EVALUATION OF INJECTION SAFETY AND HEALTH CARE WASTE MANAGEMENT IN MMIS EXPANSION AREAS IN MOZAMBIQUE

2009 FINAL REPORT

SEPTEMBER 2009

This publication was produced for review by the United States Agency for International Development. It was prepared by the Making Medical Injections Safer (MMIS) project.

Acknowledgements

The MMIS team is grateful to the Ministry of Health for their permission and cooperation during the time of data collection exercise and to the management of the health centers involved in this assessment for allowing the data collectors access to their facilities and staff. Special thanks go to the MMIS/Mozambique team under the leadership of Dr. Americo Ubisse, MMIS/Mozambique Country Director, for their participation in training, supervision, and logistical coordination. Special thanks to the local consultants who served as study coordinators – Mr. Jorge Bardalez at baseline and Ms. Meldina Valente at follow up – and to the teams of data collectors. Ms. Karen Van Roekel, Senior Monitoring and Evaluation Advisor served as Principal Investigator for this study while other staff from MMIS/HQ including Mr. Ethan Collins, JSI Monitoring and Evaluation Advisor, for overall support for training for the follow up survey, Ms. Evis Haake, MMIS Project Coordinator, participated in writing this report and Dr. Iqbal Hossain, MMIS Technical Officer, participated in the technical review.

MMIS thanks USAID and the President's Emergency Plan for Aids Relief (PEPFAR) whose financial support has made the survey and the MMIS interventions in Mozambique possible.

This study would not have been complete without the participants who provided the information upon which the report is based. Our gratitude goes to all the providers, supervisors, waste handlers and patients who agreed to be interviewed for this survey.

EVALUATION OF INJECTION SAFETY AND HEALTH CARE WASTE MANAGEMENT IN MMIS EXPANSION AREAS IN MOZAMBIQUE

2009 FINAL REPORT

Abstract: The United States President's Emergency Plan for AIDS Relief (PEPFAR), through the US Agency for International Development, has funded JSI for the implementation of the Making Medical Injections Safer (MMIS) project on injection safety in Mozambique. JSI and its partners are responsible for implementing other similar projects in 10 other countries in Africa and the Caribbean. This report compares the results of the baseline and follow up surveys on the status of injection safety and health care waste management, which took place during the month November 2005 and 2008 respectively in the provinces of Gaza and Nampula.

Recommended citation: K. Van Roekel and E. Farka Haake. Evaluation of Injection Safety and Health Care Waste Management in Mozambique: 2009 Final Report, May 2009 edition. MMIS for the Office of the Global AIDS Coordinator, and the Department of Health and Human Services.

Development of this publication was supported by USAID, contract # GSA-GS-10F-0453. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of OGAC or USAID.

The Making Medical Injections Safer (MMIS) project is a five-year initiative funded by the President's Emergency Plan for AIDS Relief through the US Agency for International Development. Financial support was provided through contract # GHS-I-00-03-0026-00.

Making Medical Injections Safer is implemented by JSI Research & Training Institute, Inc. in collaboration with the Program for Appropriate Technology in Health (PATH), the Academy for Educational Development (AED), and the Manoff Group.

John Snow, Inc/ Mozambique
Av. Mao Tse Tung, House 820 P.O. Box 149
Maputo City, Mozambique
Tel: 258.82.3253.330
Fax: 258.21.312544
Email: aubisse@jsi.org.mz

MMIS Headquarters
John Snow, Inc.
1616 N. Fort Myer Drive, 11th Floor
Arlington, Virginia 22209 USA
Tel: 1 (703) 528-7474
Email: info@mmis.jsi.com
www.mmis.jsi.com

Office of the Global AIDS Coordinator
SA-29, 2nd floor
2201 C. Street NW
Washington, DC 20522-2920 USA
Tel: 1 (202) 663-2708
www.pepfar.gov

US Agency for International Development
Bureau of Global Health
Office of HIV/AIDS
Ronald Reagan Building
1300 Pennsylvania Avenue NW
Washington, DC 20523 USA
Tel: 1 (202) 712-4810
Email: inquiries@usaid.gov
www.usaid.gov

TABLE OF CONTENTS

LIST OF ABBREVIATIONS 9

EXECUTIVE SUMMARY 11

1. GENERAL INTRODUCTION 17

2. METHODOLOGY 19

2.1 Objectives of the Study 19
2.2 Sampling 19
2.3 Data collection tool 20
2.4 Data collection 20
2.5 Organization and coordination of the data entry and analysis 21

3. DESCRIPTION OF THE ATTAINED SAMPLE 23

4. RESULTS OF THE STOCK OF INJECTION EQUIPMENT AND PRODUCTS IN THE MAIN STOCK ROOMS OF THE HEALTH CARE FACILITIES 25

4.1 Analysis of the Stock cards: Availability, Update and Evidence of Stockouts by Product 25
4.2 Comparison of Stock of Safety Boxes with the Stock of Syringes 27
4.3 Presence of Oral Formulations of Common Medicines 28

5. OBSERVATIONS ON MATERIALS, EQUIPMENT AND WASTE MANAGEMENT 29

5.1 Presence and Use of Safety Boxes in Locations where Injections are Administered 29
5.2 Individual Indicators of the Disposal of Used, Sharp Objects 29
5.3 Storage of Full Safety Boxes 31
5.4 Tightly Sealed Safety Boxes 31
5.5 Waste Segregation 31
5.6 Loose Biological Waste 31
5.7 Waste Disposal Methods 32
5.8 Observations on Job Aids 33

6. OBSERVATIONS ON INJECTION ADMINISTRATION PRACTICES 35

6.1 Preparation of Injections on a Clean Work Table or Tray 36
6.2 Hand Hygiene and Use of New Gloves 37
6.3 Cleaning Patients' Skin before the Injection 37
6.4 Type of Equipment Used for Procedure 38
6.5 Patients as the Source of Injection Equipment 38
6.6 Use of New Needles and Syringes for Injections and to Reconstitute Medications 38
6.7 Removing Needles from the Cap of Multi-dose Vials and Cleaning of the Cap 39
6.8 Use of Clean Barriers to Protect Fingers when Breaking Glass Ampoules 39
6.9 Temperature at which Heat-sensitive Vaccines were Stored 40
6.10 Recapping Needles after Administering Injections 40
6.11 Use of a Safety Box for Immediate Disposal of Used Sharps 41

7. INTERVIEWS WITH INJECTION PROVIDERS 43

7.1 Sources of New, Disposable Needles and Syringes 43
7.2 Use of Disposable Safety Syringes 44
7.3 Reuse of a Needle or Syringe 44
7.4 Use of Needle Removal Devices 44
7.5 Recall of Stockouts of Safety Boxes and Syringes 45
7.6 Accidental Needle Stick Injuries 45
7.7 Providers' Knowledge of Diseases Transmitted by Reuse of Non Sterile Needles 46
7.8 Injection Providers Vaccinated Against Hepatitis B 47

7.9 Injection Providers Who Received Training on Injection Safety *47*
7.10 Description of Safe Injection *47*
7.11 Sources of Information for Safe Injection Practices and/or Safe Disposal Practices and Their Usefulness *48*
7.12 Provider Perceptions of Risks and Benefits of Injections *49*

8. INTERVIEWS WITH SUPERVISORS OF INJECTION PROVIDERS 51

8.1 Availability of Policies and Guidelines *51*
8.2 Stockouts of Syringes and Safety Boxes *51*
8.3 Delivery of Vaccines and Other Medications with Corresponding Quantities of Injection Equipment and Safety Boxes *52*
8.4 Supervisors' Perception of the Quantities of Syringes and Safety Boxes for Curative Services *54*
8.5 Supervisors' Reminders on Injection Safety *55*

9. INTERVIEWS OF WASTE HANDLERS 57

9.1 Main Methods of Waste Disposal Used *57*
9.2 Disposal of Ashes from Incineration *60*
9.3 Common Problems with Medical Waste Disposal *60*
9.4 Availability of Personal Protective Equipment *61*
9.5 Training of Waste Handlers *62*
9.6 Sources of Behavior Change and Communication (BCC) Messages *63*
9.7 Accidental Needle Stick Injuries *63*
9.8 Waste Handlers' Knowledge of Diseases Transmitted by Needle Stick Injuries *64*
9.9 Hepatitis B Vaccination of Waste Handlers *64*
9.10 Waste Handlers' Perception of Risk by Needle Stick Injuries *64*

10. EXIT INTERVIEWS WITH PATIENTS OR PARENTS OF PATIENTS 67

10.1 Socio-Demographic Characteristics of the Patients *67*
10.2 Patients' Knowledge of the Availability of New Needles and Syringes in the Community *68*
10.3 Source of the Injection Equipment Used on the Day of the Survey *68*
10.4 Patients' Recall of Injections Received in the Health Facility Surveyed *68*
10.5 Patients' Recall of Injections Received Outside the Health Facility Surveyed *69*
10.6 Recall of the Most Recent Prescription *70*
10.7 Patients' Attitudes about Injections *71*
10.8 Sources of Information about Injection Safety *72*

11. CONCLUSIONS 75

12. RECOMMENDATIONS 79

LIST OF TABLES

Table 1: Table summarizing the desired sample of the target population by component of the survey.....20
Table 2: Sampling by Type of Organization 23
Table 3: Summary of the Availability of Stock Cards, by Product.....27
Table 4: Summary of the Updating of Stock Cards for Health Care Facilities That Have Them, by Product...27
Table 5: Comparison of the Stock of Safety Boxes and Syringes 28
Table 6: Stock of Oral Medications 28
Table 7: Observations on the Use of Safety boxes 29
Table 8: Observations on the Condition of the Safety Boxes and Used Sharps 30
Table 9: Observations on Segregation of Waste and Biological Waste.....32
Table 10: Observations on the Main Methods Used to Dispose of Sharps Waste at Baseline and Followup ...33
Table 11: Types of Health Care Workers Observed Administering an Injection.....35
Table 12:Number of Each Type of Injections Based at Baseline and Follow-up.....36
Table 13:Locations in which Different Types of Injections were Given at Follow Up 36
Table 14: Number of Injection Providers Interviewed, by Job Category.....43
Table 15: Comparison of the Distribution of Health Facilities Surveyed According to Disposal Methods for the Three Types of Medical Waste: Sharp, Infectious, Non-infectious 59
Table 16: Problems Encountered in Waste Management 61
Table 17: Distribution of the Sampling of Patients by District and by Ward at Follow Up 67
Table 18: Socio-Demographic Characteristics of the Adult Patients Interviewed 68
Table 19: Common Risk Factors for Health Care Workers and Patients.....76
Table 20: Risk Factors Specific to Injection Providers.....76
Table 21: Risk Factors Specific to Waste Handlers.....77
Table 22: Risk Factors related to Patients and Visitors at Health Facilities 78

LIST OF FIGURES

Figure 1: Summary of Satisfactory Disposal Practices at Baseline and Followup 31
Figure 2: Summary of the Observations Related to Infection Prevention and Control 38
Figure 3: Summary of the Distribution of Observations on the Sources and Practices of Using New Needles and Syringes 39
Figure 4: Summary of the Variables on Protecting Injectable Medications from Contamination or Deterioration 40
Figure 5: Summary of the Observations on Disposal of Sharp Objects after Injections 41
Figure 6: Frequency of Accidental Needle Stick Injuries among Injection Providers Interviewed.....46
Figure 7: Injection Providers Who Received Training on Injection Safety at Followup.....47
Figure 8: Sources of Injection Safety Information, at Baseline and Follow up.....48
Figure 9: Injection Equipment and Safety boxes Delivered in Corresponding Quantities for Vaccines.....53
Figure 10: Injection Equipment and Safety boxes Delivered in Corresponding Quantities for Other Medications 53
Figure 11: Supervisors' Perception that the Quantities of Injection Equipment were Adequate for Curative Services They Provide 54
Figure 12: Supervisors' Perception that the Quantities of Safety Boxes were Adequate for Curative Services They Provide.....54
Figure 13: Methods Used to Dispose of Sharps Waste.....58

Figure 14: Overall Summary of the Distribution of Health Facilities Surveyed According to the General Categories of Sharps Waste Disposal at Baseline and Followup.....60
Figure 15: Distribution of Waste Handlers According to the Type of Protective Equipment Available at the Health Facilities Surveyed.....62
Figure 16: Training of Waste Handlers at Baseline and Followup.....62
Figure 17: Distribution of Waste Handlers According to the Number of Accidental Needle Stick Injuries in the Six Months Preceding the Survey.....64
Figure 18: Patients' Recall of the Number of Injections Received in the Health Facility Surveyed in the Six Months Prior to the Survey.....69
Figure 19: Recall of Number of Injections Prescribed in the Six Months Prior to the Survey.....71
Figure 20: Preferences Expressed by Patients Regarding Formulations of Medications at Baseline and Followup.....71

List of Abbreviations

BCC	Behavior Change Communication
CDC	U.S. Centers for Disease Control and Prevention
HCWM	Health Care Waste Management
JSI R&T	John Snow Research and Training Institute, Inc.
MMIS	Making Medical Injections Safer project
STD	Sexually Transmitted Diseases
PEPFAR	President's Emergency Plan for AIDS Relief
AD	Auto-Disable Syringe
SIGDAS	Injection Safe and Health Care Waste Management
SIGN	Safe Injection Global Network
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Executive Summary

One of the objectives of the Ministry of Health is to improve the quality of care provided on all levels of the healthcare pyramid. Previous studies revealed that the problem of injection safety and the management of waste generated by health care activities needed to be addressed. In the framework of the implementation of the U.S. government's President's Emergency Plan for AIDS Relief (PEPFAR), Mozambique received technical and financial support to promote injection safety and health care waste management through the support of the US Agency for International Development (USAID) and the injection safety and health care waste management project resulting from activities of the Making Medical Injections Safer (MMIS) project and its partners. With the goal of preparing a broad evaluation of injection safety, MMIS conducted this global evaluation of injection safety and health care waste management at the project intervention sites in order to complete the information from previous studies.

This report presents the comparison between the baseline and follow up surveys. The surveys were carried out through interviews, observations and an inventory of materials in a sample of health facilities that were identified as MMIS' expansion area when the survey was designed in 2005. Baseline data were collected in November 2005 and the follow up data were collected in November 2008 in the project expansion areas of Gaza and Nampula provinces.

The survey units of this evaluation on injection safety and health care waste management are the medicine, pediatrics, gynecology-obstetrics, surgery, central stock rooms, and laboratory departments of the 18 lower-level facility levels in the provinces mentioned above. The target populations for this survey were the injection providers, supervisors of the staff responsible for administering injections, waste handlers, and health care recipients (i.e.: patients who just received one or more injections in the facilities covered by this evaluation).

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 stock rooms of the health facilities
- Availability of injection equipment and material for managing waste
- Material and equipment for managing waste vis-à-vis accidental needle stick injuries
- Injection administration practices vis-à-vis accidental needle stick injuries
- Training on and knowledge of blood-borne diseases
- Health care worker protection

1. Availability of Reference Documents and Management Tools

The study revealed that availability of reference documents including national policy document, norms, standards and guidelines for injection safety and health care waste management has improved significantly since the time of baseline. At that time, only 6% of the supervisors interviewed had a copy of the injection safety guidelines or recommendations compared to 78% at follow up. Similarly, the increase in availability of waste management guidelines was dramatic, from 0% at baseline to 61% at followup. Although these results are encouraging, it is important to keep in mind that one of the

strategies of the injection safety approach is to establish and provide these reference documents to all stakeholders – including supervisors – so that they can provide support for the improved practices that are being promoted by MMIS and the MOH. It is recommended that these key documents be provided to each facility.

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

The results obtained through observations in the main stock room of each health facility surveyed highlighted the fact that although almost all facilities have a mechanism for tracking safety boxes using either stock cards or registers – a clear improvement over baseline – the facilities are not updating these records and the figures recorded on them do not match the physical inventory conducted during this survey. A positive finding for safety boxes was that most facilities had supplies that were more than adequate for the disposal of all of the syringes in stock.

For the different types and sizes of syringes, it was found that few facilities track standard disposable syringes. They are more likely to track safety syringes, possibly due to the higher cost or because they are donated commodities. However, even the facilities that do track these commodities do not tend to keep updated records every month.

Since the availability and proper maintenance of management tools such as stock cards and registers can facilitate better monitoring of consumption patterns and regular supply of the health facilities with materials, it is recommended that this system be further strengthened with individual tracking mechanisms for each product.

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. When the data collectors looked for the oral forms of four commonly-used medications, they found that most facilities had three of the four medications that were sought, but fewer than half had all of them. It is recommended, therefore, that additional efforts be made in identifying the essential, non-injectable medications that can replace the most common injections and ensuring that all facilities have a regular, adequate stock of these medications.

3. Availability of Injection Equipment and Waste Management Materials

Observations in the main stock room showed that the record keeping on individual products made it difficult to determine whether there had been any stockouts. For this reason, this survey is focused on the reports from injection providers and their recall of stockouts of safety boxes and injection devices.

Very few providers at baseline and none at follow up reported stockouts of safety boxes. Distribution of the safety boxes around the facilities in all areas where injections are given improved significantly from baseline (72%) to follow up (100%), and at follow up, in all of the injections that were observed, the provider had thought ahead to place a safety box within arms reach to facilitate the immediate disposal of the used sharp.

Stockouts of injection devices, on the other hand, were fairly common at baseline (82% of those interviewed had had one in the prior six months). Reports of stockouts dropped significantly to 17% of the providers interviewed by the time of the follow up survey. Those who experienced stockouts reported that they were primarily of 5 ml or 10 ml syringes, and they were able to use another size or type of syringe without any need for sterilization of injection devices.

Consistent with the drop in stockouts of injection devices, noticeable improvements were also seen in the proportion of supervisors reporting that they had adequate or corresponding quantities of safety boxes and injection devices for both vaccines and other injectable medications that they were receiving. Reports of supervisors saying that they had adequate supplies for the curative services provided in their facilities jumped significantly from 50% at baseline to 94% at follow up.

The results obtained through observations of the health care facilities surveyed showed that satisfactory disposal of used sharps improved significantly over time, from 41% of facilities at baseline to 94% at follow up. All three key aspects of this indicator - i.e. no overflowing or punctured safety boxes, no loose used sharps lying around inside any facilities, and no loose used sharps outside on the grounds of the facilities – improved over time. The most dramatic improvements were seen inside facilities (with 61% of facilities having no loose sharps at baseline compared to 94% at follow up) and outside facilities (with 39% of facilities having no loose sharps at baseline compared to 100% at follow up). Few facilities had overflowing or punctured sharps containers at baseline and none had them at follow up. Furthermore, significant improvements in the segregation of waste into sharps, infectious and non infectious groups from baseline, at which time only 22% of facilities were segregating their waste, to 94% at follow up provides further support to safe disposal of waste by dramatically reducing the amount of waste that contains used sharps.

