

Prevalence of needle stick and sharp injuries among healthcare workers in Edna Adan Maternity Hospital, Hargeisa, Somalia

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Abstract

The study examined the prevalence of needle stick and sharp injuries (NSSIs) among healthcare workers attending Edna Adan Maternity Hospital in Hargeisa, Somalia. The objective of the study was to determine the risk factors and prevalence of needle stick and sharp injuries among healthcare workers attending Edna Adan Maternity Hospital for purposes of making practical recommendations to improve that public health challenge.

The study used questionnaire to collect data, and simple random and stratified sampling techniques to select the respondents. Data was collected from 174 Health Care Workers.

The study found that the prevalence of NSSIs among workers was high (73.7%). The length of working hours [AOR = 3.200, (CI 95% = 1.151 - 8.901), p = 0.026], adherence to existing safety guidelines [AOR = 0.198, (CI 95% = 0.062 - 0.632), p = 0.006], and health awareness of NSSI [AOR = 0.213, (CI 95% = 0.096 - 0.472), p = 0.000] were statistically significant factors associated with occurrence of NSSIs among the Health Care Workers.

The study concluded that it was important to strengthening the occupational health of health care workers by reducing working hours, provision of routine CMEs on adherence to safety guidelines among the HCWs, as well as providing awareness programs to HCWs on NSSIs. Hence it was recommended that policy makers should revise and reduce the workload of Health Care Workers, so as to reduce their exposure to NSSIs.

Keywords

Needle stick and sharp injuries, Health care workers, Somalia.

Introduction and Background

Needle Stick and Sharp Injuries (NSSIs) is a major global public health issue among Health Care Workers (HCW) (Shaghaghian *et al.*, 2015, WHO 2016 and WHO 2021). NSSIs are skin wounds caused by accidental needle pricks during procedures or treatment (Mitchell, 2020). Globally, more than 35 million healthcare workers suffer from occupational needle stick and sharp injury every year (Akulume *et al.*, 2016). Most (86%) occupationally related infections are due to needle stick injury (Deisenhammer S, 2006). Worldwide, about three million HCWs are exposed to blood pathogens through percutaneous, of which two million were exposed to HBV, 0.9 million exposed to HCV, and 170,000 exposed to HIV of which more than 90% occurred in developing countries (WHO, 2021). The risk of infections from NSSIs ranges from 0.2 to 0.5% for HIV, 3–10% for HCV, and 40% for HBV (Zhang *et al.*, 2018). According to Center for Disease Control and Prevention (CDC) and European Agency for Safety and Health at Work, more than 385,000 and one million NSSIs cases are reported annually among HCWs working in hospitals in the United States and Europe, respectively (Mitchell 2020). World Health Organization (WHO) estimated that NSSIs cause HCV that account 16,000, HBV that account 66,000, and HIV that account 1,000 annually among HCWs (Prüss-Üstün, Rapiti, and Hutin, 2015). Furthermore, percutaneous exposure accounts for approximately 37.0% of HBV, 39.0% of HCV, and 4.4% of HIV cases among HCWs (WHO, 2021).

Globally, the risk associated with NSSIs such as transmission of disease can cause different problems in the body's system (Borde *et al.*, 2022). The highest risks of injuries are from blood-filled hollow bore needles which account for 63% of the needle stick injuries. While the use of safe needle devices can prevent needle stick injury by 80%, the conjunction of this safe needle device with worker education and work practice control can reduce injuries by more than 90% (Getie *et al.*, 2020). Around 70.4% of nurses

working in operation rooms experience NSSI at least once a year. Working units like the preoperative room and being emotionally exhausted during the working time significantly increased the risk for NSSIs.

