

ORIGINAL ARTICLE

PREVALENCE OF NEEDLE-STICK INJURIES AND ASSOCIATED FACTORS  
AMONG HEALTH CARE WORKERS AT HAWASSA TOWN, SOUTH ETHIOPIA

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ABSTRACT

**Background:** Health care workers (HCWs) face a definite risk of becoming infected with blood-borne pathogens, like HIV as a result of their professional activities.

**Objective:** This study was designed to assess the prevalence of needle-stick injuries and associated factors among health care workers at Hawassa town, South Ethiopia

**Method:** A total of 366 health care workers involved in the direct day-to-day management of patients answered a questionnaire inquiring about the occurrence of needle-stick injuries and about potential predictors.

**Result:** The two-week incidence and the annual prevalence rates of needle-stick injury were 14 and 310 per 1000 exposed workers. Multiple logistic regression analysis showed that the most important risk factors for needle-stick injuries were youth (<30 years) [AOR: 3.00, 95% CI: (1.82-4.93)], lack of training on such injuries (AOR: 2.24, 95% CI 1.74-3.06), in availability of safety box (AOR: 0.45, 95% CI 0.23-0.76), not considering needle-stick injuries avoidable (AOR: 2.21, 95% CI 1.39-3.47), and recapping needles most of the time [AOR: 2.09, 95% CI: (1.07-2.48)].

**Conclusion:** This study showed a high rate of needle-stick injuries among health care workers in Hawassa town. The most important contributing factors to needle-stick injuries were being young health worker, lack of training on needle-stick injuries, lack of availability of safety box, not considering needle-stick injuries avoidable and recapping of needle.

**Key words:** Prevalence, Needle-Stick Injury, Associated Factors, Health care workers.

INTRODUCTION

Health care workers (HCWs) are at a high risk of occupational exposure to blood and body fluids of patients, resulting in possible transmission of blood-borne pathogens. It is estimated that 2 million needle-stick injuries occur on health care workers each year worldwide. These injuries result in 2.5% of HIV, 40% of hepatitis B virus (HBV), and 40% of hepatitis C virus (HCV). Hepatitis C virus, HBV, and HIV are the most serious among the 20 blood borne pathogens that health care workers are exposed to in their daily work caring for the world's health (1, 2).

Health care facilities at work places at which needle-stick injury links patients and health care workers to

the risk of occupational exposure (3) and those health care workers that are exposed to body fluids have a definite risk of becoming infected with HIV and other blood borne infections by the virtue of their professional activities (4). Among 35 million health care workers worldwide, about 3 million receive percutaneous exposure to blood pathogens each year. Two million of these are exposed to HBV, 0.9 million to HCV, and 170,000 to HIV. These injuries may result in 150,000 HCV, 70,000 HBV, and 500 HIV. More than 90% of these infections occur in developing countries (5).

Needle-stick injury exposure is higher in sub-Saharan countries in Africa. This risk is increased further in African health care facilities due to the rise of HIV prevalence and increased work load at a given time which further increases the risk of inoculums and transmission if occupational injuries occur.

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Meanwhile, needle-stick injury in all health care settings is a public health concern and a priority as it is the fear of occupational infection faced by ill-paid, ill-protected, and overworked health care workers (6).

Despite the heavy HIV/AIDS burden and other blood borne infections, few studies have investigated needle-stick injuries in resource constraint countries in the developing world. A study conducted at Mulago National Referral Hospital in Kampala, Uganda, showed that 57% of 526 nurses and midwives experienced at least one needle-stick injury in the last year and the rate of needle-stick injury was 4.2 per person/year. Factors that contributed to the risk include poor lighting, emergency situations, lack of gloves and other protective barriers, carelessness in discarding needles or blades, and lack of disinfectants. In Uganda, the main risk of occupational HIV transmission to midwives is needle-stick injury during stitching after episiotomies in conditions of poor lighting (7).

