

## Needle-stick and Sharps Injuries Among Health Care Workers in Wolaita Zone, Southern Ethiopia

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### Abstract

**Background:** Needle-stick and Sharps injuries to health care workers constitute a major public health concern and the problem is more severe in low income setting. This study examines the magnitude of needle-sticks and sharps injuries and its associated factors among health care workers in Wolaita Zone, Southern Ethiopia. **Methods:** Institution based cross sectional study was conducted in February 2016. Health care workers (n=760) of various occupations were the study population. A cluster sampling technique was used. Self-administered questionnaire was used to collect the data. Data was entered into EPI info version 3.5.4 and exported into SPSS version 20.0 for analysis. Binary logistic regression model is used to identify factors associated with the outcome variable, and finally multivariate logistic regression model is used to identify independent predictors of the outcome, with statistical significance set at  $p < 0.050$  (95% confidence interval (CI)). **Results:** Three hundred and forty three (55.1%) health care workers were injured by needle-stick and sharps in the past one year. Occupation (AOR: 3.07; 95%CI: 1.80-5.25), and inconsistent wearing of gloves (AOR: 2.87; 95%CI: 2.00-4.12) were independent predictors of needle-stick and sharps injuries. **Conclusion:** The level of needle-stick and sharps injuries was high. All relevant stake holders in health need to provide training on prevention of needle-stick and sharps injuries to health care workers and ensure consistent wearing of gloves over their whole professional career.

**Keywords:** Health care workers, Needle-stick and sharps injuries, Ethiopia.

### Background

Needle-stick and sharps injuries (NSIs) is a serious public health problem that health workers face and it constitutes a major risk for the transmission of infections such as human immune-deficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) [1-3]. Taking this into account, the U.S. Centres for Disease Control and Prevention (CDC) proposed stepwise standard operating procedures for preventing occupational exposures, and handling potentially infectious materials such as blood and body fluids [4, 5]. These procedures are used as a guideline for health care workers to practice proper disposal of sharps and clinical wastes, use protective gloves and wear gown whenever they come in contact with mucous membranes, blood and body fluids of patients [6].

The World Health Organization (WHO) estimates that, from a total of 35 million health care workers globally, about 3 million are exposed to blood borne viruses each year of which 2 million to Hepatitis B virus (HBV), 900,000 to Hepatitis C virus (HCV), and 300,000 to Human Immune deficiency virus (HIV), and 90% of the infections that result from these exposures borne by developing countries [7].

Needle-stick and sharps injuries (NSIs) are more prevalent in low-income settings of the world, specifically more common in sub Saharan African countries [8, 9]. Different studies from developed and developing countries have indicated that there is a gap in compliance to universal precautions (UPs) by HCWs [10-12]. For instance, 64.0% of health care workers in India adhere to standard precautions [13], in Malaysia 75% [14], and in Nigeria only 38.8% of health care workers (HCWs) had a good knowledge of the practice of universal precautions [15]. About 80.8% of HCWs in eastern Ethiopia reported that they regularly follow universal precautions [16].

In developing countries, the risk of injuries at work place is higher than that of developed countries [17]. For instance, nearly 50% of HCWs from southern Ethiopia recapped needles [12, 18], 25% of HCWs from a study in Nigeria reported to always recap [13], while 40% from a study in India recapped at least sometimes. HCV and HBV infections are generally considered endemic in sub-Saharan Africa [19].

In Ethiopia there is unavailability of national data of these blood born infections. However, studies conducted in different parts of the country indicate the estimates for HBV range from 4.7% to 14.4% [20-24] and prevalence of HCV to be 0.9-5.8% [20, 25]. According to the 2014 HIV estimates, the national HIV prevalence in Ethiopia is 1.14% [26].

There is no sufficient information in Ethiopia that describes the magnitude of needle-stick and sharps injuries and associated factors. Convincing finding is more important in designing policies and implementation of infection prevention practices. Therefore, the aim of this study was to determine the magnitude of needle-stick and sharps injuries (NSIs) and associated factors among health care workers (HCWs) in Wolaita Zone, Southern

Ethiopia.