In Africa and sub-Saharan Africa in particular, the prevalence of NSSIs among HCWs has been reported to be high and vary widely across different countries (Amira *et al.*, 2014). Over 50% of HCWs in sub-Saharan Africa are exposed to NSSIs with potential risk of transmitting blood-borne pathogens. The exposure to NSSIs ranges from 31% in some countries to over 75% in others. Healthcare workers in African countries suffer on average two to four needle stick injuries per year and yet, for example in South Africa, over half of the hospitalized patients are HIV positive (Amira *et al.*, 2014, Mengistu *et al.*, 2021). The above study also reported that healthcare workers (HCWs) in African countries are experiencing incidences of NSSIs, which consequently result into increased risk of infections from blood-borne pathogens through occupational exposure because of the high prevalence of such pathogens in their countries as well as the lack of basic personal protective equipment (PPE), poor adherence to safety practices and less likely to report and use post-exposure prophylaxis (PEP) and also due to enormous popularity and overuse of injectable therapy.

Getie *et al.*, (2020) have also reported that most recently in Africa, 68.3% of nurses have been injured by NSSIs. Hollow bore needles were the most common (68.5%) cause of injury followed by suturing needles (10.6%). Practice of needle recap, cigarette smoking, lack of training on occupational health and safety, more working hours per week, job dissatisfaction, and less work experience were reported to be the common identified risks.

In Somalia, healthcare work-related injuries continue to be a challenge and the situation of the NSSIs is considered one of the most dangerous. Reports from Berhan *et al.*, (2016) show that in

Hargeisa region of Ethiopia, injuries among healthcare workers accounted for 13% in 2016 and this was the third contributor of injury events on the health workers. Over 60% of all occupational accidents in the country occur in Hargeisa and the injury and fatality rate for Somalia stood at 4248 per 100,000 and 92 per 100,000 workers respectively in 2014 (Bedoya, 2017). As most of the cases of NSSIs are reported in developing countries including Somalia, so this study aims to collect data of NSSIs among Health Workers in hospitals and health centers and to determine factors contributing to occurrence of NSSIs among Health Workers. According to EU-OSHA report, (2014), about 50% illnesses among health care workers in Somalia was estimated to be the prevalence of occupational health challenges. This was due to underreporting and lack of documentation about NSSIs among health care workers especially in low level health facilities resulting into poor estimation of resources to be allocated in improving safety of the working environment (Bekele *et al.*, 2015).

Somalia's National Infection Prevention and Control (NIPC) recommended Standard Operating Procedures guidelines to healthcare workers on the safety and control measures to reduce on their occupational exposure but the recommendations have not helped to reduce the occurrence of NSSIs among health care workers in hospitals (GBD 2015). There is scanty information on the prevalence and associated factors of NSSIs among Health Workers in Somalia hospitals as a result; authorities are unable to quantify exposure level for policymaking.

This study therefore aimed at determining the risk factors and prevalence of needle stick and sharp injuries among health care workers at Edna Adan Hospital. Specifically, the objectives of this study were to:

