwa	16	3	0	19	17	7	0	21
<b>TOTAL</b>	<b>171</b>	<b>70</b>	<b>0</b>	<b>241</b>	<b>175</b>	<b>68</b>	<b>0</b>	<b>243</b>

Source: Records review, GLSL records

*Volume of waste collected:* For the January–March 2013 quarter, the volumes of waste collected by GLSL are presented in Table 7. The districts of Mbale and Iganga generated and disposed of more waste through GLSL than their counterparts.

**Table 7. Volume of Waste Generated for January–March 2013, in Kilograms**

	<b>Public</b>						
Type of waste	Sharps (kg)	Infectious (kg)	Highly infectious (kg)	Pharmaceuticals (kg)	Metal (kg)	Plastic (kg)	Glass (kg)
District							
Iganga	1,285.5	1,392	1,070.5	59	161	326.25	337
Kamuli	920	1473.6	1209.8	62	1	229	319
Bugiri	706	515.5	664.8	62	7	381.5	925
Mbale	1915	2462.5	2006	701	8	887.5	1397.5
Sironko	991.8	718.7	711.4	150.2	2	277	1,272.2
Kapchorwa	101.5	103	198	99	0	95.5	264.5
<b>Total</b>	<b>5,919.8</b>	<b>6,665.3</b>	<b>5,860.5</b>	<b>1,133.2</b>	<b>179</b>	<b>2,196.75</b>	<b>4,515.2</b>
	<b>PNFP/NGO</b>						
Type of waste	Sharps (kg)	Infectious (kg)	Highly infectious (kg)	Pharmaceuticals (kg)	Metal (kg)	Plastic (kg)	Glass (kg)
Iganga	326	210.5	1070.5	59	161	326.25	337
Kamuli	505	456.5	414	0	0	302	194.5
Bugiri	99.5	22	16	56.5	0	17	59
Mbale	365	433	283	106	0	137	263
Sironko	211.2	190	86.5	9	0.5	46.2	407.6
Kapchorwa	45	15	27	0.5	0.5	15	7.5
<b>Total</b>	<b>1,551.7</b>	<b>1,327</b>	<b>1,897</b>	<b>231</b>	<b>162</b>	<b>843.5</b>	<b>1,268.6</b>
<b>Grand total</b>	<b>7,471.5</b>	<b>7,992.3</b>	<b>7,757.5</b>	<b>1,364.2</b>	<b>341</b>	<b>3,040</b>	<b>5,783.8</b>

Source: Record review of GLSL documents on waste collection, January–March 2013

## **VOLUME OF HAZARDOUS WASTE COLLECTED, BY TYPE OF FACILITY**

At both baseline and follow-up, quarterly estimates consistently showed that public facilities contributed a higher proportion of the total waste collected for disposal at the Iganga facility. In all instances, over 70 percent of the waste collected was from public health facilities.

## VOLUME OF WASTE COLLECTED QUARTERLY

This section compares baseline and follow-up findings on the quarterly volume of hazardous waste collected and disposed of through the centralized service provider. At the follow-up evaluation, the total volume of waste collected had increased by a factor of about 1.7, compared with the baseline October–December 2012 quarter (from 19,616.3 kg to 33,750.5 kg), as shown in Table 8. Infectious, highly infectious, and sharps waste constituted about 68 percent of the total collected by GLSL for the January–March 2013 quarter: somewhat higher than the volume of this type of waste collected in the October–December 2012 quarter (61 percent).

**Table 8. Volume of Hazardous Waste Collected, by Type of Ownership and Type of Waste**

Type of waste	Baseline (kg)						Follow-up (kg)					
	Public	%	PNFP	%	Totals	%	Public	%	PNFP	%	Totals	%
Sharps	3,522.7	25.2	1,132.4	20.0	4,655.1	23.7	5,919.8	22.4	1,551.7	21.3	7,471.5	22.1
Infectious waste	1,724.4	12.4	1,404.9	24.8	3,129.3	16.0	6,665.3	25.2	1,327	18.2	7,992.3	23.7
Highly infectious waste	1,393.5	10.0	1,138.3	20.1	2,531.8	12.9	5,860.5	22.1	1,897	26.1	7,757.5	23.0
Pharmaceuticals	3,320.3	23.8	328.7	5.8	3,649.0	18.6	1,133.2	4.3	231	3.2	1,364.2	4.0
Metal scrap	315.5	2.3	0.0	0.0	315.5	1.6	179	0.7	162	2.2	341	1.0
Plastic	993.2	7.1	531.4	9.4	1,524.6	7.8	2,196.75	8.3	843.5	11.6	3,040.2	9.0
Glass	2683.3	19.2	1127.7	19.9	3811.0	19.4	4515.2	17.1	1268.6	17.4	5783.8	17.1
Totals	13,952.9	100.0	5,663.4	100.0	19,616.3	100	26,469.7	100	7,280.8	100	33,750.5	100

**Source:** GLSL records, October–December 2012 and January–March 2013

**Volume of waste collected quarterly by type of ownership:** Both at baseline and during the last quarter of the follow-up period, public health facilities generated the majority of the waste collected by GLSL across all categories. Infectious, highly infectious, and sharps waste constituted the largest proportion of waste disposed of from these facilities. Highly infectious, sharps, and glass constituted the largest proportion of the waste collected from PNFP facilities.