## **Methods**

### **Study area and setting**

An institution based cross sectional study was conducted in Wolaita Zone, Southern Ethiopia, located in Southern Nation Nationalities and Peoples Region (SNNPR), which is 327 KM from Addis Ababa, the capital of Ethiopia. Wolaita Zone has a total of 417 health facilities consisting of 1487 health care workers. According to Zonal health department report of Woalita Zone, there is no available data on the prevalence of needle-stick and sharps injuries among health care workers [27]. All health care workers in the study area were included in the study. Health care workers who are on official leave were excluded from the study.

### **Sample size and sampling procedure**

The sample size was determined by using a formula for estimation of single population proportion with the assumption of 95% confidence level, the margin of error of 5% and the prevalence of occupational exposure to BBFs (66%) – taken from a previous study conducted in Bahir Dar town, Northwest Ethiopia [28]. After considering 10% non-response rate and multiplying by the design effect of 2 the total sample size was estimated to be 760.

A cluster sampling technique was used. A total of 417 health care institutions were clustered into hospitals, primary health care units, health centers, and clinics. Of these 350 health care institutions were randomly selected for this study. For each health care institution, probability proportional allocation to sample size was made according to the total number of health care institutions consisting of health care workers. Sampling frame of health care facilities with health care workers was known based on the health care workers registration in the Wolaita zone health office. Finally, systematic random sampling method was used to select 760 health care workers.

### **Data collection**

The data was collected by a pretested self-administered questionnaire, adopted from the previous study conducted in Bahir Dar town, Northwest Ethiopia [28]; which was translated to Amharic language. Eight data collectors, based on their previous experience, were recruited and trained for data collection, and two trained public health officers supervised collection of the data. Before the data collection all of the study subjects were oriented and well informed about the purpose of the study, and their right to accept, or refuse to participate in the interview. A pilot study was done on 21 health care facilities which are found in the same district that were not included in the study.

### **Data quality management and entry**

Before the actual data collection, the questionnaire was pre-tested on similar setting outside the study area. The data collectors and supervisors were trained for two days on principles, ethical considerations, procedures, and details of questionnaire. The principal investigator closely monitored the data collection process. Completed questionnaires were checked for their consistency and completeness every day, and then entered into EPI-Info version 3.5.4 statistical software, and finally the data was exported to software package version SPSS 20.0 for further cleaning and analysis, statistical significance was set at  $p < 0.050$  (95% confidence interval (CI)).

### **Operational definition**

Health care workers considered to be injured by needle-stick and sharps if they encountered needle-stick or sharps injury at least once the past one year career.

### **Ethical Consideration**

Ethical clearance was obtained from Research and Ethical Committee of Wolaita Sodo University, School of Public Health. Informed verbal consent was obtained from each study subject prior to data collection, and the purpose of the study was explained to the respondents in advance. Confidentiality of the information and privacy of the respondents was maintained. During the data collection, each of study participants was communicated that their participation would be voluntary, and also they were told that as they can quit any time when even after the interview has started.

## **Results**

A total of 623 health care workers participated in the study; yielding a response rate of 82%. 61.3% of HCWs are in the age range of (30-40), while nearly fifty seven percent of HCWs attained educational level of college degree. 32.1% were nurses by occupation, while 18.3% works in injection and dressing room, 44.3% have a working experience of six up to nine years [Table 1].