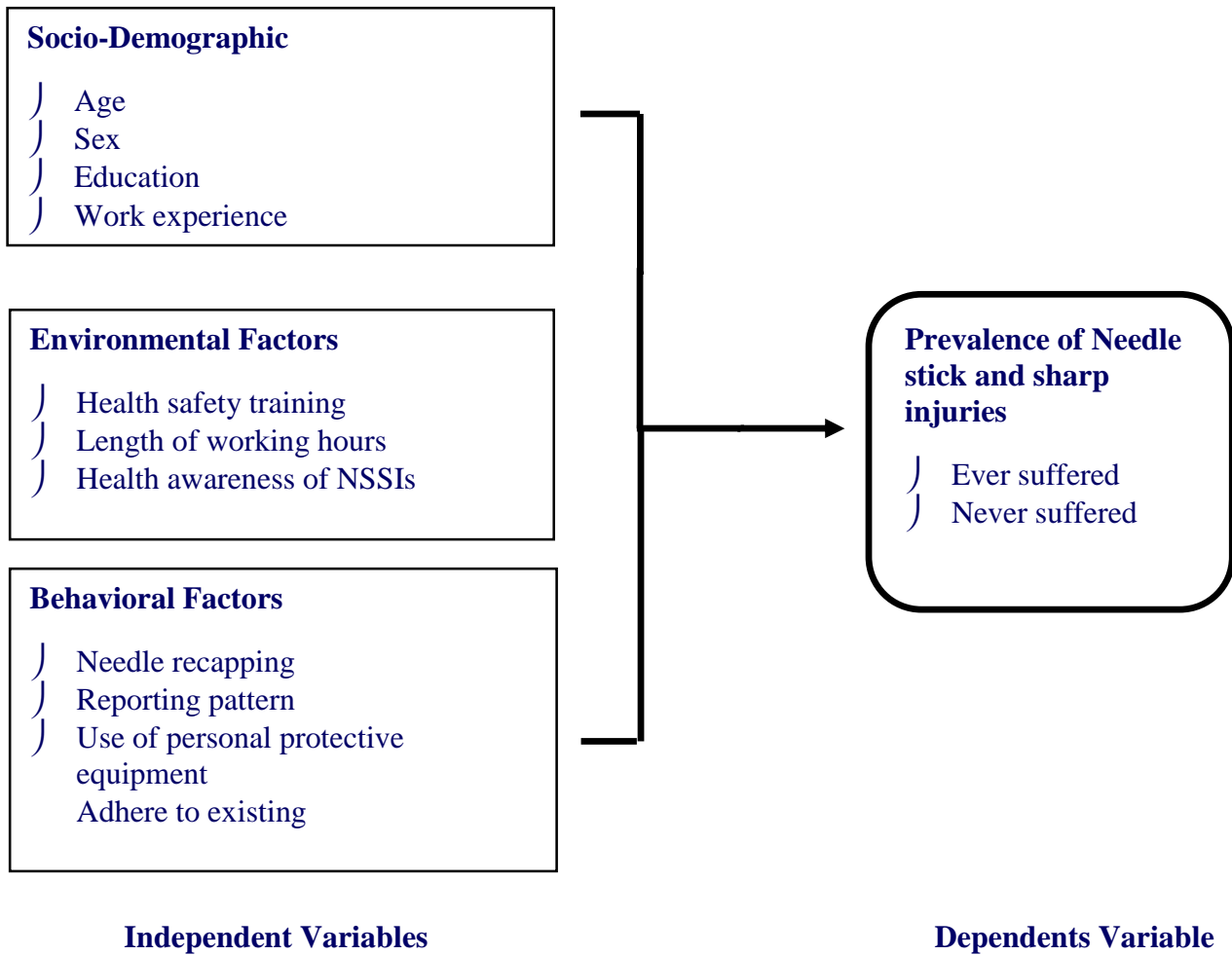
-) Investigate the factors (socio-demographic, environmental, and behavioral) associated with prevalence of needle stick and sharp injuries,
-) Determine the prevalence of needle, stick and sharp injuries among healthcare workers, and
-) Establish the association between the factors and prevalence of needle stick and sharp injuries among healthcare workers in this Hospital.

Theoretical and Conceptual Framework

This study used the Social Ecological Model (SEM), which is based on the ecological model that was proposed by Bronfenbrenner (1992) mainly because it describes intrapersonal (socio-demographic and behavioral and organizational (environmental) level influences on behavior (McLeroy *et al.*, 1988; Islahi *et al.*, 2018 Neal & Neal 2013, Bekele *et al.*, 2015).

Using the above theoretical frame work a conceptual frame was developed (Figure 1 below) illustrating the relationship between dependent and independent variables. Socio-demographic, environmental and environmental factors interact with each other to cause occupational injuries and illnesses.

Figure 1: Conceptual Framework



Literature review

As far as study design is concerned, some scholars conducted case control studies (Bazie, 2020); while others conducted retrospective studies (Fadil *et al.*, 2021), which is prone to recall bias, and have inferior level of evidence compared with prospective studies; some scholars carried out a literature review study, using only secondary data sources (Mengistu and Tolera, 2020), which do not provide first-hand information as primary sources do.

With regards to sample size and sampling techniques, some scholars used systematic random sampling technique to select the study participants (Bazie, 2020; Berhan *et al.*, 2021;

Dilie *et al.*, 2017), which requires a close approximation of a population, and has a high risk of data manipulation; whereas, some scholars used the non-probability purposive sampling technique to select the study participants (Basaza, 2021), which exposes the study to likely sampling biasness; on the other hand, some scholars used a confidence interval of 99%, which yields a very big sample size (Gebre *et al.*, 2018; Uffan *et al.*, 2021), hence making the study expensive and straining financially.