At baseline, for the months of October–December 2012, public health facilities again generated most of the waste collected by GLSL across all the categories of waste, but the type of waste differed: Sharps waste, pharmaceuticals, and glass constituted the largest proportion of waste collected.

**Capacity of the incinerator being used for the disposal of health care waste:** The incinerator has the capacity to destroy 4,000 kg of waste per burning cycle. Two cycles can be completed each day. Total monthly capacity is 184,000 kg [4,000 x 2 x 23 (number of working days in a month)]. In the January–March 2013 quarter, the incinerator was used 22 times and destroyed a total volume of 19,302.3 kg. Based on this estimate, HCW is utilizing approximately 3 percent of the incinerator’s capacity.

Compared with baseline, there was a 1 percent increase in the capacity of the incinerator being used for disposal of HCW. For the October–December 2012 quarter, the incinerator was used for five days and

destroyed a volume of 10,952.5 kg,<sup>5</sup> representing about 2 percent of the incinerator’s total capacity. Though utilization of the incinerator is increasing, there is still room for expanding the service to other users in the area.

*Use of the Iganga disposal center by non-project facilities:* Ten districts outside the AIDSTAR-One project districts use the centralized waste treatment and disposal facility at Iganga; 250 non-project health facilities are using the facility (Table 9). With the six project districts, these facilities use 34.7 percent of the incinerator’s capacity.

**Table 9. Health Facilities Using the Centralized Waste Management Service Outside the Six Project-Supported Districts**

<b>District</b>	<b>Number of health facilities</b>
Busia	32
Butaleja	24
Budaka	19
Bukwo	16
Bududa	15
Pallisa	31
Mayuge	42
Kumi	17
Kaliro	21
Namutumba	33
<b>Total</b>	<b>250</b>

**Source:** GLSL records, July 2013

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<sup>5</sup> Before installation of the Iganga incinerator in December 2012, some waste was incinerated in Jinja, while other waste was recycled.

# DISCUSSION OF RESULTS

Overall, the findings from the follow-up survey show progress between the baseline and the follow-up on most HCWM practices, but there is substantial room for improvement. Also, there is a need for broader awareness-raising to ensure that communities and other stakeholders understand the importance of HCWM to address gaps in the larger procurement and funding systems.

## AVAILABILITY OF REFERENCE DOCUMENTS

At follow-up, a higher proportion of health facility managers had copies of waste management guidelines. If these guidelines are used by all staff members, it is feasible that facilities can attain and maintain high-quality HCWM. The research team confirmed that all available resource persons were mentoring their colleagues to improve standards.

However, it is important to realize that between baseline and follow-up there was a significant increase in the number of new health workers at all levels of service delivery due to recruitment. Continuous recruitment requires continuous HCWM training and mentoring. This means that the facility-based resource persons for waste management must solicit support for mentoring from members of the infection prevention and control committees and working groups at hospitals and health centers. Quality improvement and occupational safety and health teams can also provide support.

## HEALTH CARE WASTE MANAGEMENT PRACTICES AND PREVALENCE OF BEST PRACTICES

**Capacity building:** The project set an ambitious target establishing mechanisms for continually training health workers in HCWM at each facility—through mentoring, on-the-job supervision, and continuing medical education—to achieve 100 percent coverage at all times. The follow-up study showed an improvement (from 40 percent to 68 percent) in the number of facilities in which all health workers had been trained, but this remains below the desired 100 percent.

Constraints to achieving desired targets include new recruitment, shift work (which causes some workers to miss training sessions), and inconsistent provision of continuing medical education, especially at lower-level facilities. To improve performance in this indicator, facilities should include HCWM in orientation packages for new staff. In addition, visiting technical supervisors should make it a habit to ensure that each visit includes re-orientation for those found to have gaps in HCWM knowledge or skills. These two approaches, used mainly in Mbale District and to some extent in Iganga District, seem to have given the two districts an edge over Bugiri District.

**Health worker safety:** The proportion of waste handlers provided with full PPE remains very low (26 percent), mainly because the waste handlers are managed through contracts. Most existing contracts do not make it a strict requirement for employers to provide full PPE to their workers. In the short term, this implies that USG implementing partners supporting service delivery should make plans to provide PPE to waste handlers. In the long term, however, contract agreements need to specify the minimum

PPE that each waste handler must receive before starting work. In addition, employers who directly employ individual waste handlers need to be reminded to provide the handlers with full PPE.