The magnitude of needle-stick injuries and associated risk factors are not well known in Ethiopia because of lack of formal reporting system. A study done on the risks of the transmission of HIV after occupational accidents has identified the research gaps and a priority agenda in Ethiopia (8). A study conducted in Sidama zone, South Ethiopia in 2004, showed 32 % prevalence of accidental needle-stick injury among health workers (9). So, occupational risk of becoming infected by needle-stick injury is affecting not only the quality of care delivered but also the safety and well being of care providers. Despite the fact that the risk is high, the majority of health professionals are glad to use their professional skills in assisting HIV/AIDS patients, but health institutions are not taking adequate measures to protect them from HIV and other blood-borne infections. And this has created a stressful environment to deal with dying patients (10). Therefore, this study was designed to investigate the prevalence of needle-stick injuries and associated factors among health care workers at Hawassa town, South Ethiopia.

## **METHODS**

**Study design:** An institution-based cross-sectional study was conducted to investigate the prevalence of needle-stick injuries and associated factors among health care workers in Hawassa town, South Ethiopia from March 1 to 11, 2008.

**Study area:** This was a cross-sectional study on needle-stick injuries among health workers at health care facilities in Hawassa town. The town had an estimated total population of 200,000 out of which 102,000 are males and 98,000 females. There were 2 hospitals, 3 health centers, 3 health posts, 7 diagnostic laboratories, 6 higher clinics, 19 medium clinics, and 10 institutional clinics with an estimated total of 660 health professionals in the town prior to this survey (11).

**Source population:** Professionals who were working in public as well as private sectors and were involved in the direct day-to-day management of patients in Hawassa town were taken as source population.

**Study population:** Health care workers who were involved in the direct day-to-day management of patients in public as well as private sectors and selected by simple random sampling method were considered as the study population.

**Inclusion Criteria:** All health care workers who were present at work during the study period and were involved in the direct day-to-day management of patients in public and private health services were invited to participate in the study

**Exclusion criteria:** Health care workers who were in general administrative positions or who were on leave (maternity, annual, sick, fieldwork, or study) during the study period were excluded.

**Sample size:** The sample size was calculated using the formula for single population proportion. The prevalence (P) of needle-stick injury was taken as 32% from the study conducted in Sidama zone (9), 95% level of confidence, 3% margin of error and to compensate for possible non-response rate, 10 % of calculated sample size was added. Based on the above assumptions the sample size was 1022. But since the total population of health care workers in Hawassa town has been less than 10,000, a population correction formula was used. Hence, the calculated sample size was 401.

**Sampling technique:** The determined 401 sample was allocated to the 2 hospitals, 3 health centers, 1 Ethiopian Family Guidance Association Clinic, 5 higher clinics, 12 medium, and 3 institutional clinics based on population proportional to size (PPS) of health care workers within each of the health facilities. Then by using the monthly payroll as a sampling frame and using simple random sampling method, health care workers were selected and invited to participate in the study ( see figure 1).