In reference to inclusion – exclusion criteria, some scholars only included nurses in their studies (Abbas *et al.*, 2020; Kumah *et al.*, 2020; Yeshitila *et al.*, 2015; Zhang *et al.*, 2015), and excluded other cadres of health care workers like

the laboratory technicians who are equally exposed to NSIs; some scholars excluded participants who had ever participated in a similar study before (Mohammadnejad & Dopolani, 2015), yet these equally have relevant information needed for the study; while some scholars included non-medical staff members such as cleaners (Matsubara *et al.*, 2017).

Regarding quality assurance, some scholars pretested the study instruments using 5% proportion of the total sample size of the study (Gholami *et al.*, 2013); while some scholars determined reliability test of the study instruments using Cronbach’s alpha coefficient (Mohammadnejad & Dopolani, 2015), which is commonly used for instruments having Likert scale questions. Also, some scholars considered all variables that had p-value of 0.2 that were entered in the multivariate logistic regression model (Rhys and van de Walle, 2012), and this is likely to expose the results to high margin of error.

About data management and analysis procedures, some scholars used ANOVA to analyze the data (Kwanzaa *et al.*, 2020), which is commonly used for continuous variables but not categorical variables; some scholars analyzed data using t-test analysis (Gholami *et al.*, 2013), which is commonly used for comparative studies not cross sectional study like this one.

This study being aware of the above gaps used methods and approaches which addressed these gaps.

Methods

Table 1: Sample Size of each Category and Sampling Techniques Used

Respondents	Population	Sample Size	Sampling Methods
Physicians	75	42	Simple random sampling
Nurses and midwives	216	122	Simple random sampling
Laboratory attendants	18	10	Simple random sampling
Total	309	174	

This was a facility based cross-sectional research design with a quantitative approach and the design allowed describing of situations in the way they exist (Ishak *et al.*, 2019).

The quantitative approach was used to provide statistical data on the socio-demographic, environmental and behavioral factors and prevalence of needle stick and sharp injuries among healthcare workers by using a semi-structured questionnaire.

The study was carried out at Edna Adan Maternity Hospital in Hargeisa Somalia which is located in Southeastern Togdheer region and its on-profit charity hospital (Hanna J. S. *et al.*, 2020). This health facility was chosen due to its high number of health workers, who are relatively inexperienced in using personal protective equipment and hence are more prone to needle stick and sharp injuries (Edna Adan Maternity Hospital 2019).

The study population was all the frontline healthcare workers such as doctors, clinicians, nurses, and midwives. However, the accessible population in the study was comprising of all health workers attending Edna Adan Maternity Hospital. According to Makeen *et al.*, (2022), this hospital comprises of a total of 309 health workers, and this was taken as the study population Those excluded did not belong to the aforementioned categories.

The sample size was determined to be 174 health workers using the Sloven’s formula and each category was determined by simple sampling technique (Table 1 below).

Data was collected using the questionnaire survey method which was researcher-administered. The questionnaire mainly contained close ended questions in four sections: A which captured data on socio-demographic factors; B captured data on environmental factors; C captured data on behavioral factors; and D captured data on NSSIs.

Due to absence of relevant Institutional Review Board (IRB) in Somalia, the IRB of Mulago hospital in Kampala, Uganda approved this study and the management of Edna Adan Maternity Hospital cleared the researcher with a formal acceptance letter.

All the relevant standard operating procedures (SOPs) regarding Covid 19 were duly followed and written consent was obtained from all the respondents clearly indicating that they were free to opt out at any stage if they so desired.

Data was analyzed using the statistical package for social scientists (SPSS) version 27.0. The first and second objectives were analyzed using descriptive statistics while the third objective was analyzed using inferential statistics. Since the study variables are all categorical, chi-square test and logistic regression analyses were appropriate for testing for association between the prevalence of needle, stick and sharp injuries and categorical factors, with the level of statistical significance

set at $p = 0.05$; as this would help to compare the observed values in the data to the expected values that would be observed (Ugoni & Walker, 1995). All factors with the p -value of 0.05 were considered as significantly associated with prevalence of NSIs.