**Table 1: Socio-demographic characteristics of (n =760) health care workers, Wolaita Zone, Southern Ethiopia; February 2016**

Variables	Result	Frequency (#)	Percent (%)
Sex	Male	465	74.6
	Female	158	25.4
HCPs' age in years	<30	140	22.5
	30 - 40	382	61.3
	>40	101	16.2
Educational qualifications	Certificate	17	2.7
	Diploma	172	27.6
	Degree	365	58.6
Job category	Specialist	69	11.1
	Nurse	200	32.1
	Laboratory technologist	78	12.5
	Health officer	187	30.0
	Medical doctor	84	13.5
	Midwife	56	9.0
Department of work	Other	18	2.9
	Outpatient department	101	16.2
	Injection and dressing room	114	18.3
	Surgical ward	112	18.0
	Paediatrics ward	77	12.4
	Gynaecology ward	97	15.6
	Medical ward	41	6.6
	Laboratory	63	10.1
Work experience in years	Other	18	2.9
	≤2	92	4.3
	3 - 5	159	25.5
	6 - 9	276	44.3
	≥10	161	25.8

Three hundred and forty three (55.1%) health care workers were injured by needle-stick and sharps in the past one year. While four hundred and sixty three (73.8%) study participants were exposed to blood and body fluids in their life time [Table 2].

**Table 2: Needle-stick and sharps injuries among health care workers in Wolaita Zone, Southern Ethiopia; February 2016**

Variables	Result	Frequency	N (%)
Life time exposure to blood and body fluids	Yes	460	73.8
	No	163	26.2
Life time needle stick injury	Yes	396	63.6
	No	227	36.4
Needle stick injury in the past one year	Yes	343	55.1
	No	280	44.9
Needle stick injury in the past one year			
<b>Non injured (&lt;1 items)*</b>			343(55.1)
<b>injured (&gt;1 items)*</b>			280(44.9)

(Items)\* - individual and institutional factors associated with needle sticks injuries

The reasons for needle-stick and sharps injuries (NSI) among health care workers were: the sudden movement of a patient during blood sampling (52.2%); during handling of specimen (46.1%); during recapping of samples (27%); during labour/delivery (22%); due to a lack of post exposure prophylaxis (15.7%); and during collection of waste (6.1%) [Fig 1].

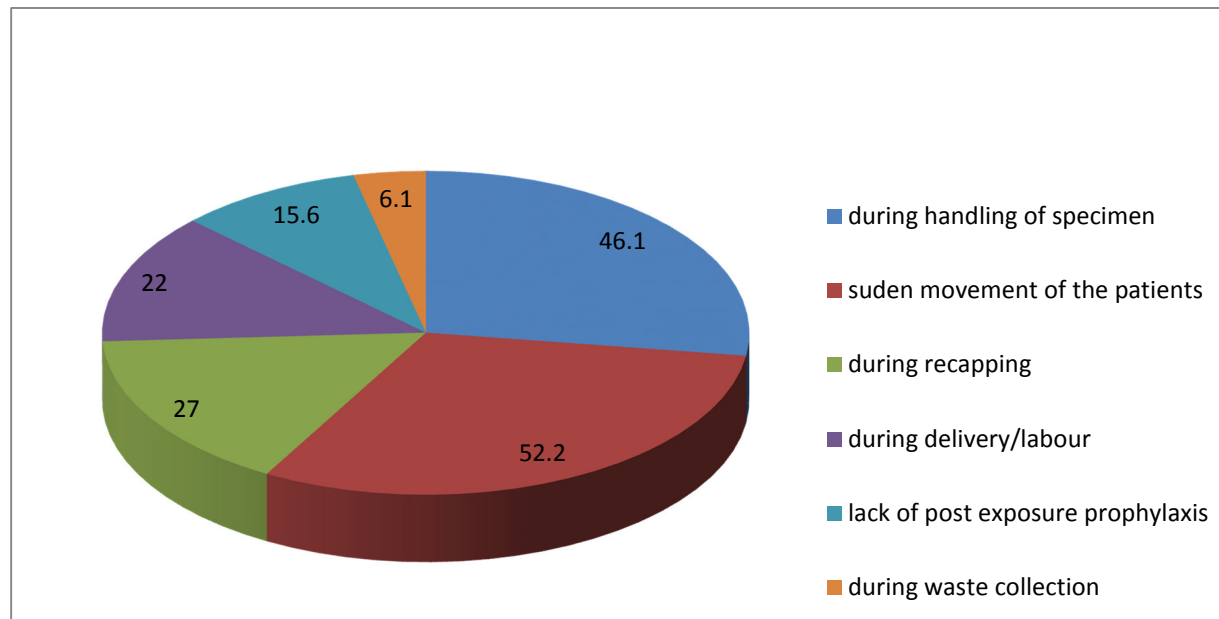


Fig 1: Reasons for needle-stick and sharps injuries among health care workers in Wolaita Zone, Southern Ethiopia, February 2016