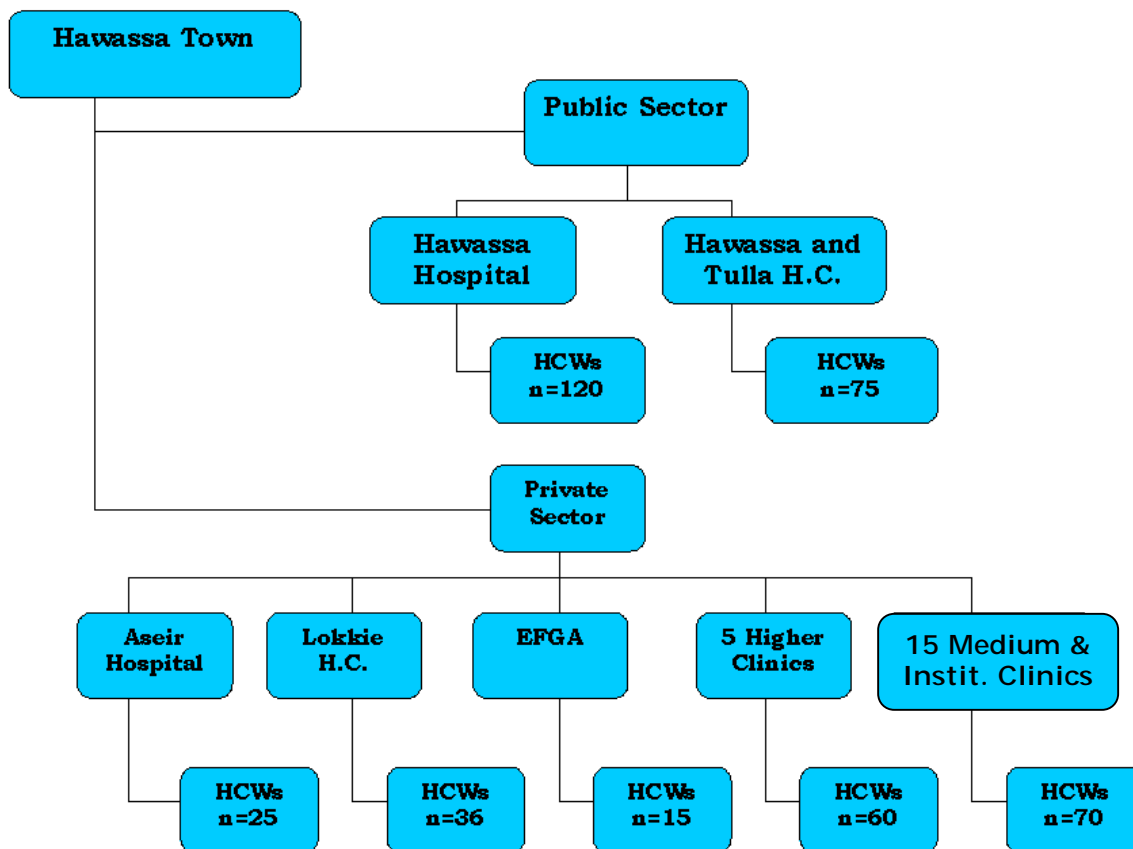


Figure 1: Schematic sampling technique

**Data collection procedures:** A pre-tested, structured self administered questionnaire was used for data collection. It was prepared in English and translated to Amharic and then back to English to verify the consistency and content of the questionnaire. Data was collected by visiting each health facility included in the study. Variables included were socio-demographic, environmental, and behavioral risk factors for needle-stick injuries.

**Data quality control:** The quality of data was ensured through a training of two supervisors and giving orientation to the study subjects by the principal investigator. Supervisors were one health officer and one B.Sc nurse who were trained for one day on the purpose of the study and supervision techniques. The study subjects were given an orientation on the purpose and importance of the study and on how to answer the questions set in the questionnaire. The questionnaire was pre-tested on health care workers from each health facilities who were not selected for the study and the necessary corrections were made accordingly. Completeness and consistency of the collected data was checked at each day of data collection.

**Data analysis:** Data were entered into computer and cleaned. Data analysis was made using the SPSS version 13.0 statistical soft ware. Descriptive statistics, such as frequency distribution, mean, percentages, and odds ratio for statistical significance were employed for the analysis. Forward stepwise binary logistic regression analysis was carried out to assess the relative importance of the explanatory variables on the dependent variable.

**Ethical considerations:** This study was approved by the Institutional Review Board of the University of Gondar. Written permission was obtained from the University of Gondar, South Nations, Nationalities and People’s Regional State Health Bureau and Hawassa Town Health Office. An informed consent was obtained from each health institution and the study subjects. Each study subject was informed about the purpose of the study. A leaflet about the prevention of needle-stick injury was distributed to the study participants at the same time.