Results and Discussion

Data was collected from 171 healthcare workers out of the planned 174, giving a 98.3% response rate.

Socio-Demographic, Environmental, and Behavioral Related Factors and Prevalence of Needle Stick and Sharp Injuries among Healthcare Workers in the Study

The first objective of the study was to describe the factors (socio-demographic, environmental, and behavioral) related to prevalence of needle stick and sharp injuries among healthcare workers in Edna Adan Maternity Hospital. The descriptive results of these factors are presented in Tables 2, 3 and 4 below.

The socio-demographic factors were based on age, sex, education and work experience are presented in Table 2 below.

Table 2: Description of the factors associated with and prevalence of NSSIs among health care workers in the Edna Adan Hospital

Individual characteristics	Frequency (n=171)	Percentage (%)
Age		
< 25 years	40	23.4
25 years and above	131	76.6
Sex		
Female	109	63.7
Male	62	36.3
Education		
Below Diploma Level	27	15.8
Diploma or above	144	84.2
Work Experience		
< 5 years	134	78.4
5 and Above years	37	21.6

The majority (76.6%) of the health care workers were aged 25 years and above (Table 2). This implies that most of the health Care workers were older, and this could be due to spending years at school and training institutions. The assumption is that they are in position to protect themselves from NSSIs where possible.

However, earlier studies in other countries report that most participants were younger in Ethiopia and Saudi Arabia (Bazie 2020 and Fadil *et al.*, 2021) respectively.

Sex

The results show that the majority (63.7%) of the health care workers were females mainly due to the fact that the respondents included nurses and midwives which category is dominated by female cadres. Earlier studies (Zhang *et al.*, 2018; Berhan *et al.*, (2021) agree with these findings but other studies by Dilie *et al.*, (2017) found more males in the samples.

Education

The results further show that the majority (84.2%) of the workers had attained diploma level of education and above. This implies that most of the health care workers had attained sufficient

training in their respective disciplines and thus having adequate knowledge for managing NSSIs. Most earlier reports agree with these findings (Gholami *et al.*, 2013; Abbas *et al.*, 2020; and Mohohammadnejad & Dopolani 2015). This could be related to the global requirement for high qualifications to work in health facilities.

Work Experience

Results in Table 2 further show that majority (78.4%) of the health workers had worked for less than five years which is understandable given their age ranges.

A recent study in Uganda (Basaza *et al.*, 2022) reported that much older workers though in minority were 3.7 times more likely to have NSIs compared to those within 1-5 years of experience. However reports by Mohohammadnejad & Dopolani (2015) and Kumah *et al.*, (2020) revealed that the majority of the workers had over 5 years of work experience in Iran and Ghana respectively.

Environmental Factors

The environmental factors studied included health and safety training, length of working hours and adherence to existing safety guidelines. The results are presented in Table 3 below.

Table 3: Description of the Environmental Factors Associated with Prevalence of NSSIs among health care workers in the Study

Factors	Frequency (n=171)	Percent (%)
Health and safety training		
Yes	141	82.5
No	30	17.5
Length of working hours		
< 8 hours	45	26.3
8 and Above hours	126	73.7
Awareness of NSSIs		
Yes (Aware)	78	45.6
No (Not aware)	93	54.4

Table 3 results indicate that the majority (82.5%) of the health care workers reported having undergone safety training. This implies that a big proportion of the health workers had knowledge on NSSIs since they had received the training. The finding above could be attributed to the hospital’s guidelines that require its employees to undergo health safety training to create a safer work environment where employees are better able to focus on their tasks without the worry of their personal safety.

Reports from Iran (Mohammadnejad & Dopolani 2015) also found that the majority (68.8%) of the health workers had received training in NSSIs. However, Abbas *et al.*, (2020) in Ethiopia reported that almost half of the Health Workers in the study (45.5%) had never received any health safety training.

Length of Working Hours

Study findings in Table 3 also show that majority (73.7%) of the respondents reported to be working for eight or more hours in a day. This is

certainly long working hours among health care workers. There are several effects of long working hours which could inevitably result in more NSSI cases as earlier reported by Gebre *et al.*, (2018). Heavy working hours also resulted in less or no time for training in health and safety including in NSSIs (Matsubara *et al.*, 2020).