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 (in the event that more than one is used in a health care facility). The "good disposal" category includes high or medium temperature incineration, dumping into a latrine or other protected pit (whether or not it is followed by burial) and/or transportation off-site for processing. Low temperature incineration, on the other hand, is considered "marginal" disposal. "Poor" disposal is comprised of the other, less secure methods: open air burning on the ground or in a hole or enclosure, burial alone, and dumping into an unsupervised or unprotected area. Storage of used sharps in cans was also considered a poor practice since there was no indication that the cans were safely disposed of once they were full.

When the overall results of the sharps waste disposal methods are calculated based on these three categories, the data from interviews of the waste handlers at baseline shows 33% of the waste handlers reporting good methods being used at their facilities and 67% using poor methods. At follow up, 17% of facilities had good waste disposal practices, 55% had marginal practices and 28% had poor practices.

4. Injection Administration Practices vis-à-vis General Infection Prevention and Control

The results obtained on general hygiene as it relates to injections showed that injection providers were much more likely to prepare injections on a clean surface at follow up (93% of the injections observed) than at baseline (58%). Hand hygiene practices improved over time from 3% of the injections observed being given by a provider who had washed his/her hands to 27%, but even with this improvement, there is still much work to be done to make hand hygiene a universal infection prevention and control practice.

On the other hand, the single most important measure of infection prevention and control as it relates to injection safety is the use of a new, sterile needle and syringe from a sealed package for each injection given to each person. The results for this key indicator showed that the needle and syringe were removed from a sterile package in 100% of the injections at follow up. This indicator had already been strong at baseline (96%), but the extension of this concept to include use of a new needle and syringe from a sealed package for each case of reconstitution resulted in a significant improvement, from 66% of the injections

observed in which a medication was reconstituted at baseline to 100% at follow up. Further evidence of the elimination of the problem of reuse was found in provider interviews. At baseline, 11% of the providers interviewed reported having boiled a syringe to sterilize it for reuse at baseline. At follow up, not only were none of the providers aware of any cases of reuse, they also reported that such a practice would not be acceptable under any circumstances in their facilities.

5. Injection Administration Practices vis-à-vis Accidental Needle stick injuries

In considering the aspects of injection administration practices that may put providers at risk of accidental needle stick injuries, two practices emerge as the most likely sources of potential injury: recapping and disposal of the used sharp. Devices used for curative, family planning injections, and vaccinations should never be recapped. At baseline, providers disposed of the used injection devices without recapping them in 61% of the injections observed. This improved significantly to 91% at follow up, but these results show that there is room for further improvement. The practice of immediately disposing of a used sharp after completing an injection also improved significantly, from 63% of the injections observed at baseline to 100% at follow up.

It is interesting to note in the results from this survey though that despite significant improvements in the two aspects of injection safety that are thought to contribute the most to preventing needle stick injuries among providers, there was no improvement in the level of injuries reported. In fact, the proportion of injection providers interviewed in this survey who had sustained accidental needle stick injuries in the six months prior to the survey remained similar between baseline (28% of those interviewed) and follow up (22%). It appears that these injuries were unrelated to the injection practices themselves and were more likely to be caused by other types of procedures administered by the same type of personnel (such as suturing wounds) and by other factors such as unexpected patient movements (among children in particular). It is recommended that these other factors be explored with providers during supervision visits as situations in which the providers may need to use extra caution to avoid injuries as they were not the focus of the injection safety training materials.

6. Training, Knowledge of Blood-Borne Diseases, and Equipment for the Protection of Health Care Workers

The results of this survey showed that 67% of the injection providers interviewed at follow up reported having been trained in injection safety (compared to none at baseline). Among waste handlers, 33% at baseline and 61% at follow up had received training on sharps waste management. Although training was a focus of the interventions in the MMIS project, staff turnover may lead to a situation in which new staff are continually arriving who need to be trained. It is recommended, therefore, that supervision visits be used as reminders on key practices as a way of providing on-the-job training to those workers who are not able to attend during formal training workshops.

Knowledge of the risk of HIV transmission from an accidental injury was found to be universal among the providers and waste handlers interviewed at follow up while knowledge of hepatitis B and C was much less common. Unlike HIV, hepatitis B can be prevented by vaccinating workers, but this type of protection was found to be very rare among the workers interviewed, and none were completely protected with all three doses that are needed. It is recommended that the MOH consider adopting a policy of expanding hepatitis B coverage to injection providers and waste handlers to protect them from contracting this disease from accidental sharps injuries.

It is also recommended that continued emphasis be placed on the use of safe disposal methods described earlier. In addition, use of personal protective equipment by waste handlers is a key strategy for avoiding

accidental needle stick injuries. Availability of both types of key equipment increased significantly from baseline to follow up (boots and close-toed shoes from 0% to 61% and heavy duty gloves from 6% to 83%). Masks, aprons and goggles also increased. These results are encouraging and further procurement and distribution of boots and gloves to all waste handlers and masks, aprons and goggles to all waste handlers working with incinerators can continue to protect these workers from accidental occupational injuries.

Already with the improvements seen since baseline, the proportion of waste handlers reporting any injuries decreased from 22% at baseline to 0% at follow up.

7. Behavior Change Communications

During their visits to the health facilities, data collectors observed whether one or more communication materials (such as reminder charts and/or job aids) were posted to encourage the rational use of injections or medical waste management, promote the safe administration of injections, or promote the safe disposal of used injection equipment. Overall, across all three messages included in these observations, 17% of the facilities at baseline had one or more BCC materials posted compared to 100% at follow up.

At follow up, during the injection observations, some interpersonal communications between patients and providers were observed, but virtually all of this communication was limited to follow up instructions. This finding highlights a lost opportunity for injection providers to communicate injection safety messages to patients on avoiding loose sharps in the community, insisting on new injection devices every time and in every location where they receive injections, and other similar messages that could protect them from contaminated devices or accidental injuries.

When asked where they had seen or heard injection safety messages, 94% of the providers interviewed mentioned at least one source at follow up. Training workshops and pre-service training were the most frequently mentioned sources. Only 11% of the providers (and 22% of the waste handlers) interviewed mentioned their supervisor as a source, in spite of the fact that 67% of the supervisors interviewed at the same facilities say that they remind providers about injection safety. This conflicting data suggests that either the supervisors overestimate the amount of time that they invest in reinforcing key injection safety messages or they need to re-evaluate the way in which they communicate the messages to ensure that they are received and understood.

Among patients treated at these facilities, the overall proportion of patients who reported receiving any injections at the MMIS study facilities dropped from 76% at baseline to 30% at follow up was significant.[1] It was interesting to compare this to their report of injections received at other facilities outside the MMIS intervention areas, which had not changed over time (i.e.: from a baseline of 22% to a follow up result of 25%). Patient preferences also appeared to shift over time from 50% citing a preference for injections at baseline compared to 14% at follow up. When data collectors asked whether patients had heard or seen messages on injection safety, although only 23% reported that they recalled these messages, it is encouraging to note that health staff were by far the most common source of the messages. This finding suggests that MMIS' BCC materials promoting the reduction of injections (including a poster directed at patients and training materials directed at providers) are having the intended effect but may need to be reinforced during supervision visits to encourage providers to expand their efforts, by showing them that they are seen by patients as important sources of this information.

[1] The results in terms of their most recent prescriptions did not change over time, but this may be a reflection of the fact that patients who were targeted for interviews were those who had received injections on the day of the survey.

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 the hepatitis B or C virus. Finally, Chapter 12 presents a summary of the main recommendations.

1. General Introduction

One of the objectives of the Ministry of Health is to improve the quality of care provided on all levels of the health care pyramid. Previous studies revealed that injection safety and health care waste management was a serious problem in need of specific interventions. In the framework of the implementation of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), Mozambique received technical and financial support to promote injection safety and health care waste management through the support of the US Agency for International Development and the injection safety and health care waste management project known as Making Medical Injections Safer (MMIS) and its partners. With the goal of having a broad assessment of injection safety, MMIS evaluated injection safety and health care waste management at the project's intervention sites to determine whether the interventions were having an impact on key practices.

According to the WHO, every year, unsafe medical injections are responsible for around 8 to 16 million cases of infection with the hepatitis B virus, 2.3 to 4.7 million cases of hepatitis C and 80,000 to 160,000 cases of HIV infection globally. Certain high-risk practices, in particular the reuse of non sterile 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.

2. Methodology

This evaluation of the status of injection safety and health care waste management is a descriptive comparison between the baseline and follow up studies. It includes interviews, observations and stock assessments in a sample of health care facilities in the project's two expansion area health provinces (Gaza and Nampula).

2.1 Objectives of the Study

The overall objective is to evaluate the general status of injection safety and health care waste management in the health care facilities in two of the project's expansion areas that were identified at the time of the baseline in 2005. 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 health care waste management 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 care facilities,
5. Evaluate the adequacy of the quantities of injectable products ordered (vaccines, medications), injection equipment (syringes/needles) and health care waste management equipment,
6. Describe the experiences related to injections in the health care 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 of the injection safety and health care waste management evaluation are the general medicine, pediatrics, gynecology-obstetrics, and surgery wards as well as central stores and laboratories of the 18 lower-level facilities. This sample of health care facilities for this evaluation was obtained through random selection.

The target populations, which were planned for this survey, were the injection providers, supervisors of the staff responsible for administering injections, waste handlers, and health care recipients (i.e.: patients who had just received an injection(s) in the study facilities), according to the following distribution:

- One central stock room in each health care facility, or a total of **18 stock rooms**.
- **The provider** administering the largest number of injections in each health facility
- **1 supervisor** of the staff responsible for administering injections per health facility.
- **1 waste handler** per health facility.
- **4 recipients of** injection per health facility.
- In addition to the people interviewed, up to **4 injections were observed** in each health facility.

Observations were sought in the following areas: vaccinations, curative injections, diagnostic injections including phlebotomy and family planning. Data collectors were instructed to observe whatever

procedures were taking place; they did not request that additional injections be given simply to complete their observations.

Table 1: Table summarizing the desired sample of the target population by component of the survey

		Time Period	
Section	Target Population	Baseline	Follow up
1	Stock rooms	18	18
2	Health care facilities	18	18
3	Injections observed	72	72
4	Injection providers	18	18
5	Supervisors of the staff responsible for administering injections	18	18
6	Waste handlers	18	18
7	Patients or parents of patients coming for an injection(s) at the centers	72	72

2.3 Data collection tool

Data were collected in the field with the aid of an MMIS questionnaire adapted to the context of the health care system in Mozambique (See Appendix 1). The MMIS questionnaire includes 7 components or sections related to the specific intervention areas of injection safety and medical waste management. These sections are as follows:

- Stock rooms (equipment/medications/vaccines, etc.): “Section 1”
- Observations on the structure of care and the waste in each health care 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 care facilities surveyed: “Section 7”

2.4 Data collection

Baseline data were collected in November 2005 with follow up data collected in November 2008 in Gaza and Nampula provinces. Data collectors and supervisors were identified and trained to participate in the collection of data in the health facilities. Training for the data collectors and supervisors lasted 3 days, and it included one day of on-site practice in a facility that was not included in the survey sample. Following the training, data collection teams were formed. The local study coordinator, JSI HQ staff, and MMIS / Mozambique project staff provided supervision.

2.5 Organization and coordination of the data entry and analysis

The data were analyzed using SPSS software. This required the contribution of data entry staff with prior training on the use of the data entry program. Each completed questionnaire was reviewed and validated before being entered and analyzed. The proportions of observations were calculated for each component of the form using as a denominator either the number of health care facilities, or the number of individuals interviewed, or the number of injection observations as shown in Chapters 4-10 of this report.

3. Description of the Attained Sample

There were a total of 18 health care facilities in the project's expansion areas (i.e.: 11 in Gaza and 7 in Nampula) that were surveyed in both time periods (baseline and follow up). 17 of these facilities are owned by the government with the remaining one being privately owned. All 18 are lower-level.

Table 2 shows the sample collected in each component of this survey at baseline and follow up.

Table 2: Sampling by Type of Organization

Component	Time Period	
	Baseline	Follow Up
Observations		
Health care facilities	18	18
Stock rooms	18	18
Injections observed	72	61
Interviews		
Injection providers	18	18
Supervisors of the staff responsible for administering injections	18	18
Waste handlers	18	18
Patients or parents of patients coming for an injection(s) at the centers	72	64

4. Results of the Stock of Injection Equipment and Products in the Main Stock Rooms of the Health Care Facilities

In the health care facilities participating in this survey, data collectors evaluated the stock cards for various products such as safety boxes and injection equipment. They noted the availability of a stock card and/or register for each product, whether it had been updated in the 30 days preceding the survey, whether any stockouts were recorded, and the balance indicated on the card. After collecting card (or register) data, the data collectors took a physical inventory by counting all products in the stock room in order to compare the data from the updated stock cards or registers to the physical stock in the stock rooms. Finally, the stocks of some common oral medications were examined. This section contains these results on products available in the main stock room of each of the 18 health facilities surveyed.

4.1 Analysis of the Stock cards: Availability, Update and Evidence of Stockouts by Product

4.1.1. Safety boxes

Of the 18 health care facilities surveyed at baseline, data collectors found a stock card or register for five liter safety boxes[2] in only 2 health facilities (11%). Both facilities' records had been updated during the 30 days prior to this survey.

At follow up, the data collectors were able to find stock cards for tracking 5 L. safety boxes in 8 health facilities. Only 2 of the 8 stock cards had been updated within the last month before the survey. They also checked for registers and found them in 16 facilities. 10 of the 16 registers had been updated. Overall, among all facilities surveyed, when the two types of tracking mechanisms were considered together, 16 facilities of the 18 surveyed (89%) had either a card or register or both and 10 of these 16 were updated.

After collecting the data on the stock cards and registers, the data collectors performed a physical inventory, counting all the injection equipment and safety boxes in the stock room. These results were compared with the updated stock cards. There should have been the same balance on the updated stock card and in the stock room's physical stock if the stock room employees maintained them as required. For the safety boxes, they did not collect complete data in 3 of the 10 health facilities with an updated card. In the other 7, the number of safety boxes on the card corresponded to the stock in the stock room at follow up in only 1 facility.

4.1.2 Standard Disposable Syringes

The stock cards were not much more common for standard single-use (disposable) syringes. Of the 18 health care facilities surveyed at baseline, 1 had a stock card and 2 had registers for the standard 10 ml disposable syringes. Only 1 of the 2 records was updated.

At follow up, the data collectors looked for registers and found that 6 facilities (33% of those surveyed) had a register for standard 10 ml disposable syringes. 2 of them were updated. They also found stock cards available in 2 of the facilities with registers; neither of them was updated.

[2] No other size of safety boxes was found.

Similarly, for the standard 5 ml disposable syringes, 1 stock card and 2 registers were found at baseline. Only 1 of the 2 records was updated. At follow up, the data collectors found also only 2 facilities with a stock of this size and type of syringes (11%). Both facilities had a register for tracking these devices and 1 of them also had a stock card available. None of these materials were updated.

Continuing with the standard 2 ml disposable syringes, none of the 18 health care facilities surveyed at baseline had a stock card and only 1 had a register. This register was not updated. At follow up, the data collectors were also able to find only 1 facility with a stock card for this size and type of syringes and 2 with registers (11%). Only 1 was updated.

At follow up, none of the facilities had 1 cc syringes of this type.

4.1.3 Disposable Syringes with Features that Prevent Reuse and / or Injuries

The data collectors evaluated the situation of disposable syringes with features that prevent reuse. These devices were added after the baseline data were collected, so the results here are limited to the follow up survey.

Of the 18 health care facilities surveyed, 10 were found to have stock cards and 17 had registers for the 10 ml size. 4 of the stock cards and 10 of the registers were updated. Overall, 17 of the facilities surveyed (94%) had some stock tracking mechanism, of which 11 had been updated in the month preceding the survey. 8 of these, however, had conflicting data from what was found in the physical inventory. (The other 3 were missing either stock card balance or inventory data to make this comparison.)

For the 5 ml syringes, at follow up, 10 facilities were found to have stock cards, 4 of which were updated. 15 had registers of which 9 were updated. Overall, 16 facilities (89%) had either a stock card or register or both with 10 that were updated. Data collectors found that the stock card or register balance agreed with the physical inventory in only 2 of the 10 facilities with updated records. In 6 the data differed between the written records and inventory and in 2 one or the other of the pieces of data needed for this calculation was missing.

Continuing with the 2 ml syringes, 5 facilities were found to have available stock cards, 2 of which were updated. 8 had a register, of which 4 were updated. Overall, 9 facilities (50%) of those surveyed had at least one type of stock tracking mechanism for this size of syringes. 5 of these 9 were updated. The balance on the stock card or register was the same as the inventory in only 1 of these 5 updated records. In 2 the two figures were different and in 2 there was insufficient data for the comparison.

For the 1 cc size of these syringes, only 1 facility (6%) had a stock card and it was not updated. None of the facilities had a register.

None of the facilities surveyed at follow up had safety syringes that prevent injuries in stock.

Table 3: Summary of the Availability of Stock Cards, by Product

	Baseline		Followup	
Products	Cards or Register Available	Facilities Surveyed with Data	Cards or Register Available	Facilities Surveyed with Data
New, unused safety boxes	2	18	16	18
Standard disposable syringes				
10 ml	2	18	6	18
5 ml	2		2	
2 ml	1		2	
Disposable syringes equipped with features preventing reuse (auto-disable)				
10 ml	NA	NA	17	18
5 ml	NA	NA	16	
2 ml	NA	NA	9	

Table 4: Summary of the Updating of Stock Cards for Health Care Facilities That Have Them, by Product

	Baseline		Followup	
Products	Updated Cards or Register	Available Cards or Register	Updated Cards or Register	Available Cards or Register
New, unused safety boxes	2	2	10	16
Standard disposable syringes				
10 ml	1	2	2	6
5 ml	1	2	0	2
2 ml	0	1	1	2
Disposable syringes equipped with features preventing reuse (auto-disable)				
10 ml	NA	NA	11	17
5 ml	NA	NA	10	16
2 ml	NA	NA	5	9

4.2 Comparison of Stock of Safety Boxes with the Stock of Syringes

It is hard to estimate the number of syringes that can be disposed of in a single sharps box because, in reality, safety boxes are filled with a mixture of various sizes and types of syringes. Logically, more of the smaller 1 ml or 2 ml syringes can be disposed of in a single box than the larger 10 ml syringes. In addition, syringes for which the needle is retracted into the hub of the syringe after the injection should not take up as much space in a sharps box as syringes equipped with fixed needles. However, if one estimates that it is possible to place some 80 syringes of various types and sizes into a sharps box, it is possible to calculate the number of syringes, which could be disposed of in the safety boxes existing in the stock rooms. Out of the 18 facilities surveyed at baseline, 15 of them were found to have a sufficient supply of safety boxes in stock to safely dispose all syringes in stock. Of the remaining 3, 2 had no safety boxes in stock and 1 had about a third less than what would be needed to safely dispose of all of the

syringes in stock. At follow up, 14 of the 18 facilities surveyed (82%) had sufficient supply of safety boxes in stock to safely dispose the syringes in stock as well. (Table 5)

Table 5: Comparison of the Stock of Safety Boxes and Syringes

	Baseline		Followup	
	Percentage	Number of Health Facilities	Percentage	Number of Health Facilities
Health care facilities with a stock of safety boxes for every 80 syringes	83%	18	82%	17[3]

4.3 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 medications 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.

