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EVALUATION OF INJECTION SAFETY AND HEALTH CARE WASTE MANAGEMENT IN ETHIOPIA

2009 FINAL REPORT

SEPTEMBER 2009

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MMIS
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Abstract: The United States President's Emergency Plan for AIDS Relief (PEPFAR), through the United States Agency for International Development (USAID), has funded JSI, Inc. for the implementation of the *Making Medical Injections Safer (MMIS)* project on injection safety in Ethiopia. JSI and its partners also implement similar projects in 10 other countries in Africa and the Caribbean. This report describes the results of the final evaluation on the status of injection safety and health care waste management, which took place during the month of December in the health districts of Amhara, Dire Dawa, Harari, and Tigray regional states.

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List of Abbreviations

AD	Auto-Disable (syringe)
BCC	Behavior Change Communication
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCWM	Health Care Waste Management
HIV	Human Immunodeficiency Virus
IPC	Infection Prevention and Control
JSI R&T	John Snow Research and Training Institute, Inc.
MMIS	Making Medical Injections Safer project
MOH	Ministry of Health
PEP	Postexposure Prophylaxis
PPE	Personal Protective Equipment
PEPFAR	President's Emergency Plan for AIDS Relief
RDF	Revolving Drug Fund
SIGN	Safe Injection Global Network
STI	Sexually Transmitted Infections
USAID	United States Agency for International Development
WHO	World Health Organization

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EXECUTIVE SUMMARY

One of the objectives of the Ethiopia MOH is to improve the quality of care provided on all levels of the health care pyramid. Under PEPFAR, Ethiopia received technical and financial support to promote injection safety and health care waste management (HCWM) through the support of the USAID and the injection safety and HCWM project called the Making Medical Injections Safer (MMIS) project. Under the premised of a broad evaluation of injection safety, the MOH organized, with the technical and financial support of MMIS, an evaluation of injection safety and HCWM at the project's intervention sites in order to assess the changes in the safe injection and waste disposal practices from the previous baseline study conducted four years ago.

This report presents the result of the follow-up survey. It was carried out through interviews, observations, and an inventory of materials in a sample of health facilities. Data were collected from December 9 through December 22, 2008, in the project's four expansion districts (Amhara, Dire Dawa, Harari, and Tigray).

The target populations and survey units of this evaluation on injection safety and HCWM were the outpatient, medicine, pediatrics, gynecology-obstetrics, surgery, central pharmacy, and laboratory departments of the 13 hospitals as well as 58 lower-level health facilities in these districts. The target populations for this survey were the central stockrooms, injection providers, supervisors of the staff responsible for administering injections, waste handlers, and health care recipients/patients/clients who had just received one or more injections in the facilities.

The results obtained through observations in each health facility surveyed and interviews of the target populations are presented below—accompanied by their main recommendations—in the following areas:

- The availability of reference documents and management tools.
- Stock management in the main stockrooms of the health facilities.
- Availability of injection equipment and material for managing waste.
- Material and equipment for managing waste vis-à-vis accidental needlestick injuries.
- Injection administration practices vis-à-vis accidental needlestick injuries.
- Training and knowledge of blood-borne diseases.
- Health care worker protection.

1. Availability of Reference Documents and Management Tools

One of the strategies of the injection safety approach is to establish and provide the reference documents (policies or guidelines) on injection safety and waste management to all stakeholders as essential support for the preservice and in-service training of health care professionals. The finding of this survey revealed that such documents were not widely available. At least 1 policy/guideline document on injections safety or waste disposal was available in only 15% of

the facilities as to the response of the interviewed injection supervisors. Moreover, no supervisor had all of the 3 reference documents at the time of this survey.

It should be noted that the national injection safety policy is not a stand-alone document, and, rather, it is integrated into the national infection prevention and control (IPC) guidelines. In addition, as of the time of the follow-up study, the national HCWM guidelines were, and currently are, being finalized although facility and district HCWM guidelines existed.

In light of this result, it is recommended to increase awareness of the injection safety policy within the context of the IPC guidelines. Additionally, further dissemination of these guidelines, including the HCWM document when finalized, is necessary.

2. Stock Management in the Main Stockrooms of the Health Facilities

It is common knowledge that the availability and proper maintenance of management tools like stockcards/registers facilitate better monitoring of consumption patterns and regular supply of the health facilities with materials.

The results obtained through observations in the main stockroom of each of the 71 health facilities surveyed highlighted the presence of an overall unsatisfactory system for monitoring the stock of various injection-related products such as sharps boxes and disposable syringes. Specifically, the availability of tools, i.e., stockcards and/or registers, for managing injection equipment were assessed in all of the 71 health facilities. Despite the wide availability of safety boxes, stockcards/registers for 5L safety boxes were found in only 17% of the health facilities with only 3% of stockcards/registers being updated.

Similarly, a wide range of different sizes of disposable syringes was found in stock at facilities although few had stockcards and even fewer with updated stockcards. The *5ml standard disposable syringe* was the most common size; 44% of facilities had stockcards although only 26% of those stockcards were updated. For *1ml disposable syringes equipped with features preventing reuse (auto-disable)*, 9% (or 6) of the facilities had stockcards; of these, only 1 stockcard was actually updated. Likewise, 13% (or 9) of facilities had *10ml disposable syringes with features that prevent reuse and accidental needlestick injuries* (like retractable syringes) with none of the cards being updated.

When data collectors compared the balance of each product recorded on the limited number of updated stockcards with the physical inventory, mismatches were noted. The physical inventory revealed the presence of a huge stock of most of the items but without any system in place for monitoring the stock.

Additionally, a strategy for improving the injection safety is to reduce injections to the minimum necessary, but this strategy assumes that the health care workers who write the prescriptions for medications have a choice to prescribe oral medications. When the data collectors looked for the oral forms of 4 commonly used medications, at least 1 medication was available in 92% of the facilities, and all four medications were available in 34% of the facilities.

Overall, the use of management and monitoring tools like stockcards/registers in the stockrooms of the health facilities did not show any significant improvement from the baseline for all of the injection-related items studied. However, availability of most of the different sizes and type of syringes, including AD and retractable syringes, in the stockroom had improved during the time of the follow-up survey.

Given this result, it is recommended that consistent record keeping should be further encouraged and supported at facility levels. Stockcards should be reproduced and included in regular logistics management training for facility staff. In addition, technical assistance should be provided to help integrate the logistics management information system that is currently being launched by the Ethiopia government

3. Availability of Injection Equipment and Waste Management Materials

Observations in the main stockrooms showed that stockcards/registers were not commonly used to monitor the balance of the injection equipment and safety boxes, and, hence, evaluation of stockouts from stockcards of the different items was not possible. This alone is a major finding. However, the physical inventory showed that there were stocks of the different sizes and types of syringes and safety boxes at the time of the survey. More than 90% of the interviewed injection providers reported that there were no stockouts of syringes and safety boxes within 6 months prior to the survey. This was a significant improvement from the baseline condition. In fact for safety boxes it was observed that 94% of all surveyed facilities had safety boxes at the time of the survey. Moreover, in 38% of the injections observed, the patients brought their own needles and syringes. This was higher than the finding at baseline where 25% of patients brought their own injection equipment.

When the adequacy of the stock of syringes vis-à-vis safety boxes was compared (assuming 1:80 ratio as adequate), 38% of the 71 health facilities had enough safety boxes for the available quantity of different type and size syringes.

From supervisors where vaccinations were given at their facility/unit, 75% claimed that the vaccines were delivered with the corresponding quantities of safety boxes. Similarly, 91% of supervisors reported that the supply of safety boxes corresponded to the quantity of injectable medications. In the cases in which safety boxes were not available, the use of inappropriate receptacles increases the exposure of providers and other people to accidental needlestick injuries.

Almost all (95%) of the supervisors interviewed thought that the quantities of needles and syringes provided to them were adequate for curative services provided in their health facilities. Only a single injection provider interviewed in this survey had experienced stockouts of single-use, disposable syringes in the six months prior to this survey. In addition, the amount of injection equipment delivered with vaccines and other medications was not considered adequate according to 11% of the supervisors interviewed.

Still, 63% of the injection providers interviewed informed the data collectors that patients always bring injection equipment for therapeutic injections, and 25% of these respondents felt the same about needles and syringes used in diagnostic injections.

These apparent discrepancies, however, are to be expected given the scaling up since the baseline period of the revolving drug fund (RDF) pharmacies. As many health care services are provided on a cost recovery system (i.e., "pay-as-you-go"), these pharmacies, situated in the facilities themselves, enable patients to purchase their injection equipment and medication onsite and allow for expedited treatment.

Considering these results, it is recommended to increase awareness at the woreda level for the need of a constant supply of safety boxes, so they can be distributed efficiently to the health centers and help prevent injuries. On the national level, continued advocacy for and promotion of locally produced safety boxes should be maintained and further increased. Further procurement of safety boxes might also be necessary, depending on varying needs. In addition, assistance should be provided to ensure that the RDF pharmacies have adequate supply of safe injection commodities.

4. Material and Equipment for Managing Waste Vis-à-Vis Accidental Needlestick Injuries

The results obtained through observations of the health facilities surveyed showed that 94% of the facilities had sharps containers in each place where injections were administered, but only 92% had only safety boxes. This is a great improvement from baseline where only 74% of the facilities had sharps containers in each place where injections were given, and only 42% were considered to be safety boxes.

Half (50%) of the health facilities surveyed showed evidence of all 3 good practices for sharps object disposal; i.e., there were no overflowing or punctured safety boxes and no used sharps lying around inside any facilities or outside on their grounds. This was also a great improvement from the baseline where only 36% had good sharps disposal practices. The facilities not complying with this indicator of good sharps waste disposal, however, tended to have the highest number of problems with disposing used sharp objects outside the facilities. In 48% of 21 facilities surveyed, full safety boxes were not tightly sealed, and in 42% of 26 facilities full safety boxes were stored in a location accessible to the public. All these variables show that current HCWM still presents factors that put the health care staff and general public at risk of accidental needlestick injuries. In fact 14% of all injection providers interviewed during this survey declared that safety boxes were never used. Interestingly, among the injection providers without safety boxes, only 11% had experienced accidental needlestick injuries during the 6 months prior to this survey.

While a significant improvement from baseline, the lack of waste segregation in the majority of health facilities (54%), however, continues to contribute to a situation in which all waste poses a risk of accidental needlestick injuries to the waste handlers as it contains used injection equipment. In fact 45% of the waste handlers interviewed at follow-up reported they had had at least 1 or more accidental needlestick injuries during the 6 months preceding the survey.

Chapter 9 presents the details of the specific methods of sharps waste disposal, which were obtained through interviews of waste handlers. These methods were analyzed into three general categories of "good," "acceptable," and "poor" according to the level of safety of each method and the combination of methods (if more than one method was used in a health facility). When the overall results were calculated on the various combinations of methods using these three categories, the data from the interviews of waste handlers showed that most health facilities used open-air burning or dumping to eliminate their waste (a poor method of waste disposal). Thus, similar to the findings during the baseline survey, 68% of the health facilities were categorized as having "poor" sharps waste management. The results obtained through observations were consistent with the data obtained in the interviews. Half of the waste handlers mentioned several specific problems, which affected their work, such as no incinerator, shortage of fuel, and shortage of personal protective equipment (PPE).

Of the 20 waste handlers, 80% were observed to be using some sort of PPE at the time of the survey with all of them wearing heavy-duty gloves. Only 5 of the 16 waste handlers used boots or closed-toed shoes. Approximately half of the waste handlers were also observed to use materials that were not considered effective protection for the purposes of this evaluation.

Although there has been improvement in the satisfactory disposal of used injection equipment, more work is needed in this area, especially in final disposal of sharps waste. In light of this situation, it is recommended that regular support supervision and technical support be provided to implement waste segregation and final disposal practices. Additionally, there is a need to increase distribution of PPE (especially heavy-duty gloves and boots) and other HCWM materials such as bin liners and safety boxes to enable proper waste segregation practices and protect waste handlers from accidental needlestick injuries.

5. Injection Administration Practices Vis-à-Vis Accidental Needlestick Injuries

The results obtained on general hygiene as it relates to injections showed that 81% of injections were prepared in a clean space, and even if the administering parties cleaned the patient's skin, 80% of the providers washed their hands prior to administering the injections. In both cases, a statistically significant improvement was seen as compared to the baseline where only 68% of the injections were prepared in a clean space, and just 4% of providers washed their hands.

The results on injection equipment and injection administration practices showed that the needles and syringes were removed from a sterile package in 96% of injections. These results are very similar with the situation found at baseline (98%), which were already high, and imply a good practice. The result, however, was lower for reconstituted medications where 87% of the providers used a new needle and syringe taken from a sterile package. Among injection providers observed preparing 1 or more injections with a multidose bottle, 90% of the injection providers removed the needle from the rubber cap after withdrawing the dose to be administered every time they prepared an injection.

Only 2% of the injection providers recapped the needle after having finished 1 or more injections, and 78% of injection providers disposed of the used needle and syringe immediately

after administering each injection by using a safety box or a needle-remover device. Only 6% of the injection providers interviewed in this survey and 35% of waste handlers had had 1 or more accidental needlestick injuries in the 6 months prior to the survey. While these figures are small, there was a statistically significant improvement from baseline in regards to needle recapping before disposal, immediate disposal of needles, and reports of accidental needlestick injuries both by injection providers and waste handlers.

Continued support supervision and regular in-service training is recommended to ensure that all these good practices are maintained. In addition, injection safety topics should be promoted in preservice curricula to ensure that new providers are taught good practices from the beginning.

6. Training and Knowledge of Blood-Borne Diseases

The results of this survey showed that only 58% of the injection providers surveyed and 24% of waste handlers had received training on injection safety and waste management, a significant improvement from baseline where just 24% of injection providers and 7% of waste handlers received training. Almost all of the injection providers interviewed in this survey (98%) spontaneously mentioned human immunodeficiency virus (HIV) when the data collectors asked them if they knew of diseases that could be transmitted by reuse of a nonsterile needle or by an accidental injury from a contaminated needle. Hepatitis B virus (HBV), on the other hand, was mentioned by 75% of injection providers interviewed, while hepatitis C virus (HCV) was mentioned by only 28%. Among the waste handlers interviewed, 95% declared that they knew of diseases that could be transmitted by accidental injuries with a contaminated or by reuse of a needle. HIV was mentioned by 92% of the waste handlers interviewed. While no change was noted in reporting HIV as a disease that could be contracted by reuse of nonsterile needle or accidental needle injury by both injection providers and waste handlers, the number of injection providers who reported HBV and HCV infections increased remarkably at a statistically significant level.

While training has increased between survey periods, the still relatively low percentage of providers and waste handlers reporting being trained are mostly due to high turnover rates at facilities. Therefore, it is recommended to devise policies and strategies for training to address staff turnover and orienting new staff in injection safety and waste management. Waste handlers, in particular, should be targeted for training.

7. Protection of Health Care Workers

As few as 11% of the injection providers reported that they had received the hepatitis B vaccine, but of those who had received the vaccine, only 1 (7%) had had all 3 doses. Therefore, in reality, only 1% of the injection providers interviewed were completely protected against this disease. Among the waste handlers interviewed, this condition was even worse, where only 1 waste handler had received 2 doses of vaccine against hepatitis B (i.e., no one was completely protected). Compared to the baseline, a small increase in the number of injection providers who took at least one dose of hepatitis B vaccine was reported, and almost no change was reported on the vaccination status of waste handlers against the HBV.

Additionally, only 83% of the waste handlers interviewed mentioned at least 1 type of PPE that was available in their health facility and which could protect them against accidental injuries with sharp objects. Out of those who cited that PPE was available, heavy-duty gloves were the most frequently mentioned (76%), followed by aprons (37%), and boots/closed-toed shoes (25%).

Given these results, it is recommended that the vaccination against hepatitis B for health care workers at all levels be made available and encourage health care workers to become fully covered by the vaccination. Additionally, waste handlers should have access to postexposure prophylaxis (PEP), especially heavy-duty gloves and boots/closed-toed shoes, at all facilities

8. Behavior Change Communications

The awareness level of injection providers and waste handlers was assessed through interviews with the respective health workers. Over three-quarters (79%) of the injection providers described safe injections as the use of new or sterile injection equipment. This was followed by injections that do not harm the recipient, provider, and the community, and safe disposal of used injection devices. With regard to the source of information heard or seen by injection providers about reducing the number of injections, safe injection practices and/or safe disposal practices, in-service training, and preservice trainings were the most frequently cited sources of the information. Similarly, a poster was the most commonly available job aid/reminder related to injection safety.

Patients' preference for receiving injections over oral medications did not appear to shift over time.

Only a quarter of the patients/clients said that they had heard or seen any information about safe injection in the six months prior to the survey. Similar to the injection providers, patients/clients also described safe injection as a closed/new package of needle and syringe as (the most frequently cited description), which was followed by an injection that does not harm the patient, the provider, and the community, and an injection given by a trained/professional provider.

Given these results, it is recommended that behavior change communications (BCC) materials developed should be more widely distributed to ensure that all facilities have their own copies for injection providers to use. Injection providers should be taught how to use the job aids in counseling and other services. Additionally, further work is necessary at the community level to reduce the demand for injection and to encourage providers to use noninjectable medications.

9. Observations of Phlebotomy

During the follow-up study, additional questions were added to provide insights into current practices of phlebotomy.[1] Of the 59 phlebotomy observations, 88% of the injection providers transferred the collected venous blood from a disposable syringe into a tube. Only 51% of the

[1] It is noted that the questions and the analysis are intended for discussion purposes only and not a formal, exhaustive phlebotomy evaluation.

injection providers who transferred the blood from a disposable syringe into a tube removed the needle prior to transferring the blood, and 92% of the providers who removed the needle prior to transferring the blood used only their hands to remove the needle. In addition, in cases where the needle was not removed prior to the transfer of blood to a tube, the providers used two hands for the transfer 53% of the time, putting them at risk of a needlestick injury.

It should be noted that phlebotomy is an area that has not received adequate attention during the life of the project, and the follow-up study has highlighted concerns about some unsafe practices. Phlebotomy will require more targeted interventions in the future.

10. Report Structure

The following report is organized into 12 chapters. After the introduction in Chapter 1, the methodology and a summary of the attained samples are presented in Chapters 2 and 3, respectively. The specific results drawn from the observations and interviews are detailed in Chapters 4 through 10. The conclusions in Chapter 11 are focused on an analysis of the results vis-à-vis their contribution to the risks of transmitting a blood-borne pathogen such as HIV and HBV or HVC. Finally, Chapter 12 presents a summary of the main recommendations.

1. GENERAL INTRODUCTION

One of the objectives of the Ethiopia MOH is to improve the quality of care provided on all levels of the health care pyramid. Previous studies revealed that injection safety and HCWM are serious problems. In the framework of the implementation of PEPFAR, Ethiopia received technical and financial support to promote injection safety and HCWM through the support of the USAID and the injection safety and HCWM project known as MMIS and its partners. Under the premise of having a broad assessment of injection safety, the MOH, with the technical and financial support of MMIS, organized a comprehensive evaluation of injection safety and HCWM at the project's intervention sites.

According to the World Health Organization (WHO), every year, unsafe medical injections are responsible for approximately 8 to 16 million cases of HBV infections, 2.3 to 4.7 million cases of HCV infections, and 80,000 to 160,000 cases of HIV infections globally. Certain high-risk practices, in particular the reuse of nonsterile needles and syringes, increase the risk of transmitting disease.

Given this situation, the WHO, in collaboration with partners through the Safe Injection Global Network (SIGN) developed and provided to countries an intervention strategy for reducing overuse of injections and promoting the administration of safe injections. The SIGN strategy is articulated around three basic axes, which are

1. Behavior change of health care workers and patients to ensure safe injection practices and reduce unnecessary injections,
2. Ensure availability of equipment and supplies necessary for injection safety,
3. Manage waste safely and appropriately.

In the majority of developing countries, including Ethiopia, the WHO strategy is justified by the fact that beyond vaccination programs the issue of injection safety and waste management is not granted appropriate attention by the governments or community of development partners.

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2. METHODOLOGY

This evaluation of the status of injection safety and HCWM is a descriptive follow-up study. It includes interviews, observations, and stock assessments in a sample of health facilities in the project's four expansion area health districts (Amhara, Dire Dawa, Harari, and Tigray).

2.1 OBJECTIVES OF THE STUDY

The overall objective is to evaluate the general status of injection safety and HCWM in the health facilities of the project's four expansion area health districts. The specific objectives are as follows:

1. Evaluate the availability of the injection equipment/materials/products and stock management methods,
2. Evaluate the availability of the collection equipment/materials, transportation, and removal of waste as well as the HCWM practices,
3. Describe the conditions and steps for administering injections in the treatment rooms,
4. Evaluate the existence of reference documents (national policy, norms, guidelines) with the health care staff and managers of health facilities,
5. Evaluate the adequacy of the quantities of injectable products ordered (vaccines, medications), injection equipment (syringes/needles), and HCWM equipment,
6. Describe the experiences related to injections in the health facilities and community of patients (or parents/families of patients) who received injections on the day of the survey.

2.2 SAMPLING

The survey units and target populations of the injection safety and HCWM evaluation are the general outpatient, medicine, pediatrics, gynecology-obstetrics, and surgery wards as well as central stores and laboratories of 71 health facilities. This sample of health facilities for this evaluation was obtained through a mix of purposeful and random selection. In each district evaluated, purposeful selection was used for the hospitals. Random selection was used for lower-level facilities in the districts.