Awareness of NSSIs

According to Table 3 results, it is indicated that 54.4% of the health workers were not aware of the NSSIs. This means about half of the health workers are aware of the NSSIs at their work place. This is a very low level of awareness similar to what has been reported in Tanzania (37.7%) and in Ethiopia (65%) (Chalya *et al.*, 2015, Bazie 2020).

Behavioral Factors

The behavioral factors studied included needle recapping, reporting patterns and use of personal protective equipment (PPE) and their association with prevalence of NSSI are indicated in Table 4 below.

Table 4: Description of the Behavioral Factors Associated with Prevalence of NSSIs among health care workers

Factors	Frequency (n=171)	Percent (%)
Needle Recapping		
Yes	40	23.4
No	131	76.6
Reporting Pattern		
Yes	155	90.6
No	16	9.4
Use of PPEs		
Yes	126	73.7
No	45	26.3
Adhering to Existing Safety Guidelines		
Yes	124	72.5
No	47	27.5

Needle Recapping

The results (Table 4 above) show that the majority (76.6%) of the health care workers reported not practicing needle recapping. This finding could be as a result of the awareness of OSHA policy that indicates that recapping of needles, in general, is not appropriate. Health care workers are advised to place used needles in sharps disposal containers without recapping. However, some few healthcare workers go against this and recap needles.

Several researchers (Rhys and van de Walle 2013; Dilie *et al.*, 2017; Yeshitila *et al.*, 2015) have reported that most health workers do not recap the needles after use though a much smaller percentage recaps with one hand. However, the majority had never been exposed to an injury.

Reporting Pattern

Almost all (90.6%) of the health care workers do not report about incidence of NSSIs (Table 4 above). This implies that while every needlestick and sharps injury should be documented, it is clear from these respondents that this is not done. This means there could more NSSIs among these health care workers in this case. However other researchers (Uffan *et al.*, 2018; Matsubara *et al.*, 2020) in Egypt and Lao PDR respectively have reported that most of their respondents while having knowledge about NSSI they had not received any NSIs and even those who had never got any knowledge about NSSI had also never received any NSI.

Adhering to Existing Safety Guidelines

The results in Table 4 above also indicate that majority (72.5%) of the health care workers were adhering to the existing safety guidelines. This implies that they could easily use the health safety guidelines. The above results are in agreement with earlier reports from Ethiopia (Rhys and van de Walle *et al.*, 2012 and Berhan *et al.*, 2021) which indicated that the majority of health care workers were adhering to the safety guidelines in their places of work.

Use of Personal Protective Equipment (PPE)

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The findings in Table 4 also indicate that the majority (73.7%) of the health care workers were wearing PPEs indicating that they were mindful of the occupational health requirements. Use of PPEs is mandatory and protects workers from NSSIs (Babirye J. *et al.*, 2020; Mutekanga David R. 2020).

While Rhys and van de Walle *et al.*, (2012) found out from their study in Ethiopia that almost all the health workers who participated in the study (94.6%) were using PPEs. Basaza *et al.*, (2022) in a study in Uganda reported that the majority of the health care workers indicated unavailability of PPEs for their protection and they were not using them.

Prevalence of Needle Stick and Sharp Injuries among Healthcare Workers Attending Edna Adan Maternity Hospital

Objective 2 of the study was to determine the prevalence of NSSI among health care workers attending this Hospital.

The results indicate a high (73,7%) prevalence of NSSIs among workers attending Edna Adan Maternity Hospital. This indicates a high chance of transmission of blood borne pathogens including the human immunodeficiency virus, hepatitis B and C virus among healthcare workers in this hospital. However, this high prevalence of NSSIs in this hospital is lower than that previously reported at national level in Somalia of 90% (Bedoya 2017). However other previous reports from Iran and Uganda show relatively lower levels of NSSI prevalence (Mohammadnejad & Dopolani 2015 and Basaza *et al.*, 2022).