**Operational definitions**

**Health care workers:** Refers to all people delivering health care services including physicians, health officers, nurses and laboratory technicians who have

direct contact with patients or with a patient's blood or body substances.

**Needle-stick injury:** Any cut or prick sustained to a respondent by a needle during providing care to a patient.

## RESULTS

**Socio-demographic characteristics of the respondents:** A total of 366 subjects were covered during the study with a response rate of 91.3%. The majority 218(59.6 %) of the respondents were female with a sex ratio of 1.47: 1. The mean ( $\pm$ SD) age of the study subjects was 27.43 ( $\pm$ 7.83) years, ranging 17-60 years. Regarding the educational status of the study participants, 259 (70.8 %) were diploma graduates. The distribution of the socio-demographic characteristics of the respondents is presented in Table 1.

**Table 1:** Selected socio-demographic characteristics of study subjects in Hawassa Town, South Ethiopia, 2008 (n=366)

Characteristics	Frequency	Percentage
<b>Gender</b>		
Male	240	65.6
Female	126	34.4
<b>Age (years)</b>		
<20	85	23.2
20-29	178	48.6
30-39	69	18.9
> 40	34	9.3
<b>Marital status</b>		
Single *	148	40.4
Married **	218	59.6
<b>Religion</b>		
Orthodox	164	44.8
Protestant	165	45.1
Muslim	25	6.8
Others ***	12	3.3
<b>Ethnicity</b>		
Amhara	94	25.7
Guragie	54	14.8
Wolayta	42	11.5
Sidama	40	10.9
Hadiya	20	5.5
Oromo	17	4.6
Gamogofa	17	4.6
Kaffa	11	3.0
Others ¥	71	19.4
<b>Educational status</b>		
Diploma	259	70.8
Less or equal 12	45	12.3
B.Sc	32	8.7
Others ©	30	8.2

\*single; \*\*married, divorced, and widow; \*\*\*Catholic, and ¥Siltie, Konso, Amaro, Alaba, Tigray, Kambata, Dawro, and ©Medical doctors.

**Occurrence and Characteristics of Needle-stick injuries:** Among 366 study participants, 1.4% reported having experienced at least one needle-stick injury in the last two weeks, while 31% reported at least one needle-stick injury in the last 12 months. About 51% reported having ever experienced such injury while 49% had not experienced any such injury in their entire career. About 72.2% of the study participants injured their fingers and 17.2% their hands, by sharp objects. The prevalence of needle-stick injuries was higher among diploma nurses (30.3%), followed by 9.3%, 4.1%, and 5.5% among laboratory technicians, junior nurses, and other professionals, respectively.

The most commonly reported causes for 113 injured respondents in a one-year time were syringe needle (54.4%), suture needle(16.7%), lancet(8.9%) and glass items(8.3%). One hundred and forty-four (80.0%) of the injuries were self-inflicted which was followed by injuries caused by non-compliant patients, 17(9.4%), and by another staff, 16(8.9%). One hundred and fifty-five( 42 %) of the study participants reported that there were devices or procedures that can cause needle-stick injury in their workplace.

**Procedures related to needle-stick injuries:** As shown in Figure 2, almost 23.9% of the needle-stick injuries reported in the last 12 months were related to emergency situations, 17.8% during suturing, 7.8% due to heavy work load, and 6.1% due to unexpected patient movement. These procedures were followed by recapping of needles which caused about 5.6% of the injuries, 5.0% after drawing blood, 4.4% due to lack of glove, 4.4% during removing a needle cap, 3.3% by non-compliant patient, 2.8% due to over injection, and 2.2% during securing IV line.