Loose biological waste also continues to be present inside and outside the facility and is attributed to patients littering swabs; these patients are not properly instructed on where to dispose of the swabs used to stop bleeding following blood draws and dental extraction. This suggests a need to create wider awareness among communities about the risks posed by this unsafe practice. One strategy might be to conduct educational sessions at individual health facilities, targeting patients while they wait to be seen by clinicians.

**Exposures:** The prevalence of needle sticks injuries diminished from 24 percent to 16 percent between baseline and endline, but the finding of continuing exposure demonstrates the need to address risk factors. These include inadequate preparation of patients for procedures, failing to place used sharps in appropriate containers, and gaps in skills during surgical procedures. The follow-up survey did document that needle injuries are commonly reported—a positive finding as it increases the likelihood that exposed workers will receive PEP.

**Post-exposure prophylaxis:** Availability of PEP services at the service delivery level remained almost unchanged, 54.5 percent at baseline and 57.6 percent at follow-up, although most facilities can access PEP through referral. Arrangements between facilities providing and receiving PEP need to be established so any worker referred can easily access services. Health workers also need a clear understanding of where they can go for PEP services.

**Waste segregation practices:** At the final evaluation, over 70 percent of the health facilities surveyed were segregating waste. This reduces the cost of waste management for the region because facilities can use suitable treatment and disposal methods for each category of waste. It also reduces the risk of polluting the environment, especially if the waste is handled by licensed service providers.

However, facilities commonly lacked sufficient equipment for collecting their segregated waste. At the final evaluation, 11 (4.6 percent) of the 239 service delivery areas surveyed had both color-coded bins and bin liners available, a decrease from baseline, when 21 service delivery areas (8.9 percent) had appropriate disposal bins and liners. In most instances, the research team noted that color-coded bins were available, but color-coded bin liners were lacking.

**Treatment of infectious waste:** The number of laboratories treating infectious waste prior to disposal increased from 35 percent to 53 percent, but this remains far below the desired 100 percent. A special program needs to be designed to address this gap.

**Stocks of needles and syringes:** At the time of follow-up, nearly half (47 percent) of the facilities assessed had experienced stockouts of 2 ml and 5 ml needles and syringes because of insufficient or inconsistent delivery of supplies from the National Medical Stores.

Thus, there is a need for each district to establish or strengthen mechanisms for tracking facilities with surplus stock, so they can send supplies as a buffer for facilities with stockouts. Partners with programs that require use of both syringe sizes also may need to provide buffer stocks to their implementing sites. Additional strategies include requiring higher-level facilities, such as hospitals and HC IVs, to increase their buffer stocks when ordering. They also include supporting National Medical Stores to improve the timeliness of their deliveries.

**Final waste disposal:** The follow-up survey showed that 90 percent of facilities were using acceptable methods for disposal of infectious and sharps waste, a dramatic improvement from the low baselines. Facilities using suboptimal disposal methods are mainly PHPs. This improvement shows that centralized waste treatment and disposal facilities provide an opportunity for many health facilities to rapidly implement best practices in managing HCW.

## AVAILABILITY OF EQUIPMENT FOR COLLECTING, TRANSPORTING, AND DISPOSING OF WASTE

**Safety boxes:** Nearly one-fourth (24 percent) of facilities reported that stockouts of safety boxes had occurred in the past six months—an increase from baseline. Stockouts mainly occurred at hospitals, where consumption is high, while lower-level facilities were over-stocked on this item.

Since USG partners work within existing structures, partners should ensure the availability of sharps boxes by supporting redistribution of the boxes from over-stocked facilities to hospitals, while also addressing factors that lead to stockouts of safety boxes at the hospitals.

**Color-coded waste bins:** Less than 10 percent of service delivery points had both color-coded waste bins and liners of a matching color, yet resources were allocated to procure these commodities. To improve matching, maintain appropriate segregation. Also, to avoid the unnecessary costs of disposing of improperly coded waste, health managers and their procurement officers should carefully observe patterns of liner use and plan for sustainable stocks of each color.

**Quantities of hazardous waste collected per month:** Follow-up data on waste collection from all six project districts showed that health facilities are now able to dispose of their hazardous waste via handover for centralized treatment and disposal at the Iganga site. Both at baseline and follow-up, public health facilities made the largest contribution (over 80 percent) to the total volume of waste collected for disposal. Over 33,750 kg of waste was collected from the six districts from January to March 2013, 1.7 times more than what was recorded at the baseline for the October–November 2012 quarter.

**Efficiency in utilizing available incinerator capacity:** At baseline, the six project districts were using the incinerator at Iganga for their waste disposal on a cost recovery basis, utilizing 1.5 percent of the incinerator's capacity. At follow-up, the number of districts using the incineration services was 16, so the incinerator was used at 34.7 percent of its capacity. Achieving sustainable cost recovery will require higher buy-in by the health sector and from outside the health sector in the region.