Association between Factors and Prevalence of NSSIs among health care workers in Edna Adan Maternity Hospital

The third objective was to establish the association between the factors (socio-demographic, environmental, and behavioral) and

prevalence of NSSIs among healthcare worker in this hospital. As a result, data was analyzed using both chi-square at bivariate and logistic linear regression analysis at multivariate (Tables 5, 6 and 7 below). Factors significant in the chi-square analysis were further analyzed in the logistic regression to generate both crude and adjusted odds and are presented in Table 8 below.

The Chi Square results in relation to socio-demographic factors are presented in Table 5 below.

Table 5: Chi-Square Analysis of Socio-Demographic Factors and Prevalence of NSSIs among Healthcare Workers

Factors	Ever got NSSIs		²	df	p-Value	
	Yes n (%)	No n (%)				
Age						
	< 25 years	32 (80.0)	8 (20.0)	1.074	1	0.300
	25 years and above	94 (71.8)	37 (28.2)			
Sex						
	Female	78 (71.6)	31 (28.4)	0.700	1	0.403
	Male	48 (77.4)	14 (22.6)			
Education						
	Below Diploma Level	17 (63.0)	10 (37.0)	1.901	1	0.168
	Diploma or above	109 (75.7)	35 (24.3)			
Work experience						
	< 5 years	98 (73.1)	36 (26.9)	0.097	1	0.756
	5 and Above years	28 (75.7)	9 (24.3)			

The results in Table 5 above show that all the socio-demographic factors (age, sex, education and work experience) were not significantly associated with occurrence of NSSIs ($p > 0.05$).

Environmental Factors

The Chi-Square results in relation to environmental factors (health safety raining, Length of working hours and awareness of NSSIs) are shown in Table 6 below.

Table 6: Chi-Square Results Analysis of Environmental Factors and Prevalence of NSSIs among Healthcare Workers

Factors	Ever got NSSIs		²	df	p-Value	
	Yes n (%)	No n (%)				
Health safety training						
	Yes	107 (75.9)	34 (24.1)	2.010	1	0.156
	No	19 (63.3)	11 (36.7)			
Length of working hours						
	< 8 hours	39 (86.7)	6 (13.3)	5.308	1	0.021
	8 and hours	87 (69.0)	39 (31.0)			
Awareness of NSSIs						
	Yes (Aware)	47 (58.8)	33 (41.2)	17.291	1	0.000
	No (Not Aware)	79 (86.8)	12 (13.3)			

The results in Table 6 show that two of the three factors (length of working hours ($p = 0.021 < 0.05$) and health awareness of NSSIs ($p = 0.000 < 0.05$) were significantly associated with occurrence of NSSIs among the health workers.

Behavioral Factors

The results in relation to behavioral factors (Needle recapping, reporting pattern, use of personal PPEs and adhering to existing safety guidelines) are shown in Table 7.

Table 7: Chi-Square Analysis of Behavioral Factors and Prevalence of NSSIs among Healthcare Workers

Factors	Ever got NSSIs		²	df	p-Value
	Yes n (%)	No n (%)			
Needle recapping					
Yes	97(74.0)	34(26.0)	0.038	1	0.846
No	29(72.5)	11(27.5)			
Reporting pattern					
Yes	115 (74.2)	40 (25.8)	0.222	1	0.638
No	11 (68.8)	5 (31.3)			
Use of personal PPEs					
Yes	98(77.8)	28(22.2)	4.138	1	0.042
No	28(62.2)	17(37.8)			
Adhering to Existing Safety Guidelines					
Yes	83 (66.9)	41 (33.1)	10.597	1	0.001
No	43 (91.5)	4 (8.5)			

The results in Table 7 above show that two factors: the use of PPE ($p = 0.042 < 0.05$) and health awareness of NSSIs ($p = 0.001 < 0.05$) were the only ones significantly associated with occurrence of NSSIs.

Relationship between the statistically significant factors and prevalence of NSSI

It was found important to also to determine the strength and direction of association between the different factors found statistically significant and prevalence of NSSIs among the Health Workers. The factors were analyzed at multivariate level using binary logistic regression. Crude Odds Ratio (COR) and adjusted odds ratio (AOR) were determined. These findings are presented in Table 8 below.