The target populations were stockrooms (for equipment/medications/vaccines, etc.), injection providers, supervisors of the staff responsible for administering injections, waste handlers, and adult health care recipients (patients or clients who had just received an injection(s) in the study facilities) according to the following distribution:

- One central stockroom in each health facility, or a total of 71 stockrooms.
- Observation of the waste management system of 71 health facilities.
- Providers administering the largest number of injections in the health care units, or a total of 390 injection providers.
- 128 supervisors of the staff responsible for administering injections.
- 71 waste handlers with 1 participant per health facility.
- 373 recipients of health care services coming to the facility for an injection(s) in the evaluation centers or a total of 179 clients per hospital and 194 per lower level health facilities.
- In addition to the people interviewed, injections were observed in 71 locations with 4 injections observed by ward in each hospital and in each lower-level health centers. Observations were sought in the following areas: Vaccinations, curative injections, diagnostic injections including phlebotomy, and family planning.

Table 1: Table summarizing the sampling of the target population by section of the form

		Baseline			Follow-up		
Section	**Target Population**	**Hospitals**	**Lower-Level Facilities**	**Total**	**Hospitals**	**Lower-Level Facilities**	**Total**
1	Stockrooms	16	58	72	13	58	71
2	Health facilities	16	58	72	13	58	71
3	Injections observed	97	156	253	199	191	390
4	Injection providers	50	57	107	72	58	130
5	Supervisors of the staff responsible for administering injections	28	55	83	71	57	128
6	Waste handlers	16	58	72	13	58	71
7	Patients or parents of patients coming for an injection(s) at the centers	108	165	273	178	194	372

2.3 DATA COLLECTION TOOL

Data were collected in the field with the aid of an MMIS questionnaire to capture the practices of injection safety within the health care system in Ethiopia (See Appendix 1). The MMIS questionnaire includes seven components or sections related to the specific intervention areas of injection safety and medical waste management. These sections apply to the different stakeholders, which are

- Stockrooms (equipment/medications/vaccines, etc.): “Section 1,”
- Observations on the structure of care and the waste in each health facility: “Section 2,”
- Observations on the practices of the injection providers: “Section 3,”

- Interviews with injection providers: “Section 4,”
- Supervisors of the staff responsible for administering injections: “Section 5,”
- Waste handlers: “Section 6,”
- Recipients of health care services who had just received one or more injections at the health facilities surveyed: “Section 7.”

2.4 DATA COLLECTION

The data were collected from December 8, 2008, through December 22, 2008, in the 71 health districts of Amhara, Dire Dawa, Harari, and Tigray. A total of 20 data collectors and 4 supervisors were trained to participate in the collection of data in the health facilities. Training for the data collectors and supervisors lasted three days. Following the training, 4 teams were formed with 4 data collectors and 1 supervisor for each team. Leaders from Harambee Health Consulting services and the MMIS project staff provided joint coordination.

Data were collected in the field over 15 days. The form was reviewed and validated following a pretest conducted in the 2 health facilities with the same characteristics as those surveyed. These 2 health facilities were not included in the survey proper or the results presented in this report.

Each supervisor was placed in charge of a team to ensure the proper implementation of the survey. In all the health facilities surveyed, the informed consent of the staff facilitated the collection of data.

2.5 ORGANIZATION AND COORDINATION OF THE DATA ENTRY AND ANALYSIS

The data were entered using Microsoft Access software. This required the contribution of two data entry operators with prior training on the use of the data entry program. Each completed questionnaire was reviewed and validated with the team supervisors before being entered and analyzed with the Statistical Package for the Social Sciences software. The proportions of observations were calculated for each component of the form using as a denominator either the number of health facilities or the number of individuals surveyed or the number of injection observations.

2.6 LIMITATIONS

- Due to security issues in Tigray (which is near to the Eritrea border), five facilities were replaced by similar standard facilities in the same region only after the team arrived in the region. This was in addition to the number of known replacements made before the follow-up study commenced.

- A measles campaign in the Amhara region was being carried out at the same time as the follow-up study. This meant that some health workers were not available on their duty station at the time of the survey, and, thus, data collectors had to repeat visits to the same facilities.
- Difficulty in getting complete information at most of the sampled health posts due to closing and irregular service provision by the posts was a challenge particularly in Dire Dawa and Harari regions.

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3. DESCRIPTION OF THE ATTAINED SAMPLE

There were a total of 71 health facilities in the project's expansion districts (Amhara, Dire Dawa, Harari, and Tigray). Section 2.2 above presents the overall results of the sampling made by target type and by level of health facility. This chapter presents this sampling by type of organization (public or private/NGO).

Table 2: Sampling by type of organization

	Baseline			Follow-up		
	Public	**Private/NGO**	**Total**	**Public**	**Private/NGO**	**Total**
Observations						
Health facilities	58	14	72	62	9	71
Stockrooms	58	14	72	62	9	71
Injections observed	198	54	252	354	36	390
Interviews						
Injection providers	85	20	105	117	13	130
Supervisors of the staff responsible for administering injections	67	16	83	112	16	128
Waste handlers	58	14	72	62	9	71
Patients	217	56	273	350	22	372

3.1 FACILITY REPLACEMENTS

Some health facilities could not be accessed at follow-up. The study team replaced these with similar facilities from those same districts. All replacements were selected from the MMIS sampling frame. MMIS headquarters was notified before replacement and permission to do the replacement was granted by the principal investigator.

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4. RESULTS OF THE STOCK OF INJECTION EQUIPMENT AND PRODUCTS IN THE MAIN STOCKROOMS OF THE HEALTH FACILITIES

In the health facilities participating in this survey, data collectors evaluated the stockcards for various products such as safety boxes and injection equipment. They noted the availability of a stockcard for each product, whether it had been updated in the 30 days preceding the survey, stockouts, and the balance indicated on the stockcard. Finally, the stocks of some common oral medications were examined. This section contains these results on products available in the main stockroom of each of the 71 health facility surveyed at follow-up with comparison to those 74 facilities surveyed at baseline.

4.1 ANALYSIS OF THE STOCKCARDS: AVAILABILITY, UPDATE, AND EVIDENCE OF STOCKOUTS BY PRODUCT

4.1.1 SAFETY BOXES

Of the 71 health facilities surveyed at follow-up, data collectors found stockcards available for the *5 liter safety boxes* in 11 health facilities, i.e., 16%; and a register was found in only 1 health facility, or 1%. The overall use of either stockcard or register was noted in 17% of the surveyed facilities. For each stockcard found, the data collector evaluated whether the card had been updated during the 30 days prior to this survey. Only one stockcard and the single register were "up-to-date" in this sense. Both the single updated stockcard and also the one register showed no stockout during the 6 months prior to the survey.

The stock management system of *safety boxes* did not show substantial improvement as compared to the baseline (16% at follow-up compared to 14% at baseline). As it can be seen from the result of the section that deals with the observation of waste management system in the health facilities, more than 90% of the facilities were witnessed to use safety boxes at the time of the survey. Moreover, the stockouts of safety boxes was by far lower than that of the finding at baseline. The marked increase is to be commended, but the management is still poor. This could be due to lack of awareness or reluctance to update stockcards regularly.

4.1.2 STANDARD DISPOSABLE SYRINGES

Stockcards were more common for standard single-use (disposable) syringes than for safety boxes. Of the 71 health facilities surveyed at follow-up, 39% had stockcards for the *standard 10ml disposable syringes* (no register was found). Of these 28 stockcards, 21% had been updated in the 30 days prior to this survey. Similar to the safety boxes, for the standard 10ml disposable syringes, all of the 6 updated stockcards showed no stockout in the last 6 months prior to the study. At baseline, 43% of 74 facilities surveyed had a stockcard for this type of supply; and

unlike those observed at follow-up, the majority of these were updated, pointing to a need for greater emphasis on keeping cards up to date in the future. Further, out of the 43 follow-up facilities without stockcards, 44%, nevertheless, had a stock size of up to 11,000 pieces of 10ml standard disposable syringes with no system for monitoring this stock.

For the *standard 5ml disposable syringes*, 31 health facilities surveyed (44%) had a stockcard available on the day of the survey, and one facility was found using a register (1%). Of the 31 stockcards available, 8 had been updated (25.8%), and the single register was also updated at the time of the survey. None of the 8 updated stockcards and the one register showed stockout in the 6 months prior to the survey. By comparison, stockcards were available for this supply in 47% of surveyed facilities at baseline; and the majority of those were updated, again indicating no improvement over time. It is important to note that 28 of the follow-up facilities without stockcards had a stock size of up to 28,500 pieces of *5ml standard disposable syringes* without any mechanism for monitoring this stock.

Continuing with the *standard 2ml disposable syringes*, 20 of the 71 health facilities surveyed (28.2%) had a stockcard available on the day of the survey, and only 4 had been updated. None of the facilities with an updated card had experienced a stockout during the last 6 months. At baseline, 36.5% of surveyed facilities had a stockcard available, and the majority of those were updated. Of the follow-up facilities, 21 without stockcards had a stock of up to 12,600 pieces *standard 2ml disposable syringes* without any mechanism for monitoring this stock.

Standard 1ml disposable syringes were not commonly used in the surveyed health facilities as this type of syringe was applicable to only 6% of the 71 health facilities surveyed. Further, none of these health facilities monitored the balance of *standard 1ml disposable syringe* in their stock either through stockcard or register usage. By comparison, there were 4 facilities that had a stockcard available for this type of supply at baseline, and all of them had been updated. One of the follow-up facilities without stockcards or register had up to 1,200 pieces stock of 1ml syringes with no mechanism for monitoring this stock.

4.1.3 DISPOSABLE SYRINGES WITH FEATURES THAT PREVENT REUSE

Stockcards were not common for disposable syringes with features that prevent reuse as they were applicable in only 16 of the health facilities surveyed. Of the 71 health facilities surveyed, 6% had stockcards for the *standard 10ml disposable syringes*. Of these 4 stockcards, none had been updated in the 30 days prior to this survey. The situation improved slightly over time since only 1 facility had a stockcard for this supply at baseline. On the other hand, 12 of the follow-up facilities without stockcards or registers had a stock size of up to 7,000 pieces disposable syringes (10ml) with features that prevent reuse with no system for monitoring its balance in the store.

With regard to the *5ml disposable syringe* with features that prevent reuse, 3 health facilities surveyed (4%) had a stockcard available on the day of the survey, and no facility was found using a register. In fact most of the health facilities (79%) reported that they had never used this kind of syringe before the time of the survey. Of the 3 stockcards available, none had been

updated. At baseline, only 1 facility had a stockcard available for this size supply, but this stockcard was updated. It is important to note that 12 of the follow-up facilities without stockcards or register had a stock of up to 41,600 pieces disposable syringes with reuse prevention (5ml) without any mechanism for monitoring such a large amount of stock.

Continuing with the *2 ml disposable syringe* with features that prevent reuse, only 4 of the 71 health facilities surveyed (6%) had a stockcard available on the day of the survey, and none had been updated. Most of the surveyed health facilities (82%) reported to never have used *2ml disposable syringe* with features of reuse prevention before the survey time. By comparison, at baseline only 1 facility had a stockcard for this size supply, and it was updated. Notably, 9 of the follow-up facilities without stockcards or registers had a stock of up to 12,000 pieces of this specific needle type and size without any mechanism for monitoring this stock.

Like the other size disposable syringes with features that prevent reuse, *1cc AD disposable syringes* were not commonly used in the surveyed health facilities as this type of syringe was applicable to only 11% of the 71 health facilities surveyed; 6 of these 8 health facilities had stockcards with only 1 being updated at the time of the survey. At baseline, there were more facilities overall that used this type of device (18), but they were no better at tracking it with only 2 facilities that had a stockcard available; 2 of the follow-up facilities without stockcards or registers had up to 520 pieces stock of *1cc AD syringes* with no mechanism for monitoring this stock.

4.1.4 DISPOSABLE SYRINGES WITH FEATURES THAT PREVENT REUSE AND ACCIDENTAL NEEDLESTICK INJURIES

Compared to the other types of syringes, disposable syringes with features that prevent reuse and accidental needlestick injuries (like retractable) were not commonly available in the stocks. Of the 71 health facilities surveyed, 13% had stockcards for the *10ml retractable syringes* (no register was found), and 79% reported as such type of needles were not applicable. None of the 9 stockcards observed had been updated in the 30 days prior to this survey. At baseline, no facility had a stockcard or register for this type of supply; 6 of the follow-up facilities without stockcards or registers, nevertheless, had a stock size of up to 3,600 pieces *10ml retractable syringes* with no system for its monitoring.

For the *5ml retractable syringes*, 8 health facilities surveyed (11%) had a stockcard available on the day of the survey. Of the 8 cards available, none had been updated. Again at baseline, no facility had a card or register for this type of supply. However, it is imperative to note that 10 of the facilities without stockcards or any register had a stock size of up to 27,200 pieces *5ml retractable syringes* without any system in place for monitoring this stock.

Similarly, for *3ml retractable syringes*, 6 of the 71 health facilities surveyed (9%) had a stockcard available on the day of the survey, and none had been updated. In contrast, 4 of the facilities without stockcards or any register had a stock size of 6,000 pieces of *2ml retractable syringes* without any formal store management mechanism for monitoring the this stock. Again at baseline, no facility had a card or register for this type of supply.

Out of 71 health facilities, only a single facility had a stockcard, although not updated, to monitor the balance of *1cc retractable syringes*. All the remaining (99%) health facilities reported that such type of needle was not applicable to their institution at the time of the survey. At baseline, this supply type was also not applicable to any of the surveyed facilities. Unlike the other supplies, no follow-up facility was found with a stock of *1cc retractable syringe*,

Table 3: Summary of the availability of stockcards, by product

	Baseline			Follow-up		
Products	**Cards Available**	**Facilities with Data**	**Percentage**	**Cards Available**	**Facilities with Data**	**Percentage**
New, unused safety boxes	10	74	14%	11	71	16%
Standard disposable syringes						
10 ml	32	74	43%	28	71	39%
5 ml	35		47%	31		44%
2 ml	27		37%	20		28%
1 ml	4		5%	0		0%
Disposable syringes equipped with features preventing reuse (auto-disable)						
10 ml	2	74	3%	4	71	6%
5 ml	1		1%	3		4%
2 ml	1		1%	4		6%
1 ml	2		3%	6		9%
Disposable syringes equipped with features preventing reuse *and* needlestick injuries						
10 ml	0	74	0%	9	71	13%
5 ml	0		0%	8		12%
3 ml	0		0%	6		9%
1 ml	0		0%	1		1%

Table 4: Summary of the updating of stockcards for health facilities that have them, by product

	Baseline			Follow-up		
Products	**Updated Cards**	**Available Cards**	**Percentage**	**Updated Cards**	**Available Cards**	**Percentage**
New, unused safety boxes	4	10	[40%]	1	11	[9%]
Standard disposable syringes						
10 ml	25	32	78%	6	28	21%
5 ml	27	35	77%	8	31	26%
2 ml	19	27	70%	4	20	20%
1 ml	4	4	[100%]	0	0	0%
Disposable syringes equipped with features preventing reuse (auto-disable)						
10 ml	1	2	[50%]	0	4	[0%]
5 ml	1	1	[100%]	0	3	[0%]
2 ml	1	1	[100%]	0	4	[0%]
1 ml	2	2	[100%]	1	6	[17%]
Disposable syringes equipped with features preventing reuse and needlestick injuries						
10 ml	0	0	[0%]	0	9	[0%]
5 ml	0	0	[0%]	0	8	[0%]
3 ml	0	0	[0%]	0	6	[0%]
1 ml	0	0	[0%]	0	1	[0%]

Note: instances with less than 20 cases are shown in brackets.

4.2 PRESENCE OF ORAL FORMULATIONS OF COMMON MEDICINES

One strategy for improving injection safety is to reduce the number of injections to the minimum necessary to treat patients' diseases appropriately. However, this strategy assumes that the health care personnel who prepare the medication prescriptions and the injection providers have a choice. In order to evaluate the presence or absence of this "choice," the data collectors took notes on the availability of oral forms of four medicines commonly used in the health facilities surveyed. For each medication, they evaluated whether there was a stock (of any amount) in the facility at the time of their visit.

Variability was noted in the stock of 4 medications chosen for this analysis: Amoxicillin, multivitamin, paracetamol, and cotrimoxazole, which was asked about only at follow-up. The oral forms of commonly used medicines were available in the health facilities surveyed in 72% of cases for amoxicillin, 37% for multivitamin, 92% for paracetamol, and 83% for cotrimoxazole. Comparing baseline to follow-up study periods, 92% of follow-up facilities surveyed had a stock of at least 1 on the list of 3 comparison medications, an improvement from 81% at baseline. However, only 34% of facilities at follow-up had stocks of amoxicillin, multivitamin, and paracetamol, a significant decline compared to baseline where 69% of the facilities had all 3 (Table 5).

Table 5: Stock of oral medications

	Baseline		Follow-up	
	Percentage	**Number of Health Facilities**	**Percentage**	**Number of Health Facilities**
Amoxicillin*	76%	74	72%	71
Multivitamin*	74%		37%	
Paracetamol *	77%		92%	
Stock of at least one oral medication out of three listed	81%		92%	
Stock of all oral medications out of three on this list*	69%		34%	
Cotrimoxazole[2]	NA	NA	83%	71

* $p \leq .05$

The follow-up survey showed challenges with the store management system of the different types of syringes at both surveyed time periods. Many facilities still did not have tracking mechanisms in place for their regular injection safety supplies. Some facilities now carry syringes with features that prevent reuse and accidental needlestick injuries (like retractables), though the store management system has not fully incorporated a tracking mechanisms for those supplies either. Several data collectors from the follow-up survey noted that storekeepers were reluctant to use stockcards or registers for safety boxes and syringes received by donation (in addition to the regular stocks ordered by facilities). Thus, more work is needed to create systems that can manage and maintain all types of injection safety supplies simultaneously. Based on results from this portion of the study, facilities should work to improve the controlling mechanisms used by facility administrators and continue to provide training and supportive supervision of facility staff who work in the storerooms to improve their practices.

[2] This oral tracer medication was not asked about at baseline.

5. OBSERVATIONS ON MATERIALS, EQUIPMENT, AND WASTE MANAGEMENT

In this section of the survey, the data collectors made observations on waste management in hospitals and other health facilities. A total of 71 health facilities participated in these observations.

5.1 PRESENCE AND USE OF SAFETY BOXES IN LOCATIONS WHERE INJECTIONS ARE ADMINISTERED

From the baseline survey, only 74% (53 out of 72) health facilities had sharps containers in each place where injections were being administer. The follow-up survey showed that 94% (67 out of 71) put sharps containers in each place where injections were given, a significant statistical improvement ($p \leq .05$). In each of these health facilities, the data collectors evaluated whether all sharps containers were safety boxes. They found that in 92% of the health facilities at follow-up all of the sharps containers being used for disposing of sharps in the injection areas were safety boxes. This was a statistically significant increase when compared to the baseline finding where just 42% of facilities had this (Table 6).

Table 6: Observations on the use of safety boxes

	Baseline		Follow-up	
	Percentage	Number of Health Facilities	Percentage	Number of Health Facilities
Health facilities with sharps containers for sharp objects in each location where injections are administered.*	74%	72	94%	71
Health facilities that only use safety boxes in locations where injections are administered.*	42%		92%	

*$p \leq .05$

5.2 DISPOSAL OF USED, SHARP OBJECTS

5.2.1 OVERFLOWING OR PIERCED SAFETY BOXES

The placement of safety boxes in the locations where injections are administered does not guarantee injection safety if the condition of the boxes is not adequate. For this reason, data collectors evaluated the health facilities in order to see whether there were cases of pierced or overflowing boxes. At baseline, 91% of the 58 health facilities were observed to have no pierced or overflowing safety boxes, while at follow-up only 82% of the 68 health facilities were

observed not to have any pierced or overflowing safety boxes.[3] While more facilities were found to have overflowing or pierced safety boxes at follow-up when compared to baseline, the change was not statistically significant (Table 7).

5.2.2 SHARP OBJECTS INSIDE THE HEALTH FACILITY

At baseline, 42% of the health facilities surveyed (29 out of 69) had no used sharp objects in open containers or lying around inside the facilities At follow-up, this finding improved significantly to, 83% (58 out of 70) if the health facilities ($p \leq .05$).[4] In the rest of the health facilities, the data collectors found sharp objects lying around where they could expose the injection providers or public to the risk of accidental needlestick injuries (Table 7).

5.2.3 SHARP OBJECTS OUTSIDE OF THE HEALTH FACILITY

Data collectors evaluated the grounds outside of each health facility surveyed to see whether there were any loose sharps lying around. During the baseline survey, they found 52% (37 of 71) had no loose (visible) sharps lying around outside, while at follow-up the figure was 66% (44 of 67).[5] Although the number of facilities without used sharp objects outside the facilities had increased from the baseline, the change is not statistically significant.