# CONCLUSION

The installation of a centralized waste management facility, along with training for health workers, resulted in improved health waste management in three districts in Uganda's Eastern Region. At the conclusion of the intervention, 90 percent of the 50 facilities observed were practicing safe final disposal of their infectious and sharps waste. However, safe practices were not observed in every detail; waste handlers did not have all the recommended PPE, and in the event of exposures, only half of facilities had PEP available onsite. Not all facilities provided each employee with training about the importance of HCWM—in part due to the rapid turnover that left some employees untrained. Further, the majority of facilities did not have all the color-coded bins for segregating different types of waste. Also, stockouts of needles and syringes persist. Some of these shortfalls were due to problems in the logistical supply chain, in particular problems with supplies provided by the National Medical Stores.

The MOH, district managers, and facilities should collaborate to ensure that HCWM is prioritized throughout each facility at every level, and that all employees are trained and appropriately equipped. As the HCWM system develops, a positive step might be to include HCWM in the pre-service curricula and to develop standardized HCWM in-service training for facility-based employees.



# RECOMMENDATIONS

The main recommendations provided in this chapter are focused on sustaining the behaviors that are positive and improving those that are less than optimal, as shown in this evaluation.

## LOGISTICS SYSTEMS IMPROVEMENTS

*Strengthening the supply chain and logistical capacity:* The MOH and partners should provide facilities with support and training in logistics management and quantification to health facilities to ensure that there are no stockouts of essential equipment. The supply systems should also be streamlined at all levels to ensure continuous supply of equipment. In some cases, facilities should plan for extra supplies in case of stock shortages in house or at adjacent facilities.

The MOH should work with the National Supply Stores to ensure that facilities have a continuous and reliable supply of safety, collection, and disposal equipment and supplies.

## POLICY AND GUIDELINES

Availability of national policy and guidelines is essential in all facilities. Job aids, such as safety posters, remind providers and waste handlers of the need for safety practices in disposing of medical waste; they should be provided and posted to promote good practices.

## TRAINING

Because understanding of HCWM remains suboptimal, and because staff members frequently move from one facility to another, managers and policymakers should ensure that there are numerous opportunities to learn and continue learning about waste man

- Training opportunities can include strengthening integration of HCWM in pre-service training (nursing and medical curricula), including HCWM in continued medical education sessions in-service training, and encouraging district HCWM technical teams to organize workshops, possibly using a standardized training curriculum.
- Facility managers should promote use of feedback during supportive supervision visits as a way of providing on-the-job training to providers and waste handlers who were not able to attend training workshops on HCWM. Another option would be to use previously trained individuals as trainers who conduct additional workshops in new areas and with newly arriving staff.

## AVOIDING NEEDLE STICK INJURIES

*Preventing injuries:* It is critical for health unit managers to continuously assess circumstances leading to needle stick injuries and exposure to blood and bodily fluids, with the aim of identifying persistent risk factors. These should be targeted for education.

*Enabling self-protection:* All facilities should ensure the availability of PPE to protect health workers and waste handlers from accidental occupational injuries.

## **TRAINING AND SENSITIZATION**

All facilities should have a designated staff member or an infection prevention and control/HCWM committee to ensure that HCWM is a priority throughout the facility. This person, with support from facility management, should provide continuous supportive supervision on HCWM to all other staff.

## **WASTE SEGREGATION**

As mentioned above, facilities require logistical support. The MOH, via the National Medical Stores, must continuously provide appropriate supplies for waste segregation. At the facility level, managers should ensure that adequate numbers of color-coded waste bins and accompanying liners are available at each service delivery point. Appropriate waste segregation and disposal also require behavior change by all health facility staff, with continued supervision and support by facility management.

## **WASTE DISPOSAL**

Though the availability of a centralized waste facility has improved waste disposal, some facilities are still conducting inappropriate disposal. Some medical waste, including sharps, is still disposed of in unprotected pits or with low temperature incineration. Domestic waste is commonly disposed of using unsafe methods, including dumping in unsupervised areas or burning on open ground. Though domestic waste is not hazardous, facilities must ensure that it is disposed by appropriate means. These practices should be targeted for elimination through continued training and supervision.

## **USE OF CENTRALIZED HEALTH CARE WASTE MANAGEMENT SERVICES**

The use of a centralized waste management service provider is a very promising practice for promoting safe final disposal of HCW. The MOH and private partners should encourage PHPs to use a centralized waste disposal and treatment facility, since this group appears to drive unsafe waste practices. As of July 2013, very few PHPs were using this service, which has shown great potential to promote safe waste disposal practices.

# REFERENCES

Ministry of Health. 2007. *Annual Health Sector Performance Report, Financial Year 2006/2007*. Online at <http://www.health.go.ug/docs/AHSPR06.pdf>.