The results from the follow up survey are shown in table below in Table 6. As this data shows, the best results were found with cotrimaxazol, which was available in all facilities compared to amoxacillin which was found in only 56%. Feniximetil penicillin and erythromycin were found in a large majority of the facilities surveyed (83% and 89%, respectively).

Furthermore, all of the facilities surveyed had a stock of at least one of these drugs in stock. 44% had all four drugs in stock at the time of the data collection visits.

Table 6: Stock of Oral Medications

	Followup	
	Percentage	Number of Health Facilities
Feniximetil Penicilina	83%	18
Amoxacillin	56%	
Cotrimaxazol	100%	
Erythromyin	89%	
Stock of at least **one** oral medication on this list	100%	18
Stock of **all** oral medications on this list	44%	18

[3] Data on the quantity of safety boxes in stock were missing from 1 facility so it was excluded from this calculation.

5. Observations on Materials, Equipment and Waste Management

In this section of the survey, the data collectors made observations of the facilities themselves of the same 18 health care facilities participated in these observations in both time periods.

5.1 Presence and Use of Safety Boxes in Locations where Injections are Administered

From the baseline survey, only 72% (13 out of 18) health facilities had sharps containers in each place where injections were being administered. The follow up survey shows that all facilities (100%) put sharps containers in each place where injections were given, a significant improvement ($p \leq .05$). In each of these places, the data collectors evaluated whether all sharps containers were safety boxes. They found that 79% (14 out of 18) of the health care facilities were using safety boxes as sharps containers at baseline and 100% of the health care facilities were doing so at follow up ($p \leq .05$, Table 7).

Table 7: Observations on the Use of Safety boxes

	Baseline		Followup	
	Percentage	Number of Health Facilities	Percentage	Number of Health Facilities
Health care facilities with sharps containers in each location where injections are administered	72%	18	100%	18
Health care facilities that only use safety boxes in locations where injections are administered	79%		100%	

5.2 Individual Indicators of the Disposal of Used, Sharp Objects

5.2.1 Overflowing or Pierced Safety Boxes

The fact of having 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, 94% of the health facilities (the sole exception being 1 facility in Gaza) were observed to have *no* pierced or overflowing safety boxes. At follow up, none of the 17 health facilities surveyed had pierced or overflowing safety boxes for 100% compliance with this indicator. (Table 10)[4]

5.2.2 Loose Sharp Objects Inside the Health Care Facility

At baseline, 61% of the health facilities surveyed (11 of 18) had *no* used sharp objects in open containers or lying around inside the facilities. At follow up, this finding improved significantly to 94% (17 out of

[4] One facility where this indicator could not be evaluated was excluded in each survey period.

18) of the health facilities (p≤.05). The sole exception was 1 facility in Gaza in which the data collectors found sharp objects lying around where they could expose the injection providers or public to the risk of accidental needle stick injuries. (Table 10)

5.2.3 Sharp Objects Outside of the Health Care Facility

Data collectors also evaluated the grounds outside the buildings of each health facility surveyed to see whether there were any loose sharps lying around. During the baseline survey, they found that 39% (7 of 18) of the facilities had *no* loose (visible) sharps lying around outside. At follow up, this finding improved significantly such that *none* of the 17 facilities that could be observed for this variable had loose sharps lying around outside for 100% compliance with this waste management indicator (p≤.05).[5]

Table 8: Observations on the Condition of the Safety Boxes and Used Sharps

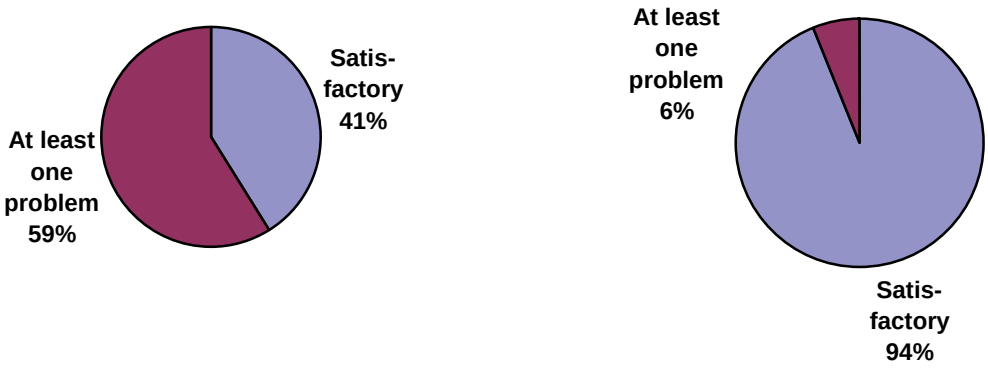
	Baseline		Follow up	
	Percentage	Number of Health Care Facilities	Percentage	Number of Health Care Facilities
Health facilities *without* overflowing or pierced safety boxes	94%	17	100%	17
Health facilities *without* used sharps in open containers or loose inside the health facilities	61%	18	94%	18
Health facilities *without* used sharp objects outside	39%	18	100%	17

5.2.4 Summary of Satisfactory Disposal Practices

After having analyzed the 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 baseline, 7 out of 17 the health facilities where the data were available for all three variables (41%) were found to be practicing safe satisfactory disposal. At follow up, the data collectors were able to observe all the three variables in 16 facilities out of which 15 had satisfactory disposal (94%), a significant improvement (p≤.01).

[5] One facility where this indicator could not be evaluated was excluded from the follow up survey period.

Figure 1: Summary of Satisfactory Disposal Practices at Baseline and Followup



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 10 facilities, the data collectors could not make these observations (for example, in cases where there were no full boxes or where the facilities did not use safety boxes). Out of the 8 remaining health facilities, where the observations for this variable could be conducted, none of them stored the full safety boxes in a locked area inaccessible to the public. During follow up, only 3 facilities had full used safety boxes. Two of these 3 stored the full safety boxes in a locked area inaccessible to the public.

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 only in 6 out of the 18 facilities. The safety boxes were completely sealed in 2 out of these 6 facilities. At follow up, only 2 facilities had full safety boxes awaiting destriction and both of them had completely closed the safety boxes awaiting final destruction.

5.5 Waste Segregation

One strategy for reducing the amount of used sharps and infectious waste generated by injections is to segregate used sharps, infectious waste and non infectious waste into different containers. At baseline, data collectors found that waste was only segregated in 22% (4 of the 18) health facilities surveyed. At follow up, the number of facilities practicing waste segregation increased significantly to 94% (17 out of 18 facilities, $p \leq .001$, Table 9).

5.6 Loose Biological Waste

The data collectors' next observations 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, they did not find any loose biological waste where it could pose a risk of contamination to providers or the public in 44% (8 of the 18) health facilities surveyed. At follow

up, the number of health facilities that did not have infectious waste disposed improperly anywhere inside or outside facilities increased to 72% (13 of 18 facilities surveyed, p=.09, Table 9).

Table 9: Observations on Segregation of Waste and Biological Waste

	Baseline		Followup	
	Percentage	Number of Health Facilities	Percentage	Number of Health Facilities
Health facilities that segregate their waste in different containers for used sharps, infectious waste and non infectious waste	22%	18	94%	18
Health facilities *without* loose biological waste	44%	18	72%	18

5.7 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 method was open burning in a hole or in an enclosure, which was recorded in 67% of health facilities. This method was significantly less common at follow up (11%, $p \leq .001$). Burial was the second most common method being practiced in 28% of the facilities at baseline, but this dropped to 6% at follow up ($p \leq .09$). The other method observed at baseline was transportation of waste for off site treatment used by one facility at baseline (6%) and two at follow up (11%).

At follow up, the most common waste disposal method observed was low incineration/burning (single chamber) used by 61% of observed facilities. This was a significant increase over baseline, at which time no facility (0%) was using this method ($p \leq .001$). The second most common method at follow up was dumping in an unprotected pit, a method used by 28% of the facilities surveyed. This method had not been observed anywhere at baseline ($p \leq .05$). Open burning on the ground and dumping in a protected pit were observed at only one facility (6%) respectively. Neither had been observed at baseline.

Medium or high temperature incineration was not observed in any facilities in either time period.

Table 10: Observations on the Main Methods Used to Dispose of Sharps Waste at Baseline and Followup

	Baseline		Followup	
	Number of Health Facilities where Method Was Observed (n=18)	Percentage	Number of Health Facilities where Method Was Observed (n=18)	Percentage
Open-air burning in a hole or an enclosure	12	67%	2	11%
Open-air burning on the ground	0	0%	1	6%
Low temperature incineration/ burning (single-chamber)	0	0%	11	61%
Burial	5	28%	1	6%
Dumping in protected pit	0	0%	1	6%
Dumping in an unprotected pit	0	0%	5	28%
Transportation for off-site processing	1	6%	2	11%

5.8 Observations on Job Aids

During their visits to the health facilities, data collectors observed whether one or more communication materials (such as reminder charts and/or job aids) encouraging the rational use of injections or medical waste management were posted. At baseline, they saw materials that promoted reducing the use of injections in 3 out of 18 health facilities (17%). 2 of the 3 were using a poster on biosafety and 1 was using guidelines from the DPS. At follow up, 14 out of 18 health facilities (78%) had materials, a significant improvement over baseline ($p \leq .001$). Of the 14 facilities using materials to promote reducing the use of injections at follow up, 13 facilities were using calendars and 7 were using posters on the "12 Steps to Safe Injections", 1 was using a poster on biosafety as well.

Data collectors also looked for BCC materials that promote the safe administration of injections. At baseline, only 2 facilities (11%) had any material that the data collectors assessed as fitting in this category. No details were collected on the specific materials seen. At follow up, this result improved significantly to 83% of the facilities surveyed ($p \leq .001$). Of the 15 facilities at follow up with any materials, 13 facilities were using calendars, 7 were using posters on the "12 Steps to Safe Injections", and 3 were using a poster on the concept of injection safety saving lives.

The results for materials related to safe disposal of used injection equipment were similar. 2 facilities at baseline (11%) had a poster on bio safety. At follow up, a significant improvement was seen ($p \leq .001$) to 16 of the 18 facilities (89%). Of these 16 facilities, 15 had job aids on waste segregation, 7 were using posters on the "12 Steps to Safe Injections", and 1 was using a poster on biosafety.

Overall across all three messages included in these observations, 3 facilities at baseline (17%) had one or more BCC materials posted compared to all 18 (100%) at follow up ($p \leq .001$).

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 per lower-level facility for a total of 133 injection observations for both time periods, 72 at baseline and 61 at follow up. The analysis presented in this report is calculated as a percentage of all injections observed. Cases where a particular question is not applicable to a particular type of injection procedure will be noted as needed.

The injections observed during this survey were administered by various types of health care personnel. Table 11 presents these results.

Table 11: Types of Health Care Workers Observed Administering an Injection

	Baseline	**Follow up**
Type of Health Care Worker	Percentage of the Total Observed	Percentage of the Total Observed
Nurse	100	69
Midwife	0	10
Medical agent	0	7
Health technical assistant	0	3
Agent of preventive medicine	0	5
Lab technician	0	3
Lab agent	0	3
Total	**100%**	**100%**

By far the most frequent types of injection observed at both time periods were the curative injection followed by preventive injections such as vaccinations. (Table 12)

Table 12: Number of Each Type of Injections Based 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**
Curative (therapeutic)	43	60%	36	59%
Vaccinations	19	26%	16	26%
Family planning	8	11%	2	3%
Diagnostic	2	3%	-	-
Phlebotomy (blood draw)[6]	-	-	3	5%
Finger prick	-	-	4	7%
Total	**72**	**100%**	**61**	**100%**

Table 13: Locations in which Different Types of Injections were Given at Follow Up[7]

	Ward					
Type of Injection	**Injection Room**	**ELAT / PNCTL**	**Family Planning Ward**	**Maternity**	**EPI**	**Lab**
Curative (therapeutic)	32	1	2	1		
Vaccinations			2		14	
Family planning			2			
Phlebotomy (blood draw)[8]						3
Finger prick						4
Total	**32**	**1**	**6**	**1**	**14**	**7**

6.1 Preparation of Injections on a Clean Work Table or Tray

The data collectors began their observations by focusing on the hygienic conditions of the injections – in particular, whether the injection providers had taken care to prepare the injection on a clean work table or tray where contamination of the injection equipment with blood, dirty swabs or other biological waste would be unlikely. At baseline, 58% of all injections observed were prepared on a clean surface. At

[6] At the time of the baseline survey, phlebotomy and finger prick observations were included in a general diagnostic category. At follow up, data collectors recorded more detailed information as to the type of procedure being observed as shown in Table 12.
[7] This analysis is limited to follow up data because ward locations were not collected at baseline.
[8] At the time of the baseline survey, phlebotomy and finger prick observations were included in a general diagnostic category. At follow up, data collectors recorded more detailed information as to the type of procedure being observed as shown in Table 12.

follow up, the number of injections prepared on a clean surface increased significantly to 93% ($p \leq .001$, Figure 2). At follow up, the 4 cases in which injections were not always prepared on a clean surfice were found in maternity, EPI and lab.

6.2 Hand Hygiene and Use of New Gloves

The other aspect of general hygiene that the data collectors observed was hand washing. They 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 at baseline injection providers washed their hands only in 3% of the injections observed. At follow up, this number increased significantly to 27% of the injections observed ($p \leq .001$)[9]. (Figure 2) Out of the 16 providers that washed their hands at follow up, 15 used soap and running water and 1 used a hand sanitizer.

At follow up, the data collectors also observed whether the injection providers used new gloves. In 12% of the injections observed, the providers used new gloves. In 77% of the injections observed, no gloves were worn at all and in the remaining 12% they did not change gloves between patients. These results include 7 finger prick and phlebotomy procedures in which the provider used new gloves in 3 cases, gloves were not changed between patients in 3 cases and no gloves were used in 1 case.

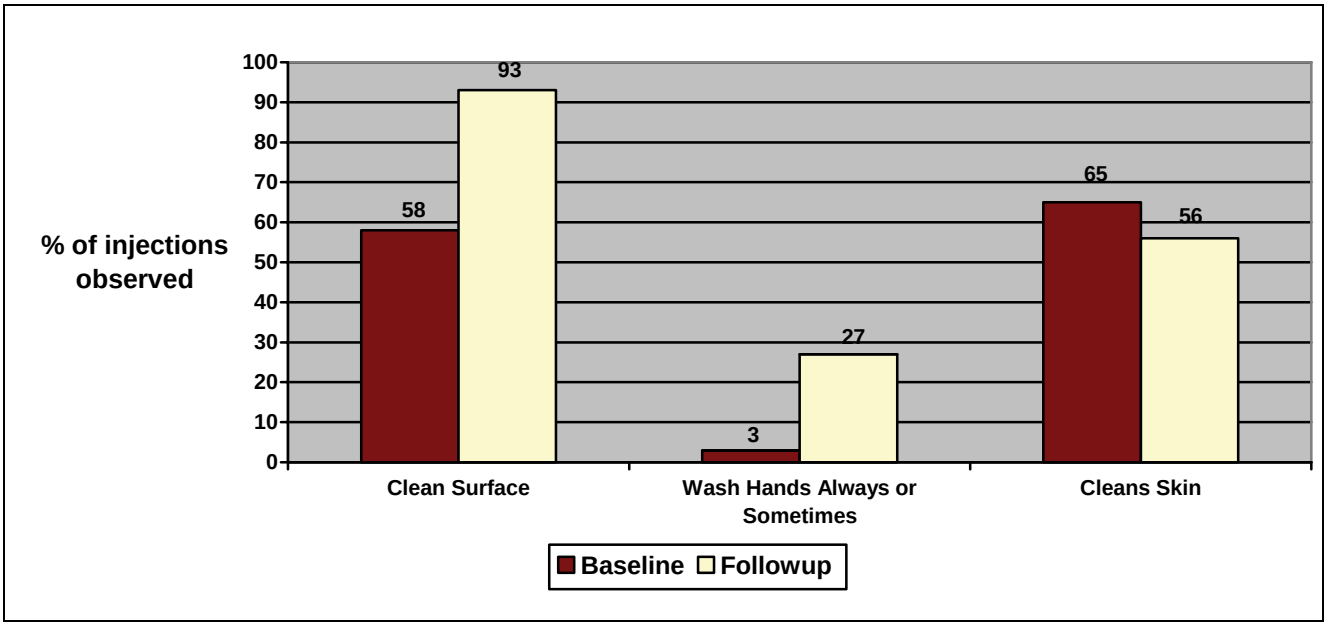
6.3 Cleaning Patients' Skin before the Injection

In this survey, data collectors were able to observe whether and how the injection providers cleaned the patient's skin. At baseline, in 65% of the 72 injections observed, the provider cleaned the skin with a clean swab or a disinfectant before the injection was given. At follow up, 56% of the 59 injections observed for this indicator[10], the provider cleaned patients' skin. In two thirds of these cases, the provider used a clean swab and in one third an antiseptic. (Figure 2) The difference over time between the baseline and follow up results was not significant.

[9] One case at follow up in which the data collector was not able to observe this practice was excluded from the analysis.

[10] Two cases at follow up were excluded from the analysis because the data collector was not able to observe this practice.

Figure 2: Summary of the Observations Related to Infection Prevention and Control



6.4 Type of Equipment Used for Procedure

At follow up, the data collectors observed the type of device for all 61 procedures. An auto-disable needle and syringe were used for the vast majority (85%) including all vaccinations, all but one curative injection and one of two family planning injections). Lancets were used for 7% of all injections observed (i.e.: all 4 finger pricks). Standard disposable needles and syringes were used in 7% of all injections observed (i.e.: all three phlebotomy procedures and one curative injection). A retractable needle and syringe were used in 2% of all injections (i.e.: one family planning/contraceptive case).

6.5 Patients as the Source of Injection Equipment

In some health facilities, if the health care systems do not supply injection providers with sufficient quantities of injection equipment, the patients may be obliged to bring their own needles and syringes. In the facilities surveyed, however, this practice was very rare. In the 72 objections done at baseline, only 1 of the injections (1%) was administered with a needle and syringe brought by the patient. At follow up, no cases of patients providing devices were observed. (Figure 3).