Table 7: Observations on the condition of the safety boxes and used sharps

	Baseline		Follow-up	
	Percentage	Number of Facilities	Percentage	Number of Facilities
Health facilities *without* overflowing or pierced safety boxes	91%	58	82%	68
Health facilities *without* used sharps in open containers or loose *inside* the health facilities*	42%	69	83%	70
Health facilities *without* used sharp objects *outside*	52%	72	62%	67

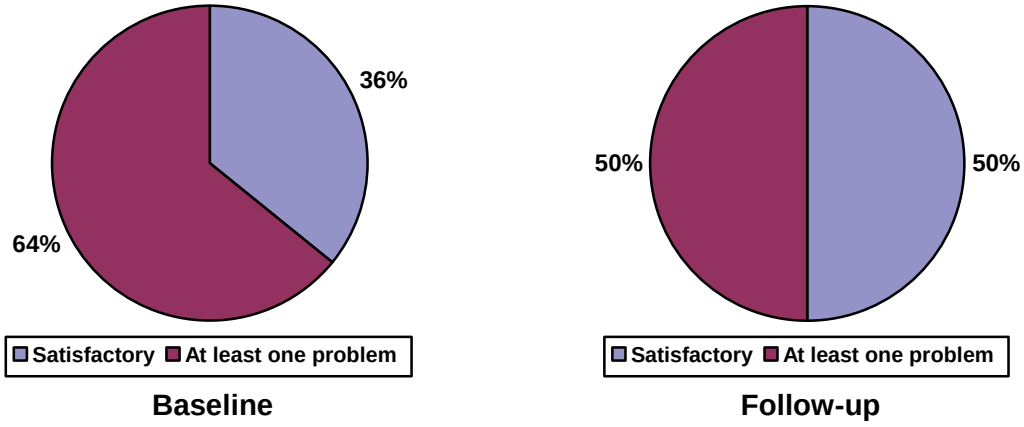
Additionally, data collectors observed that in 14% of the 71 health facilities surveyed there were attempts to sterilize injection equipment for reuse using autoclaves and boilers. This was much higher compared to the baseline where no observations were made.

[3]Fourteen facilities where this indicator could not be evaluated were excluded from the baseline survey period, and three facilities were excluded from the follow-up survey period.
[4]Three facilities where this indicator could not be evaluated were excluded from baseline survey period, and one facility was excluded from the follow-up survey period.
[5]One facility where this indicator could not be evaluated was excluded from baseline survey period, and four facilities were excluded from the follow-up survey period.

5.2.4 SUMMARY OF SATISFACTORY DISPOSAL PRACTICES

After analyzing three individual variables of the practice of sharps waste disposal—i.e., no pierced or overflowing boxes and no sharps lying around inside or outside the facility—it is useful to look at a summary of the results for the satisfactory practice of sharps disposal overall. These results show that at follow-up 32 out of 64 health facilities in which the data collectors collected all 3 variables (50%) had the 3 good practices throughout the entire facility and its grounds. The rest of the health facilities were excluded because they did not have at least 1 of these good practices. While these results appear to be an improvement compared with the practices at baseline where 36% (20 out of 56) of facilities had good disposal practices, this change is not statistically significant (Figure 1).

Figure 1: Summary of satisfactory disposal practices at baseline and follow-up



5.3 STORAGE OF FULL SAFETY BOXES

Once safety boxes become full, they must be stored somewhere until their final destruction. The data collectors evaluated whether full safety boxes were stored in a closed location inaccessible to the public on the day of the survey. At baseline, in 36 (50%) facilities, data collectors could not make these observations of the facilities (for example, in cases where there were no full boxes or where the facilities did not use safety boxes). Out of the remaining 36 where the observations for this variable could be conducted, 14% stored the full safety boxes in a locked area inaccessible to the public At follow-up, 26 health facilities had full used safety boxes; and 58% of these stored the full safety boxes in a locked area, which is a statistically significant increase ($p \leq .05$) (Table 8).

5.4 TIGHTLY SEALED SAFETY BOXES

Normally, safety boxes awaiting final destruction must be tightly sealed. The data collectors evaluated whether this was the case. At baseline, the data collectors were able to conduct the observations for this variable in only 27 out of the 72 facilities. The safety boxes were completely sealed in 12 (44%) out of these 27 facilities. Similarly at follow-up, 50 of the 71

facilities could not be assessed for this variable. Of the 21 health facilities where full safety boxes could be found, data collectors found that 52% of health facilities had tightly sealed, full boxes. Although a small percentage of improvement was noted, the changes were not statistically significant (Table 8).

Table 8: Observations on the storage of full safety boxes

	Baseline		Follow-up	
	Percentage	Number of Facilities with Full Safety Boxes	Percentage	Number of Facilities with Full Safety Boxes
Health facilities in which all full safety boxes are stored in a closed locations inaccessible to the public*	14%	36	58%	26
Health facilities in which all safety boxes awaiting final destruction are tightly sealed	44%	27	52%	21

*p≤.05

5.5 WASTE SEGREGATION

One strategy for reducing the amount of used sharps and infectious waste generated by injections is to segregate it into different containers for used sharps, infectious waste, and noninfectious waste. At baseline, data collectors found that waste was only segregated in 25% (18 of the 72) of health facilities surveyed. At follow-up, the number of facilities practicing waste segregation increased significantly to 46% (32 out of 70 facilities, p≤.01) (Table 9).

5.6 LOOSE BIOLOGICAL WASTE

The data collectors also examined concerned biological (infectious) waste. Specifically, they evaluated whether there was any loose biological waste lying around, visible, in any location inside or outside a health facility. At baseline, data collectors found that waste was segregated in 76% of health facilities surveyed. At follow-up, data collectors found the same percentage of facilities (76%) with no loose biological waste that could pose a risk of contamination to providers or the public and, thus, indicating no change between the two periods (Table 9).

Table 9: Observations on segregation of waste and biological waste

	Baseline		Follow-up	
	Percentage	Number of Facilities	Percentage	Number of Facilities
Health facilities that segregate their waste in different containers for used sharps, infectious waste and noninfectious waste*	25%	72	46%	70
Health facilities *without* loose biological waste	76%	72	76%	71

*p≤.05

5.7 OBSERVATIONS ON WASTE MANAGEMENT

Data collectors in this survey were instructed to observe waste handlers as they handled waste on the day of the survey to the extent that this was possible. The purpose was to compare these observations with the data obtained from interviews of waste handlers. The data collectors had the opportunity to observe a total of 26 waste handlers at baseline and 20 waste handlers at follow-up. During the baseline survey, the 2 most common types of protective equipment observed were boots or closed-toed shoes (5 waste handlers or 19%) and gloves (18 waste handlers or 69%). During the follow-up period, 16 of these 20 waste handlers used some sort of effective PPE, primarily boots or closed-toed shoes (5 waste handlers or 25%) and heavy-duty gloves (16 waste handlers or 80%). Additionally, 3 waste handlers used lightweight gloves for household chores, which were not considered effective protection for the purposes of this evaluation) (Table 10).

Table 10: Waste management observations

	Baseline		Follow-up	
	Number of Waste Handlers	Number of Facilities	Number of Waste Handlers	Number of Facilities
Health facilities in which the waste handlers were observed.	26	72	20	71
Health facilities in which the waste handlers used at least one type of effective PPE.				
Boots/closed-toed shoes	5	26	5	20
Heavy-duty gloves	18	26	16	20
Lightweight gloves			6	20
Aprons	17	26	3	20

5.8 WASTE DISPOSAL METHODS

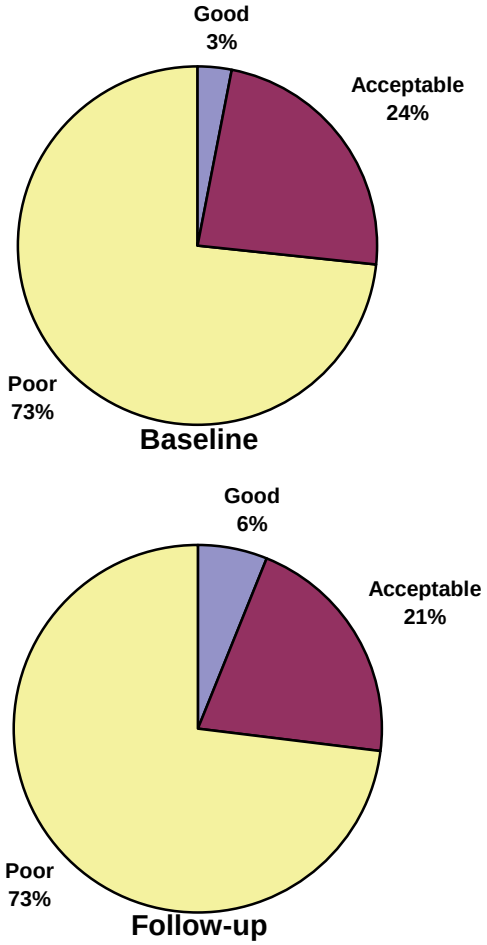
During their visits to the health facilities, the data collectors observed the main waste disposal method(s) used for sharps waste. It should be noted that in the cases where several methods were observed the sum of the results may exceed 100%. At baseline, the most common methods were open burning in a hole or in an enclosure (61%), low-temperature incineration (39%) and open-air burning on the ground (11%). During the follow-up study, these 3 methods were again the most commonly observed means of disposal (Table 11).

Table 11: Observations on the main methods used to dispose of sharps waste at baseline and follow-up

	Baseline		Follow-up	
	Percentage	**Number of Facilities where Method Observed**	**Percentage**	**Number of Facilities where Method Observed**
Open-air burning in a hole or an enclosure	61%	44	54%	38
Low-temperature incineration	39%	28	52%	37
Open-air burning on the ground	11%	8	18%	13
Burial	5%	4	10%	7
High- or medium-temperature incineration	--	0	6%	4
Dumping in a latrine or other protected pit	7%	5	6%	4
Transportation for off-site processing	1%	1	6%	4
Dumping in an unsupervised location	3%	2	4%	3
Dumping in an unprotected pit	--	0	3%	2

To summarize these results, all the particular methods could be grouped into three general categories of waste disposal: “Good,” “acceptable,” and “poor.” The “good disposal” category includes high- or medium-temperature incineration, dumping into a latrine or other protected pit followed by burial, and/or transportation off-site for processing. Low-temperature incineration, on the other hand, is considered “acceptable” disposal. “Poor” disposal comprises other less secure methods: Open-air burning on the ground or in a hole or enclosure, burial alone, and dumping into an unsupervised area or latrine or other location if this dumping is not followed by burial. When the overall results of the sharps waste disposal methods are calculated based on these 3 categories, the data from observation of the waste management practice showed 73% poor, 21% acceptable, and only 6% good. There was no statistically significant change in either direction from the baseline status, which indicates the need to explore the reason behind such malpractices and act accordingly (Figure 2).

Figure 2: Overall summary of the distribution of health facilities surveyed according to the general categories of sharps waste disposal at baseline and follow-up



5.8 OBSERVATIONS ON JOB AIDS

During their visits to the health facilities, data collectors observed whether there were communication materials (such as reminder charts and/or job aids) encouraging the rational use of injections or medical waste management. They saw materials displayed/posted that promoted reducing injections in 54 out of 71 health facilities (76%). Among these facilities, the most common job aid/reminder seen was posters with MMIS logo (94%) followed by pocket- sized reference book (13%)

At follow up, data collectors also observed whether there were reminders and/or job aids that promoted safe administration of injection and safe disposal of used injection equipment were posted/displayed. Safe administration of injection reminders were found in 83% of the 71 facilities surveyed while safe disposal reminders were seen in 72% of the facilities. Among these facilities where the respective reminders were found, posters with MMIS logo was again the

most commonly identified material in 88% and 90% of the cases, respectively. 22% also had a waste segregation diagram promoting safe administration while 16% had a waste segregation diagram promoting safe final disposal.

Overall, when facilities were checked for having at least one 1 of the three 3 categories of job aids/reminders, statistically significant improvement was noted as compared to the baseline (100% at follow-up compared to 7% at baseline, $p \leq 0.001$).

6. OBSERVATIONS ON INJECTION ADMINISTRATION PRACTICES

For this survey, up to 4 injection observations per ward where injections were being administered on the day of the survey were planned for observation at hospitals. For lower-level facilities, up to 4 injection observations were planned. This resulted in a maximum total of 616 injection observations for both time periods. Although there were several challenges in the field, 86% of the expected observations at the lower-lever facilities and 52% of the maximum expected observations in hospitals were observed.[6]

The analysis presented in this section of the report is calculated as a percentage of all injections observed. Additionally, where appropriate, the analysis was also done by facility level (hospital or lower-level). Cases where a particular question was not applicable to a particular type of injection procedure were noted as appropriate.

General outpatient department, internal medicine, pediatrics, obstetrics and gynecology (maternity), surgery, and laboratory were the hospitals units covered in this study. On average, 33 injection observations were made in each of the 6 wards although it ranged from 29 observations in pediatrics to 41 observations in the laboratory.

The injections observed during this survey were administered by various types of health care personnel. Table 12 presents these results. A total of 51% of the 390 providers observed worked in hospitals compared with 49% at lower-level facilities.

Table 12: Types of health care workers observed administering an injection at follow-up

Type of Health Care Worker	Total Observed
Nurse	80%
Lab	13%
Health Extension Worker	3%
Doctor	2%
Health Assistant	2%
Total	**100%**

By far, the most frequent type of injection observed was a curative injection, followed by injections for laboratory diagnosis, and preventive injections such as vaccinations (Table 13).

[6] Challenges included the limited mandates of health posts, which are generally only allowed to provide preventative medication (i.e., vaccination and family planning), and no curative ones (aside from antimalaria tablets and deworming drugs. Additionally, some of hospitals were found to provide almost no service in the wards during data collection time.

Table 13: Distribution of injections by type at baseline and follow-up

	Baseline		Follow-up	
Type of Injection	**Number of Injections Observed**	**Percentage of the Total Observed**	**Number of Injections Observed**	**Percentage of the Total Observed**
Therapeutic Injections	104	41%	181	46%
Diagnostic Injections (Laboratory)	36	14%	98	25%
Family Planning Injections	49	20%	61	16%
Preventive Injections (Vaccinations)	63	25%	50	13%
Total	**252**	**100%**	**390**	**100%**

6.1 PREPARATION OF INJECTIONS ON A CLEAN WORKTABLE OR TRAY

The data collectors began their observations by examining the hygienic conditions of the injections—in particular, whether the injection providers had taken care to prepare the injection on a clean worktable or tray where contamination of the injection equipment with blood, dirty swabs, or other biological waste would be unlikely. At baseline, 68% of all injections observed were prepared on a clean surface. At follow-up, the number of injections prepared on a clean surface increased significantly to 81% ($p \leq .001$, Figure 3). There was also a statistically significant improvement at the lower-level facilities, which rose from 63% of all injections at baseline to 78% at follow-up. At hospitals, about 80% of injections in both baseline and follow-up periods were prepared on a clean worktable or tray.

6.2 HAND HYGIENE AND USE OF NEW GLOVES

The other aspect of general hygiene that the data collectors analyzed was hand washing. Data collectors observed whether injection providers washed their hands with soap and running water or with an alcohol-based hand sanitizer prior to beginning the injection or in cases where there was a risk of contact with soil, blood, or organic fluids. They found that the number of injection providers who washed their hands or used an alcohol-based hand sanitizer prior to beginning the injection increased significantly from 4% at baseline to 80% at follow-up ($p \leq .001$). This improvement occurred in both hospitals and lower-level facilities.

At follow-up, 27% of the observed 372 injection providers used new gloves prior to administering the injection, while 8% of them wore gloves that were not changed between patients, and 64% did not use any glove at all.[7] Data collectors also found a significantly higher rate of glove use, both new and without changing in between, in hospitals as compared to lower-level facilities.

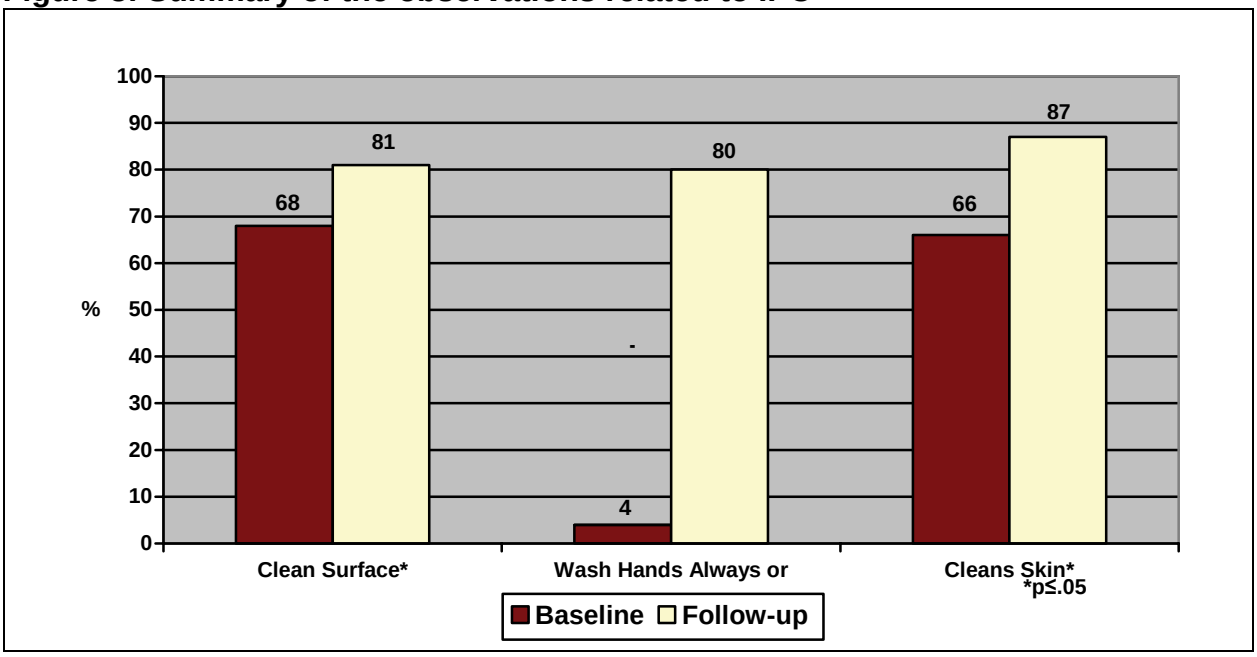
[7] Eighteen observations were excluded.

6.3 CLEANING THE PATIENT'S SKIN BEFORE THE INJECTION

In this survey, data collectors were able to observe the practice of cleaning the patient's skin. At baseline, in 66% of the 247 injections observed for this indicator, the provider cleaned the skin with a clean swab or a disinfectant. This improved significantly during the follow-up where providers cleaned the skin in 87% of the 381 injections ($p \leq .001$).

Among the 333 injection providers who cleaned the skin during the follow-up survey, 64% used a clean swab with antiseptic for cleaning purpose, and 36% used only a clean swab. This result was similar among injection providers in the hospitals where 88% cleaned the patient's skin compared to the 83% at the lower-level facilities who cleaned the patient's skin. Out of the 50 vaccination procedures observed, 22% of the providers were observed to use antiseptics to clean the skin prior to giving the injection.

Figure 3: Summary of the observations related to IPC



6.4 TYPE OF EQUIPMENT USED FOR PROCEDURE

At follow-up, data collectors found that standard disposable syringes were widely used in 76% of the 390 injections. It was also the most common type of equipment used in observations at hospitals and lower-level facilities, 79% and 69%, respectively. Auto-disposable needle/syringe and lancets were the next most common type of equipment observed being used by the health workers, 15% and 6%, respectively. Interestingly, the use of auto-disposable syringes was more common in lower-level facilities than hospitals (20% compared to 9%). Retractable syringes and vacuum or winged collection sets were infrequently used, all together accounting for only 3% of the observed injections.

6.5 PATIENTS AS THE SOURCE OF INJECTION EQUIPMENT

In the facilities surveyed, the practice of patients bringing their own injection equipment was relatively common. In the 249 objections observed at baseline, 25% were administered with a needle and syringe brought by the patient. During the follow-up survey, patients providing devices increased significantly to 38% of the 355 cases observed. (Figure 4, $p \leq .001$). This significant increase was also apparent in the hospital setting where patients provided devices in 48% of cases (out of 176) at follow-up, while in only 20% of cases (out of 94) at baseline. At the lower-level facilities, there was no real change between the two periods.

When comparing types of injections over time, a difference was seen only with curative injections. In 61% of the 171 curative injections observed at follow-up, the providers used injection equipment brought by the patients. This is a significant increase from baseline where this was true for less than half of the time (47% out of 102 observations) ($p \leq .05$).

It is important to note that the Ethiopia government has set up a cost recovery system for many of the health care services provided. This significant increase can be explained by the scaling up of the RDF pharmacies since the baseline, particularly at hospitals. These RDF pharmacies, set up at the facilities, enable patients to purchase their medicine and injection equipment immediately and prevent any delay in treatment. However, for some type of injections, such as family planning and vaccinations, syringes and medications are provided free of cost.