Ministry of Health. 2008. *Uganda National Health Care Waste Management Implementation Guidelines*. Available at the Ministry of Health Resource Center – Kampala.

World Health Organization (WHO). 2000. *AIDE-MEMOIRE for a National Strategy for Health Care Waste Management*. Online at [http://www.who.int/occupational\\_health/activities/2amhgw\\_en.pdf](http://www.who.int/occupational_health/activities/2amhgw_en.pdf)

WHO. 2012. “Waste from health-care activities,” *Fact sheet No. 253*. Online at <http://www.who.int/mediacentre/factsheets/fs253/en/>.



# APPENDIX I.

# HEALTH CARE WASTE MANAGEMENT DATA COLLECTION TOOL

District \_\_\_\_\_

Dates: \_\_\_\_\_

Names of the health facility \_\_\_\_\_

Level (Circle): Hospital HC IV HC III HC II

Ownership (Circle type) Gov PHP PNFP

Names of Interviewers \_\_\_\_\_

Please interview the facility manager to obtain information on HCWM practices followed at the facility.

	<b>Basis (regulation framework) for HCWM practices followed at the health facility</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Comments</b>
1	Do you have a copy of any guidelines on health care waste management (HCWM)? <i>(List the guidelines in use in the comments column.)</i> Only tick yes if observed				
	<b>Organization of HCWM</b>				
2	Does the facility have someone in charge of HCWM?				
3	Is the person in charge of HCWM mentoring other staff to segregate HCW?				
4	How many designated waste handlers are available? Write down the number in the comments column.				

5	How many health workers are available at the health facility? Write down the numbers in the comments column as applicable.	Ownership		Number	
		MOH			
		PNFP			
		PHP			
		Partner staff			
		Others			
		Total			
<b>Capacity building</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Comments</b>
6	Have all the health workers, including waste handlers, in this facility ever had training in health care waste management?				
7	If no to 6 above, how many have not had the training? Please write number in comments column. Skip if all have been trained.				
<b>Health worker safety</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Comments</b>
8	Are waste handlers provided protective gear (i.e., heavy duty gloves, gum boots, and overalls)? Only tick yes if all three are provided Please list other type of gear provided in the comments column.				
9	Has anyone at this facility had a needle stick injury or any other exposure to blood or body fluids in the last six months?				
10	If yes to 9 above, how many individuals were: Injured <i>and/or</i> exposed? ----- Waste handlers? ----- (insert numbers)				

11	Does the facility have post-exposure prophylaxis (PEP) services?				
12	Have there been stockouts of either a 2ml or 5ml needle and syringe at the facility in the last six months? Review stock cards to confirm.				
13	Have there been any stockouts of safety boxes over the past six months at this facility? If available, review stock cards to confirm.				

The following information is captured through *observations* of waste segregation and treatment of infectious waste.

<p>For each health facility visited, you will assess a maximum of 12 service delivery areas on selected indicators for HCWM practices elaborated in questions 14 – 19 below.</p> <p>Insert the name of the service delivery area that is being assessed as illustrated in the first column in the next row below. For each question, select the most suitable option by circling either Yes “1”, No “2” or Not applicable ‘3’.</p>														
Out-patient department	Current HCWM practices at the health facilities	1	2	3	4	5	6	7	8	9	10	11	12	Comments
	14	Are color-coded waste bins and bin liners provided in <u>this</u> service delivery area? (If no, indicate the number of service delivery areas that do not have the color-coded bins and liners.)	1	1	1	1	1	1	1	1	1	1	1	
		2	2	2	2	2	2	2	2	2	2	2	2	
		3	3	3	3	3	3	3	3	3	3	3	3	
15	Does this service delivery area use safety boxes to dispose of sharps waste?	1	1	1	1	1	1	1	1	1	1	1	1	
	2	2	2	2	2	2	2	2	2	2	2	2	2	
	3	3	3	3	3	3	3	3	3	3	3	3	3	

16	Are sharps being disposed of into the safety box immediately after use?	1 2 3												
17	Are posters on waste management available and displayed? Name the different types of posters in the comments column.	1 2 3												
18	Is waste being segregated according to recommended color codes <sup>6</sup> at the point of generation? (If not, find out the reasons why segregation is not being done and include in the comments column.)	1 2 3												
19	Is there loose biological waste and/or sharps littered around waste bins or on the floor?	1 2 3												
<b>Current HCWM practices at the health facilities</b>											<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Comments</b>
20	Is there any loose biological waste littering the compound?													
21	Is infectious waste from the laboratories treated before final disposal?													

<sup>6</sup> Recommended color codes include black – for non-infectious waste; yellow – for infectious waste and sharps; red – for highly infectious waste; and brown – for pharmaceutical waste.