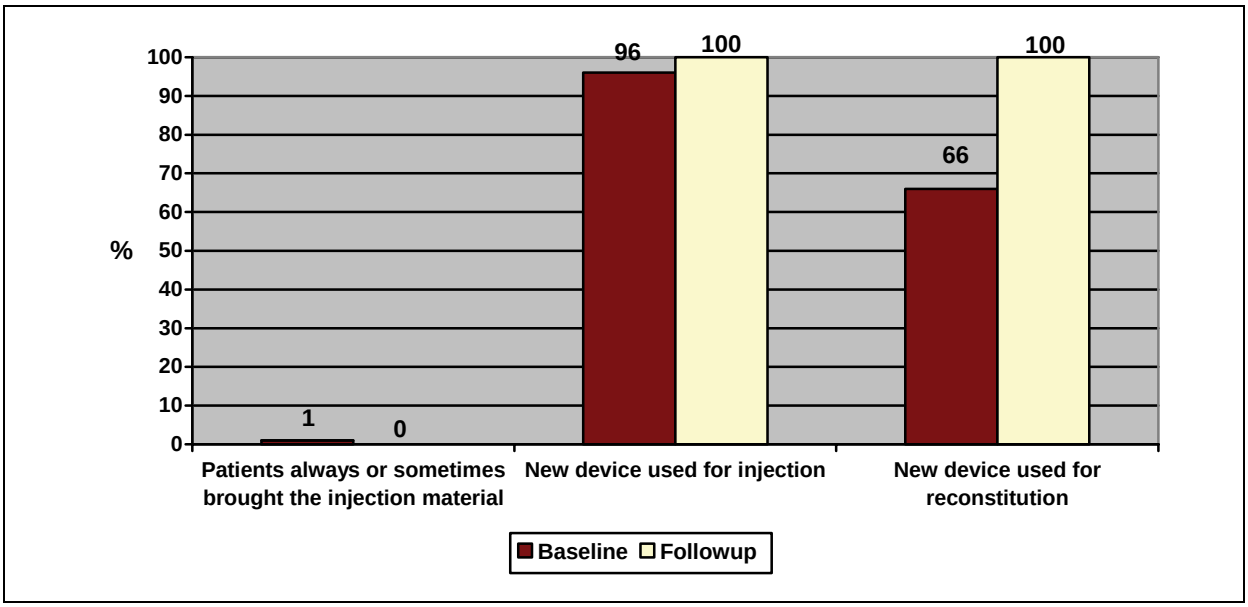
6.6 Use of New Needles and Syringes for Injections and to Reconstitute Medications

Nearly all injections observed at baseline[11] (96%) were administered with a new syringe and needle. (Among the three cases that were not seen to be drawn from a new packet, data collectors did not observe any instances of reuse without reprocessing.) At follow up, this practice was universal with 100% of the injections being administered with a needle and syringe from a sterile package (Figure 3).

[11] One baseline case in which this practice could not be observed was excluded from the analysis.

The proportion of injections with a vaccine or reconstituted medication in which the provider used new needles and syringes was significantly lower for the 50 observations at baseline (66%) than for the 35 injections at follow up, all of which (100%) were administered with a new sterile device ($p \leq .001$). (Figure 3)

Figure 3: Summary of the Distribution of Observations on the Sources and Practices of Using New Needles and Syringes



6.7 Removing Needles from the Cap of Multi-dose Vials and Cleaning of the Cap

A needle, which remains in the rubber cap of a multi-dose 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. The question concerning multi-dose vials is only applicable to curative injections, vaccinations and family planning injections. For this variable, the data collectors were able to make observations of injections in which this variable was relevant (ie: a multi-dose vial was used) in 69 cases (45 at baseline and 24 at follow up). At baseline, the needle was removed from the rubber cap in 71% of the injections observed compared to 100% at follow up, a significant improvement ($p \leq .01$).

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 67% of the 45 cases observed.

6.8 Use of Clean Barriers to Protect Fingers when Breaking Glass Ampoules

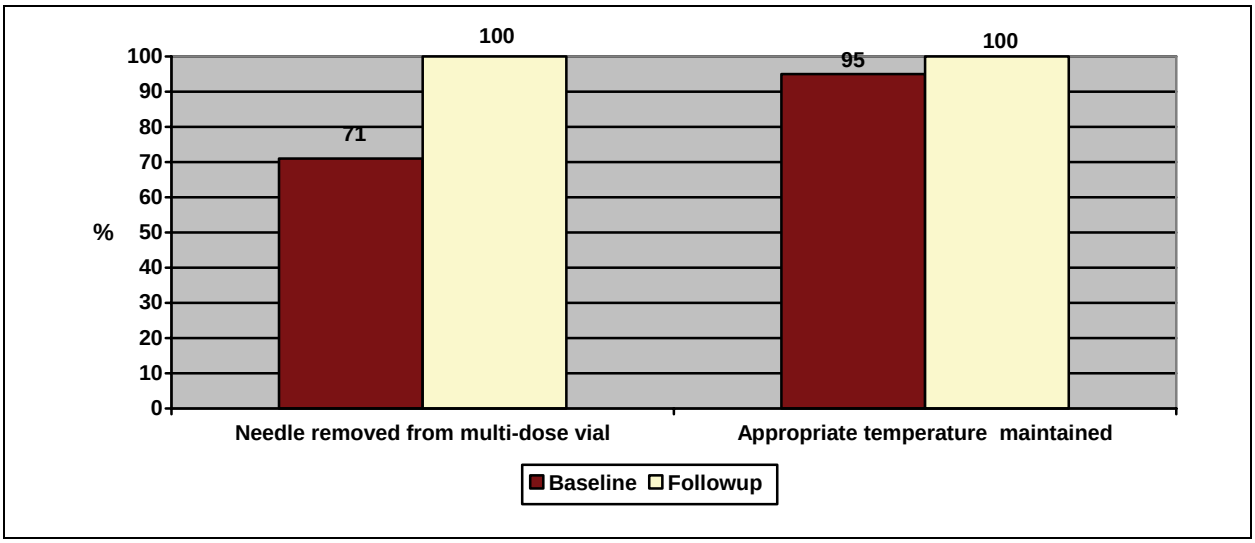
Injection providers can be injured when opening or breaking glass vials, which risks contaminating the injectable medication or injection equipment. For this reason, injection providers were observed while they were preparing injections. The data collectors noted what material (i.e. a sponge, cotton or gauze) was used by the providers as a barrier to protect their fingers when breaking the ampoules. In the cases in which this variable was relevant (ie: glass ampoules were used) and in which it could be evaluated. At baseline, only one injection qualified for this evaluation and the provider did use a clean barrier when

breaking the glass ampoule. At follow up, providers did not take this precaution in any of the three cases of use of a glass ampoule

6.9 Temperature at which Heat-sensitive Vaccines were Stored

The data collectors observed the temperature at which heat-sensitive vaccines were stored. At baseline, 18 out of 19 vaccines (95%) were stored at an appropriate temperature between 2-8º C. At follow up, all 16 vaccinations (100%) were stored at appropriate temperature (Figure 4).

Figure 4: Summary of the Variables on Protecting Injectable Medications from Contamination or Deterioration



6.10 Recapping Needles after Administering Injections

The practice of recapping entails risks for injection providers because it exposes them to blood-borne pathogens. Unlike the preceding surveys which were focused 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. (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.)

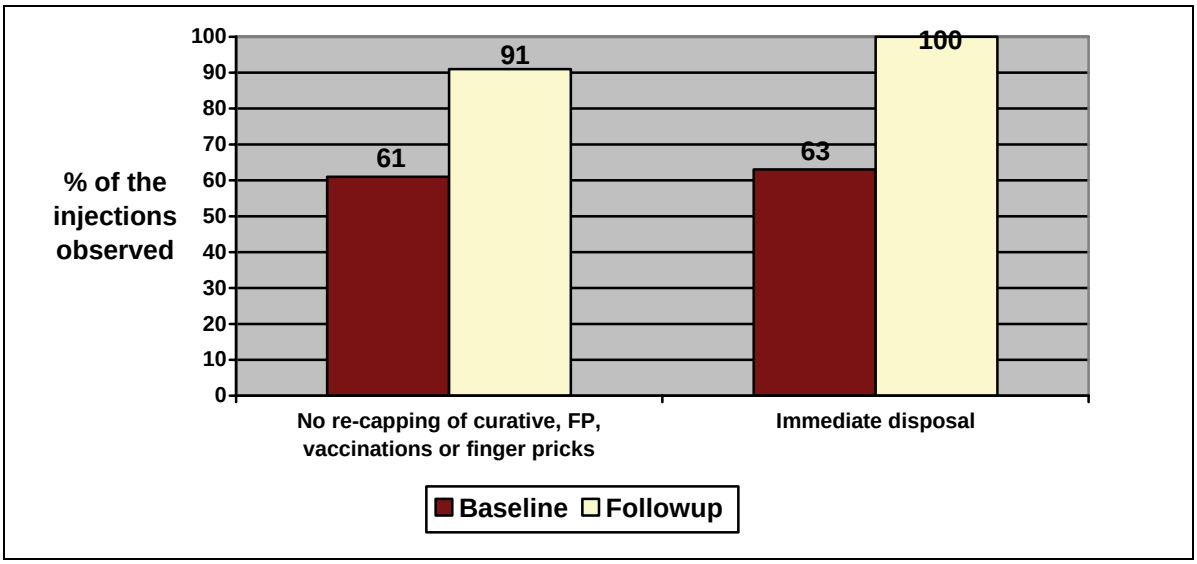
At baseline, used devices were discarded without recapping in 61% of the 70 curative, family planning injections, vaccinations and finger pricks observed. At follow up, in the 53 injections in which this practice could be observed, the providers discarded 91% of the used devices without recapping them (Figure 5). This change was a significant improvement overall ($p \leq .001$).

Two-handed recapping is considered an unsafe practice that can lead to needle stick injury. This was found in 3 of the 5 cases of recapping. The one-handed technique was used in the other 2 cases. It is important to note, though, that all 5 cases of recapping were curative injections, none of which should be recapped at all before the used sharp is disposed of in an appropriate sharps container.

6.11 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, 63% of the 70 injections observed[12] at baseline were disposed immediately (Figure 5). The data collectors observed that this practice was universal (100%) at follow up, a significant improvement ($p \leq .001$). In addition, location of a needle remover or sharps container within arms reach to facilitate immediate disposal was also universal (100%) at follow up[13].

Figure 5: Summary of the Observations on Disposal of Sharp Objects after Injections



[12] Two baseline cases in which this practice could not be observed were excluded from the analysis.
[13] One follow up case in which this variable was not recorded was excluded from the analysis.

6.13 Behavior Change Communication (BCC)

Data collectors observed whether the injection providers provided any instructions or behavior change messages to the patients after administering an injection. At baseline, no such instructions or messages were given by any providers and none of the injection providers referred to any BCC material when talking to the patients in either time period. At follow up, however, some messages were given. Data collectors noted their observations for each specific message. Hence, the total of the observations exceeds 100%.

Their observations showed that 89% of the 61 providers observed gave follow up instructions to the patients, 3% told patients when to come back to the clinic for a follow up, 3% mentioned the importance of the vaccination, 3% mentioned side effects of the injection, 3% told patients how to treat side effects, and 2% told patients what to do in case of an adverse reaction.

6.14 Phlebotomy analysis

At follow up, the data collectors sought to collect information on the practices regarding phlebotomy, but they were only able to observe 3 cases on the day of the survey. These 3 were administered using standard disposable syringes. For all 3 procedures, the injection was done with a new device, and the providers disposed the used devices safely after administering the injection. In all 3 cases, the provider cleaned the patient's skin with a clean swab, but in 1 case the procedure was conducted on a table or tray that was not a clean surface. The provider did not clean his/her own hands before the procedure. Furthermore, new gloves were used in only 1 of the 3 procedures. In the remaining 2, the providers did not change gloves between patients.

In all 3 phlebotomy cases, the provider removed the used sharp prior to transferring the blood to a test tube for analysis. However, in only 1 case, he/she recapped the used sharp with a one-handed technique prior to the transfer in order to avoid a potential needle stick injury. In the other 2 cases, the provider used his/her bare hands, which is considered an unsafe practice. As a result, overall, only 1 of the phlebotomy cases was considered to have been done safely as regards the transfer of the blood to the test tube.

7. Interviews with Injection Providers

This section contains data on interviews with the injection providers. A total of 36 providers were interviewed or one in each of the 18 facilities in each time period. At baseline, all the providers interviewed were nurses. At follow up, 14 (78%) were nurses, 2 (11%) were midwives, 1 (6%) was a lab worker and 1 was an unspecified medical worker. (Table 14)

Table 14: Number of Injection Providers Interviewed, by Job Category

	Baseline	Follow up	Total
Qualifications	Number of Injection Providers, by Job Category	Number of Injection Providers, by Job Category	Percentage of the Total
Nurse	18	14	32
Midwife	0	2	2
Lab worker	0	1	1
Medical worker	0	1	1
Total	**18**	**18**	**36**

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, contraception injections, curative injections and diagnostic injections.

At baseline, 4 out of 18 the providers interviewed at baseline and 3 out of 18 at follow up declared that the question on vaccinations did not apply to them. Of the remaining providers, none at baseline or at follow up reported that patients ever bring the syringes for vaccinations.

With regard to contraception services, 2 out of 18 providers at baseline and 5 of 18 at follow up declared that this question did not apply to them. Of the remaining providers, none at baseline or at follow up reported that patients ever bring the syringes for contraceptive injections.

Regarding curative injections, at baseline, 39% of providers interviewed (7 out of 18) indicated that patients sometimes bring the needle and syringe. The remaining 61% (11 out of 18) indicated that the patients never bring the needle and syringe. At follow up, 3 out of 16 providers (19%) indicated that the patients sometimes bring a needle and syringe for curative injections. The rest (81%) reported that patients never do so.[14]

[14] Two providers who indicated that this question does not apply to them were excluded from the analysis at follow up.

At baseline, one out of five of the injection providers interviewed who provide diagnostic injections or phlebotomy services declared that the patients sometimes bring the injection equipment for diagnostic injections and the rest of them indicated that the patients never does so. At follow up, none of the 7 providers who provide diagnostic injections or phlebotomy services reported that the patients bring the syringe and needle.[15]

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, 17% (3 out of 18) of the injection providers indicated that it was possible to buy injection equipment in their communities. The rest said that it was not possible or did not know. At follow up, 11% (2 out of 18) declared that it is possible to buy needles and syringes in the community and the rest said that it was not possible to do so.

7.2 Use of Disposable Safety Syringes

The data collecters asked the providers whether they use any disposable safety syringes that prevent reuse or needle stick injuries. This question was asked only at the follow up. 17 of the providers interviewed (94%) declared that they use such syringes. All 17 of these providers reported that they use syringes with features that prevent reuse such as auto disable syringes; none of them have any other safety features. Next, the data collectors asked the same group of providers about the procedures for which they use reuse prevention syringes. 12 of the 17 declared that they use the syringes for vaccines, 14 use them for curative injections, 6 use them for family planning injections, and one mentioned using them for diagnostic injections but not for drawing blood.

7.3 Reuse of a Needle or Syringe

At baseline, when data collectors asked whether the injection providers had reused a syringe on another patient, 2 providers (11% of the providers interviewed) answered affirmatively and both reported boiling them to sterilize them. (One of these providers had reported having a stock of sterilizable syringes at the time, so it is possible that the reference was to a glass syringe.) At baseline, the data collectors also asked all 18 providers under what conditions they would sterilize used needles/syringes. 11 of them (61%) said that there were no conditions to justify such action, 4 providers (22%) said that they would consider sterilization if there was a stockout, and the last 3 providers (17%) indicated that they would consider it if the patient could not afford buying a new needle/syringe.

At follow up, the data collectors asked all 18 providers whether they were aware of cases of re-use of a disposable syringe or needle across patients in the last six months. None of them were aware of such practices in the last 6 months. Next, the data collectors asked the providers under what conditions someone would re-use injection equipment on the same patient or another patient. Almost universally, 17 of the providers (94%) responded that re-using injection equipment would never be acceptable under any conditions. The remaining provider (6%) only reported that he/she could imagine re-use happening if the patients got an injection outside of his/her facility.

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. Overall, 44% (8 out of 18) of the injection providers declared that they use them. The rest (56%) did not. At follow up, the data collectors

[15] The remaining providers were excluded from each time period because they do not provide this type of service.

asked the injection providers if they used a needle cutter in the facility and none of them (0 out of 18) indicated of doing so.

7.5 Recall of Stockouts of Safety Boxes and Syringes

At baseline, the data collectors asked the providers whether they had ever had safety boxes at their facility. Two providers (11%) reported that they had never had a stock of them; the remaining 16 providers with a stock of safety boxes had not had any stock outs in safety boxes in the six months prior to the survey. At follow up, all 18 providers had safety boxes at their facilities. None of the providers recalled any stock outs in the last six months prior to the survey (16 providers (89%) responded that there had been no stock outs of safety boxes and the other two (11%) could not recall any stock outs).

The baseline results for stockouts of single-use disposable sterile syringes (including standard, auto-disable (AD) or retractable syringes) in the six months prior to the survey show that 5 providers (28%) had not had any stockouts in the last six months prior to the survey compared to 15 providers (83%) at follow up. This difference is significant ($p \leq 001$).

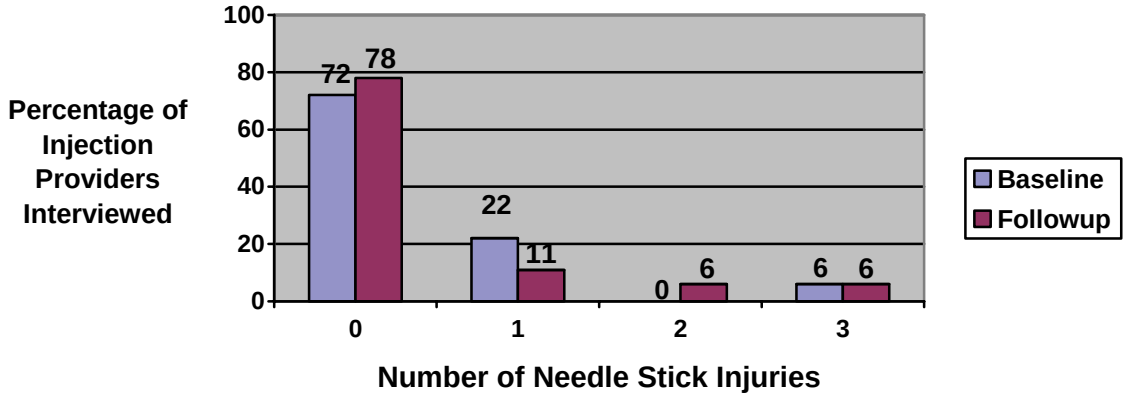
The amount of time of stockouts varied between the two time periods with more reports of longer stockout periods at baseline than at follow up. At baseline, 1 provider (6%) had stockouts lasting less than a week, 9 providers (50%) had stockouts lasting for longer than a week but less than a month, 2 (11%) had stockouts longer than a month and 1 (6%) had stockouts longer than 3 months. Out of the 18 providers at follow up, indicated that there had been no stockouts in the last six months, 2 providers (11%) had stockouts that lasted for less than one week and 1 (6%) had stockouts that lasted for more than a week but less than one month. At follow up, the three providers who mentioned any stockout were asked what was out of stock. One provider mentioned the 10cc syringes, one mentioned 5cc syringes and the mentioned disposable syringes without providing any further details.