6.6 USE OF NEW NEEDLES AND SYRINGES FOR INJECTIONS AND TO RECONSTITUTE MEDICATIONS

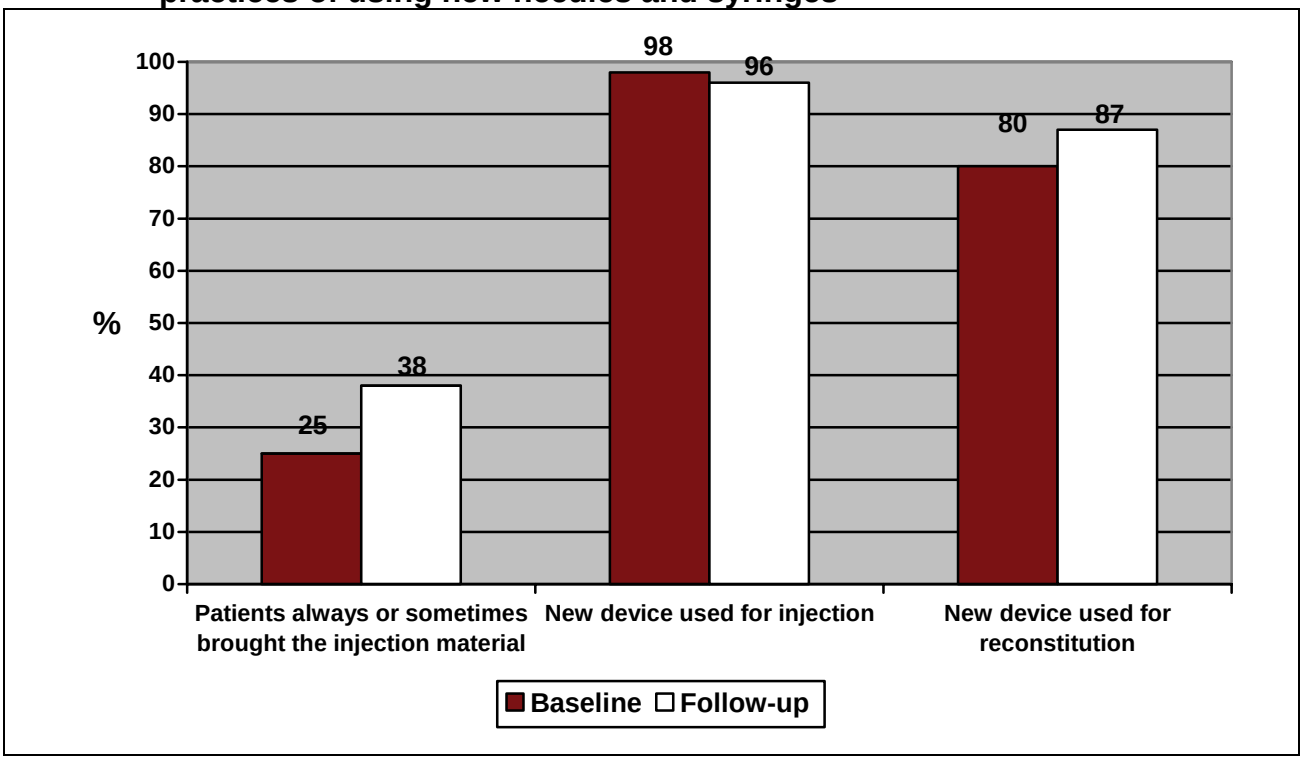
In the baseline, 98% of the needles and syringes used in 252 injections were taken from a sterile package in most of the cases. At the follow-up, 96% of the 356 injections observed used new needles and syringes, indicating no statistically significant change between the periods (Figure 4).[8] Of the 16 injections observed where the syringe and needle were not taken from a sterile package, there was no evidence that the needles and syringes had been used before.

No difference was found in the practice of using a syringe and needle from a sterile package between hospitals and lower-level facilities. There was, however, a statistically significant difference at follow-up between the types of injections. As many as 98% of curative and family planning injections (170 and 60 cases, respectively) were given using new devices, while only 92% of vaccinations (out of 47) and 91% of diagnostic injections (out of 79) were given using new devices ($p \leq .05$).

The proportion of injections with a vaccine or reconstituted medication in which the provider used new needles and syringes appeared to be slightly lower for the 103 observations at baseline (80%) than for the 111 injections at follow-up where 87% were administered with a new sterile device. The difference, however, was not statistically significant (Figure 4).

[8] Thirty-four cases in which this practice could not be observed during the follow-up were excluded from the analysis.

Figure 4: Summary of the distribution of observations on the sources and practices of using new needles and syringes



6.7 DILUENT FOR RECONSTITUTION

Although there are cases in which it is not necessary to use diluents from the same manufacturer as the medications (for example, cases of reconstitution that only use sterile saline), in general, using a diluents from the same manufacturer as the vaccines is one facet of injection safety. The data collectors noted that the diluents from the same manufacturer as the vaccine was used in 83% of the reconstituted injections in which this practice could be observed (40 cases) at baseline and 91% (out of 32 cases) during the follow-up. This difference between the two collection periods was not considered significant.

6.8 REMOVING NEEDLES FROM THE CAP OF MULTIDOSE VIALS AND CLEANING OF CAP

A needle that remains in the rubber cap of a multidose vial risks becoming a route by which microbes gain access to and will contaminate the injectable medication. Removing the needle from the rubber cap after withdrawing the dose to be administered is, thus, a measure of injection safety. In order to examine this issue, the data collectors were able to make observations of injections in which this variable was relevant (i.e., a multidose vial was used) in 234 cases (135 at baseline and 109 at follow-up). At baseline, the needle was removed from the rubber cap in 90% of the injections observed compared to 84% at follow-up. The difference between the two collection periods is not statistically significant (Figure 4).

At follow-up, an additional question was added to determine whether the rubber stopper of the medicine vial was cleaned with disinfectant before withdrawing the dose. This cleaning took place in 21% of the 182 cases observed.

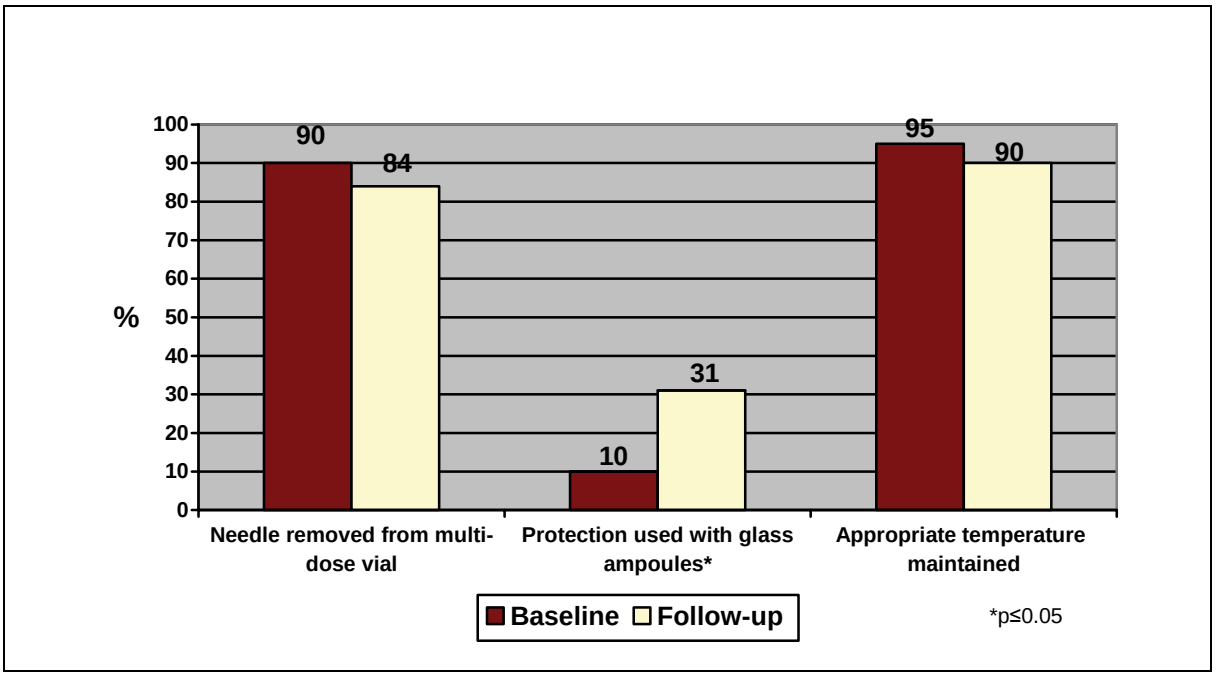
6.9 USE OF CLEAN BARRIERS TO PROTECT FINGERS WHEN BREAKING GLASS AMPOULES

Injection providers can be injured when opening or breaking glass vials, which risks contaminating the injectable medication or injection equipment. For this reason, injection providers were observed while they were preparing injections. The data collectors noted what material (i.e., a sponge, cotton, or gauze) was used by the providers as a barrier to protect their fingers when breaking the ampoules. During the baseline, providers used a clean barrier in 10% of the 50 injections where a glass ampoule was used. During the follow-up, this result increased significantly to 31% of the 114 injections ($p \leq .01$). Still, there is room for improvement as ideally this should be as close to 100% as possible.

6.10 TEMPERATURE AT WHICH HEAT-SENSITIVE VACCINES WERE STORED

The data collectors observed the temperature at which heat-sensitive vaccines were stored. At baseline, 53 out of 56 vaccines (95%) were stored at an appropriate temperature between 2 to 8º C. Similarly, at follow-up, 43 out of the 48 vaccinations (90%) were stored at appropriate temperature (Figure 5).

Figure 5: Summary of the variables on protecting injectable medications from contamination or deterioration



6.11 RECAPPING NEEDLES AFTER ADMINISTERING INJECTIONS

The practice of recapping entails risks for injection providers because it exposes them to blood-borne pathogens. Unlike previous surveys which focus on recapping with two hands, for this survey, any recapping of the injection equipment—with one or two hands—was considered unsafe in curative and family planning injections, vaccinations, and finger pricks.[9]

At baseline, used devices were discarded without recapping in 73% of the 211 curative, family planning injections, and vaccinations observed. At follow-up, in the 279 injections in which this practice could be observed, the providers discarded 98% of the used devices without recapping them (Figure 6). This change was a significant improvement overall ($p \leq .001$).

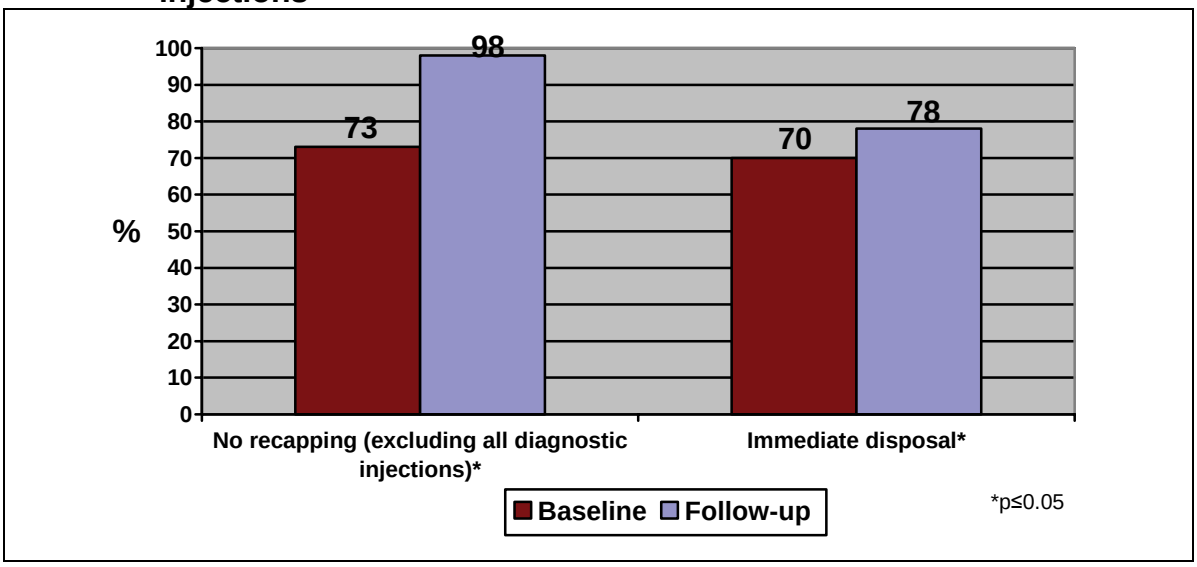
In the follow-up, injection providers used the one-handed technique in all seven cases where recapping occurred. Additionally, in all seven cases of recapping, there was a sharps container within arm's reach of the provider administering the injection in which case none should have be recapped at all before the used sharp was disposed of in the sharps container.

6.12 USE OF A SAFETY BOX FOR IMMEDIATE DISPOSAL OF USED SHARPS

It is important that injection equipment be safely disposed of as soon as injections are administered so that injection providers, patients, and waste handlers are protected from accidental injuries from used sharps. Injection providers were observed to evaluate whether they safely disposed of the used needle and syringe in a safety box or if they used a needle-removal device immediately after administering the injection. In fact providers appropriately disposed of the injection equipment immediately after the injection in 78% of the 380 injections observed in the follow-up survey. This was a significant improvement from baseline where 70% of the injection equipment in 246 observations was immediately disposed ($p \leq .05$, Figure 6). Additionally, in the follow-up study, 82% of the injections were immediately disposed in a sharps container that was within arm's reach.

[9] Phlebotomy procedures, on the other hand, may use one-handed recapping for safe removal of a used sharp before the blood is transferred to a test tube. (Please refer to Section 6.14 for a more detailed discussion.)

Figure 6: Summary of the observations on disposal of sharp objects after injections



6.13 BEHAVIOR CHANGE COMMUNICATION

In addition to the preparation and administrations of injection properly and appropriate waste disposal, the concept of safe injection extends to the provision of relevant information to the patient/client. Accordingly, the provision of follow-up instructions to patients was observed in 29% of the overall 390 injections observed. However, only 7% of the injection providers told their patients/clients about possible side effects, and 4% added information on how to treat side effects. Similarly, only 2% informed their patients what to do if they had adverse reactions.

Finally, the practice of using, explaining, or referring to communication materials by injection providers was assessed, and the use of posters with MMIS logo was observed, while 13% of the injections were administered. The use of leaflets and pocket-sized reference books was witnessed in 2% (leaflets) and 1% (reference books) of situations. Similarly, 3% of the injection providers used different logos and reference materials related to injection safety prepared by Ethiopia MOH, Centers for Disease Control and Prevention, and Jhpiego.

6.14 PHLEBOTOMY ANALYSIS

Out of 390 total injection observations during follow-up, 59 observations were made of phlebotomy (blood draw) procedures. These cases are singled out here for special analysis because some of the practices—particularly as they relate to recapping and IPC—are different from other types of injection procedures or are more vital.

In terms of general IPC practices, 92% of the phlebotomy procedures observed were prepared on a clean table or surface. A clean swab was used in 28% of phlebotomy cases with antiseptic used in 64%. In 7% cases, the skin was not cleaned; and in 1 case, a dirty swab was used. New gloves

were used in 59% of cases, while in 17% the providers wore gloves that were not changed between patients. In 25% of the cases, the providers did not wear any gloves.

In most of the cases observed (64%), the providers used an alcohol-based hand sanitizer before beginning the phlebotomy procedure. Soap and running water were used in 19% of cases, while in 17% of cases the providers did not wash their hands.

Of the phlebotomy procedures observed, standard disposable needles and syringes were used in 49 of the 59 procedures (83%), while 2 procedures used an AD needle and syringe; 1 procedure used a retractable syringe, and 7 procedures used a vacuum set.

In the 7 cases in which a vacuum set was used, new sterile devices were used, and 4 were disposed of without recapping immediately after the blood was drawn. One-handed recapping followed by immediate disposal was observed in 1 case. For the 3 remaining cases, data collectors were not able to observe whether the needle was recapped prior to the device being immediately disposed.

In the remaining 52 cases, a needle and syringe was used to draw blood. New needles and syringes were used in 41 of the 44 cases (93%).[10] In 40 of the 50 cases (80%), the used device was discarded immediately after the blood was drawn; in the remaining cases, the data collector was not able to observe the disposal practice.

In 44 of the 49 cases with syringes, data collectors observed the provider transferring the blood from the syringe in which it was collected to a test tube.[11] In 57% of these cases (25 out of 44), providers removed the needle prior to transferring the blood using their hands. In only 2 of the cases, the needle had been recapped (using the one-handed technique) prior to removal, while 22 cases (92%)[12] had an exposed needle.

Out of the remaining 19 observations where the needle was not removed prior to the transfer of blood to a tube, the providers used two hands for the transfer in 10 of the cases, putting themselves at risk of a needlestick injury.

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[10] This variable was not observed in eight of these cases.
[11] This variable was not observed in three cases of blood transfer using a needle and syringe.
[12] This variable was not observed in one case.

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7. INTERVIEWS WITH INJECTION PROVIDERS

This section contains data on interviews with the injection providers. In the follow-up survey, a total of 130 were interviewed, 58 injection providers at the lower-level health care centers and 72 at hospitals. This sample of 130 providers comprised 117 (90%) in public health facilities, 6 (5%) in private facilities, and 7 (5%) in facilities run by NGOs. In the baseline, 81% of the 105 injection providers were from public facilities, while 13% were from facilities run by NGOs, and 5% were from private facilities.

The most common qualifications at follow-up were nurses, accounting for 89% of the interview respondents, followed by "other," which included laboratory technicians, health extension workers, health assistants, and lay or primary health workers (Table 14).

Table 14: Qualifications of the injection providers interviewed, by type of health facility

Qualifications	Number of Injection Providers in Health Centers	Number of Injection Providers in Hospitals	Number of Injection Providers in Total	Percentage of the Total
Doctor	0	1	1	1%
Nurse	51	65	116	89%
Other	7	6	13	10%
Total				**100%**

Table 15: Classification of injection providers by ownership and facility

Ownership	Baseline	Follow-up
Public	81%	90%
NGO	13%	5%
Private	6%	5%
Type	**Baseline**	**Follow-up**
Hospital	48%	55%
Lower-level	52%	45%

7.1 SOURCES OF NEW, DISPOSABLE NEEDLES AND SYRINGES

In interviews of the injection providers, the data collectors posed questions about the source of the syringes for various types of services: Vaccinations, curative injections, contraception injections, and diagnostic injections.

Of the 49 injection providers in all the health facilities surveyed who responded that the question on vaccinations was applicable to them,[13] only 3 (6%) reported that patients sometimes brought their own syringes and needles. This was similar to the finding during the baseline study where 61% of providers interviewed claimed that the question did not apply to them, and only 5 out of the remaining 41 injection providers said patients always (4 cases) or sometimes brought their own syringes and needles. Vaccines are generally given free of charge throughout the country, and patients are not expected to bring needles/syringes for vaccination purpose, which could explain these results.

Of those who answered the question on curative injections, 48% of the 46 injection providers at baseline and 45% of the 100 injection providers at follow-up responded that the patients never brought syringes;[14] 26% at baseline and 41% at follow-up responded that their patients always brought syringes, while the remaining in both time periods declared that patients sometimes brought bring syringes. In it is interesting to note that while these differences were not statistically significant, the responses from providers at the lower-level facilities between time periods were significant ($p \leq .001$). At baseline, 18% of the 30 providers responded that patients always brought their own needles and syringes, and 48% reported that patient never brought their own needles and syringes. At follow-up, 63% of the providers said patients always brought their own needles and syringes, and only 28% responded that patients never brought their own needles and syringes. As mentioned earlier, this finding is reflective of a common practice and government policy for patients to buy and bring their own injection equipment for treatment.

With regard to contraception services, 83% of the 15 providers at baseline and all of the 55 providers at follow-up reported that patients never brought needles or syringes for contraception services.[15] As with vaccination injections, it was not common for patients to bring their own needle/syringe for contraceptive injection purpose due to the fact that drugs and injection equipment for contraceptives are provided free of charge throughout Ethiopia.

At baseline, 4 out of 17 (77%) the injection providers interviewed who provided diagnostic injections or phlebotomy services responded that the patients sometimes brought the injection equipment for diagnostic injections, and the rest of the injection providers indicated that the patients never brought the injection equipment for diagnostic injections. At follow-up, 25% of the 57 providers who provide diagnostic injections or phlebotomy services reported that the patients always or sometimes brought a syringe and needle.[16]

After the questions about their experience seeing patients bringing their syringes, the data collectors asked the injection providers whether it was possible to buy new, disposable needles and syringes in the community around the health facility surveyed. At baseline, 78% (82 out of 105) of the injection providers indicated that it was possible to buy injection equipment in their communities. The rest of the injection providers said that it was not possible or did not know. At

[13] At follow-up, 62% of the providers interviewed declared that the question on vaccinations did not apply to them.
[14] Of the injection providers interviewed, 56% at baseline and 23% at follow-up claimed that the questions on curative injections did not apply to them.
[15] Of the injection providers interviewed, 83% at baseline and 58% at follow-up claimed that the questions did not apply to them.
[16] The remaining providers were excluded from each time period because they do not provide this type of service.

follow-up, 79% (103 out of 130) declared that it is possible to buy needles and syringes in the community, and the rest of the injection providers said that it was not possible to do so or did not know.

7.2 USE OF ANY DISPOSABLE SAFETY SYRINGES

The data collectors asked the providers whether they use any disposable safety syringes that prevent reuse or needlestick injuries. This question was asked only at the follow-up. From the 130 injection providers interviewed, 39% reported using any disposable safety syringes. Among the 50 who reported using any disposable safety syringes, 76% were using reuse prevention (auto-disable only), and 6% reported using reuse and needlestick injury prevention syringes (retractable only). The remaining 18% reported using both types of safety needles.

Of the 47 injection providers who reported using prevention syringes, 57% used them for curative injections; and a similar proportion, 55%, used them for vaccination purpose. Family planning injection procedures were reported by 36% of the providers. Injections for diagnostic purpose and for drawing blood accounted 19% and 15%, respectively.

Out of the 12 injection providers who reported using syringes with reuse prevention features, 58% used them for providing curative injections, and 33% used them for drawing blood. Provision of injections for vaccination and diagnostic purposes were mentioned by only 1 provider in both cases. No injection providers reported using syringes with reuse prevention features for family planning injections.