Socio-demographic characteristics have been found to show statistically significant association with needle-stick and sharps injuries among health care workers. Among them, HCWs who are health officer's by occupation, with (AOR = 3.07; 95%CI: 1.80-5.25), and health care workers who attained master/specialized/ level of education, with (AOR = 0.41; 95%CI: 0.17-0.95) were found to be significantly associated in multivariate analysis. Regarding the individual and institutional factors associated with needle-stick and sharps injuries, inconsistent wearing of gloves during health care procedures (AOR = 2.87; 95%CI: 2.00-4.12), and life time injuries by needle-stick and sharps (AOR = 0.25; 95%CI: 0.16-0.37) respectively were factors associated with needle sticks injuries in the past one year [Table 3].

**Table 4: Factors associated with needle-stick and sharps injuries among health care workers in Wolaita Zone, Southern Ethiopia; February 2016**

Variables	Result	Exposure to BBF		COR(95%CI)	AOR(95%CI)
		Exposed	Non exposed		
Educational qualifications	Certificate	12	5	1	1
	Diploma	105	67	0.54(0.18-1.63)	0.85(0.33-2.22)
	Degree	228	137	0.45(0.24-0.84)*	0.74(0.13-4.09)
	Specialist	64	5	0.40(0.23-0.71)*	0.41(0.17-0.95)**
Occupations	Nurse	114	86	1	1
	Lab technologist	46	32	0.96(0.57-1.63)	1.27(0.70-2.30)
	Health officer	125	62	1.88(1.25-2.82)*	3.07(1.80-5.25)**
	Medical doctor	71	13	2.25(1.32-3.83)*	1.60(0.68-3.72)
	Midwife	40	16	1.30(0.71-2.35)	1.26(0.64-2.48)
	Other	13	5	1.41(0.53-3.71)	1.32(0.28-6.22)
Department of work	Outpatient department	62	39	1	1
	Injection & dressing	69	45	0.94(0.55-1.63)	1.18(0.57-2.41)
	Surgical ward	69	43	0.79(0.46-1.36)	0.76(0.39-1.47)
	Paediatrics ward	57	20	1.16(0.63-2.12)	0.97(0.44-2.11)
	Gynaecology ward	77	20	1.25(0.71-2.22)	2.19(0.85-5.62)
	Medical ward	21	20	0.42(0.20-0.90)*	0.52(0.21-1.27)
	Laboratory	41	22	0.71(0.38-1.35)	0.81(0.30-2.15)
	Other	13	5	0.74(0.27-2.02)	0.36(0.06-2.04)
	Consistently wearing gloves during the last health care procedures	Yes	152	129	1
No		257	85	2.63(1.89-3.67)*	2.87(2.00-4.12)**
Recapping needles	Yes	171	138	1.62(1.13-2.34)*	1.24(0.81-1.88)
	No	238	76	1	1
Life time exposure to blood and body fluids	Yes	161	123	3.96(2.70-5.81)*	0.25(0.16-0.37)**
	No	248	91	1	1
Compliance with standard precautions	Yes	151	111	1	1
	No	258	103	1.62(1.18-2.24)*	1.06(0.73-1.55)

\* Factors associated with needle-stick and sharps injuries

\*\* Independent predictors of needle-stick and sharps injuries

Statistical significance was set at  $p < 0.050$

## Discussion

This study has shown that 55.1% (343) of health care workers were injured by needle sticks in the past one year, which is higher than findings from Bahir Dar and Cameroon; 29% [28, 29]. However, the finding of this study is much higher than a study conducted in eastern Ethiopia [16]. This study indicates higher percentage of HCWs exposed to blood and body fluids in their life time as compared with the study conducted in Northwest Ethiopia and Serbia; in which life time exposure of HCWs to BBFs constitute 70.2% and 66% respectively [31, 32]. However, this study is much higher than a study in Eastern Ethiopia and Kenya [16, 33].