The data collectors also asked what the injection providers did during the stockouts of syringes. Out of the 13 providers that had experienced any stockouts at baseline, 1 provider instructed patients to buy syringes and 2 providers reported sterilizing the used syringes for reuse. There were no details recorded for any other responses. At follow up, no providers mentioned sterilizing any for reuse. All three providers that had experienced stock outs reported using a different size/type of syringe that was in stock and they also indicated that the stock outs lasted a short time so they did not interfere with their work.

7.6 Accidental Needle Stick Injuries

The data collectors asked the injection providers whether they had experienced any accidental needle stick injuries in the six months prior to the survey. At baseline, 13 out of 18 providers interviewed (72%) had not had any accidental needle stick injuries during that time, 4 providers (22%) had received one and 1 provider (6%) had three injuries. At follow up, 14 providers interviewed (78%) had not received any needle stick injuries in the six months prior to the survey, 2 providers (11%) had received one, 1 (6%) had received two and 1 (6%) had received three. (Figure 6)

Figure 6: Frequency of Accidental Needle Stick Injuries among Injection Providers Interviewed



At follow up, the data collectors asked the 4 providers who reported a total of 7 injuries about the type of the injection procedure that they were performing when the injury occurred. 3 of the 4 indicated that they were administering an immunization injection, 1 provider mentioned a curative injection and 1 was suturing a wound when the accident occurred.

The data collectors also asked the injured providers about the type of needle or sharp item that caused the injuries. Four providers reported being injured by the needle of an auto-disable syringe and one by a suturing needle. The four injured providers described what happened when they got injured as follows:

- One provider was suturing a uterus when he/she was injured.
- Three injuries (1 curative and 2 immunizations) were all related to giving injections to children.
- Two providers were injured before the needle was used (one was opening the syringe package and one was preparing a vaccination).

Out of the four injured providers at follow up, two reported the injuries to their supervisors, who advised to the providers to take an HIV test. The other two that did not report did so because the needle/syringe was not infected.

At follow up, the data collectors asked all of the providers being interviewed whether HIV post-exposure prophylaxis (PEP) was available at the facility where they worked. 6 providers (33%) responded 'yes', 10 (56%) responded 'no', and 2 did not know whether PEP was available. Among the 4 providers who were injured, 2 reported that PEP was available at their facility, 1 said that it was not, and 1 did not know.

7.7 Providers' Knowledge of Diseases Transmitted by Reuse of Non Sterile Needles

The data collectors asked the providers at both time periods whether they were aware of diseases that can be transmitted by re-use of a non-sterile needle or needle stick injury. All the providers (100%) at both time periods responded affirmatively to this question. When asked about the specific diseases of which they were aware, at baseline, 17 out of 18 providers (94%) mentioned HIV while at follow up, all providers (100%) mentioned it. At baseline, 10 providers (56%) mentioned hepatitis B compared to 7 at follow up (39%), but this difference was not significant. Only 1 provider at follow up (6%) mentioned hepatitis C. In all, only one injection provider at follow up mentioned all three diseases known to be

transmitted by unsafe injections or waste management practices (i.e: HIV, hepatitis B, hepatitis C). Other diseases mentioned by any providers in either time period included syphilis (2 providers or 11% at follow up), tuberculosis (1 provider or 6% in each time period), and tetanus (1 provider or 6% at baseline).

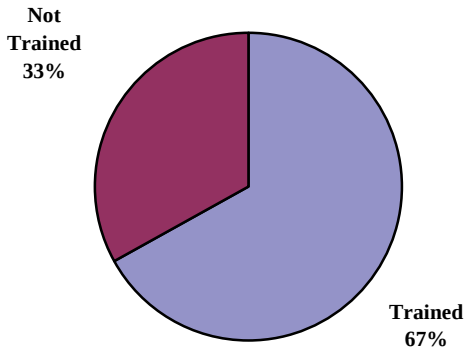
7.8 Injection Providers Vaccinated Against Hepatitis B

The data collectors asked the providers whether they had received the vaccine against hepatitis B. At baseline, none of the providers had received the vaccination. At follow up, only one provider had received the vaccination (6%), but this person had only received one dose rather than the three doses needed for complete protection. Thus, no providers in either time period were protected from hepatitis B infections.

7.9 Injection Providers Who Received Training on Injection Safety

At baseline none of the injection providers had received any training in injection safety. At follow up, 12 providers (67%) had received some training in injection safety. This difference was significant ($p \leq 001$.) Of the 12 providers at followup with any training, 2 providers received training three years prior to the survey, 6 providers received it two years prior, 3 providers received it one year prior, and 1 received it just one month before the follow up survey. All four providers who received any accidental needle stick injuries in the six months preceding this survey had also been trained on injection safety.

Figure 7: Injection Providers Who Received Training on Injection Safety at Followup



7.10 Description of Safe Injection

At follow up, injection providers were asked how they would describe a safe injection. The most common response (14 providers or 78%) was that “a safe injection is a procedure that does not harm the recipient, the provider or the community.” Other responses, in order of prevalence, included: 5 providers (28%) who mentioned new/sterile injection equipment; 4 (22%) hand washing; 3 (17%) using the right route; 2 (11%) safe disposal; 2 (11%) correct reconstitution of medication; 1 (6%) using the right medication; and 1 (6%) using gloves.

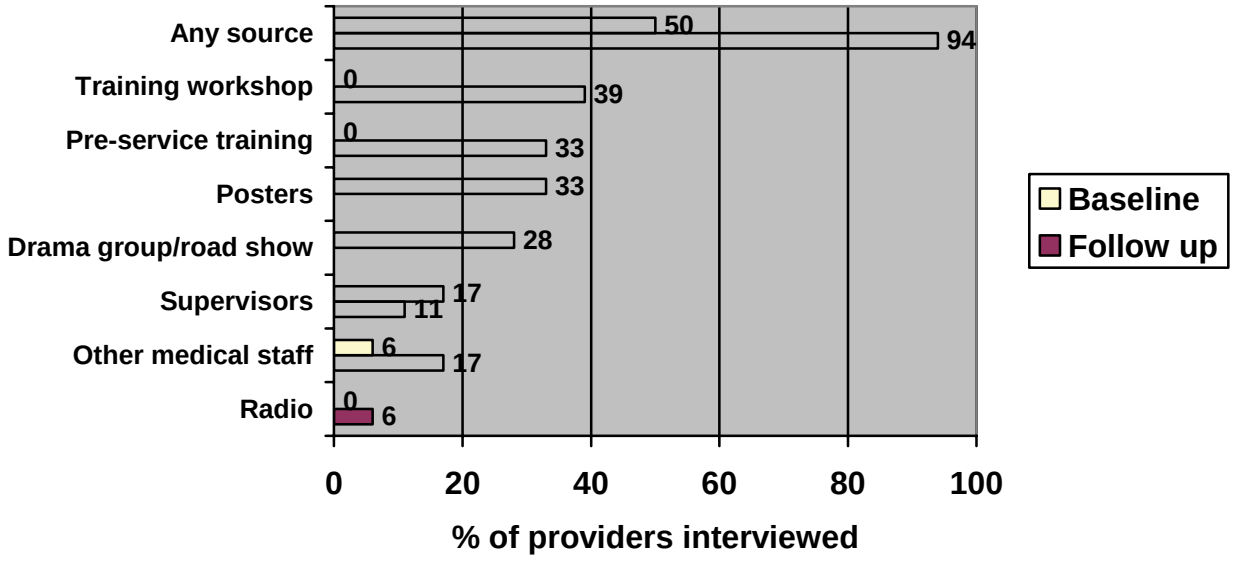
In addition, the data collectors asked the providers about the difficulties that they perceived in following safe injection and waste disposal practices for every injection. The most common response was lack of material for segregation of waste mentioned by 9 providers (50%), followed by shortage of gloves, which was mentioned by 5 of them (28%) while two (11%) mentioned lack of stock of needles and syringes.

The remaining items were each mentioned by one person (6%): lack of time, basins and running water, PEP, means of protection from injuries, and patient's fear of injections. One person who had not yet been trained also mentioned lack of information on injection safety.

7.11 Sources of Information for Safe Injection Practices and/or Safe Disposal Practices and Their Usefulness

The data collectors also asked the providers where they had heard or seen anything about reducing the number of injections, safe injection practices and/or safe disposal practices. Out of 18 providers at baseline, 9 mentioned one or more sources and 9 did not know or did not remember if they had heard or seen such messages. Of the 9 who mentioned any source(s), 6 (33%) mentioned posters; 5 (28%) drama groups/road shows; 3 (17%) supervisors; and 1 (6%) other medical staff. At follow up, out of 18 providers, only one did not know or did not remember if he/she had heard or seen any such messages. Out of the 17 who mentioned one or more source(s), 7 (39%) mentioned training workshops, 6 (33%) pre-service training; 3 (17%) other health staff; 2 (11%) supervisor; and 1 (6%) radio. One person (6%) also mentioned receiving "orientation" but it was not clear whether this was given by the person's supervisor or other health staff.

Figure 8: Sources of Injection Safety Information, at Baseline and Follow up



At follow up, the data collectors next asked the providers what behavior change and communication (BCC) materials they had around. All the providers mentioned more than one material. 15 providers (83%) mentioned calendars; 14 (78%) posters; and 4 (22%) brochures. Then, the data collectors asked the providers which of the materials were useful to them or their patients. 7 out of the 15 providers that mentioned calenders along with 12 out of the 14 providers that mentioned posters found them to be useful. None of the 4 providers that mentioned brochures found them to be useful.

Among the reasons for finding the BCC materials useful that were cited by any of the 16 providers who found them useful were that they are "a good reminder" (12 providers), they can teach patients/community (11 providers); easy to understand (3 providers), interesting and attracts attention (3 providers), and good visual aid / pictoral (2 providers).

7.12 Provider Perceptions of Risks and Benefits of Injections

When asked to what extent they feel at risk of contracting an infection from injection equipment or injection waste in the health facility where they worked. Out of the 18 providers interviewed at baseline, 12 (67%) felt at high risk and 6 providers (33%) felt at some risk. At follow up, 11 out of 18 providers (61%) said that they feel at high risk, 3 providers (17%) more or less high risk, and 3 providers (17%) some risk. Only one provider (6%) did not feel at risk.

The reasons for feeling this way were described as a fear of contracting an infection such as HIV/AIDS at baseline; this was mentioned in some way by all providers. At follow up, needle stick injuries and/or contracting illnesses such as HIV and others were mentioned by 11 providers. Lack of protective equipment and risk associated with biological products were each mentioned by 1 provider. Those who reported little or no risk explained that they are careful with used devices and following guidelines to reduce their risk and, in particular, use of safety boxes.

Finally, at follow up, providers were asked whether a medicine taken by mouth was more effective, just as effective as, or less effective than medicine taken by injection when treating a simple case of fever. Out of the 18 providers, 15 (83%) declared that oral was more effective than injectable medicine, 2 providers (11%) said that oral was just as effective and one provider (6%) said that it depended on the probable cause of fever.

8. Interviews with Supervisors of Injection Providers

A total of 36 interviews were conducted or 18 in each time period. The data collectors interviewed one person per health facility. 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. At follow up, 11 injection providers were interviewed as supervisors because of this lack of supervisory staff on site.

8.1 Availability of Policies and Guidelines

The data collectors asked the respondents whether they had a copy of the injection safety policy or workplan in the facility. No one reported having this type of document in either time period, but at follow up, 14 out of 18 respondents (78%) reported having a copy of guidelines or recommendations on injection safety. (Of the remaining respondents, 2 did not have it and 2 did not know.) This was a significant improvement over baseline, at which time only 1 person (6%) had a copy of recommendations or guidelines related to injection safety ($p \leq 001$).

Data collectors also asked whether the respondents had a copy of the waste management guidelines. At baseline, none of the respondents (0%) had a copy. At follow up, 11 respondents (61%) reported having them, 6 did not, and 1 did not know. Although availability of these guidelines was not universal, this was a significant improvement over baseline ($p \leq 001$).

At last, the data collectors asked the supervisors to show the documents that they had. The one supervisor at baseline that reported having a copy of guidelines and recommendations on injection safety showed the interviewer his/her copy. At follow up, of the 14 supervisors that reported having a copy of this type of document, only 11 showed a copy of it to the interviewer. Of the 11 supervisors who declared of having a copy of waste management guidelines, only 9 showed a copy to the data collectors.

None of the supervisors interviewed at follow up had all three documents.

8.2 Stockouts of Syringes and Safety Boxes

The data collectors asked the supervisors whether they had been out of stock of any size or type of single-use disposable syringes in the last six months. Out of the 18 interviewed at baseline, 6 (33%) declared that there had not been any stock outs, 4 (22%) supervisors declared that they had been out of stock for less than a week, 7 (39%) reported stocks for more than a week but less than a month and 1 (6%) had been out of stock for over one month. At follow up, 17 out of 18 supervisors (94%) had not had had any stock outs in the six months preceding the survey and 1 (6%) declared a stock one lasting less than a week. This supervisor declared that the 2ml and 5ml syringes were the ones out of stock for less than one week.

Next, the data collectors asked the supervisors if they used safety boxes in the wards that they supervised and whether they had been out of safety boxes in the six months prior to the survey. Out of the 18 supervisors interviewed at baseline, 15 had not experienced any stock outs in the previous six months (83%), 1 person (6%) had experienced a stock out for less than a week, and 2 people (11%) had never had any safety boxes (effectively, the equivalent of a permanent stock out). At follow up, 17 supervisors

(94% of those interviewed) had had no stock outs during the study period. The remaining person (6%) had never had any stock of them.

8.3 Delivery of Vaccines and Other Medications 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. Of the supervisors interviewed, 5 out of 18 supervisors (28%) at baseline and 2 out of 18 supervisors (11%) at follow up declared that the questions about vaccines did not apply to them because it was not applicable to the wards these supervisors oversaw. Of the rest, 9 out of 13 supervisors at baseline (69%) declared that the vaccines were delivered with the corresponding quantities of injection equipment, 3 said that the quantities were not adequate, and 1 did not know. At follow up, 15 out of 16 supervisors (94%) to whom the question about vaccines applied, declared that the vaccines were delivered with the corresponding quantities of injection equipment and 1 supervisor said that the quantities were not adequate (Figure 9).

The data collectors also asked the supervisors whether the stock of vaccines were delivered (or available) with adequate quantities of safety boxes. At baseline, of the 13 supervisors who dealt with vaccines, 8 (62%) declared that the vaccines were always delivered with the adequate quantities of safety boxes, 4 supervisors (31%) declared that the vaccines were not delivered with the adequate quantities of safety boxes and 1 supervisor (8%) did not know. Out of the 16 supervisors to whom the question about vaccines applied at follow up, 15 (94%) declared that the vaccines were delivered with adequate quantities of safety boxes and 1 supervisor (6%) declared that this wasn't the case. It is worth noting that this was the same supervisor who reported the problem of non corresponding quantities for syringes.

Stocks of other injectable medications were delivered (or available) with the corresponding quantities of injection equipment, according to 44% of all 18 supervisors interviewed at baseline. At follow up, 100% of the supervisors interviewed declared that the injectable medication was delivered with the corresponding quantities of injection equipment. This was a significant improvement over the baseline finding ($p \leq .001$).

Regarding the question whether the injectable medication was delivered with adequate quantities of safety boxes, 6 out of the 17 supervisors at baseline who responded to this question (35%) declared that the delivery was adequate while the remaining 11 supervisors said that it was not. At follow up, 100% of the 18 supervisors interviewed declared that the delivery of injectable medications was done with the corresponding quantities of safety boxes. This was a significant improvement over the baseline finding ($p \leq .001$).