7.3 REUSE OF A NEEDLE OR SYRINGE

At baseline, 99% of the 105 data collectors at baseline reported that they had never reused a syringe on another patient (the remaining 1 did not know). During the follow-up, however, when data collectors asked whether the injection providers were aware of any cases of reusing a syringe on the same or another patient, 5 of the 130 providers interviewed answered affirmatively.

Out of the five providers who reported being aware of any cases of reuse of disposable syringe/needle on the same or another patient, three of the conditions were attributed to patients who could not afford to buy another needle and syringe. One injection provider said it was because of a stockout, and the remaining injection provider did not give any information to this regard. Three of these four providers reported that they were not aware of any attempt to sterilize the injection materials before reusing, while the remaining injection provider did not know of an attempt of sterilization using an autoclave.

7.4 USE OF NEEDLE-REMOVAL DEVICES

At baseline, the data collectors asked the injection providers whether they used something to remove the needles in the hospital ward or health facility where they worked. Five percent (5 out of 105) of the injection providers responded that they used a needle-removal device, while 80% said they did not use a needle-removal device. The rest (15%) of the injection providers did not know. At follow-up, 3% of the 130 injection providers used needle-removal devices, while 95% said that they did not. The remaining 2% did not know.

7.5 RECALL OF STOCKOUTS OF SAFETY BOXES AND SYRINGES

Among the 130 providers surveyed in the follow-up, 14% (18 providers) claimed that safety boxes were never used; 12 of these 18 providers (67%) worked in hospitals. It is interesting to note that the providers without safety boxes were 2 of the 8 who had experienced accidental needlestick injuries during the 6 months prior to this survey.

Of these 112 injection providers who had safety boxes at some time, all were able to remember about the status of stockouts, and 94% had not had a stockout in the 6 months prior to the survey. Another 4 (4%) of injection providers reported having had a stockout for 1 to 4 weeks, and the remaining 3 (3%) injection providers had stockouts lasting more than a month. These results showed statistically significant improvement from the baseline where 84% of the 105 providers reported no stockouts for the 6 prior to the survey ($p \leq .001$).

The baseline results for stockouts of single-use disposable sterile syringes (including standard, AD, or retractable syringes) in the 6 months prior to the survey showed that 86 providers (82%) had not had any stockouts in the 6 months prior to the survey compared to 119 providers (92%) at follow-up. This difference is statistically significant ($p \leq .001$).

The data collectors asked the providers who had had stockouts of injection equipment at any time in the 6 months prior to this survey an additional question in order to determine what they had done during the stockout.[17] In response to this question, 2 providers at baseline and 1 provider at follow-up reported that they had stopped administering injections, while 11 at baseline and 1 at follow-up reported that they asked patients to go buy injection equipment. At baseline, 3 providers also reported borrowing from another facility, while the remaining 2 providers claimed that the stockouts lasted only a short period of time and did not affect their work.[18]

7.6 ACCIDENTAL NEEDLESTICK INJURIES

The data collectors asked the injection providers whether they had experienced any accidental needlestick injuries in the 6 months prior to the survey. At baseline, 90% of the 105 providers

[17] At baseline 19 providers reported stockouts, but only 17 responded to these questions. At follow-up, only 2 providers reported a stockout of some type.
[18] Total is greater than 17 since providers could answer more than one option

interviewed had not had any accidental needlestick injuries during that time; 6% had received 1; 3% had received 2, and 1 provider (1%) had 3 injuries. The remaining provider could not remember how many times. At follow-up, 94% of the 130 providers interviewed had not received any needlestick injuries in the 6 months prior to the survey; 4% had received one; 2% had received 2, and 1% had received three.

At follow-up, the data collectors asked the 8 providers who reported a total of 11 injuries about the type of the injection procedure that they were performing when the injury occurred. Four of the 8 indicated that they were administering a curative injection, and 3 mentioned inserting an IV infusion line when the accident occurred. The remaining providers each mentioned family planning, drawing blood, and suturing as the procedure that they were carrying out when the accident occurred.

The data collectors also asked the injured providers about the type of needle or sharp item that caused the injuries. Five providers reported being injured by a needle on standard disposable syringe, while three reported a needle from an IV/cannula. Two providers reported being injured by the needle of an AD syringe, and one provider reported being injured by a suturing needle. The remaining provider reported being injured by a detached needle. All of the providers reported that needlestick injury accidents occurred while preparing or administrating injection.

Out of the 8 injured providers at follow-up, 2 reported the injuries to their supervisors, where 1 supervisor advised the provider to take an HIV test.[19] The remaining providers who did not report the injuries did so because they did not know that the injury should have been reported (two cases), could not report it at night (one case), did not think it was serious (one case), or was too busy/forgot (one case).

Data collectors also asked at follow-up whether HIV PEP was available at their facilities. Among the 130 providers surveyed, 63% reported that there was, while 23% reported that there was no PEP. Almost 8% did not know. Most (70%) of the respondents who said that PEP was available in their facilities were from hospitals.

7.7 PROVIDERS' KNOWLEDGE OF DISEASES TRANSMITTED BY REUSE OF NONSTERILE NEEDLES

Only 94% of the 130 injection providers interviewed were aware of the diseases that can be transmitted by reuse of a nonsterile needle or by a needlestick injury. This was statistically significantly lower than at baseline where all 105 injection providers (i.e., 100%) were aware that diseases could be transmitted by needles. When asked about the specific diseases which they were aware, at baseline, 98% of the 105 providers mentioned HIV, while at follow-up 92% of 130 providers mentioned HIV. Hepatitis B was mentioned by 75% of the providers interview, which was a statistically significant increase compared to baseline where only 46% mentioned hepatitis B. Similarly, 28% of the providers at follow-up mentioned hepatitis C, a statistically significant increase from baseline where only 12% mentioned it. In all, 28% of all the providers at follow-up mentioned all three diseases known to be transmitted by unsafe injections or waste

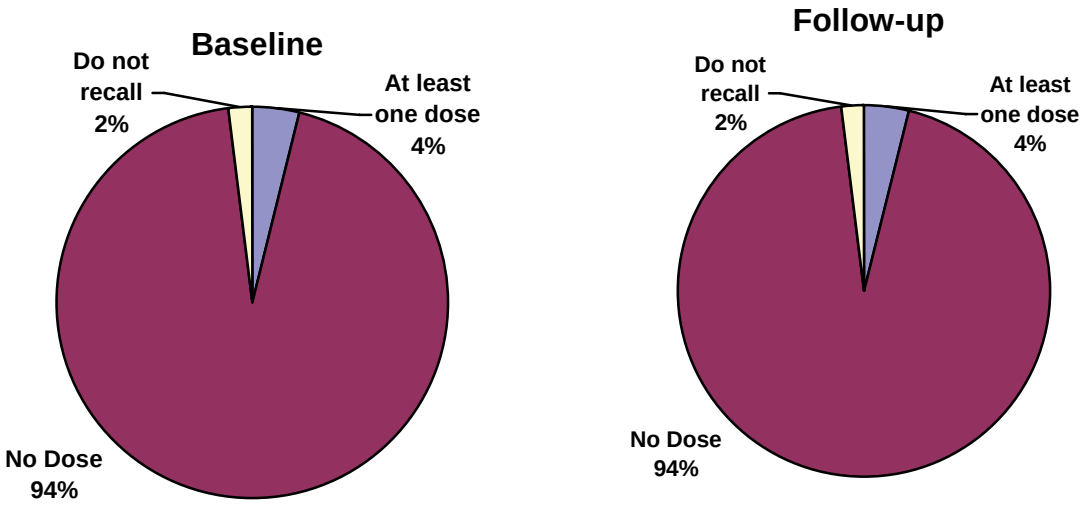
[19] The second injection provider could not remember what their supervisor adviser them to do.

management practices (i.e., HIV, hepatitis B, and hepatitis C) compared with at baseline where only 11% mentioned the 3 diseases. In addition to these common diseases, 8% of those interviewed at follow-up mentioned other diseases including tetanus, hepatitis A, hepatitis E, influenza, and sexually transmitted infections (STI).

7.8 INJECTION PROVIDERS VACCINATED AGAINST HEPATITIS B

Of the 130 injection providers surveyed at follow-up, 11% declared that they had received the hepatitis B vaccine; 2 providers did not remember, and the rest, 88%, declared that they had never received it (Figure 7). Of the 14 who said they had received the vaccine only 1 provider reported receiving the three or more doses necessary for full protection. In comparison, at baseline, 4% of the 105 providers reported receiving the vaccination, but none of the 4 had actually received more than 1 dose.

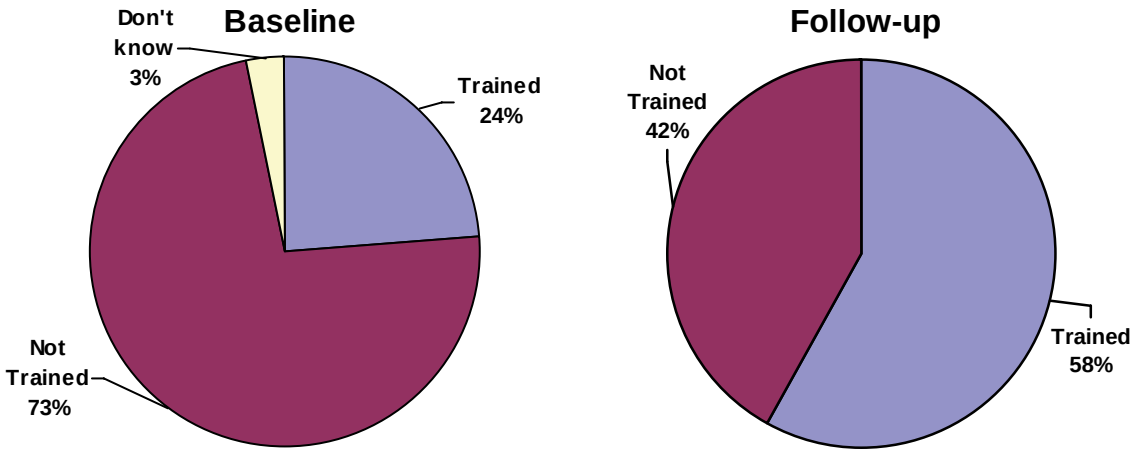
Figure 7: Injection providers who declared receiving the hepatitis B vaccine at baseline and follow-up



7.9 INJECTION PROVIDERS WHO RECEIVED TRAINING ON INJECTION SAFETY

Of the injection providers surveyed, 58% declared having received training on injection safety (Figure 8). This was a remarkable and statistically significant achievement compared to baseline where only 24% of the providers responded that they had training. At the follow-up, when asked about the timing of their training, 13% of the 75 injection providers who received training had taken the training less than 6 months prior to the follow-up survey. The majority (56%) of injection providers received the training more than 6 months ago from when the survey was administered, and 31% of injection providers did not remember when they had received the training.

Figure 8: Injection providers who declared receiving training on injection safety at baseline and follow-up



7.10 DESCRIPTION OF SAFE INJECTION

At follow-up, injection providers were asked how they would describe a safe injection; 79% of the 130 respondents mentioned the use of new or sterile injection equipment. This was followed by 59% of injection providers describing a safe injection as one that did not harm the recipient, the provider, and the community. A similar proportion, 57%, described safe injection as safe disposals of used injection devices (Table 16).

Table 16: Injection providers' description of a safe injection[20]

Description of Safe injection	%
New/sterile injection equipment	79%
Injection that does not harm the recipient, provider and the community	59%
Safe disposal of used injection devices	57%
Wear gloves	30%
Right route	26%
Right anatomic/body site	22%
Right medication	18%
Wash hands	17%
Right dose	15%
Right volume	10%
Mixed correctly	7%
Don't know	2%

The providers were also asked by data collectors whether they had any difficulties following proper safe injection and waste disposal practices when giving an injection. Almost half (46%) reported shortage of gloves, and 42% cited a lack of soap and water to wash hands. As many as 22% of providers also mentioned shortage of safety boxes, while 14% reported shortage of

[20] It should be noted that owing to multiple responses the total sum exceeds 100%.

needles/syringes. Providers also mentioned not having not enough time (11%), shortage of oral medications or alternatives to injectables (9%), and lack of disinfectant/cleaner (5%).

7.11 SOURCE OF INFORMATION FOR SAFE INJECTION PRACTICES AND/OR SAFE DISPOSAL PRACTICES AND THEIR USEFULNESS

The providers were also asked at follow-up where they had heard or seen anything about reducing the number of injections, safe injection practices, and/or safe disposal practices. The 2 most common responses were in-service/training workshops (59% of providers) and preservice trainings (44%).[21] A breakdown of the responses can be found in Table 17 below.

Table 17: Where injection providers have heard or seen about safe injection/safe disposal practices[22]

Source of information	%
Training workshop	59%
Preservice training	44%
Other health staff/personnel	19%
Radio	13%
Poster	12%
Television	10%
Supervisor	8%
Booklet/brochure	5%
Newspaper/magazine	4%
Drama group/road show	2%
Don't know/don't remember	2%
Billboards/banners	1%
None/nowhere	2%

Injection providers were further interviewed on the type of materials available at their respective facilities. Almost half of the providers (49%) claimed that no material were available at the facility; 45% of the providers, however, mentioned posters, and 9% cited video as available job aids. Brochures and calendars were each mentioned by 8% of the providers, while pocket guides and newsletters were mentioned by 6% of injection providers.[23]

Among the 62 providers who mentioned at least 1 job reminders of safe injection, 84% found posters as the most useful job reminders, followed by 40% who found the videos to be useful; 21% of these providers cited brochures, and pocket guides and newsletters were each cited by 16% of the providers. Another 15% of providers found calendars as most useful reminder.[24]

[21] More than 2% said that they had not heard or seen anything, and another 2% could not remember.
[22] The total sum exceeds 100% due to multiple responses.
[23] The sum exceeds 100% because of multiple responses.
[24] The sum exceeds 100% because of multiple responses.

Among the 62 injection providers who said that they found the different job aids of safe injection useful, 71% cited that it was a good reminder for themselves; 61% found them useful since it created a visual, and 57% found them easily understandable. A breakdown of the complete responses is in Table 18. The total sum exceeds 100% due to multiple responses.

Table 18: Reasons materials found useful by injection providers

Reason for considering the job aids useful	%
It is a good reminder for me	71%
It is pictorial/visual	61%
It is easily understandable	57%
It is interesting and attracts attention	31%
Can be put anywhere	18%
It can teach community/patients	18%
Don't know	2%

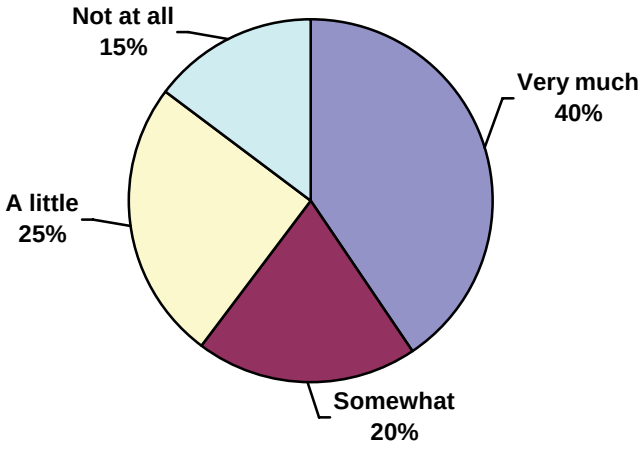
7.12 PROVIDERS' REASONS FOR RECAPPING

In the follow-up survey, 30 injection providers were observed recapping needles. Data collectors asked these injection providers why they did so, and data were documented from 15 of them. It was not possible to interview the remaining half because of several limitations encountered during data collection; e.g., providers not willing to give information, complaining of very busy, and data collectors conducting the interviews not necessarily being the same data collector who observed the recapping. Out of the 15 observed, most (67%) cited that they forgot; 4 of the injection providers said they usually do it, and 3 did recapping to keep from getting needlestick injury. One provider did so since the provider was planning to reuse it, and 2 replied that they did not know.

7.13 PROVIDER' PERCEPTIONS OF RISKS AND BENEFITS OF INJECTIONS

All of the 130 injection providers were asked to what extent they felt that they were at risk of contracting an infection from injection equipment or injection waste in their respective health facility. The breakdown of responses appears below in Figure 9.

Figure 9: Injection providers' perceptions of risk at follow-up

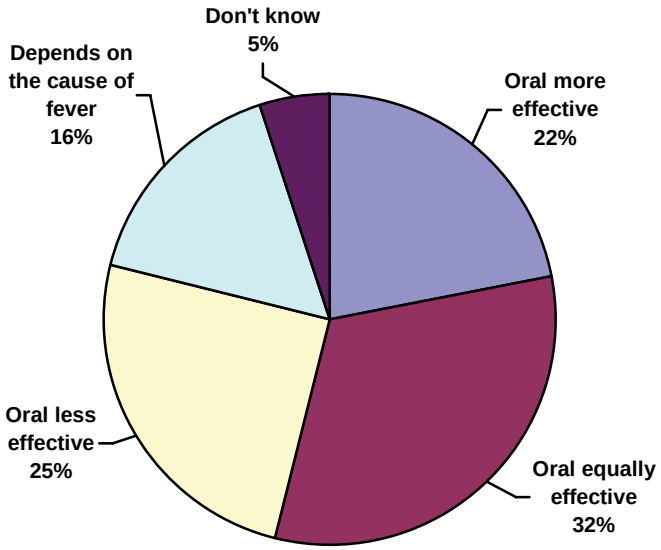


Providers were also asked to describe why they felt the way they felt on their risk of contracting infections.[25] Among those who said they were at lower-level of risk (not at all and a little perceived risk), 32 providers felt that they regularly took care of themselves when providing injection, and 9 said they regularly applied standard procedures. Among those who said they were at higher risk of getting infection, 31 providers felt that they were at higher level of risk by the nature of work and continuous exposure to infectious wastes. Similarly, 15 injection providers said that the fact that they were always busy put them at a higher risk; 8 providers cited lack of PPE, and 5 said lack of a proper waste disposal system. The remaining 17 gave other reasons.

Data collectors asked all of the 130 injection providers to respond, in their opinion, when treating a simple case of fever, whether medicine taken by mouth is more effective, just as effective as, or less effective than medicine taken by injection to assess their attitudes toward oral versus injectable medications. As shown below in Figure 10, just over half of the providers (54%) thought oral medication was equally or more effective type of treatment for a fever.

[25] Thirteen providers chose not to answer this question.

Figure 10: Providers' preference for type of treatment for treating patients with fever



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8. INTERVIEWS WITH SUPERVISORS OF INJECTION PROVIDERS

In the baseline, a total of 83 supervisors of injection providers were interviewed to obtain information on supervisors' perspectives on injection safety issues; 28 supervisors (34%) were from hospitals, and 55 (66%) were from health centers; 81% of the supervisors worked in public facilities, and the rest worked in private facilities. In the follow-up survey, a total of 128 supervisors of injection providers were interviewed in this survey including 57 (45%) from health centers and 71 (56%) from hospitals; 112 supervisors, or 88% of those interviewed, worked in public/government health facilities and 16 (12%) were from private facilities.[26]

8.1 AVAILABILITY OF POLICIES AND GUIDELINES

The data collectors asked respondents whether they had a copy of the injection safety policy or work plan in the facility. Overall, at follow-up, of the 128 supervisors surveyed, only 2% (2 from hospitals and 1 from a lower-level facility) had a copy of an injection safety policy and the rest 91% did not and 7% didn't know. This remained unchanged from the baseline where 4% of supervisors reported having a copy of the injection safety policy; 88% of supervisors did not have it and the rest; 8% did not know. This is an area for improvement.

Of the surveyed supervisors, 19 (15%) (5 from lower-level facilities and 14 from hospitals) said that they had a copy of the guidelines or norms for injection safety, and 20% of supervisors (17 from hospitals and 8 from lower-level facilities) said that they had a copy of the guidelines for HCWM. The rest of those surveyed did not have either document (80% for injection safety guidelines and 77% for HCWM guidelines) or did not know (6% and 4%, respectively for each of the guidelines).

The percent of supervisors reporting injection safety guidelines at follow-up increased over baseline (11%), but this increase was not statistically significant. At baseline, 87% of supervisors reported not having a copy, and 2% did not know.

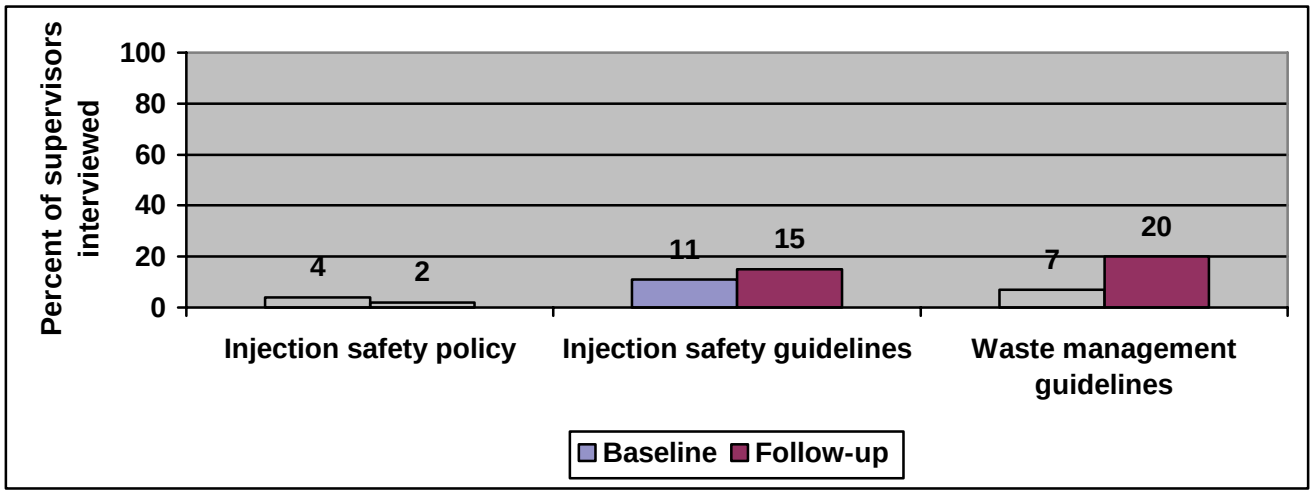
The percent of supervisors reporting HCWM guidelines almost tripled from baseline to follow-up (7% to 20%), and this increase was statistically significant ($p \leq .05$). At baseline, 88% of supervisors did not have these guidelines, and 5% did not know (Figure 11).