**Final health care waste disposal practices (Please circle the final method(s) of disposal for each type of waste.)**

22	The following information on final disposal is to be captured through interview with the waste handler (or the manager or facility manager, if waste handler is not available).	
	High/medium incineration followed by putting the ash in an ash pit Dumping in a protected health care waste pit Dumping in a protected placenta pit Dumping in a protected needle pit Burning in shallow pit followed by burial Using sanitary landfill burial Transportation offsite	H) Low temperature incineration I) Dumping in unprotected deep pit J) Dumping in shallow pit/hole K) Burning on open ground L) Burning in a shallow pit M) Burial N) Other (specify)
22.1	Domestic waste (non-infectious waste)	A B C D E F G H I J K L M N Other (specify) _____
22.2	Sharps waste	A B C D E F G H I J K L M N Other (specify) _____
22.3	Infectious waste (sputum, blood, testing strips)	A B C D E F G H I J K L M N (N) Other (specify) _____  Not applicable (explain) _____

22.4	Placenta/other anatomical waste	<p style="text-align: center;">A B C D E F G H I J K L M N</p> <p>(N) Other (specify) _____</p> <p style="text-align: center;">Not applicable (explain) _____</p>
22.5	Pharmaceutical waste	<p style="text-align: center;">A B C D E F G H I J K L M N</p> <p>(N) Other (specify) _____</p> <p style="text-align: center;">Not applicable (explain) _____</p>
22.6	Effluent	<p style="text-align: center;">A B C D E F G H I J K L M N</p> <p>(N) Other (specify) _____</p> <p style="text-align: center;">Not applicable (explain) _____</p>









## APPENDIX 4.

# SAMPLING FRAME

Number	District	Name of health facility	Ownership	Level
1	BUGIRI	MAYUGE –BUDHAYA	GOVT	HC III
2	BUGIRI	MAZIRAGA HC	GOVT	HC II
3	BUGIRI	BUGIRI T/C	GOVT	HC II
4	BUGIRI	BUGIRI HOSPITAL	GOVT	HOSPITAL
5	BUGIRI	URHB MEDICAL CENTRE-CLINIC	PNFP	HC II
6	BUGIRI	FIRST LINE MEDICAL CENTRE	PNFP	HC III
7	BUGIRI	BULESA	GOVT	HC III
8	BUGIRI	BUWUNI	GOVT	HC II
9	BUGIRI	BULUGUYI	GOVT	HC III
10	BUGIRI	WAKAWAKA	GOVT	HC II
11	BUGIRI	BUWUNGA	NGO	HC III
12	BUGIRI	BUSOGA HC	PHP	HC II
13	BUGIRI	BULIDHA	GOVT	HC III
14	BUGIRI	IWEMBA	GOVT	HC III
15	BUGIRI	KIGULU	NGO	HC II
16	BUGIRI	KAYANGO	GOVT	HC III
17	BUGIRI	MUTERERE	GOVT	HC III
18	BUGIRI	MUTERERE	GOVT	HC II
19	BUGIRI	KAYOGERA	PHP	HC II
20	BUGIRI	NABUKALU	GOVT	HC III
21	BUGIRI	NANKOMA	GOVT	HC IV
22	IGANGA	BUNYIRO	GOVT	HC III
23	IGANGA	BULAMAGI	GOVT	HC III
24	IGANGA	BUSEMBATYA	GOVT	HC III
25	IGANGA	LUBIRA	GOVT	HC III
26	IGANGA	IGANGA HOSPITAL	GOVT	HOSPITAL

27	IGANGA	IGANGA ISLAMIC MEDICAL CENTRE	PNFP	HC III
28	IGANGA	IGANGA MUNICIPAL	GOVT	HC III
29	IGANGA	BUSESA	GOVT	HC IV
30	IGANGA	IBULANKU COMMUNITY HC III	PNFP	HC III
31	IGANGA	MAKUTU	GOVT	HC III
32	IGANGA	BUGONO	GOVT	HC IV
33	IGANGA	KASAMBIKA	GOVT	HC II
34	IGANGA	NAKALAMA	GOVT	HC III
35	IGANGA	BUSOWOBI	GOVT	HC III
36	IGANGA	NAMBALE	GOVT	HC III
37	IGANGA	NAMUNGALWE	GOVT	HC III
38	IGANGA	NAWANDALA	GOV	HC III
39	IGANGA	IGANGA TOWN COUNCIL	GOVT	HC III
40	IGANGA	BUMANYA	GOVT	HC IV
41	IGANGA	GADUMIRE	GOVT	HC III
42	IGANGA	BUDINI	PNFP	HC II
43	IGANGA	KALIRO TOWN COUNCIL	GOVT	HC II
44	IGANGA	URHB KALIRO CLINIC	PNFP	HC II
45	IGANGA	KIWALA MEDICAL CENTRE	PNFP	HC III
46	IGANGA	NAMUGONGO HC	GOV	HC III
47	IGANGA	NAMWIWA	GOV	HC III
48	IGANGA	NAWAIKOKE	GOV	HC III
49	MBALE	BUSIU	GOVT	HC IV
50	MBALE	MAKHONJE	GOVT	HC III
51	MBALE	BUDWALE	GOVT	HC II
52	MBALE	BUMADADA	GOVT	HC II
53	MBALE	THORNBURY BUFUMBO	GOVT	HC II
54	MBALE	BUFUMBO	GOVT	HC IV
55	MBALE	NAKALOKI	GOVT	HC III
56	MBALE	KOLONYI/KOLONYI SALEEM	GOVT	HC III
57	MBALE	ST.PATRICK	PHP	HC II
58	MBALE	NAMANYONYI	GOVT	HC III
59	MBALE	SHARE-REFUAH	NGO	HC II
60	MBALE	KHABASHEKE DOMICILIARY	PHP	HC II
61	MBALE	WANALE	GOVT	HC III