Figure 9: Injection Equipment and Safety boxes Delivered in Corresponding Quantities for Vaccines

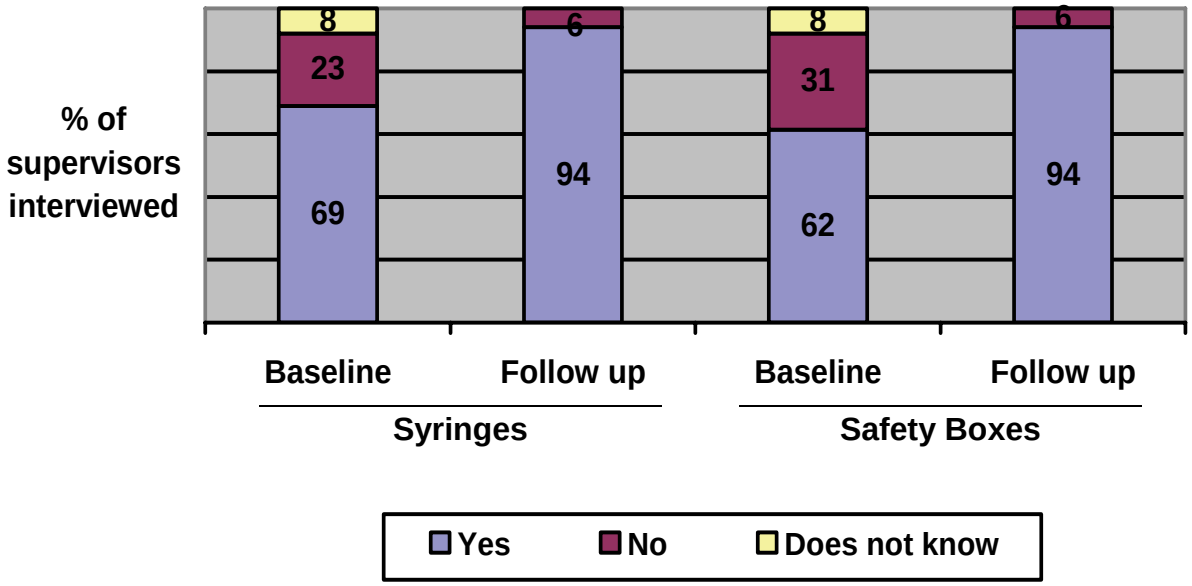
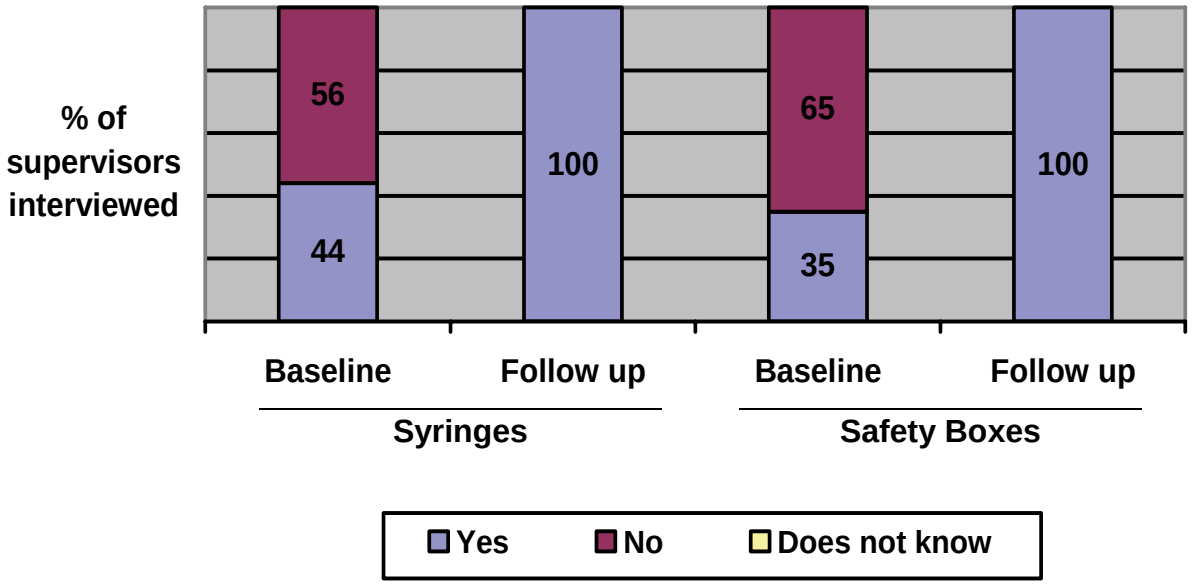


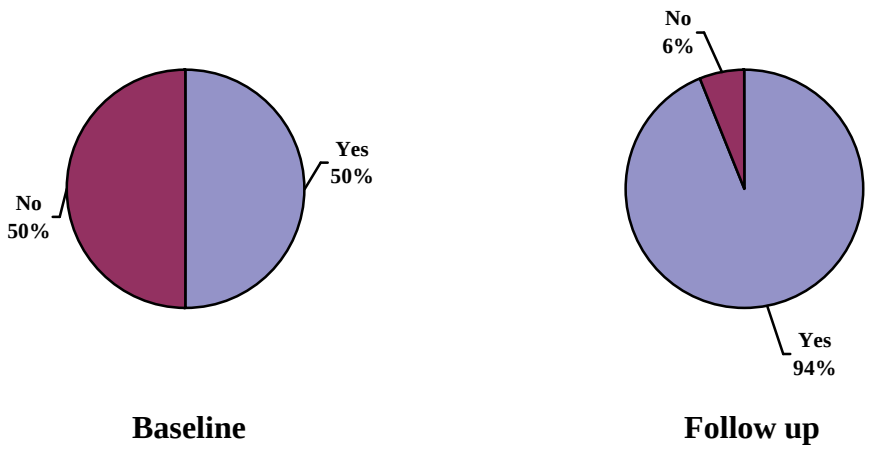
Figure 10: Injection Equipment and Safety boxes Delivered in Corresponding Quantities for Other Medications



8.4 Supervisors' Perception of the Quantities of Syringes and Safety Boxes for Curative Services

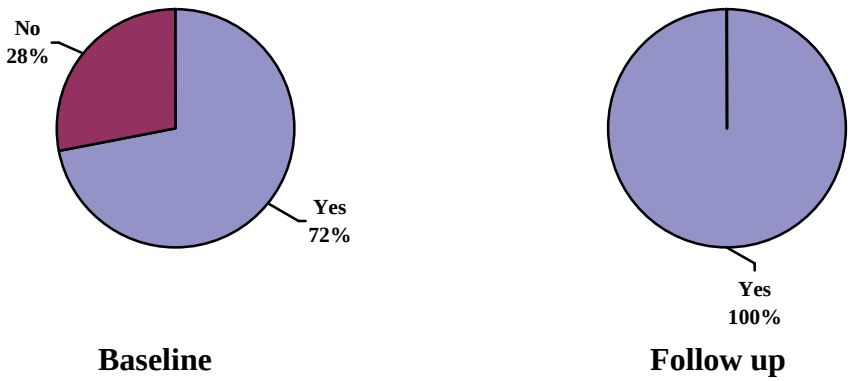
Data collectors asked the supervisors whether they thought the quantities of needles and syringes provided to them were adequate for the provision of curative services in their health facilities. At baseline, 9 supervisors (50%) declared that they were adequate and the rest (50%) said that they were not. At follow up, 17 supervisors (94%) declared that the quantities of needles and syringes were adequate and 1 supervisor (6%) said that they were not. This was a significant improvement over the baseline finding ($p \leq .01$).

Figure 11: Supervisors' Perception that the Quantities of Injection Equipment were Adequate for Curative Services They Provide



With regard to safety boxes, at baseline, 13 supervisors (72%) said that the quantity of safety boxes was adequate and the other 5 (28%) said that the quantity was not adequate. At follow up, all 18 supervisors (100%) declared that the quantity of safety boxes was adequate to cover the treatment services in their health facilities. This was a significant improvement over the baseline finding ($p \leq .05$).

Figure 12: Supervisors' Perception that the Quantities of Safety Boxes were Adequate for Curative Services They Provide



8.5 Supervisors' Reminders on Injection Safety

The data collectors also asked if the supervisors found that they needed to remind injection providers about injection safety. Out of the 18 interviewed at baseline, 67% said that they reminded the injection providers about injection safety, 28% said that they did not, and 6% said that they did not know. At follow up, 83% of the supervisors (15 out of 18) said that they remind providers about injection safety while 17% said that they did not. These two time periods were not significantly different.

Next, the data collectors asked the supervisors about their opinion on what were the most important things to remind injection providers. Out of the 12 supervisors who reported giving any reminders at baseline, 9 supervisors mentioned reminding providers about washing their hands, 7 mentioned reminding providers about cleaning patient's skin, 4 mentioned that it was important to remind providers about using a clean table/tray, 4 mentioned reminding providers about using gloves, 2 mentioned reminding providers about the use of new needle and syringe from a sealed package for each injection, 2 mentioned reminding providers about being careful of needle sticks, 1 mentioned reminding them to remove the needle from the rubber cap of multidose vials after withdrawing each dose, 1 mentioned reminding about the use of clean barriers if using ampoule, and 1 mentioned reminding the providers about checking the dosage of medications.

At follow up, out of the 14 supervisors who reported giving any reminders, 1 mentioned clean table/tray, 6 mentioned hand washing, 3 mentioned reminding them about wearing gloves, 1 supervisor mentioned reminding about the use of new needle and syringe, two supervisor mentioned reminding about the removal of needle from rubber cap of multidose vial after withdrawing each dose, 2 mentioned not recapping the needle, 3 supervisors mendioned being careful of needle sticks, 3 mentioned immediately dispose of needles or using a needle remover, 2 mentioned not overfilling safety boxes, 1 mentioned the reminding of checking dosage of medications. Other messages mentioned at follow up included: follow waste management norms / 12 Steps to Injection Safety practices (mentioned by 3 supervisors), not giving unnecessary injections / reducing them as much as possible (2), telling the provider to be careful not to hurt the patient or himself (1), not using poor practices for administering injections (1), registering patients that receive injections (1), removing waste (1) and giving instructions to the patients (1).

9. Interviews of Waste Handlers

At each time period, 18 waste handlers were interviewed during this survey, i.e. one participant per health facility. In cases in which the surveyor found several waste handlers, he interviewed the main person responsible for waste management. As mentioned in the previous sections, all the facilities where the survey was conducted were lower level facilities owned by the government.

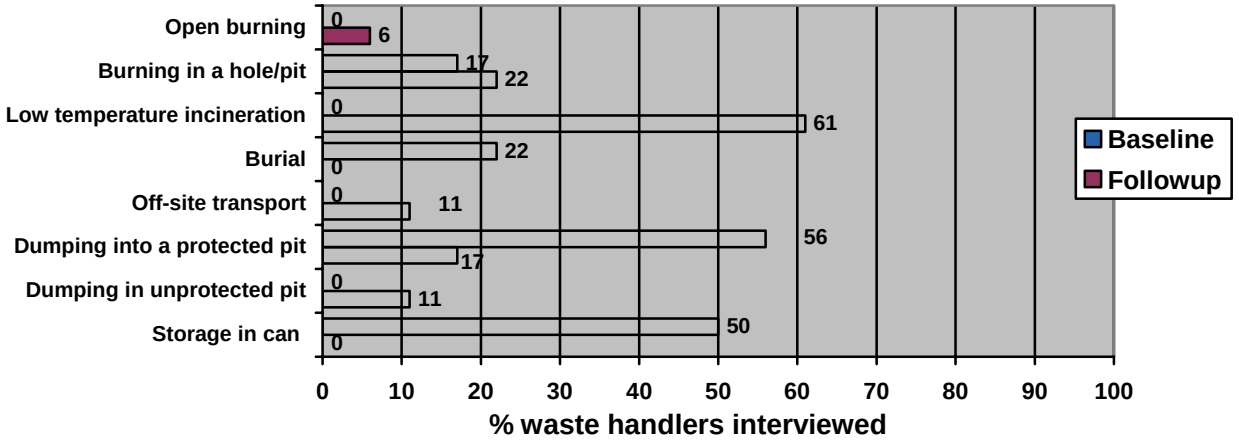
9.1 Main Methods of Waste Disposal Used

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 non-infectious waste. All waste handlers mentioned at least one method. Some waste handlers responded by citing several methods. (In cases where several methods were mentioned, the sum of the results may exceed 100%).

Out of the 18 waste handlers, the most common method of disposing of **sharps waste** at baseline was dumping in a protected pit, which was mentioned by 56% of the waste handlers (10 respondents). This result dropped to 17% at the time of the follow up (3 respondents, $p \leq .05$). At baseline, 50% (9 waste handlers) mentioned storing used sharps in a tin can, but this option was not used by anyone at follow up. ($p \leq .01$) At follow up, 11% (2 respondents) mentioned dumping in an unprotected pit; no one had reported this at baseline. Burial was mentioned by 22% of waste handlers at baseline (4 respondents) compared to none at follow up ($p \leq .05$). Open burning in a hole or in an enclosure was mentioned by 17% (3 waste handlers) at baseline and 22% (4 people) at follow up with one additional person (6%) mentioning “open burning” without any further details.

Of the 18 waste handlers at follow up, 61% (11 respondents) mentioned low temperature incineration/burning (DeMontfort,>800 C, 2 chamber, industrial). This option had not been mentioned by anyone at baseline, so this was a significant increase ($p \leq .001$). Transportation for off-site treatment was not mentioned at all at baseline, but at follow up 2 respondents (11%) reported this as a method of disposal. High or medium temperature incineration was not mentioned by any waste handlers in either time period. These overall results are presented in Figure 13.

Figure 13: Methods Used to Dispose of Sharps Waste



The most common method of disposal of **infectious waste** at baseline was burial, which was mentioned by 83% of the waste handlers. This method was not mentioned at all (0%) at follow up ($p \leq .001$). Open burning in a hole or pit (such as a sanitary landfill) was the second most common method mentioned at baseline (78% of waste handlers), but this dropped significantly to 17% at follow up ($p \leq .001$). At follow up, the most common methods of infectious waste disposal were low temperature incineration mentioned by 39% (a significant increase over baseline of 0%, ($p \leq .01$)) and dumping in a protected pit mentioned by 39% (a significant increase over the baseline of 6% ($p \leq .05$). Open burning in a hole or in an enclosure and dumping in an unprotected pit were each mentioned by 11% at follow up. Transportation for off-site treatment was mentioned by 6% in each study period. (Table 15)

The results for **non-infectious waste** disposal methods are similar to the common practices mentioned above. At baseline, the most common practice was burial which was mentioned by 89%; this result dropped sharply by the time of the follow up survey to just 17% ($p \leq .001$). Open burning in a hole or in an enclosure was the second most common method at baseline (72%), but this dropped significantly to 39% at follow up ($p \leq .05$). Other methods such as dumping in a protected pit (6%) and transportation for off site treatment (6%) were not common at baseline. At follow up, the most common method used was low temperature incineration/burning (39%); this method had not been mentioned at all (0%) at baseline ($p \leq .01$). Dumping in unprotected pit was mentioned by 17% at follow up compared to 0% at baseline. Transportation for off-site treatment was mentioned by 6%. Table 15 presents a summary of the disposal methods used for various types of medical waste.

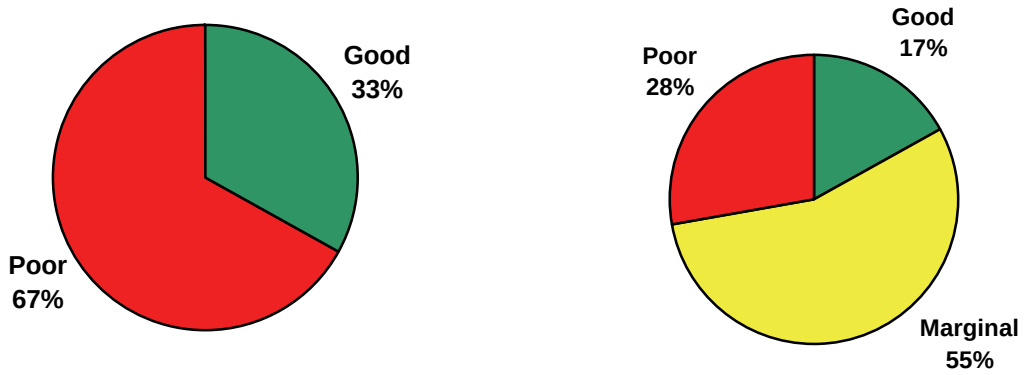
Table 15: Comparison of the Distribution of Health Facilities Surveyed According to Disposal Methods for the Three Types of Medical Waste: Sharp, Infectious, Non-infectious

Medical Waste Disposal Method(s)	Infectious: Sharps	Infectious: Not Sharp	Non-infectious	Number of Waste Handlers Interviewed
Baseline				
Open burning on the ground	0%	0%	0%	18
Open burning in a hole or enclosure	17%	78%	72%	
Low temperature incineration (< 800 C)	0%	0%	0%	
Dumping into a protected pit	56%	6%	6%	
Dumping in an unprotected pit	0%	0%	0%	
Collection in a tin can	50%	0%	0%	
Burial	22%	83%	89%	
Transportation to another site for processing	0%	6%	6%	
Follow up				
Open burning on the ground	6%	11%	6%	18
Open burning in a hole or enclosure	22%	17%	39%	
Low temperature incineration (< 800 C)	61%	39%	39%	
Dumping into a protected pit	17%	39%	0%	
Dumping into an unprotected pit	11%	11%	17%	
Burial	0%	0%	17%	
Transportation to another site for processing	11%	6%	6%	

Note: The sum of the results exceeds 100% because some waste handlers mentioned several methods.

To summarize these results, all the particular methods could be grouped into three general categories of waste disposal: “good,” “marginal” and “poor.” The “good disposal” category includes high or medium temperature incineration, dumping into a latrine or other protected pit (whether or not it is followed by burial) and/or transportation off-site for processing. Low temperature incineration, on the other hand, is considered “marginal” disposal. “Poor” disposal is comprised of the other, less secure methods: open air burning on the ground or in a hole or enclosure, burial alone, and dumping into an unsupervised or unprotected area. Storage of used sharps in cans was also considered a poor practice since there was no indication that the cans were safely disposed of once they were full. When the overall results of the sharps waste disposal methods are calculated based on these three categories, the data from interviews of the waste handlers at baseline shows 33% of the waste handlers reporting good methods being used at their facilities and 67% using poor methods. At follow up, 17% of facilities had good waste disposal practices, 55% had marginal practices and 28% had poor practices. (Figure 14)

Figure 14: Overall Summary of the Distribution of Health Facilities Surveyed According to the General Categories of Sharps Waste Disposal at Baseline and Followup



Baseline **Follow up**

9.2 Disposal of Ashes from Incineration

Only 11 waste handlers (therefore 11 facilities) reported using incineration for disposal of waste. All of them were at follow up, and in all cases, the incineration was at low temperature.

Data collectors asked the waste handlers who reported using incineration what they did with the resulting ashes. 8 declared that they bury them in a secure pit, and 1 declared that he/she puts them in a sanitary landfill. 2 waste handlers reported that the ashes are left in the incinerator pit.

In addition to the final disposal of the ashes, data collectors asked what the waste handlers do when the incinerator is not working. 9 waste handlers of the 11 who use low temperature incineration declared that the incinerator always works. Of the rest, one waste handler declared that he burns the ashes in a pit and the other one simply disposes of them in a protectd pit.

9.3 Common Problems with Medical Waste Disposal

Data collectors asked the waste handlers what problems they encounter in disposal of medical waste. At baseline, 1 waste handler responded by saying that he/she did not have any problems with waste disposal. The other 17 waste handlers spontaneously mentioned one or more problems distributed as follows: lack of buckets (16), shortage of fuel (7), the lack of land for burial (2), lack of manpower for digging pits (2), lack of incinerator (1), and lack of a pit for disposal of infectious waste (1).

At follow up, 5 waste handlers declared that they do not face any problems. The other 13 waste handlers interviewed mentioned shortage of fuel (4), lack of incinerator (3), lack of a pit or poorly constructed pit (2), lack of goggles (2), a breach in the fence through which children may enter the waste disposal area (1), lack of boots (1), lack of masks (1), lack of gloves (1), lack of bags for collection of waste (1), lack of buckets (1), lack of products for accelerating decomposition (1), and lack of waste drums (1). The overall results of the problems mentioned by two or more waste handlers in at least one time period are summarized in Table 16.