The number of supervisors who reported to have injection safety policy and guidelines/norms did not change significantly between the two time periods. However, the percent of actual facilities

[26] This section of the survey was intended to be administered to the supervisor of injections providers, but in cases where the supervisor was not available at the time of the study visit or in small facilities without a supervisor on site, the data collector was instructed to interview the injection provider as an alternate source of information.

with guidelines for waste management has shown statistically significant improvement from baseline to follow-up ($p \leq .05$).

Figure 11: Percent of supervisors reporting having a copy of policies and guidelines



8.2 STOCKOUTS OF SYRINGES AND SAFETY BOXES

The data collectors asked the supervisors whether they had a stockout of single-use disposable syringes or safety boxes in any ward they supervised during the six months prior to the survey. If they answered in the affirmative, the data collectors asked how long the stockout lasted.

At baseline, 84% reported no stockouts of syringes in the 6 months prior to the survey. Of the 11 supervisors who had a stockout, 1 supervisor said less than a week; 2 supervisors said over 3 months; 3 supervisors said over 1 month, and 7 supervisor said over 1 week but less than a month. At follow-up, of the 128 supervisors interviewed, 95% never had a stockout of syringes during this period; 4% didn't remember or didn't know.

The data collectors also asked the supervisors if they had been out of safety boxes in the 6 months prior to the survey. At baseline, 81% reported no stockouts of safety boxes in the 6 months prior to the survey; 4 supervisors (5%) did not remember. The length of the stockout varied from less than a week to over 3 months.

In the follow-up only, the data collectors asked the supervisors if they used safety boxes in the ward/unit that they supervised. Out of the 128 supervisors interviewed, 32% reported that they had never had safety boxes in the unit or department they were supervising. Among the facilities that reported never having had safety boxes, stockouts of safety boxes were also noted to be infrequent as stockouts of syringes; 98% of the 87 supervisors who said they never had had safety boxes reported that there were no stockouts of safety boxes in the 6 months before the time of the survey (48 from hospital and 37 from lower-level facilities).

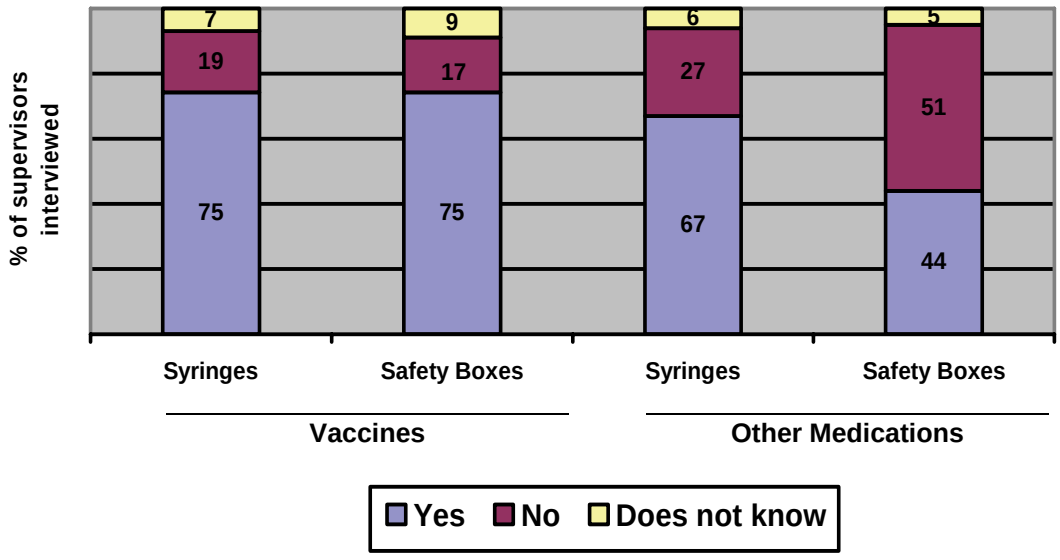
From the results of the interviews of the supervisors, it can be concluded that the supply of syringes and safety boxes has improved considerably and is a statistically significant increase.

8.3 DELIVERY OF VACCINES WITH CORRESPONDING QUANTITIES OF INJECTION EQUIPMENT AND SAFETY BOXES

Data collectors asked the supervisors whether the stock of vaccines were always delivered (or available) with appropriate (corresponding) quantities of injection equipment and safety boxes. For those supervisors for whom the question was applicable, 75% of the 59 supervisors at baseline said that the vaccines were delivered with the corresponding quantities of injection equipment, while 19% said they were not. The remaining 7% did not know; 75% also responded that the vaccines were always delivered with the adequate quantities of safety boxes, while 17% said they were not, and 9% did not know.[27]

At follow-up, 87% of the 69 supervisors responded that the vaccines were delivered with the corresponding quantities of injection equipment, while 9% said that the quantities were not adequate, and 4% did not know; 81% said that the quantities of safety boxes delivered were adequate; 15% said they were not adequate, and 4% did not know. Although at follow-up better results were showed in terms of the supply of injection equipment and safety boxes with vaccines, the increase was not statistically significant (Figures 12 and 13).

Figure 12: Vaccines and other medications delivered in quantities corresponding to the injection equipment and safety boxes at baseline



[27]Of the supervisors interviewed, 15% of the 72 supervisors at baseline and 46% of the 128 supervisors at follow-up claimed that the questions about vaccines were not applicable to the wards they oversaw. Thirteen supervisors at baseline did not respond to this question and were also excluded from this analysis.

8.4 DELIVERY OF OTHER MEDICATIONS WITH CORRESPONDING QUANTITIES OF INJECTION EQUIPMENT AND SAFETY BOXES

The supervisors were asked a similar question to check whether other injectable drugs were normally delivered with adequate quantities of syringes and safety boxes. Stocks of other injectable medications were delivered (or available) with the corresponding quantities of injection equipment according to 67% of the 76 supervisors interviewed at baseline, while 27% said they were not.[28] The remainder (6%) did not know.

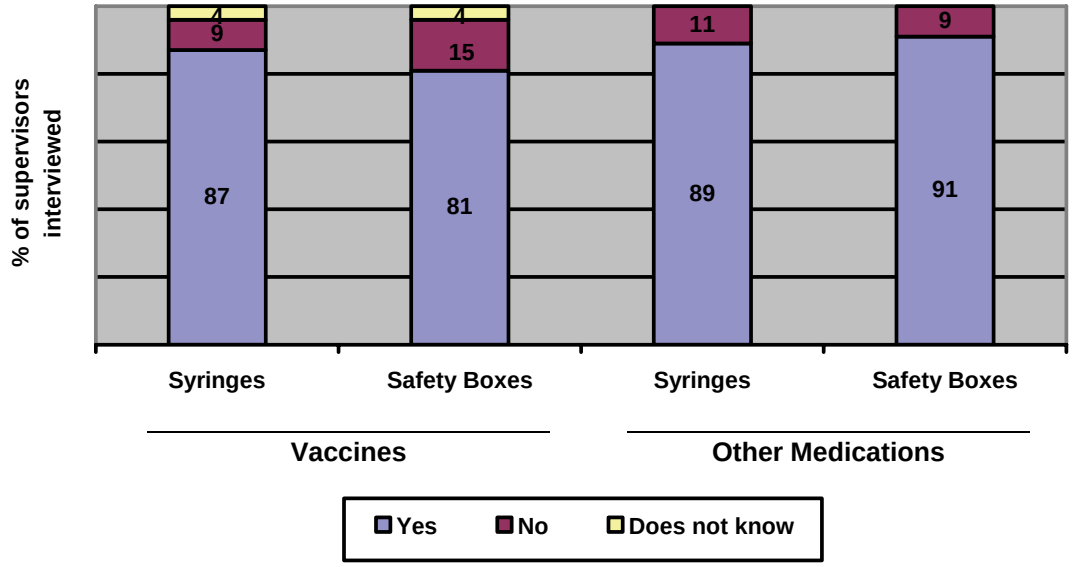
Out of 116 supervisors at follow-up for whom the question was applicable, 89% responded that stocks of other injectable medications were delivered (or available) with the corresponding quantities of injection equipment; 11% said that the quantities did not correspond, and no supervisor replied don't know. This was a significant improvement over the baseline finding ($p \leq .001$) (Figures 13).

In comparison with the delivery of the injection equipment, it was more common to find adequate quantities of safety boxes delivered with the stock of other injectable medications. Out of 82 supervisors at baseline for which the question was not applicable, 44% claimed that the delivery was adequate, while 51% said that it was not; 5% of supervisors did not know. In the follow-up, 91% of the supervisors interviewed declared that the quantities corresponded; 9% said they did not, and no supervisor replied don't know. This improvement from baseline to follow-up was statistically significant ($p < .001$) (Figures 12 and 13).

Overall, the supply/availability of injection equipment and safety boxes for curative injection services showed considerable improvement from the baseline, and the changes were statistically significant ($p < .001$).

[28] The information was not available for 6 supervisors at baseline and is excluded from this analysis. According to 1 supervisor at baseline, the question was not applicable. At follow-up, 12 the 128 supervisors said this was not applicable to the respective ward/unit they supervised.

Figure 13: Vaccines and other medications delivered in quantities corresponding to the injection equipment and safety boxes at follow-up



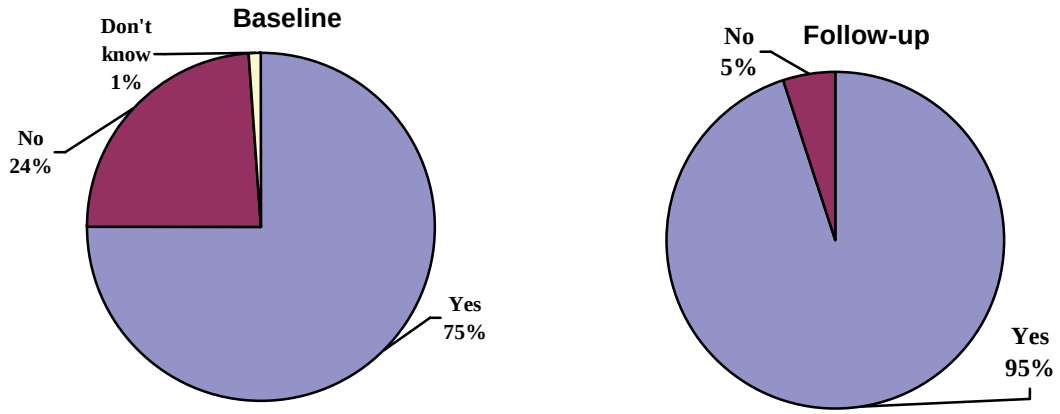
Overall, considering only the 66 supervisors with vaccination services in their health facilities and who could recall delivery information, the supervisors' general perception of the correspondence (or lack of correspondence) between the quantities of injection equipment delivered for vaccines and other medications, 83% of these supervisors thought that both quantities were adequate, compared to 44% at baseline. This improvement is statistically significant ($p<.001$). Similarly, 80% of the supervisors thought that the quantities of safety boxes were adequate for the vaccines and other medications compared to 46% of supervisors at baseline ($p<.001$).

8.5 SUPERVISORS' PERCEPTION OF THE QUANTITIES OF SYRINGES AND SAFETY BOXES FOR CURATIVE SERVICES

Data collectors asked the supervisors whether they thought the quantities of needles and syringes provided to them were adequate for the treatment services in their health facilities. Of the supervisors responding, 95% responded in the affirmative; 5% thought that they were not adequate. This was a significant increase from the baseline where only 75% of 83 supervisors felt that they were supplied with sufficient needles/syringes for the services they provide ($p<.001$)[29] (Figure 14).

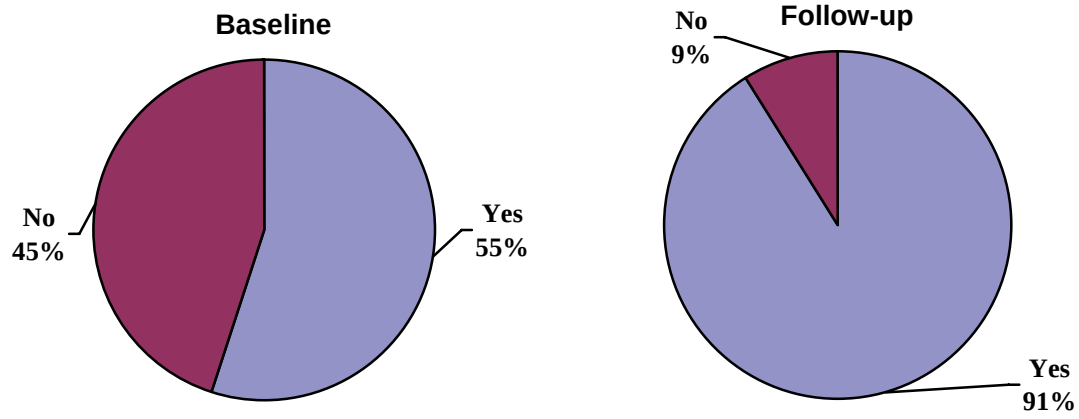
[29] Information was not available for six supervisors at baseline, and they are excluded from the analysis.

Figure 14: Supervisors' perception that the quantities of injection equipment were adequate for curative services they provide



As many as 91% the 128 supervisors interviewed also said that the quantities of safety boxes for curative services were adequate, while the remainder said they were not This was a significant increase from the baseline in which 55% felt that safety boxes were adequate for the services they provide (p<.001) (Figure 15).

Figure 15: Supervisors' perception that the quantities of safety boxes were adequate for curative services they provide



8.6 SUPERVISORS' REMINDERS ON INJECTION SAFETY

In the follow-up survey only, the data collectors also asked if the supervisors found that they needed to remind injection providers about injection safety. It is interesting to note that 95% of the 128 supervisors interviewed found that it was necessary to remind injection providers about injection safety. While 5% of the remaining supervisors said it was not necessary, 1 supervisor reported did not know.

Supervisors were also asked what were the most important things to remind injection providers to do. Table 19 provides a listing in order of frequency of these reminders. Note that because of multiple responses the sum exceeds 100%.

Table 19: What Supervisors Need to Remind Injection Providers to do

Reminders	N=122
Use new, sealed needle/syringe	54%
Wear gloves	48%
Do not recap needle	43%
Be careful of needlesticks	41%
Use clean table/tray	37%
Wash hands	36%
Immediately dispose of needles/use needle remover	36%
Do not overfill safety boxes	28%
Clean patient's skin	23%
Remove needle from cap of multidose vial	16%
Use clean barrier, if using ampoule	13%
Other: Use safety box	5%
Check dosage of medications	4%
Other: Report if problem happens	2%
Other: Don’t use soaked swab	1%

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9. INTERVIEWS OF WASTE HANDLERS

A total of 71 waste handlers were interviewed during this follow-up survey, i.e., one participant per health facility, and 68 waste handlers were interviewed during the baseline survey. When the surveyors found several waste handlers, they interviewed the main person responsible for waste management. Like other sections of the survey, 89% of the waste handlers interviewed during this survey were interviewed in public health facilities (63 people) in comparison with 3% in private facilities (2 people) and 9% in NGO health facilities (6 people). The baseline sample was a very similar profile with 81% of respondents from public facilities, 4% from private, and slightly more from NGOs, 15%. At follow-up, 20% of the waste handlers worked in hospitals and 81% in other health facilities compared to 24% at baseline from hospitals and 77% from other health facilities. For this section, given the small overall number of respondents, the results are not presented by facility type.

9.1 MAIN METHODS OF WASTE DISPOSAL USED

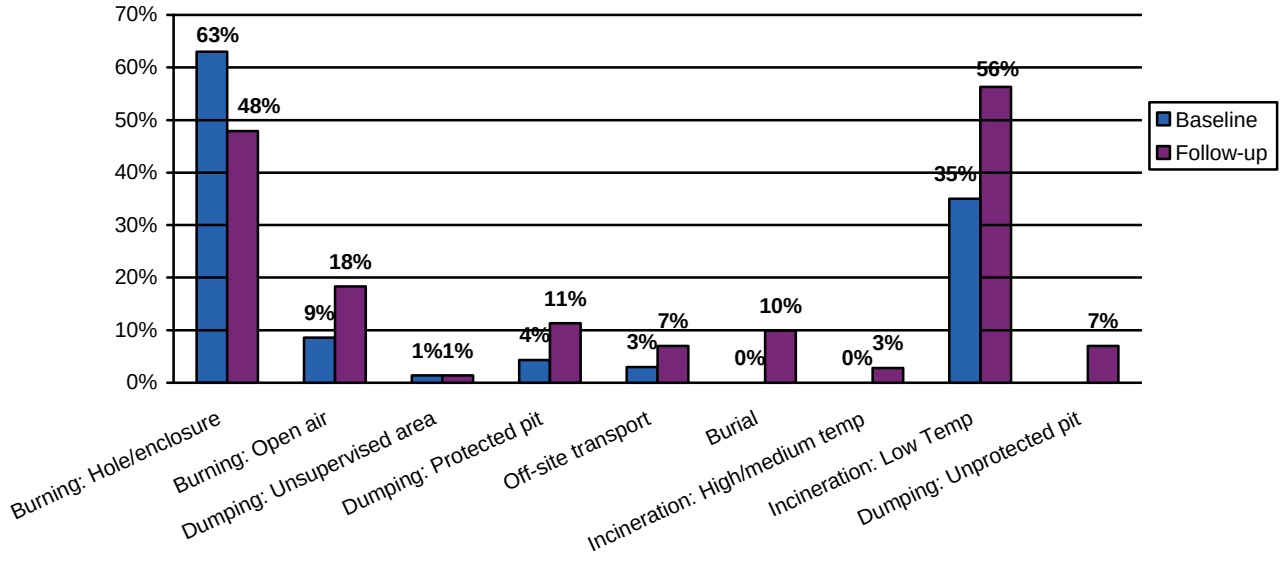
Data collectors asked the waste handlers to list the main disposal methods used for medical waste in their health facilities with individual questions about sharps waste, infectious waste, and noninfectious waste. Some waste handlers responded by citing several methods.[30]

The most common method of disposing of sharps waste was low-temperature incineration (as, for example, a single combustion chamber, "drum," or brick), which was mentioned by 56% of the waste handlers at follow-up, a significant increase from 35% at baseline ($p \leq .01$). The next most common method was open burning in hole/enclosure, which was mentioned by 48% of follow-up respondents, a significant decrease, however, from baseline, where the figure was 63% ($p \leq .05$). Open-air burning on the ground was mentioned by 18% of follow-up waste handlers and only 9% of those interviewed at baseline. Dumping in a protected/secured pit (with or without subsequent burning of the waste) was cited by 11% at follow-up and 4% at baseline, while burial was mentioned by 10% of the health facilities' waste handlers compared to none at baseline, a significant increase ($p < .01$). The overall results are presented in Figure 16.

In sum, the waste handlers reported using some of the preferred methods of medical sharps waste disposal like incineration, dumping in a protected pit, and transportation to off-site treatment area. Although not all satisfactory, the data show conditions have generally improved over time. On the other hand, inadvisable practices like open burning were reported with more frequency in the follow-up survey, so more work is left to be done.

[30] In case where several methods were mentioned, the sum of the results may exceed 100%.

Figure 16: Percentage of waste handlers who use different methods to dispose of sharps waste



The follow-up data showed slightly different results for disposal methods of **infectious** waste with the leading method of open burning in a hole or enclosure (44% of waste handlers interviewed at follow-up, a significant decline from 66% at baseline; $p \leq .05$). Low-temperature incineration followed as the second most common method, mentioned by 33.8% of waste handlers at follow-up compared to 30.9% at baseline. Other common methods included open-air burning on the ground (18.3% at follow-up, increasing from 8.6% at baseline), dumping in a latrine or other protected pit (12.7% at follow-up, up from 1.5% at baseline), and burial (11.3% at follow-up, up from 5.9% at baseline). Transportation for off-site processing and medium- or high-temperature incineration were each mentioned by 7% of waste handlers for their facilities compared to 0% for both types at baseline, both significant increases in use of this method. Dumping in an unprotected pit was mentioned by 5.6% of waste handlers at follow-up but was not asked about at baseline. Finally, dumping in an unsupervised area was mentioned by 2.8% at follow-up compared to 1.5% at baseline (Table 20).

Results for disposal of noninfectious waste at follow-up proved similar to those for infectious waste with no significant differences found over time. Open-air burning in a hole or enclosure was still the most common method mentioned (54.9%); followed by open burning on the ground (21.1%); low-temperature incineration (18.3%); dumping into unprotected pit (11.3%); dumping into a latrine or other protected pit (7%); burial, and transportation for off-site processing each mentioned by (5.6%); and medium or high-temperature incineration (2.8%). On a positive note, dumping in an unsupervised area was reduced to zero at follow-up.