About forty three percent (266) of study subjects did not wear gloves during the last health care procedures as indicated by this study, which is higher than a study in Dire Dawa (15%) [16]; and lower as compared with a finding in India (63%) [29]. This difference could possibly be due to the difference in the study areas and the experience of HCWs to adhere to standard precautions. Inconsistent use of gloves during health care procedures means that the HCWs are at increased risk of acquiring occupational infection unless effective measures are implemented.

In this study, nearly 55% (342) of health care workers reported lack of training on prevention of occupational infection; which is higher as compared to study conducted in Kenya (49.2%) [33], and 58% (361) of health care workers reported lack of adherence to universal precautions; which is higher than a finding from the UAE (19%) [34]. However, this finding is lower than a study conducted in Australia [35]. This disparity may be due to the presence of safety signs in health care institutions, availability of personal protective equipment, and on job training delivered to HCWs.

From the total of health care workers studied, 32.1% (200) were nurses, which is lower than a finding from Bale Zone (49.75) [36] and it is much lower than a report from Eastern Ethiopia [16]. Needle-stick and sharps injuries (NSIs) show a statistically significant association with the occupation of the health care workers, which is different from studies in Northwest Ethiopia [28] and Dire Dawa Dawa [16]. In this study, health officers were 3.07 times more likely to have needle-stick and sharps injuries than nurses. This could be due to the fact that majority of the health officers have higher contact hour to patients.

Health care workers who specialized in their educational qualification were 0.59 times more likely to be injured by needle-stick and sharps as compared to those who attained educational qualification of certificate. This could possibly be due to increased chance of specialised health care workers to come in contact with blood and body fluids from patients admitted to wards for delivery, postpartum care, and other surgical procedures.

Health care workers who did not wear gloves during their last health care procedures were 2.87 times more likely to be injured by needle-stick and sharps as compared to their counterparts who wore gloves. This is consistent with a finding from Bahir Dar town, Northwest Ethiopia.

In this study, health care workers exposed to blood and body fluids in their life time were 0.75 times more likely to be injured by needle-stick and sharps as compared to their counterparts. Lifetime exposure to blood and body fluids means that the HCWs are at increased risk of acquiring occupational infection unless effective measures are implemented.

In this study, (50.4) 314 of health care workers reported absence of safety signs which is higher than finding from Dire Dawa (38%) [16]. While more than fifty percent (314) of health care workers reported unavailability of personal protective equipment throughout the year in health care institutions which is lower than a report from North West, Ethiopia [31]. These differences may be due to reduced concern from health authorities in the study area.

**Limitation of the study:** A recall bias is likely to occur as the information on needle-stick and sharps injuries was obtained from the past one year.

**Strength of the study:** Pre-testing of the questionnaire before actual data collection, training and supervision to control quality of the data

**Conclusion:** This study identified higher level of needle-stick and sharps injuries among health care workers. All relevant stake holders in health need to provide training on prevention of needle-stick and sharps injuries to health care workers and ensure consistent wearing of gloves over their whole professional career.

## Competing interests

The authors declare that they have no competing interest.

## Authors' contributions

MT; was involved in principal role in the conception of ideas, developing methodologies and writing the article, MM guided in the conception and design was also involved in the analysis and interpretation of findings. ATB participated in the analysis, interpretation and writing. All authors read and approved the final version of the manuscript.

## Acknowledgements

Wolaita Zone health bureau, the supervisors, data collectors, study participants, Wolaita Sodo University, College of Health Sciences, School of Public Health. We would like to extend our gratitude to the Wolaita Sodo University School of Public Health for the contribution to this paper, and Andualem Tadesse for vital assistance.

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