**Risk factors for needle-stick injuries:** The distribution of potential risk factors for needle-stick injuries among the study participants stratified by whether they had experienced such injuries or not are shown in Table 2. Multivariate logistic regression analysis demonstrated that gender, job category, years of experience, having written protocol for reporting needle-stick injuries, and having concern about needle-stick injuries were not significantly associated with the risk of sustaining needle-stick injuries( $P>0.05$ ). Being young(<30 years) (AOR: 3.00, 95% CI 1.82-4.93),lack of training on needle-stick injuries (AOR: 2.24, 95% CI1.74-3.06), availability of safety box (AOR: 0.45, 95% CI0.23-0.76), not considering needle-stick injuries avoidable (AOR: 2.21, 95% CI 1.39-3.47) and recapping of needle(AOR:2.09,95% CI1.07-2.48) were found crucial factors predicting the occurrence of needle-stick injuries among health care workers (Table 2).

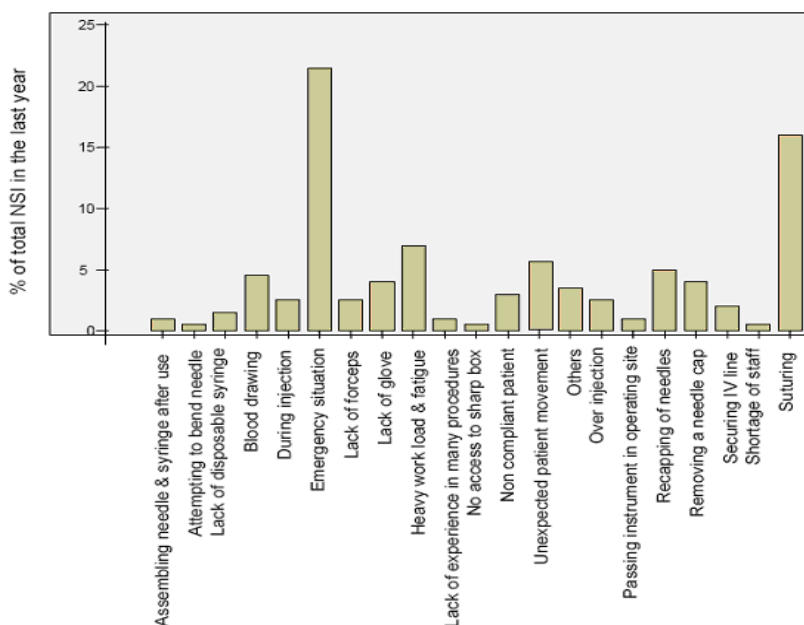


Figure 2: Frequency of procedures contributed for NSI occurrence among health care workers in Hawassa town, 2008

Table 2: Multivariate logistic regression analysis of odds (OR) for needle-stick injuries in relation to potential risk factors, Hawassa town, 2008 (n=366)

Risk factors	At least one needle-stick injury during the entire carrier			
	Yes(n=186)	No(n=180)	COR(95% CI)	AOR (95% CI)
Age (years)				
< 30	153	110	2.95(1.78-4.91)	3.00(1.82-4.93)
≥30	33	70	1®	1®
Sex				
Female	116	102	1.27(0.82-1.97)	
Male	70	78	1®	
Availability of safety box				
Yes	146	157	0.53(0.29-0.97)	0.45 (0.23-0.76)
No	40	23	1®	
Job Category				
Nurse	129	120	1.13 (0.71-1.80)	
Others ©	57	60	1®	
Years in practice				
<10	139	166	0.25(0.13-0.49)	
≥10	47	14	1®	
Having written protocol for reporting NSI				
Yes	44	50	0.81(0.49-1.32)	
No	142	130	1®	
Having training on NSI				
Yes	64	83	1®	1®
No	120	97	1.63(1.05-2.54)	2.24(1.74-3.06)
Considering NSI to be avoidable	139			
Yes	47	104	1®	1®
No		76	2.16(1.35-3.45)	2.21(1.39-3.47)
Perceived risk related to NSI	158			
High / Moderate	28	158	1®	
Low /Not risky		22	1.27(0.67-2.42)	
Having concern about NSI				
Yes	157	160	1®	
No	29	20	1.48(0.77-2.84)	
Recapping of needle				
All/ most of the time	118	94	1.59(1.02-2.46)	2.09(1.07-2.48)
Never /sometimes/	68	86	1®	1®