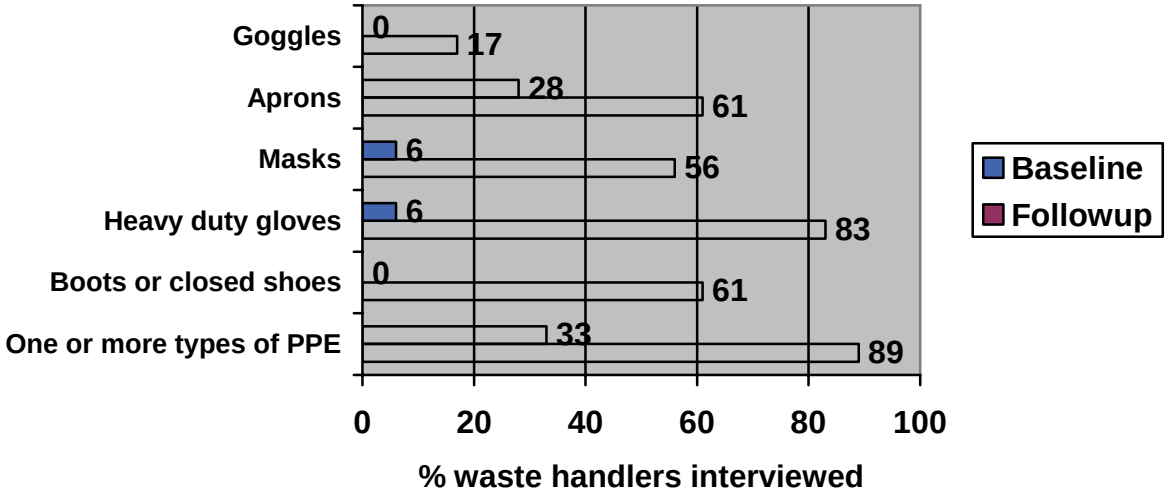
Table 16: Problems Encountered in Waste Management

	Baseline		Followup	
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	1	18	5	18
Lack of buckets	16		1	
Lack of fuel	7		4	
Lack of land for burial	2		2	
Lack of manpower for constructing a pit	2		0	
Lack of an incinerator	1		3	
Poorly constructed pit	0		2	
Lack of goggles	0		2	

9.4 Availability of Personal Protective Equipment

Following the question about problems encountered in waste management, the data collectors asked questions about the availability of personal protective equipment (PPE) which was available in the health facility where they work and which could protect them from accidental injuries by sharp objects. Availability of several types of PPE increased significantly from baseline to follow up. Boots and close toed shoes were not available for any waste handlers at baseline (0%), but this situation changed significantly by the time of the follow up when 61% of the waste handlers interviewed (11 of 18) reported having this type of protection ($p \leq .001$). Similarly, the proportion of waste handlers who reported having heavy duty gloves increased significantly from 6% (1 person) at baseline to 83% (15 people) at follow up ($p \leq .001$). Availability of masks increased from 6% (1 waste handler) to 56% (10 waste handlers) and that of aprons increased significantly from 28% (5 people) at baseline to 61% (11 people) at follow up ($p \leq .001$). Finally, goggles, which had been non existent at baseline, were available to a few waste handlers at follow up (17% or 3 people). Overall, the proportion of waste handlers with at least one type of PPE increased significantly from 33% (6 people) at baseline to 89% (16 people) at follow up ($p \leq .001$, Figure 15).

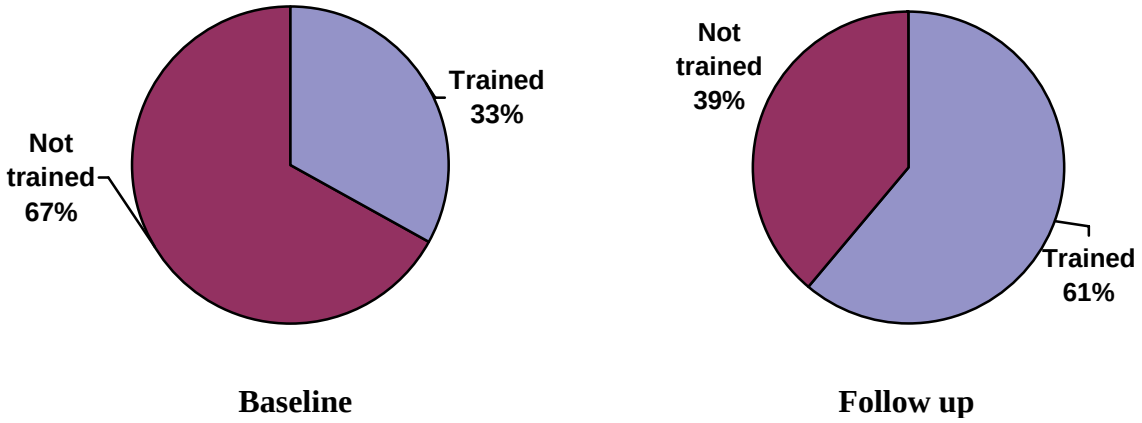
Figure 15: Distribution of Waste Handlers According to the Type of Protective Equipment Available at the Health Facilities Surveyed



9.5 Training of Waste Handlers

At baseline, 6 of the waste handlers interviewed (33%) declared having received training on sharps waste management such as low risk techniques for handling safety boxes. 4 of them had received it in the last six months before the survey was conducted and 2 had received it more than six months prior to the survey. At follow up, 11 of the 18 waste handlers interviewed (61%) had received training. All of them had received training more than six months prior to the time of the follow up survey (Figure 16).

Figure 16: Training of Waste Handlers at Baseline and Followup



9.6 Sources of Behavior Change and Communication (BCC) Messages

Next, the data collectors asked the waste handlers where they had heard or seen any messages about safe disposal practices. Some waste handlers mentioned more than one source of these messages.

Mass media sources were mentioned rarely if at all (only 1 person or 6% referred to a radio message at baseline and none mentioned TV or journals.) One person (6%) mentioned a brochure or booklet at baseline and none mentioned this as a source at follow up.

Similarly, pre-service training was only mentioned rarely (6% or 1 person in each time period). Training workshops, on the other hand, were more common: they were mentioned by 28% at baseline (5 waste handlers) and 56% at follow up (10 waste handlers).

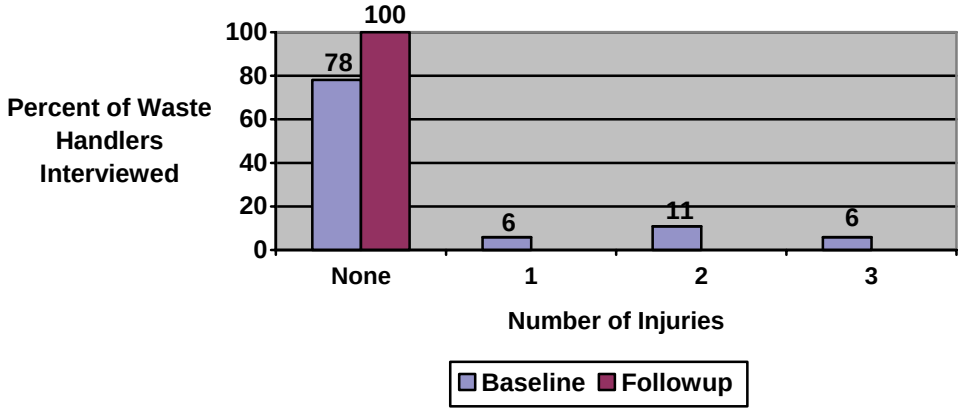
Supervisors were mentioned by 39% of the waste handlers interviewed at baseline (7 people) compared to 22% (4 people) at follow up. Other health staff were mentioned by 39% of waste handlers at baseline (7 people) but only 11% at follow up (2 person). Taken together, waste handlers reported more discussion of safe disposal practices at baseline with 72% of the interviewees reporting discussion with their supervisor and/or other health staff compared to 33% at follow up ($p \leq .05$).

Editor's note: At follow up, the small size of the facilities included in the survey meant that 9 of the 18 staff who were interviewed in relation to their waste handling duties were also interviewed as injection providers. Since the remainder of the interview covers questions on needle stick injuries, knowledge of blood-borne diseases, and hepatitis B protection – in other words, the same material that is covered in the injection provider interviews – data collectors limited the final questions to staff who had not been interviewed as injection providers.

9.7 Accidental Needle Stick Injuries

At baseline, 14 of the 18 waste handlers interviewed (78%) reported that they had not had any accidental needle stick injuries during the six months preceding the survey. 1 person had received one injury, 2 had received two and 1 had received three in the six months preceding the survey field work. At follow up, none of the 9 waste handlers interviewed (i.e.: those who also were *not* also working as injection providers) reported any needle stick injuries in the six months preceding the survey (i.e.: 100% were free of recent injuries).

Figure 17: Distribution of Waste Handlers According to the Number of Accidental Needle Stick Injuries in the Six Months Preceding the Survey



9.8 Waste Handlers' Knowledge of Diseases Transmitted by Needle Stick Injuries

In both time periods, all waste handlers interviewed declared that they were aware of diseases that can be transmitted by a needle stick injury and 100% of the waste handlers in each time period spontaneously cited HIV/AIDS as one disease that can be transmitted this way. At baseline, 10 of the 18 waste handlers mentioned hepatitis B. No waste handlers mentioned this disease at follow up, but this may be related to the fact that staff who provide injections were not interviewed as waste handlers at follow up but they were not screened out at baseline. No waste handlers mentioned hepatitis C in either time period. At baseline, 15 waste handlers mentioned malaria, 8 mentioned colera, 1 mentioned STDs, and 1 mentioned tuberculosis when asked what other diseases are transmitted by a needle stick injury. At follow up, these diseases were not mentioned, but 1 waste handler did mention syphilis and 2 mentioned tetanus as other diseases which could be transmitted by a needle stick injury.

9.9 Hepatitis B Vaccination of Waste Handlers

Among the 18 waste handlers surveyed at baseline, 39% were vaccinated against hepatitis B. The other 61% of the waste handlers reported that they had not received the hepatitis B vaccination. Of the 7 waste handlers who had received the vaccination, **1** had received one dose and the other 6 had received two doses. Thus, none of the waste handlers were completely protected at baseline. At follow up, none of the 9 waste handlers interviewed reported having been vaccinated, but this may be related to the fact that staff who provide injections were not interviewed as waste handlers at follow up but they were not screened out at baseline.

9.10 Waste Handlers' Perception of Risk by Needle Stick Injuries

When the data collectors asked the waste handlers to what extent they felt at risk of contracting an infection from sharps waste, 89% (16 of the 18) waste handlers at baseline responded that they felt at great risk, 6% said they were somewhat at risk and 6% said they were at little risk. At follow up, 8 of the 9 waste handlers reported feeling at great risk and 1 somewhat at risk.

At follow up, the main reasons cited for feeling at risk were related to the potential for a needle stick injury from a sharp that had been used on an HIV positive patient which could transmit the disease to the

waste handler (2 cases) or they simply mentioned HIV/AIDS or other diseases that could be transmitted this way without providing more details (3 cases). Some waste handlers also mentioned needing to be careful when handling waste, either because the waste itself carried a high risk (such as boxes of syringes) or because handling waste without adequate protection could lead to an injury (3 cases).

10. Exit Interviews with Patients or Parents of Patients

At baseline, 72 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 follow up, 64 patients were interviewed. In both time periods, the distribution of cases between Gaza and Nampula provinces was similar with about 60% of the respondents being from Gaza. Table 17 presents the distribution of the sampling by district and by ward of the facilities at follow up. As these data show, the vast majority of the patients interviewed in the lower-level facilities that were studied were found in the injection rooms rather than specialty wards. (Ward data were not collected at baseline.)

Table 17: Distribution of the Sampling of Patients by District and by Ward at Follow Up

	Percentage	Number of Patients Interviewed
District		
Gaza	59%	64
Nampula	41%	
Ward		
Injection room	84%	64
Lab	6%	
EPI	6%	
Maternity ward	2%	
Family planning	2%	

10.1 Socio-Demographic Characteristics of the Patients

At baseline, 46 of the 72 adult patients (64%) interviewed reported that they had received an injection with the remaining 26 saying that their children had received one (36%). Out of 46 adults patients interviewed who had received an injection on the day of the survey, 13 were men (28%) and 33 were women (72%). All these patients were between 18 and 49 years old.

At follow up, 17% of the 64 patients interviewed were men and 83% were women. 97% of the 64 patients were between 18 and 49 years old. Table 18 presents this information.

Table 18: Socio-Demographic Characteristics of the Adult Patients Interviewed

Characteristics	Baseline		Follow up	
	Percentage	Number of Patients Interviewed	Percentage	Number of Patients Interviewed
Who received the injection				
Adult	64%	72	100%	64
Child	36%		0%	
Age of the adult patients interviewed				
18-49 years old	100%	72	97%	64
Other	0%		3%	
Gender of the patients interviewed[16]				
Male	28%	46	17%	64
Female	72%		83%	

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. 18% of the patients interviewed at baseline reported that it was possible; 72% responded that it was not. 10% did not know. At follow up, 20% reported that it was possible, 64% responded that it was not, and 16% did not know.

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. None of the patients at baseline or follow up had brought the injection equipment that had been used on them. At baseline, 83% of the patients interviewed reported that the needle and syringe came from a sealed pack, 1% said that it came from an open pack, 8% answered that it came from a sterilizer, and 7% said that it came from a pot of water. At follow up, 92% said that the injection equipment came from a sealed pack and the remaining 8% did not remember.

10.4 Patients' Recall of Injections Received in the Health Facility Surveyed

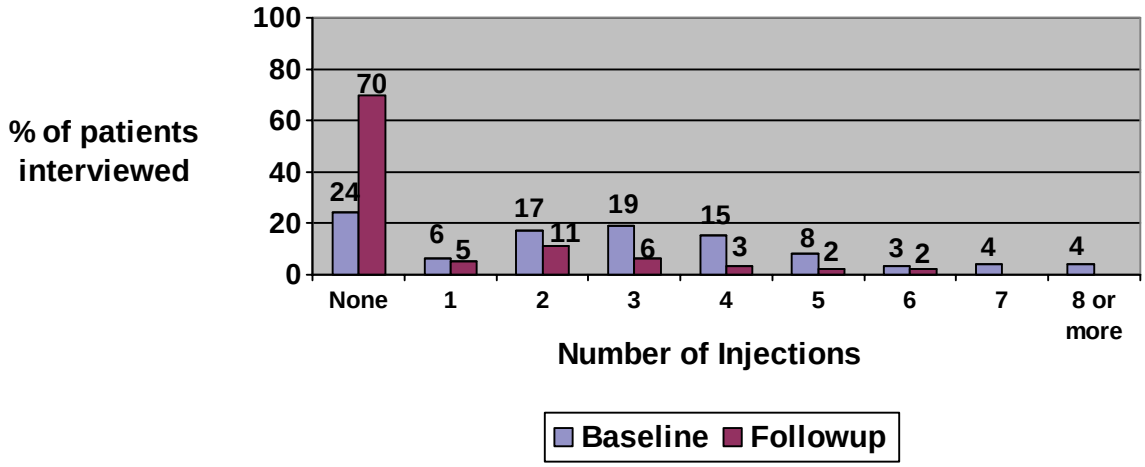
After all the preceding data on the injections received on the day of the survey had been collected, the data collectors continued the interview by asking the patients if they had received an injection in the same health facility where they were being interviewed in the six months prior to this survey. At baseline, 24% of the patients interviewed said that they had received no injections in that time period while the other 76% reported receiving a number of injections that varied between 1 and 25 injections as shown in Figure 18. The average number of injections received in this time period was 3.6. [17]

At follow up, 70% of the patients interviewed said that they had not received any injections while the other 30% had received between 1 and 9 injections in the six months preceding the survey as shown in

[16] Baseline data on gender are limited to the adults who received injections.
[17] The one case with 25 injections was considered an outlier and was excluded from this calculation.

Figure 18. The average number of injections received in this time period was 3.0. The difference in the average number of injections among patients who received any was not significantly significant from the average at baseline, but the drop in the overall proportion of patients reporting receiving any injections at the MMIS study facilities from 76% at baseline to 30% at follow up was significant (p<.001).

Figure 18: Patients' Recall of the Number of Injections Received in the Health Facility Surveyed in the Six Months Prior to the Survey



The next question the data collectors asked the patients who had received at least one injection in the six months prior to the survey was how many times they had brought their own needles and syringes. At baseline, 95% of the 55 patients who had received any injections declared that they never brought needles and syringes and 5% said that they sometimes brought them. At follow up, 90% of the 19 patients who had received an injection in the six months prior to the survey said that they never brought the injection equipment and 10% of them said that they sometimes brought them.

The data collectors posed an additional question to the patients who sometimes brought the needle and syringe used to administer their injections to determine whether they remembered the source of the injection equipment. At baseline, two of the three patients who declared brought the needle and syringe reported that the material was taken from a container and one reported that it came from an open package. At follow up, the two patients who brought their equipment said that the material came from a sealed pack.

10.5 Patients' Recall of Injections Received Outside the Health Facility Surveyed

Once the data collectors had finished the questions about the patients' experiences in the health facility being surveyed, they asked questions about the injections received outside of this facility in the six months prior to the survey. At baseline, of the 72 patients interviewed, 22% (16 people) responded that they had received injections somewhere else in the community. At follow up, 25% of the 64 patients (16 people) said that they had received injections somewhere else.

At baseline, among the 16 patients who received injections outside of the surveyed facility, 2 patients had received one injection, 3 patients had two, 1 patient had three, 4 patients had received four, and the rest (5 respondents) had between six and eight injections. One patient did not remember. All the patients

received the injections in government health units. At follow up, among the 16 patients who received injections elsewhere, 3 patients received one injection, 7 patients received two, 3 patients received three, 1 patient received five injections and 2 patients received six. 10 out of 16 people got their injections in a goverment health unit, 4 received them from a private clinic or nurse, 1 person received it from a member of their community with no medical training, and 1 person responded only that it was received outside the country without specifying the source.

The data collectors asked the patients whether they had brought the needle and syringe at the providers mentioned above. Among the patients that received an injection at a government health unit, at baseline all 16 people said that they had brought the needle and syringe compared to only 2 of 10 at follow up. At baseline, 14 of the 16 reported that the injection equipment came from a sealed pack; the remaining 2 did not know. At follow up, of the 10 patients who had gone to other government health units, 8 reported that the device came from a sealed pack and 1 reported that it came from an open pack. The other 1 did not know.

Of the 4 patients who had gone to a private clinic, one brought the injection equipment in a sealed pack. Of the other 3 who had not brought their equipment, 2 reported that it came from a sealed pack and 1 did not know.

Of the other 2 patients who mentioned other sources of care did not bring the injection equipment, but in both cases they were able to confirm that it came from a sealed pack.