Table 20: Common disposal methods of waste at baseline and follow-up

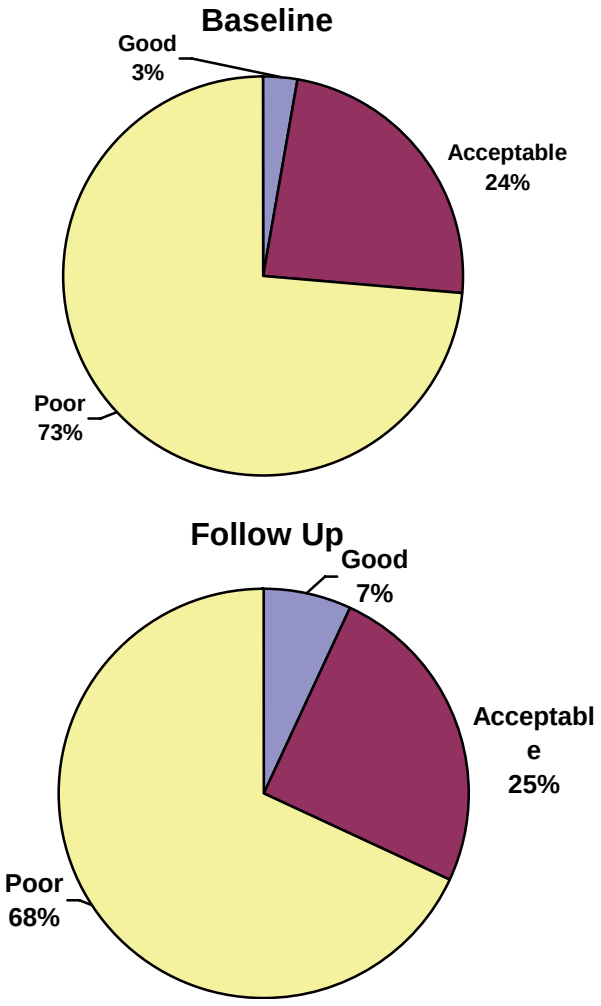
	Infectious waste		Noninfectious Waste	
	Baseline	Follow-up	Baseline	Follow-up
Burial	6%	11%	2%	6%
Dumping in a protected/secured pit	**2%**	**13%**	3%	7%
Dumping in a unprotected pit	-	6%	-	11%
Dumping in unsupervised area	2%	3%	3%	0%
Low temp incineration	31%	34%	25%	18%
Medium or high temp incineration	**0%**	**7%**	0%	3%
Open burning in hole/enclosure	**66%**	**44%**	68%	55%
Open burning on the ground	9%	18%	10%	21%
Transport to off-site treatment*	**0%**	**7%**	1.5%	5.6%

Bold numbers indicate statistically significant change over time ($p \leq .05$)

Low-temperature incineration, burning in a hole/enclosure, open-air burning on the ground, and dumping in a protected location were the most commonly used methods to manage all types of waste. Compared to the baseline finding, significant improvement in the use of low-temperature incineration for sharps waste was a positive result from the follow-up survey although medium to high-temperature incineration is a better method to use in general. On the contrary, the continued use of methods such as open burning on the ground, dumping in an unprotected pit or unsupervised area for sharp wastes and also other wastes is not ideal.

To summarize these results, all the particular methods could be grouped into three general categories of waste disposal: “Good,” “acceptable,” and “poor.” The “good disposal” category includes high or medium-temperature incineration, dumping into a latrine or other protected pit followed by burial, and/or transportation off-site for processing. Low-temperature incineration, on the other hand, is considered “acceptable” disposal. “Poor” disposal comprises the other less secure methods: Open-air burning on the ground or in a hole or enclosure, burial alone, and dumping into an unsupervised area or latrine or other location if this dumping is not followed by burial. When the overall results of the sharps waste disposal methods were calculated based on these 3 categories, the data from interviews of the waste handlers showed 68% poor compared to 74% at baseline, 25% acceptable compared to 24% at baseline, and 7% good compared to 3% at baseline (Figure 17). Although there was no significant difference from the baseline, there was a general trend of improvement as can be depicted in the figure below.

Figure 17: Overall summary of the distribution of health facilities surveyed according to the general categories of sharps waste disposal at baseline and follow-up



9.2 COMMON PROBLEMS WITH MEDICAL WASTE DISPOSAL

Data collectors asked the waste handlers what problems they encountered in disposal of medical waste. Almost half or 49% of waste handlers at follow-up responded by saying that they did not have any problems, similar to 47% with the same response at baseline. The most common problems spontaneously mentioned were as follows: Lack of incinerator (18% at follow-up compared to 16.2% at baseline); shortage of fuel (17% at follow-up, 16% at baseline); and shortage of PPE, specifically boots, gloves, goggles, and aprons (10% at follow-up only, not asked at baseline). While most of the problems cited at baseline still existed at the time of follow-up survey, a significant improvement was seen in those who reported a shortage of safety boxes, which fell from 15% at baseline to 0% at follow-up ($p \leq .05$). This was consistent with the low rate of stockouts of safety boxes reported in the other chapters of this survey. The overall results of the problems mentioned by the waste handlers are in Table 21.

Table 21: Problems encountered in waste management

	Baseline		Follow-up	
Problem	Percentage of all waste handlers interviewed who mentioned it	Number of waste handlers interviewed	Percentage of all waste handlers interviewed who mentioned it	Number of waste handlers interviewed
No problem	47	68	49	71
No incinerator	16		18	
Shortage of fuel	16		17	
Lack of PPE	-		10	
Unfilled safety boxes	3		4	
Falling boxes during transport	3		4	
Nonexistence of site for burial	2		3	
Shortage of safety boxes*	15		0	

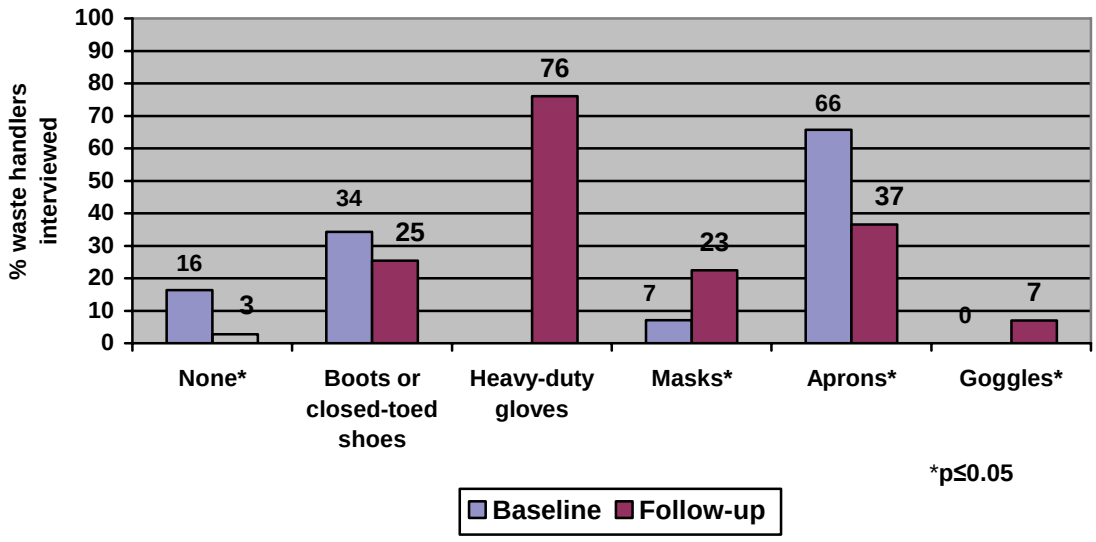
*p≤.05

9.3 AVAILABILITY OF PERSONAL PROTECTIVE EQUIPMENT

Data collectors also asked waste handlers about the availability of PPE such as closed-toed shoes or heavy-duty gloves. At follow-up, 59 respondents (83%) mentioned at least one type of PPE that was available in the health facility where they work and could protect them from accidental injuries by sharp objects. The other waste handlers only mentioned equipment that did not protect them such as lightweight (latex) gloves, gown, or they directly reported not having any protective equipment. The finding at baseline showed approximately the same number of waste handlers who reported having at least one article of PPE, but baseline data were not specific to type of glove (heavy-duty or lightweight).

The types of available equipment mentioned by 71 waste handlers at follow-up and 67 at baseline were the following: Boots or closed-toed shoes (25% follow-up, 34% baseline); masks (23% follow-up, 8% baseline); and heavy-duty gloves (76% follow-up, no baseline measure). Goggles were mentioned as protective equipment by 7% of waste handlers at follow-up and none at baseline, and aprons were mentioned by 37% of respondents at follow-up and 66% at baseline. These mixed results across time periods are displayed below in Figure 18.

Figure 18: Distribution of waste handlers according to the type of protective equipment available at the health facilities surveyed

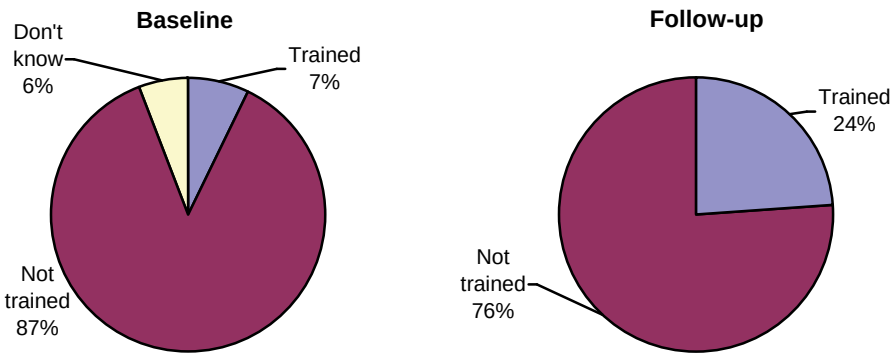


9.4 TRAINING OF WASTE HANDLERS

In the follow-up survey, 17 waste handlers interviewed (24%) declared having received training on sharps waste management such as low-risk techniques for handling safety boxes (Figure 19). Compared to the baseline, a statistically significant increase in the number of people who reported to have training on sharps waste management was noted as only 7% of the waste handlers reported having training at that time ($p<.01$). At follow-up, 10 of the 17 waste handlers reported going through training more than 6 months before the survey time, while 3 reported training less than 6 months ago from when survey was administered. The remaining 4 waste handlers could not remember when they went through training.

Additionally, data collectors in the follow-up survey asked all of the waste handlers where they had heard or seen anything about safe disposal practices. Only spontaneous responses were recorded, and multiple responses were accepted. The leading sources of information mentioned were other health staff/personnel (55%), in-service training (30%), supervisor (28%), and preservice training (20%). Other sources of information mentioned less frequently were radio (7%), television (7%), billboards/banners (4%), poster (4%), and brochure/booklet (1%). In addition, 6% of waste handlers could not remember or reported they had not heard about safe disposal practices anywhere.

Figure 19: Training of waste handlers at baseline and follow-up



9.5 ACCIDENTAL NEEDLESTICK INJURIES

The remaining results in this section are limited to a sample of 62 workers at follow-up and 59 at baseline who served only as waste handlers. At each time period, 9 people surveyed served as both injection providers and waste handlers in their facilities and are, therefore, not included in the following analyses.

Of waste handlers interviewed at follow-up, 45% of the 62 confirmed they **had** received an accidental needlestick injury during the 6 months preceding the survey. This is a significant increase from baseline where only 17% of 59 waste handlers surveyed reported receiving an accidental needlestick injury ($p \leq .05$). At follow-up, 27% of waste handlers declared that they had received 1 needlestick injury compared to 7% at baseline; 3% had 2 received needlestick injuries at both time periods, and a single waste handler in both periods had received 3 needlestick injuries. At baseline 2 waste handlers also reported 4 injuries, and 1 reported as many as 5 injuries; 2 waste handlers at follow-up (3%) could not remember the number of injuries they had received.

It should be noted that from this follow-up group 5 out of 14 waste handlers who were also trained in safe waste management techniques reported having at least 1 accidental needlestick injury injuries in the 6 months prior to this survey.

9.6 WASTE HANDLERS' KNOWLEDGE OF DISEASES TRANSMITTED BY NEEDLESTICK INJURIES

Of 62 waste handlers, 95% reported awareness of diseases that could be transmitted by accidental injuries with a contaminated needle or by reuse of a needle or syringe, similar to baseline where 100% reported awareness of such diseases.

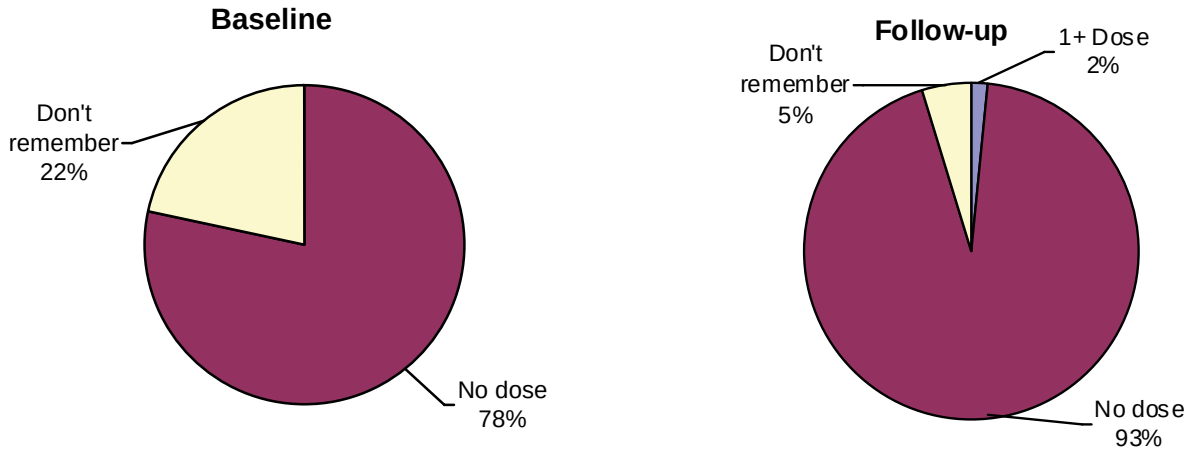
HIV/AIDS was the most frequently mentioned disease at follow-up with 92% of respondents; though, this was a significant decrease from 100% who mentioned HIV at baseline ($p \leq .05$). Hepatitis B was mentioned by 8% of all waste handlers surveyed at follow-up, a significant

increase from baseline where no waste handler mentioned this disease ($p \leq .05$). Further, 3% of follow-up waste handlers mentioned hepatitis C compared to none at baseline. Therefore, the number of waste handlers who recognized hepatitis B and hepatitis C showed a small positive change over time, but fewer waste handlers knew about HIV/AIDS at follow-up even though generally awareness was still high. Several waste handlers at both time periods also cited other diseases including tetanus, STI, and tuberculosis.

9.7 HEPATITIS B VACCINATION OF WASTE HANDLERS

Among the 62 waste handlers surveyed at follow-up, only 1 (1.6%) reported received the hepatitis B vaccination, and 93.5% were not vaccinated against hepatitis B. Although none of the waste handlers interviewed at baseline was vaccinated, it cannot be said that any real change was detected over time. At follow-up, 5% of waste handlers compared to 22% at baseline did not know if they were vaccinated (Figure 20). Despite greater knowledge of their status, the follow-up waste handler who had received the hepatitis B vaccination only received 2 doses instead of the full 3-doses course. Thus, no waste handlers surveyed was completely protected at the time of the survey.

Figure 20: Waste handlers who declared having received the hepatitis B vaccine at baseline and follow-up



9.8 PERCEPTION OF RISK

Among the 62 waste handlers at follow-up, only 2 (3%) felt that they were not at any risk of contracting an infection from injection waste. On the other hand, 66% reported that they felt very much at risk. Another 16% of the waste handlers stated they felt somewhat at risk, and 15% perceived a small amount of risk for contracting an infection from injection waste.

When these waste handlers were asked to describe why they felt that way, most of those who felt little or no risk of contracting infection cited working with due care because of fear of

transmissible diseases. Those who reported feeling somewhat at risk thought so because of the highly infectious waste they were dealing with and felt that the risk was higher especially when they were busy.

Waste handlers who said they felt very much at risk mentioned several reasons: High prevalence of HIV in the community, lack of knowledge/training, negligence of health professionals in disposing medical waste (dropping needles, ampoules, and other medical equipment everywhere inside the facility), and poor quality PPE (e.g., leaking gloves).

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10. EXIT INTERVIEWS WITH PATIENTS

At baseline, 273 patients who had received an injection on the day of the survey (or, in the case of children, the people who accompanied them) were interviewed leaving the health facility. At baseline, 40% of the interviews (108) took place in hospitals and 60% (165) took place in lower-level facilities. In the follow-up survey, 372 people were interviewed leaving health facilities. Almost half or 48% of the interviews (178) took place in hospitals in comparison with 52% (194) in lower-level health facilities. Table 22 presents the distribution of the sampling by district for both baseline and follow-up.

Table 22: Distribution of the sampling of patients by district at baseline and follow-up

	seline		Follow-up	
	Percentage	Number of Patients Interviewed	Percentage	Number of Patients Interviewed
District				
Amhara	35	273	41	372
Dire Dawa	14		9	
Harari	20		16	
Tigray	32		33	

10.1 SOCIODEMOGRAPHIC CHARACTERISTICS OF THE PATIENTS

The data collectors asked the adult patients interviewed whether they were between the ages of 18 and 49.[31] At follow-up, of the patients interviewed who had received an injection on the day of the survey, 97% were between 18 to 49 years of age, while at baseline 88% were of reproductive age. Overall, 60% of patients that were of reproductive age interviewed were women compared to 68% at baseline; 40% were male at follow-up compared to 32% at baseline (Table 23).

[31] This is the reproductive age group used by the projects funded by PEPFAR.

Table 23: Sociodemographic characteristics of the adult patients interviewed

Characteristics	Baseline		Follow-up	
	Percentage	Number of Patients Interviewed	Percentage	Number of Patients Interviewed
Age of the adult patients interviewed				
18 to 49 years of age	88%	200	97%	372
Others	12%		3%	
Gender of the patients interviewed[32]				
Male	32%	176	40%	362
Female	68%		60%	

10.2 PATIENTS' KNOWLEDGE OF THE AVAILABILITY OF NEW NEEDLES AND SYRINGES IN THE COMMUNITY

The data collectors began the interview by asking the patients whether they knew if it was possible to obtain needles and syringes in new, sealed packages outside of the health facilities and private pharmacies. Of patients interviewed, 41% of the 273 at baseline reported that it was possible; 36% responded that it was not, and 24% did not know. In the follow-up, of the 372 patients interviewed, 62% answered in the affirmative; 24% responded that it was not, and 13% did not know. This increase in the follow-up was statistically significant ($p<.001$).

10.3 SOURCE OF THE INJECTION EQUIPMENT USED ON THE DAY OF THE SURVEY

Data collectors asked the respondents about the source of the injection device that had been used for the injection received on the day of the survey. At baseline, 21% of the patients reported bringing their own equipment for the injection administered to them on the day of the survey. At follow-up, this statistically increased to 48% of the patients interviewed ($p<.001$). In the follow-up, among the 180 patients who reported to had brought their own needle/syringe, 40% were from hospitals, while the rest were from lower-level health facilities.

The patients were also asked about the source of the equipment. At baseline, 58 patients bought their own injection equipment for the injection they had received on the day of the survey; all but 2 patients brought new, unopened packet. Out of the 215 patients who did not bring their own injection equipment, 97% were from a new, unopened packet. Of the 6 that were not, one of them was from a pot of water and the five 5 others were described as "loose and already open."

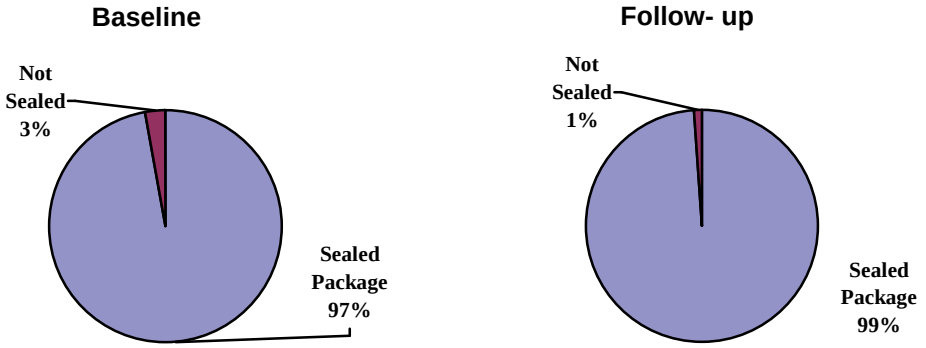
In the follow-up only, out of the 180 who bought their own injection equipment, 90% mentioned that they received the syringe and needle from within the health facility (facility pharmacy), and the remaining 10% brought syringe and needle from outside the health facility (various sources). All but 1 of the patients who had brought their own injection equipment responded that it had come from a new package.

[32] Data on gender in this table are limited to the adults who received injections.

For the 187 patients who did not bring injection equipment (i.e., the equipment used belonged to the health facility) and in which data were recorded, 80% declared that the needle and syringe used for the injection that they had just received on the day of the survey were taken from a sealed package;[33] 2% claimed that the injection equipment was already open or detached. The other 18% did not know. All 4 patients who said that the equipment was already open were patients in hospitals.