62	MBALE	NAMAWANGA	GOVT	HC III
63	MBALE	BUSHIKORI	NGO	HC III
64	MBALE	NAIKU	GOVT	HC III
65	MBALE	BUGEMA	GOVT	HC II
66	MBALE	BUNAPONGO	GOVT	HC II
67	MBALE	WANGOLO CLINIC	PHP	HC II
68	MBALE	NASASA	GOVT	HC II
69	MBALE	SIIRA	GOVT	HC II
70	MBALE	BUNGOKHO MUTOTO	GOVT	HC III
71	MBALE	JOY MEDICAL CENTRE	NGO	HC II
72	MBALE	BUWANGA	GOVT	HC II
73	MBALE	BUSANO	GOVT	HC III
74	MBALE	NYONDO	NGO	HC III
75	MBALE	LWANGOLI	GOVT	HC III
76	MBALE	MBALE DISCIPLINARY	GOVT	HC II
77	MBALE	BUGEMA BARRACKS	GOVT	HC II
78	MBALE	NKOMA DOMICILARY	PHP	HC II
79	MBALE	TASO MBALE	NGO	HC II
80	MBALE	MALUKHU	GOVT	HC III
81	MBALE	AIC MBALE MAIN BRANCH	NGO	HC II
82	MBALE	MARIE STOPES	NGO	HC II
83	MBALE	MBALE REGIONAL BLOOD BANK	GOVT	HC II
84	MBALE	ADVENTIST	NGO	HC III
85	MBALE	NAMATALA	GOVT	HC II
86	MBALE	SDA	NGO	HC III
87	MBALE	CURE CHILDREN'S HOSPITAL	GOVT	HC III
88	MBALE	DEKAR MEDICAL CLINIC & LABORATORY	PHP	HC II
88	MBALE	NEW TOWN CLINIC	PHP	HC II
89	MBALE	POLICE CLINIC	GOVT	HC II
90	MBALE	IU-IU	GOVT	HC II
91	MBALE	MBALE REGIONAL CLINIC	PHP	HC II
92	MBALE	HOPE CLINIC NAMAKWENKWE	PHP	HC II
93	MBALE	NAMAKWEKE	GOVT	HC III
94	MBALE	ST.FATIMA GANGAMA	NGO	HOSPITAL
95	MBALE	GANGAMA ST.FATIMA	NGO	HC III

96	MBALE	AHAMADIYA	NGO	HC III
97	MBALE	JOY HOSPICE	GOV	HC III
98	MBALE	MBALE	GOVT	REGIONAL REFERRAL HOSPITAL
99	MBALE	MBALE MUNICIPALITY	GOV	HC II
100	MBALE	MBALE PEOPLE'S CLINIC	PHP	HC II
101	MBALE	UGH AHAMADIYA	NGO	HC III
102	MBALE	ST.AUSTIN MBALE	NGO	HC II
103	MBALE	BUSAMAGA	GOVT	HC II

## **APPENDIX 5.**

# **INFORMATION SHEET AND CONSENT FORM**

### **INFORMATION SHEET**

26<sup>th</sup> July 2013

#### Introduction

You are being invited to take part in a survey, but before you decide, it is important for you to understand why the survey is being carried out, and what it will involve.

Please take time to read/ listen to this information carefully and discuss it with any trusted colleagues, if you wish. Please ask us if there is anything that is not clear or if you would like further information. Take time to decide whether you wish to take part or not.

#### Purpose of the survey

The Ministry of Health (MOH), AIDSTAR-One project, Green Label Services Ltd. (GLSL), and other stakeholders have over the last year been implementing health care waste management (HCWM) activities aimed at establishing a centralized system for managing health care waste (HCW) through public-private partnership. Project activities were implemented in the districts of Mbale, Bugiri, Kapchorwa, Sironko, Kamuli, and Iganga. Prior to the implementation of the project, a baseline assessment was conducted in three randomly selected districts of Mbale, Bigiri, and Iganga.