10.6 Recall of the Most Recent Prescription

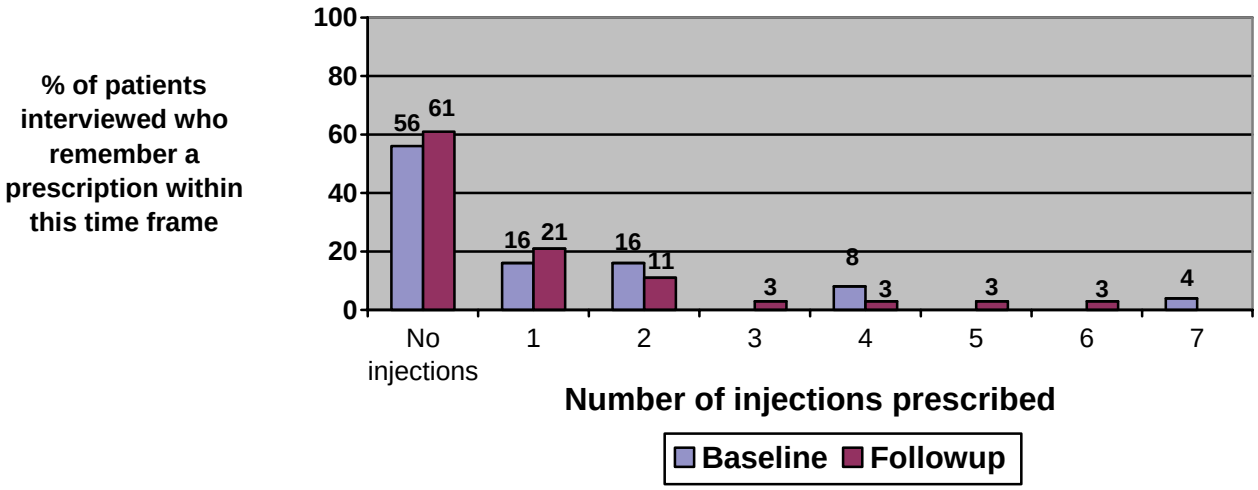
Data collectors asked all the patients interviewed if they remembered the last time they had received a prescription. Then, the data collectors asked how long ago this prescription had been given. At baseline, 26 patients (36% of those interviewed) responded that they remembered the last prescription. The time that had lapsed since they received this prescription was reported as follows: 42% declared that it was less than one month since they received it, 42% said it was in less than three months, 12% said it was between three and six months and 4% said that more than six months had passed.

Next, the data collectors asked the patients who reported receiving the prescription up to six months earlier if they had been prescribed any injectable medications. At baseline, 25 patients had received prescriptions in this time period and of them, 56% were prescribed a non injectable medication. The other 44% received injections. The number of injections ranged from 1 to 7 with the vast majority having 1 or 2 injections. (Figure 19)

At follow up, 41 patients (64% of those interviewed) remembered the last prescription. The time that had lapsed since they received this prescription was reported as follows: 49% declared that it was less than one month since they received it, 24% said it was in less than three months, 20% said it was between three and six months and 7% said that more than six months had passed.

At follow up, 15 out of the 38 people who had received a prescription in the six months preceding the survey (39%) declared that they were prescribed injectable medications. The number of injections in these cases ranged from 1 to 6 with the vast majority having 1 or 2 injections. The other 61% of patients who had received a prescription in the preceding six months did not receive any injectable medications. (Figure 19)

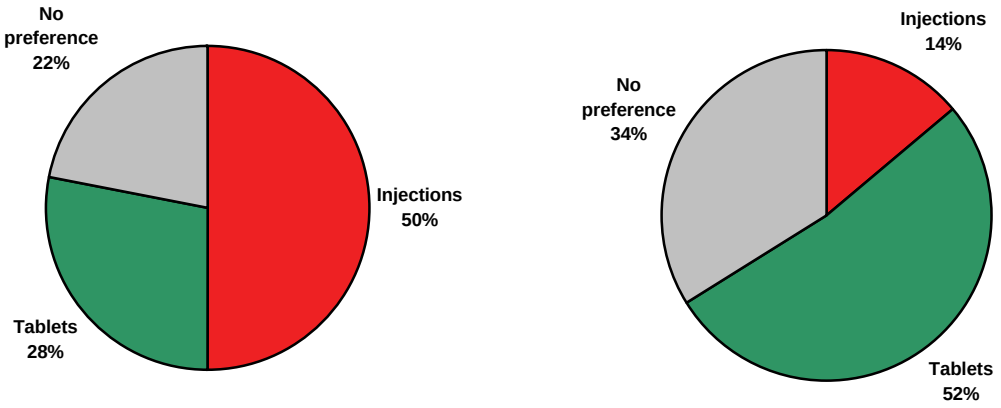
Figure 19: Recall of Number of Injections Prescribed in the Six Months Prior to the Survey



10.7 Patients' Attitudes about Injections

With regard to the preference of an administration route for medication (injection or tablet) when the patient or someone in his family has a fever, 50% of the 72 patients interviewed at baseline declared that they preferred injections, 28% preferred tablets, and 22% had no preference. At follow up, only 14% of the 64 patients interviewed preferred injectables, 52% preferred tablets, and 34% had no preference. When "no preference" or "preference for non injectable alternatives" is compared to the proportion with a stated preference for injections, the drop between baseline and follow up is statistically significant ($p \leq 001$, Figure 20).

Figure 20: Preferences Expressed by Patients Regarding Formulations of Medications at Baseline and Followup



Baseline **Follow up**

Data collectors asked the patients who declared having a preference for injections the reasons for their preference. At baseline, all 36 patients who declared a preference for injections declared that injections are faster (100%). (This was the only reason given for their preference at baseline.)

Regarding the 20 people who declared preference for tablets at baseline, they listed these reasons: works faster (1 patient or 5%), easier to get (12 patients or 60%), eliminates the problems of absesses, injury or potential HIV infection (4 patients or 20%), and it does not cause pain (3 patients or 15%).

At follow up, the 9 patients who declared a preference for injections mentioned these reasons: stronger (6 patients), can feel it working (3 patients), it is faster (2 patients), and shorter treatment (1 patient). Regarding the 33 people who declared preference for something other than injections such as tablets or syrup, they listed these reasons: is stronger (27%), can feel it working (15%), don't like needles/injections (21%), shorter treatment (15%), works faster (9%), it cures easily (3%), syrup tastes good (3%), it depends on the prescription (3%), injections are not recommended for fevers (3%). Some individuals also provided more insights into their preference explaining that "*porque estou grávida o bebé vai poder receber o comprimido mais rápido*" ("since I'm pregnant, the baby will receive a pill faster") (3%), "*sei que tomando comprimidos vou me dar bem*" ("I know that taking pills will do me good") (3%), and "*conheco um trabalhador do hospital vizinho que dava injeccoes em casa, por isso tenho medo de apanhar doencas*." ("I know a hospital worker who gives injections at home, so I am afraid of catching something.")

10.8 Sources of Information about Injection Safety

At follow up, data collectors asked the patients being interviewed whether they had heard or seen information about injections, needles or syringes in the six months preceding the survey. 23% of the patients (15 respondents) reported that they had seen or heard such messages. 72% said that they had not, and 5% did not know. Next, the data collectors asked the 15 patients who had heard or seen something about the specific messages they recalled. All the patients mentioned at least one message as follows: use/ask for a new needle and syringe for each injection (8 patients), safer injection (3 patients), go only to a trained provider for injections (2 patients), unsafe injections can transmit HIV or hepatitis B or C (1 patient), orals/pills are more effective than injectables (1 patient), only accept 'sterilized' (sterile)[18] syringes (1 patient), sterilize material in case of need (1 patient), and don't share needles or blades (1 patient). Patients reported the sources of this information as follows: health staff/personnel (11 patients), radio (4 patients), friends/neighbors/relatives (1 patient), political/ community leader (1 patient), school (1 patient), and television (1 patient).

All patients interviewed were asked what constituted a safe injection in their opinion. 39% of the patients did not know and 3% merely referred to the injection treating their condition. The remaining patients mentioned at least one of the following concepts: an injection which does not harm the patient, the provider and/or the community (20% of all respondents), injection given by a trained/professional provider (20%), if the person giving it says it is safe (3%), and no reactions or side effects (2%). The concept of a needle and syringe being taken from a new package was mentioned by 13% of the respondents with an additional 5% using similar but less defined concepts such as "*injecçao que e dada a um so paciente'* (an injection should only be given to one person) and "*é segura porque ainda nao foi usada*"(it is safe because it has not been used).

[18] To a patient, the difference between 'sterile' and 'sterilized' is not likely to be apparent. The reference here is likely to have been a reference to 'sterilized' syringes.

Data collectors then asked the patients what they could do to make sure that they and their families received safe injections. 42% said that they did not know how to do this. The others mentioned a variety of approaches including: go only to a trained provider (42%), making sure that the needle/syringe come from a new, sealed pack (16%), and bringing their own needle/syringe to the health facility or buying it there (4%). One person (2%) said simply that he/she relies on the health professional who is giving the injection to make sure that it is safe, and one person (2%) went even further saying if a health professional was not following the norms, that he/she would denounce that person in writing to the government.

Finally, patients were asked how they and their families could avoid needle stick injuries. 25% responded that they did not know or that there was nothing they could do, but the vast majority of the patients had specific ideas such as: disposing of them in a pit, latrine or other safe option (36%) or not touching or picking up any needles or syringes (27%). Some patients responded that this was the responsibility of the health centers or "whoever is responsible" for discarding them and/or keeping the syringes in a way that does not harm people (6%). One person said simply that they should be made to "disappear" once they were used (2%) and two (3%) explained that they should be kept far from people or children. One person mentioned taking a needle and syringe along if he/she needed to see a healer (2%).

11. Conclusions

The preceding chapters presented the results of a comparison of key indicators for injection safety. These results show significant improvements in the health facilities receiving the MMIS interventions between the baseline and the follow up study periods. In comparison with the presentation of results in the body of this report (i.e.: Chapters 4-10), this chapter emphasizes *what remains to be done*. In other words, what is still lacking in the health care system in Mozambique with regard to specific variables, which affect each target population studied in this survey.

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 and the hepatitis B or hepatitis C virus. Factors which can potentially contribute to the risk of accidental needle stick injuries and the transmission of blood-borne pathogens to all the target populations (i.e. health care personnel and patients) are: 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 used sharps, and all 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). In this context, the nonexistent or insufficient supply of safety boxes – and especially stockouts of safety boxes and cases in which safety boxes had not yet been introduced – could contribute to the inappropriate disposal of medical waste, and thus, to the increased risk 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 other infectious material. 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 health care waste management are key documents, which establish standards and norms for behaviors and actions that minimize the risk of a needle stick injury. The absence of these documents, as well as the lack of appropriate equipment for injection safety, is a factor that would be expected to increase the risk to health care personnel. Similarly, the lack of a reminder or job aides would constitute a missed opportunity to remind them of the desired injection safety practices.

Table 19 presents a summary of the results of this survey in relation to these risk factors. These data show that 78% of the supervisors interviewed had injection safety guidelines at the time of the follow survey, leaving only 22% remaining to be covered with this key resource. Similarly, 61% of the supervisors had waste management guidelines leaving 39% to be covered. No issues were noted with stockouts of safety boxes were reported by providers, the placement of them in each location in which injections are given, or the practice of immediate disposal of used sharps, all of which showed excellent progress against the baseline findings. Satisfactory disposal of sharps waste was nearly universal. The two remaining areas in which more work is needed include improvements in the disposal of infectious waste and increasing the availability of good final disposal methods (i.e. incineration, transportation for off-site processing and dumping into a latrine or other protected pit).

Table 19: Common Risk Factors for Health Care Workers and Patients

	Risk Factors	Followup Result of the Survey (%)
1	Safe injection guidelines or job aides	78% of supervisors interviewed had this
2	Waste management guidelines or job aides	61% of supervisors interviewed
3	Stockouts and/or nonexistence of a stock of safety boxes	No report of stockouts among injection providers interviewed
4	Safety boxes in each location where injections are administered	100% of facilities surveyed
5	Immediate disposal of used sharps	100% of all injections observed
6	Satisfactory disposal of waste inside or outside the facility	94% of facilities surveyed
7	Facilities with no infectious waste lying around inside or outside the facility	72% of facilities surveyed
8	Poor methods for final disposal of sharps waste	28% of waste handlers interviewed

Table 20 highlights the risk factors specific to injection providers. One important factor, which could contribute to the risk to injection providers, is the lack of training in safe injection practices, such as for example, the immediate disposal – without re-capping – of needles and syringes used in medical injections. Although the survey findings are encouraging with 67% of providers reporting this training, the 33% of providers who still need training needs to be considered. The absence of the hepatitis B vaccination is particularly significant, particularly given the fact that this survey showed that providers continue to have accidental needle stick injuries.

Table 20: Risk Factors Specific to Injection Providers

	Risk Factors	Followup Baseline Result of the Survey (%)
1	Training on injection safety	67% of injection providers interviewed had training
2	Re-capped needles	9% of all curative, family planning and vaccinaton injections observed
3	Absence of hepatitis B vaccination	No injection providers protected

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 personal protective equipment such as heavy duty gloves or boots or close-toed shoes (which are needed by all waste handlers working in health facilities where sharps are used), as well as waste that can contain used sharps (in cases where waste is not segregated) pose a risk to these health care waste handlers.

Table 21 presents a summary of the results of this survey related to the factors that affect waste handlers. This data shows that more than one third of the waste handlers interviewed had not received training and none were completely protected from hepatitis B. Although most waste handlers had some personal protective equipment, boots and heavy duty gloves are needed by *all* waste handlers.

Table 21: Risk Factors Specific to Waste Handlers

	Risk Factors	Followup Result of the Survey (%)
1	Training on safe health care waste management	61% of waste handlers interviewed had training
2	Absence of hepatitis B vaccine	No waste handlers completely protected
3	Lack of personal protective equipment	61% of waste handlers interviewed had boots
		83% of waste handlers interviewed had heavy duty gloves
4	Segregation of waste	94% of health facilities surveyed

From the perspective of patients who receive an injection, the lack of key infection prevention and control 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 improbable. Stockouts of new needles and syringes can place patients in a situation where the injection provider is tempted to re-use the syringe. In fact, the use of something other than a new needle and syringe for each injection administered to each patient and for each reconstitution of a medication places the patient at risk.

In addition to injections received in the facilities participating in this survey, some patients receive injections from other sources. The presence of materials for behavior change communication (BCC) on subjects that emphasize injection safety, such as for example, the importance of using a new needle and syringe for each injection received, 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 22 presents a summary of the results of this survey related to patients and other members of the community. This data shows that using a new needle and syringe from a sterile, sealed package is universal for injections and reconstitution, and this practice must now be maintained. Stockouts of new needles and syringes were considerably reduced, but it must be recognized that a complete stockout means that the injection equipment supply system needs to be further reinforced. Problems with infection prevention practices that were noted at baseline such as the lack of a clean working table or tray on which to prepare injections had virtually disappeared by the time of the follow up, but one key exception is the lack of hand washing, which continues to be common.

In addition to injections received in the facilities participating in this survey, one quarter of all patients interviewed reported receiving injections from other sources in the prior six months. The presence of materials for behavior change communication (BCC) on subjects that emphasize injection safety, such as for example, the importance of using a new needle and syringe for each injection received, regardless of the source; the importance of not touching used syringes; and the promotion of oral medications as alternatives to injectable medications could contribute to reducing the risks to patients by informing them of the need to protect themselves from blood-borne pathogens. In parallel, the lack of interpersonal communications between injection providers and patients as illustrated by the fact that 89% of patients only received follow-up instructions in conjunction with the fact that only 23% of patients interviewed after receiving injections reported hearing injection safety messages shows that there are missed opportunities to reinforce these key messages for patient safety. The finding that patients report their

providers as a key source of injection safety information is encouraging and shows that this channel could be more widely used to good effect.

Table 22: Risk Factors related to Patients and Visitors at Health Facilities

	Risk Factors	Followup Result of the Survey (%)
1	Use of a new needle and syringe from a sterile, sealed package for the injection	100% of all injections observed
2	Use of a new needle and syringe from a sterile, sealed package to reconstitute a medication	100% of injections observed
3	Stockouts of new needles and syringes	17% of injection providers interviewed had stockouts
4	Hand washing prior to administering an injection	Providers washed hands in 27% of all injections observed
5	Clean working table or tray to prepare injections	93% of all injections observed
6	Patients reporting receiving injections in prior six months to survey elsewhere	25% of patients interviewed
7	Interpersonal communications with patients during injection procedures	89% of injections observed
8	Dissemination of injection safety messages to the community	23% of patients interviewed

Implementation of the recommendations presented in following chapter is necessary to improve the safety of injections and health care waste management in health facilities, thereby contributing to better quality of care.

12. Recommendations

As detailed in the Executive Summary, the results of this survey show that most of the indicators of injection safety have been met. The following list is intended as a short checklist of remaining steps to be taken. In many cases, this is simply a reflection of the need for continued supervision to maintain the high level of injection safety that has resulted from the MMIS interventions.

1. Availability of Reference Documents and Management Tools

- Distribute key documents such as injection safety guidelines or recommendations and waste management guidelines to all facilities.

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

- Institute individual stock tracking mechanisms such as stock cards or registers for safety boxes and for each type of syringes in the facilities that lack them.
- Train stock room managers to keep these documents up-to-date, and conduct spot checks as needed to check the stock records against the physical inventory.
- It is recommended that additional efforts be made in identifying the essential, non-injectable medications that can replace the most common injections and ensuring that all facilities have a regular, adequate stock of these medications.

3. Availability of Injection Equipment and Waste Management Materials

- Continue to monitor stock levels to ensure that there are no stockouts of safety boxes or syringes.
- Use supervision visits to continue to monitor the satisfactory disposal of used sharps and waste segregation to maintain the results achieved to date.
- Seek additional approaches or partnerships to continue to improve final disposal methods to the “good” level.

4. Injection Administration Practices vis-à-vis General Infection Prevention and Control

- Monitor infection prevention and control practices – in particular, hand hygiene – and seek ways to facilitate compliance by providers.
- Continue to monitor the use of new, sterile needles and syringes for injections and reconstitution during supervision visits to maintain the the results achieved to date.

5. Injection Administration Practices vis-à-vis Accidental Needle stick injuries

- Continue to monitor the practices of recapping sharps used for curative family planning, and vaccination injections to eliminate this unsafe practice.
- Observe recapping practice in the context of phlebotomy procedures and train providers as needed in the safe ways to remove a used sharp from a syringe used to collect a blood sample.
- Continue to monitor the incidence of accidental needle stick injuries among providers and seek ways to identify common circumstances so that those cases can be prevented in the future. This includes using the circumstances identified to date such as suturing and unexpected patient movements as factors to be explored with providers during supervision visits.

6. Training, Knowledge of Blood-Borne Diseases, and Equipment for the Protection of Health Care Workers

- Use feedback during supportive supervision visits as a way of providing on-the-job training to providers and waste handlers who were not able to attend training workshops on the key components of injection safety and/or use previously trained individual as trainers to continue these workshops in new areas and with newly arriving staff.
- Consider adopting a policy of expanding hepatitis B coverage to injection providers and waste handlers to protect them from contracting this disease from accidental sharps injuries.
- Increase availability of personal protective equipment to protect workers from accidental occupational injuries.

7. Behavior Change Communications

- Encourage injection providers to communicate injection safety messages to patients so that they are better able to protect themselved from contaminated devices or accidental injuries.
- Encourage supervisors to reinforce injection safety messages with providers and waste handlers during their visits.

For more information, please visit www.mmis.jsi.com.

Making Medical Injections Safer (MMIS)

John Snow, Inc.

1616 North Ft. Myer Drive, 11th Floor

Arlington, VA 22209 USA

Phone: 703-528-7474

Fax: 703-528-7480

www.mmis.jsi.com