Thus, at follow-up, 90% of all the patients interviewed reported that the needle and syringe used for the injection they had just received were taken from a sealed package, and 1% said the needle and syringe used for the injection were not. The remaining 9% did not know, and there was no documented information for the rest of the patients (5 patients). While this appear to be a reduction from baseline where 97% of the patients reported that the injection they had just received was with a new needle and syringe, this difference can be attributed to the relatively high percentage of respondents (9% or 33 people) in the follow-up who did not know whether they received injection using a syringe and needle from a new unopened pack. When considering only the patients who knew the origin of the syringe used to administer their injection, 99% responded that the syringe came from a closed, new package (Figure 21).

Figure 21: Patients' recall of where injection equipment originated at baseline and follow-up

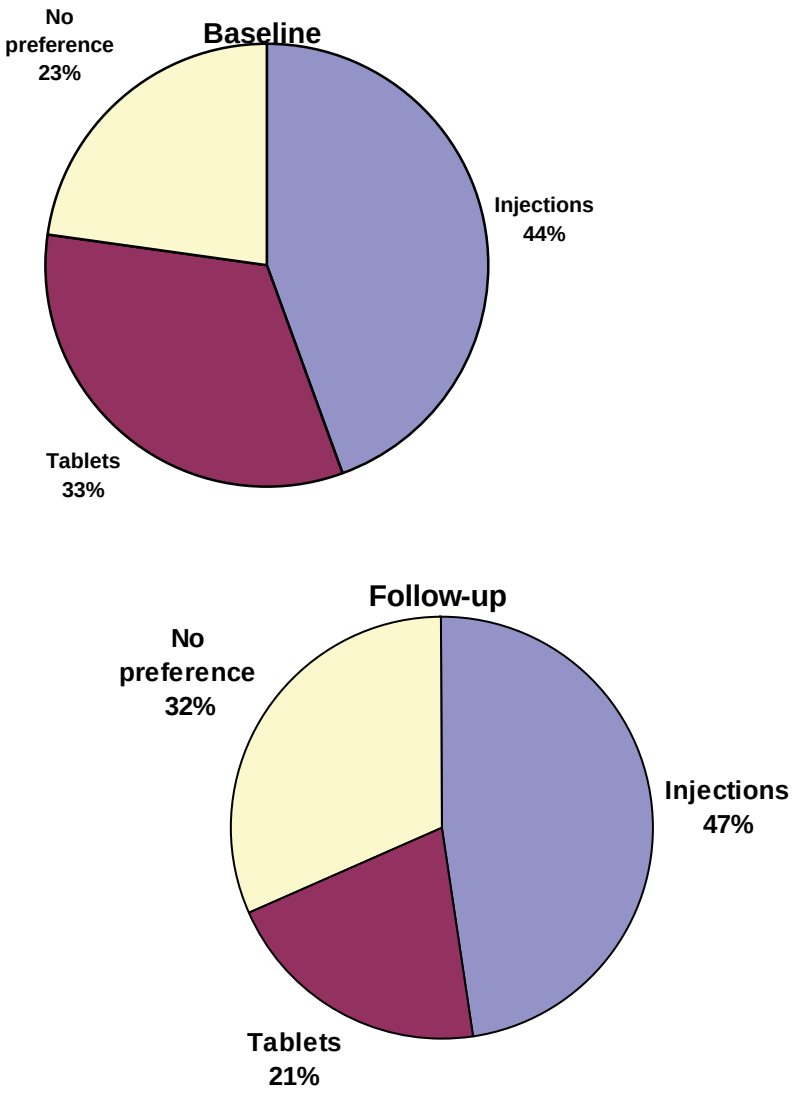


10.4 PATIENTS' ATTITUDES ABOUT INJECTIONS

With regard to the preference of an administration route for medication (injection or tablet), when the patient or someone in their family has a fever, 45% of the 267 patients who responded preferred injections, and 33% of patients preferred tablets. The rest of the patients (23%) did not have a preference. At follow-up, 21% of all patients interviewed declared that they preferred tablets, and 47% declared that they preferred injections. The rest of the patients (32%) did not express a preference. It should be noted that the preference for injections did not decrease in the follow-up (Figure 22).

[33] Five patients at follow-up who did not respond to this question are excluded from this analysis.

Figure 22: Preferences Expressed by Patients Regarding Formulations of Medications at Baseline and Follow-up



At follow-up only, data collectors asked the patients the reasons for their preference. Among all these patients, the ones who mentioned advantages of injections talked about faster action (47%), better/stronger (47%), know/can feel it working (15%), and shorter treatment (11%). Other patients mentioned problems with tablets: Pills are hard to swallow (21%), pills taste bad (10%), pills are likely to be forgotten (3%), and pills cause stomach ulcer (2%). One patient each reported that pills change skin color, and they would likely to forget the expiry date on pills.

The 78 patients who declared having a preference for tables mentioned the following: Don't like injections (68%), know/can feel it working (15%), it is better/stronger (10%), faster action (5%), and shorter treatment (4%). One person mentioned that pills are easy to swallow.

10.5 SOURCE OF INFORMATION ABOUT INJECTION SAFETY

At follow-up only, all the 372 patients surveyed were asked whether they had heard or seen any information about injections or syringes/needles in the 6 months preceding to the survey. A quarter of them (25% or 94 patients) responded positively. The rest, 66%, reported not to have heard or seen, and 9% couldn't remember or did not know. The data collectors also asked the 94 patients who had heard or seen something about the specific messages they recalled. Except for 2 patients, all patients mentioned at least 1 idea. Results are reported as a proportion of all patients interviewed: Unsafe injections can transmit HIV/AIDS/HBV/HCV (18%); safer injection (9%); use/ask for a new needle/syringe every time you need an injection (6%); go only to a trained provider (3%); injection waste is dangerous/stay away from injection waste/keep children away from medical waste (2%); orals/pills are as effective as injections (1%); orals/pills are less expensive than injections (1%); and trust the doctor/do what the doctor says (1%). One patient responded did not know/did not remember.

As an extension to the question on information or idea heard or seen about injections or syringes/needles, data collectors asked the 94 respondents about the source of the information they could recall. Again, results are reported as a proportion of all patients interviewed. Aside from 2 patients who could not remember, all the other patients could mention at least 1 source of information. The majority of patients mentioned health staff/personnel (20%), which was followed by friends/neighbors/relatives (10%), radio (5%), television (4%), pharmacy/drug store and school (each 2%), and political leader/community leader (1%). Two patients mentioned each of the following: Women's group and newspaper/magazine. One patient mentioned each of the following: Church/mosque, drama group/road show, poster, and booklet/brochure.

All of the 372 injection recipients were asked to describe, in their opinion, a "safe injection." Among the respondents, 43 (12%) did not know what it meant, and the rest could mention at least 1 way to describe a safe injection. Closed/new package of needle and syringe was the most frequently cited description (59%); followed by an injection that does not harm the patient, the provider, and the community (27%); and an injection given by a trained/professional provider (25%). Other descriptions were mentioned by less than 10% of the patients like no reaction/side effects (7%), provider wears gloves (6%), and injection site cleaned (4%).

Similarly, data collectors asked all the respondents to mention anything that the interviewee could do to help make sure that they or their family received safe injections. Among the 372 patients interviewed, 12% replied don't know, and the rest could mention at least 1 thing to do. Hence, 59% said make sure needle and syringe come from a new/sealed package, and 42% suggested to go only to a trained/professional provider. While 17% of patients suggested bringing own needle/syringe, 5% of patients said there was nothing that could be done.

Finally, all patients were asked to mention anything that they or their families could do to avoid getting stuck by used needles/syringes. While 4% of the 372 respondents did not know anything that could be done and 2% said nothing could be done, the rest were able to forward at least 1 suggestion: Do not touch/pick up any needles/syringes (66%); dispose of needles/syringes in pit/latrine/dispose of them safely (45%); tell children to stay away (35%); burn them (23%); don't bring used needles home (10%); wear shoes (6%); and do not use injections/use orals (5%).

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11. CONCLUSIONS

The preceding chapters presented the results of a comparison from baseline to follow-up of key indicators for injection safety. These results show improvements in the health facilities receiving the MMIS interventions between the baseline and the follow-up study periods on many key injection safety indicators. Additionally, some indicators that were already found high to begin with at baseline were successfully maintained at the same level during the intervention period. In comparison with the presentation of results in the body of this report (i.e., Chapters 4 to 10), this chapter emphasizes what remains to be done; in other words, what is still lacking in the health care system in Ethiopia with regard to specific variables, which affect each target population studied in this survey.

The results of this survey revealed statistically significant improvement in waste management guidelines, stockout of safety boxes, and immediate disposal of sharps, and some improvements in safe injection practice as compared to the baseline situation. However, it strongly indicated the need for continued work in the areas of availability of safe injection guideline or job aids, disposal of waste inside and outside the facility, as well as infectious wastes, and final disposal of sharps waste (Table 24).

Table 24: Common risk factors for health care workers and patients

	Risk Factors	Baseline Result (%)	Follow-up Result (%)
1	Safe injection guidelines or job aids	11% of supervisors	15% of supervisors
2	Waste management guidelines or job aids*	7% of supervisors	20% of supervisors
3	Stockouts and/or nonexistence of a stock of safety boxes*	10% of providers	20% of providers
4	Safety boxes in each location where injections are administered*	74% of facilities	94% of facilities
5	Immediate disposal of used sharps*	70% of injection observations	78% of injection observations
6	Satisfactory disposal of waste inside or outside the facility	36% of facilities	50% of facilities
7	Facilities with no infectious waste lying around inside or outside the facility	76% of facilities	76% of facilities
8	Poor methods for final disposal of sharps waste	74% of facilities	68% of facilities

* $p \leq .05$

Once an injection has been administered, the used needle and syringe present a major risk for the transmission of blood-borne pathogens such as HIV, HBV, or HBC. This study revealed that the practices of health care personnel and the lack of safe methods for disposal of used needles and syringes had improved from the baseline condition. However, still there are conditions in which injection providers, waste handlers, patients, or other members of the community are exposed to the risk of injuries from sharps that are tainted and improperly discarded.

This survey showed some signs of improvements from the time of the baseline survey in the factors that contribute to the risk of accidental needlestick injuries and the transmission of blood-

borne pathogens to all the target populations (i.e., health care personnel and patients) such as the absence of a sharps box within arm's reach of the injection provider in each location where injections are administered; inappropriate practices for disposal of contaminated sharps if they are not placed directly in a safety box or sharps container immediately after the injection; and all other inappropriate practices for medical waste disposal inside or outside the health facility (such as syringes and other loose sharps or open, overflowing, or pierced safety boxes). Yet, all these problems are not fully solved; and, hence, the remaining inappropriate practice could increase risks of injuries from used and potentially infectious sharps waste.

In addition to this possibility of transmitting a blood-borne pathogen through used needles and syringes, it is also important to consider the risk associated with the safe disposal of other infectious material, which has not improved from the situation at baseline. It is for this reason that all types of infectious waste in a health facility pose a risk to the health care personnel, patients, and other people using or visiting the health facility.

For injection providers and waste handlers, an injection safety policy and norms and guidelines on HCWM are key documents, which establish standards and norms for behaviors and actions that minimize the risk of a needlestick injury.

Even though marked improvement was observed in the availability of most of the appropriate equipment for injection safety, most of the health facilities did not have the documents related to injection safety or waste management at the time of the survey, and this is a factor that increases the risk to health care personnel. Similarly, the lack of a reminder or job aids in some of the facilities is a missed opportunity to remind patients of the desired injection safety practices.

Table 25 presents a summary of the results of this survey in relation to these risk factors. These data show that 15% of the supervisors interviewed had injection safety guidelines at the time of the follow survey. Similarly, only 20% of the supervisors had waste management guidelines. It should be noted, however, that there is no stand alone injection safety guideline in Ethiopia. Rather, the safety guideline is included in the IPC guideline that the Ethiopia MOH was finalizing. Waste management guidelines have also been delayed by the MOH for a long time. Recently, the MOH finalized both of these documents, which will need to be distributed to all health facilities.

While safety boxes were available in 94% of the facilities where injections were provided, 20% of the providers interviewed reported a lack of safety boxes and/or stockouts at their facilities. The lack of immediate disposal of used sharps contributed to a situation in which the disposal of waste inside or outside the facility was deemed unsatisfactory in approximately 50% of the facilities surveyed. The survey also revealed that only 14% of the facilities also had infectious waste lying around inside or outside the facility. Finally, the absence of safe methods of final disposal for sharps (i.e., "good" and "acceptable" methods such as incineration, transportation for off-site processing, and dumping into a latrine or other protected pit followed by burial) affected almost three-quarters of the health facilities surveyed. These above results indicate the need for further work focusing on disposal methods of sharps and infectious waste inside and outside facilities and increasing the availability of good final disposal methods.

Table 25: Risk factors specific to injection providers

	Risk Factors	Baseline Result (%)	Follow-up Result (%)
1	Training on injection safety*	24% of injection providers	58% of injection providers
2	Recapped needles (excluding all diagnostic procedures)*	27% of all injections observed	2% of injections observed
3	Absence of hepatitis B vaccination (no dose)	96% of injection providers	89% of injection providers

* p≤.05

As shown in Table 25, there are risk factors specific to injection providers such as a lack of training, recapping needles, and lack of hepatitis B vaccinations. Although the survey findings are encouraging as 58% of providers reporting received injection safety training in the follow-up survey compared with only 24% at baseline, many health worked remained untrained. Additionally, issues of high turnover of trained workers at facilities continue to be an ongoing issue. There has also been remarkable improvement in recapping of used needles, a practice that is considered most dangerous for needlestick injury among injection providers. Recapping was seen in only 2% of the injections observed during follow-up compared with 27% in the baseline. There is only slight improvement in the absence of the hepatitis B vaccination, which needs urgent attention particularly given the fact that this survey showed that providers continue to have accidental needlestick injuries.

Just as with injection service providers, there are risk factors specific to waste handlers such as a lack of training and lack of hepatitis B vaccinations. In addition, the lack of PPE such as heavy-duty gloves or boots or closed-toed shoes (for those working in health facilities where there are loose sharps) as well as waste that can contain used sharps (in the case where safety boxes are not used or waste is not segregated) pose a risk to health care waste handlers.

Table 26: Risk factors specific to waste handlers

	Risk Factors	Baseline Result of the Survey (%)	Follow-up Result of the Survey (%)
1	Lack of training on safe HCWM*	93% of waste handlers	76%
2	Absence of hepatitis B vaccine (no dose)	100% of waste handlers	98%
3	Availability of PPE: Boots/Closed-toed shoes Heavy-duty Gloves Boots and Heavy-duty Gloves (Minimum PPE)	 34% of waste handlers ---------- ----------	 25% of waste handlers 76% of waste handlers 20% of waste handlers
4	Segregation of Waste*	25% of facilities	46% of facilities

* p≤.05

Table 26 presents a summary of the results of this survey related to the factors that affect waste handlers. This data show that many more waste handlers remained untrained (76%) compared with what was found in waste handlers at baseline (76%). There was almost no improvement in hepatitis B vaccination status among waste handlers; i.e., only 2% have received any doses of the hepatitis B vaccine in follow-up compared with none in baseline; 80% of waste handlers did not

have the basic minimum PPE (boots/closed-toed shoes and heavy-duty gloves). In addition to the absence of PPE, there were cases of waste handlers with equipment who did not use their equipment. While some improvement in waste segregation has been made, there is still a long way to go with this practice.

From the perspective of patients who receives an injection, the lack of key IPC practices contributes to the risk of patients being infected with HIV or hepatitis. Some examples of these key practices are hand washing by the injection providers and preparing the injection on a clean working surface or tray where contamination of the injection device by blood, dirty swabs, or other biological waste would be unlikely.

The presence of materials for BCC on subjects that emphasize injection safety such as, for example, the importance of using a new needle and syringe for each injection regardless of the source, the importance of not touching used syringes, and the promotion of oral medications as alternatives to injectables could contribute to reducing the risks to patients of being contaminated by a pathogenic agent, while their absence contributes to increasing these risks. In parallel, the lack of interpersonal communications between injection providers and patients represents a missed opportunity to reinforce the key messages.

Table 27: Risk factors related to patients and visitors at health facilities

	Risk Factors	Baseline Result (%)	Follow-up Result (%)
1	Use of a new needle and syringe from a sterile, sealed package for the injection	98% of injections observations	96% of injections observations
2	Use of a new needle and syringe from a sterile, sealed package to reconstitute a medication	80% of injections observations	87% of injections observations
3	Stockouts of new needles and syringes*	18% of injection providers	2% of injection provider
4	Hand washing prior to administering an injection*	4% of injection observations	82% of injection observations
5	Clean worktable or tray to prepare injections*	68% of injection observations	81% of injections

* $p \leq .05$

Table 27 presents a summary of the results of this survey related to patients and other members of the community. This data show that using a new needle and syringe from a sterile, sealed package was found very high even in baseline (98%) and was well-maintained (96%) at the follow-up. There is still room for improvement when examining use of new syringe for reconstitution of a medication. Reported stockouts of new needles and syringes improved from 18% at baseline to only 2% at follow-up, but it must be recognized that any stockout could be problem and could cause reuse of syringe and needle. Other infection prevention practices such as hand washing practice showed a remarkable improvement; hand washing showed improvement to in 82% at survey compared with only 4% at baseline. Also, the use of a clean worktable or tray on which to prepare injections showed noted improved to 81% in follow-up compared with only 68% in baseline.

12. RECOMMENDATIONS

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

Strengthening Stock and Commodity Management at Different Levels

Despite the remarkable increase in the supply of injection equipment and safety boxes, the management of these items was found to be very poor and would benefit from direct and specific technical assistance to address this issue. Stock management is a particular issue for materials that were donated as opposed to materials obtained through a more routine system. Appropriate stock management needs to be addressed at staff trainings but also at administration and policy level. The importance of using a system to monitor stocks of injection equipment and safety boxes and, thereby, controlling/supervising the central stores that regularly use management tools should be emphasized. Strengthening and integrating the supportive supervision should also be considered (e.g., supervising the stock management system of infection prevention materials when supervising for antiretroviral drugs). Technical assistance should also be provided to include injection commodities as the government of Ethiopia implements a logistics management information system in the upcoming year.

Necessary support to the RDF pharmacies should continue, which includes ensuring that proper injection equipment is appropriately maintained at each site.

Increasing Community Awareness on Safe Injections

Providers and patients alike should continue to be educated regarding the use of only new injection equipment regardless of its source (i.e., provided or obtained from the health facility or brought).

Behavior change efforts directed to patients and the community to motivate them to address their high demand of injection by focusing on increasing the acceptance of oral medications should be encouraged. Suggested approaches include

- Improving the capacity of health providers to communicate interpersonally with patients about issues surrounding injection safety,
- Play TV/radio materials at health facilities for patient and visitors in waiting rooms,
- Broadcast TV and/or radio materials on air or use other channels such as video vans and video “houses” in the community, etc.

Designing a Sustainable Capacity-Building Strategy

The study found that the number of people who reported having received injection safety or infection prevention trainings to be low. This could be attributed to the high turnover and attrition of trained health staff in Ethiopia. High turnover and attrition are plaguing the health care system in Ethiopia. To have a more sustainable solution to this issue, it would be more effective if newcomers are regularly trained on the job by their supervisors. More important, providers, supervisors and waste handlers should receive injection safety as preservice training. This includes integrating injection safety including HCWM into preservice curriculum and training. In addition, supervision visits serve as both an opportunity to monitor practices and provide useful feedback and encouragement to health providers to regarding a variety of issues regarding injection safety among other things. Additional capacity to conduct regular support supervision visits is needed.

Waste handlers, in particular, should be targeted as their training figures are particularly low.

Improve Health Workers Safety

The availability and use of injection safety and waste disposal policies/guidelines and job aids should be promoted through distribution of relevant documents and encouragement of the infection prevention committees of each facility.

Full protection of injection providers from the HBV infection was found to be very low even though the level of awareness about the risk of contracting it from unsafe injection practices reported by injection providers was higher in the follow-up study. Thus, the availability of such vaccines to health workers and waste handlers should be facilitated and addressed at the national level.

Equipping health workers with appropriate skills in injection administration and provision of proper sharps containers for immediate safe disposal of the used sharps reduces the prevalence of needlestick injuries. Exposure to sharps by other means, however, could continue to be a problem. Health unit managers should continuously assess circumstances leading to needlestick injuries with the aim of identifying the persisting risk factors, and immediate supervisors should continue to discourage two-handed recapping and, rather, promote one-handed recapping when necessary to reduce needlestick injuries.

In addition, providing sufficient supplies and equipment should help health workers improve practices and feel less at risk of contracting infections on the job. The distribution of PPE especially heavy-duty gloves and boots and other HCWM materials such as bin liners and safety boxes is of the upmost importance.

Mobilize Resources to Improve HCWM

Most of the facilities were using poor method for final waste disposal. There is urgent need for health facilities to secure a proper final waste disposal system. A thorough assessment of the major hindrances to appropriate final waste management should be conducted by each facility and an action plan and resources put in place based on those results.

Ownership of Programs

Organizations working on infection prevention should give injection safety including waste management due consideration to the ownership of the program by the respective facility directors and administrators so as to get maximum enforcement for the implementation of the standard precautions until they become normal duties, which every health worker or waste handler will do by default.

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