In preparation for the official close-out of its activities by 31<sup>st</sup> October 2013, AIDSTAR-One project is carrying out a follow-up assessment. The assessment is aimed at evaluating progress made towards achieving the project objectives. In addition, data collected will serve as reference information for the progress made towards achieving best practices in HCWM. It will also highlight areas that need additional support and inform planning processes at district and national level.

## CONSENT FORM

I confirm that I have read/listened and understood the information sheet dated 26<sup>th</sup> July 2013 for the above survey and have had the opportunity to ask questions.

I understand that if I decide at any other time during the survey that I no longer wish myself to participate in this project, I can notify the *investigators involved* and be withdrawn from it immediately without my legal rights being affected.

I understand that all the information that will be collected will be kept strictly confidential and that facilities will not be identified by name or location when disseminating results.

Researcher's statement:

I \_\_\_\_\_ (name)

confirm that I have carefully explained the nature and demands of the proposed interviews to the participant involved in the study.

Signed

Date

-----

-----

## APPENDIX 6.

# LIST OF PARTICIPATING SITES

<b>Number</b>	<b>District</b>	<b>Name of health facility</b>	<b>Ownership</b>	<b>Level</b>
1	BUGIRI	BUGIRI T/C	GOVT	HC II
2	BUGIRI	BUGIRI HOSPITAL	GOVT	HOSPITAL
3	BUGIRI	URHB MEDICAL CENTRE-CLINIC	PNFP	HC II
4	BUGIRI	FIRST LINE MEDICAL CENTRE	PNFP	HC III
5	BUGIRI	BUSOGA HC	PHP	HC II
6	BUGIRI	KIGULU	NGO	HC II
7	BUGIRI	MUTERERE	GOVT	HC III
8	BUGIRI	KIGULU HC III	GOVT	HC II
9	IGANGA	BUSEMBATYA	GOVT	HC III
10	IGANGA	IGANGA HOSPITAL	GOVT	HOSPITAL
11	IGANGA	IGANGA ISLAMIC MEDICAL CENTRE	PNFP	HC III
12	IGANGA	IGANGA MUNICIPAL	GOVT	HC III
13	IGANGA	BUSESA	GOVT	HC IV
14	IGANGA	IBULANKU COMMUNITY HC III	PNFP	HC III
15	IGANGA	MAKUUTU	GOVT	HC III
16	IGANGA	BUGONO	GOVT	HC IV
17	IGANGA	NAKALAMA	GOVT	HC III
18	IGANGA	BUSOWOBI	GOVT	HC III
19	IGANGA	NAMBALE	GOVT	HC III
20	IGANGA	NAMUNGALWE	GOVT	HC III
21	IGANGA	NABITENDE	PNFP	HC II
22	MBALE	BUSIU	GOVT	HC IV
23	MBALE	MBALE MUNICIPALITY	GOVT	HC II
24	MBALE	MAKHONJE	GOVT	HC III
25	MBALE	MBALE REGIONAL REFERRAL HOSPITAL	GOVT	HOSPITAL

26	MBALE	BUDWALE HC III	GOVT	HC II
27	MBALE	MOUT ELGON HOSPITAL	PHP	HOSPITAL
28	MBALE	BUMADADA	GOVT	HC II
29	MBALE	TOBIN HEALTH CENTRE (SHARE-REFUAH)	PNFP	GOVT
30	MBALE	THORNBURY BUFUMBO	GOVT	HC II
31	MBALE	BUFUMBO	GOVT	HC IV
32	MBALE	NAKALOKE	GOVT	HC III
33	MBALE	KOLONYI/KOLONYI SALEEM	GOVT	HC III
34	MBALE	ST.PATRICK	PHP	HC II
35	MBALE	NAMANYONYI	GOVT	HC III
36	MBALE	KHABASHEKE DOMICILIARY	PHP	HC II
37	MBALE	NAMAWANGA	GOVT	HC III
38	MBALE	BUSHIKORI	NGO	HC III
39	MBALE	BUNAPONGO	GOVT	HC II
40	MBALE	SIIRA	GOVT	HC II
41	MBALE	BUNGOKHO MUTOTO	GOVT	HC III
42	MBALE	BUWANGWA	GOVT	HC II
43	MBALE	NYONDO CLINIC	NGO	HC III
44	MBALE	IU-IU	GOVT	HC II
45	MBALE	NAMAKWEKE	GOVT	HC III
46	MBALE	ST.FATIMA GANGAMA	NGO	HOSPITAL
47	MBALE	AHAMADIYA MUSLIM MEDICAL CENTRE	NGO	HC III
48	MBALE	JOY HOSPICE	GOV	HC III
49	MBALE	MBALE PEOPLE'S CLINIC	PHP	HC II
50	MBALE	BUSAMAGA	GOVT	HC II

For more information, please visit [aidstar-one.com](http://aidstar-one.com).

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