COR: Crude odds ratio, AOR: Adjusted odds ratio, 95% CI: 95 % confidence interval, NSI: needle-stick injuries, ©=Laboratory technicians, health officers and physicians, ®=Reference group

## **DISCUSSION**

Among the health care staff working at health facilities at Hawassa town, a high rate of needle-stick injuries was observed. A total of 31 % of the study population experienced at least one needle-stick injury last year. This finding is consistent with the estimates in North West Ethiopia in 1997, 31 % (12) and with the study conducted in Sidama Zone, South Ethiopia, 32 % (9). But, it is smaller than the estimates in 52 health facilities in Ethiopia in 2000, 66% (13), and a report from a sub-Saharan country among 526 nurses and midwives, 57 % (7). The rate of needle-stick injuries observed in this study is slightly higher than estimates in a Nigerian hospital (14). These studies demonstrate that needle-stick injuries are the most common source of occupational exposure to infected blood and body fluids among health care workers.

Regarding risk factors for needle-stick injuries, a higher prevalence was observed in subjects aged less than 30 years (AOR: 3.00, 95% CI 1.82-4.93). Similar observation was also reported by other investigators (19, 20). The reasons for higher needle-stick injuries among young people could be lack of experience and skill on the job. Many workers began work at an early age and often without safety training.

Training was found to be a crucial factor in predicting the occurrence of needle-stick injuries among health care staff in our study. Those who had not attended any training on prevention and management of needle-stick injuries in their work place were at a significantly greater risk of sustaining such injuries compared with those who had attended some kind of training (AOR: 2.24, 95% CI 1.74-3.06). The finding also consistent with a report from a study conducted in sub-Saharan Africa (7). The finding also has great importance for planning preventive measures in developing country environments where arranging proper training is more feasible target than buying expensive equipment. Some earlier studies have also shown that additional training and education in injection safety, prevention of sharp injuries, and universal precautions at workplace increase compliance with the use of personal protective materials that play an important role in the prevention of needle-stick injuries among health care workers (7, 14-17). Our result showed a significantly increased risk of needle-stick injuries among those who were recapping needles all or most of the time compared with those who were not recapping (AOR: 2.09, 95% CI 1.07-2.48).

This finding is consistent with earlier studies (7, 18). Almost 32% of the participants in our study were recapping needles all or most of the time, while 68 % did not recap needles at all. Recommended practice and compliance with this seemed to be an indicator for risk behavior. The risk of needle-stick was lower among health workers who use safety box at their work place compared to their counter parts (AOR: 0.45, 95% CI: 0.23-0.76). Among those who had sustained at least one needle stick injury, 11 % reported there was no safety container available when their last injury occurred.

In our study, participants who did not consider needle-stick injury to be avoidable in the work place reported higher needle-stick injury (AOR:2.21, 95% CI 1.39-3.47) in the last 12 months compared to those who had such a consideration. The perceptions and attitudes towards needle-stick injuries have influence on the occurrence of such injuries. This fact is reinforced by the fact that occupational exposure to HIV infection is a major concern to all health care workers (15, 19-25). This might help to strengthen the culture of such preventive strategy so that chances of infection could be lowered among health care workers.

## **CONCLUSION AND RECOMMENDATIONS**

This study demonstrated a high rate of needle-stick injuries among health care workers working in Hawassa town. Young age, lack of training, lack of availability of safety box at work place, not considering needle-stick injury avoidable, and recapping of needle were identified as risk factors for needle-stick injuries. The study suggests that needle-stick injuries could be considerably reduced in developing country environments by organizing adequate training on needle-stick injuries. Furthermore, research should investigate what type of training is most effective. In addition, attention should be given to availing safety boxes at work places in health care facilities and adequate training for specific tasks among the health care workforce.

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