Table 8: Significant Factors associated with Prevalence of NSSIs among Healthcare Workers in the Study
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Factors	Ever got NSSIs		COR (95%CI)	p	AOR (95%CI)	p
	Yes N (%)	No N (%)				
Age						
< 25 years	32 (80.0)	8 (20.0)	1.574 (0.664 - 3.732)	0.303	1.396 (0.525-3.716)	0.504
25 years and above	94 (71.8)	37 (28.2)	1		1	
Sex						
Female	78 (71.6)	31 (28.4)	0.734 (0.355 - 1.517)	0.404	1.374 (0.578-3.260)	0.472
Male	48 (77.4)	14 (22.6)	1		1	
Education						
< Diploma Level	17 (63.0)	10 (37.0)	0.546 (0.229 - 1.302)	0.172	1.814 (0.673-4.887)	0.239
Diploma or above	109 (75.7)	35 (24.3)	1		1	
Length of Working Hours						
< 8 hours	39 (31.0)	87 (69.0)	2.914 (1.140-7.451)	0.026	3.200 (1.151-8.901)	0.026*
8 and hours	6 (13.3)	39 (86.7)	1			
Adhere to Existing Safety Guidelines						
Yes	83 (66.9)	41 (33.1)	0.188 (0.063 - 0.561)	0.003	0.198 (0.062-0.632)	0.006**
No	43 (91.5)	4 (8.5)	1		1	
Health Awareness of NSSI						
Yes	47 (58.8)	33 (41.2)	0.216 (0.102-0.459)	0.000	0.213 (0.096-0.472)	0.000**
No	79 (86.8)	12 (13.2)	1		1	

****Significant at 0.05.**

Length of Working Hours

According to results in Table 8 above, length of working hours was a significant factor associated with occurrence of NSSIs among the Health Workers at bivariate analysis [COR = 2.914, (CI 95% = 1.140 - 7.451), p = 0.026]. The results also show that health care workers who had working time of more than 8 hours per day were about three times higher compared to those who had working time of less than eight hours per day. Working longer hours also indicates that the health workers tend to reduce adherence to use of PPEs which increases exposure to NSSIs (Babirye *et al.*, 2020; Mutekanga D. R. 2020).

Other researchers (Gholami *et al.*, 2013 and Gebre *et al.*, 2018) have reported similar results where health workers who had longer working hours were 2 times more likely to experience NSIs compared to those with shorter working hours.

Adherence to existing Safety Guidelines

A statistically significant association between adherence to existing safety guidelines and prevalence of NSSIs among the health workers was recorded at both bivariate and multivariate analyses [COR = 0.188, (CI 95% = 0.063 - 0.561), p = 0.003 and AOR = 0.198, (CI 95% = 0.062 - 0.632), p = 0.006] respectively. Those adhering to safety guidelines were about five times lower compared to those who were not adhering to the safety guidelines.

The findings above suggest that health workers who were adhering to health safety guidelines were more likely not to have incidences of NSSIs than those without these guidelines.

They are also in agreement with earlier reports by Kwanzaa *et al.*, (2020) in Trinidad, and Ngesa (2018) in Kenya who also argued that the lack of compliance to safety guidelines for medical personal resulted in accidental exposure to blood-borne pathogens.

However, some other reports (Atmaja *et al.*, 2021; Rhys and van de Walle *et al.*, 2012) disagree with the above findings who indicate that those who adhere to guidelines were 2.47 times more likely to receive NSSIs or there was no statistical significance in Mali and Ethiopia respectively.

Health Awareness of NSSI

The results in Table 8 also show that health awareness of NSSIs was statistically significant factor in association with prevalence of NSSIs among the health care workers [COR = 0.216, (CI 95% = 0.102-0.459), $p = 0.000$ and AOR = 0.213, (CI 95% = 0.096-0.472), $p = 0.000$]; and that the odds of experiencing NSSIs among those who were aware of the NSSIs were about five times lower compared to those who were not aware of the NSSIs. This implies that there is a need to re-sensitize the health care workers on keeping themselves safe against injuries during work. Several authors (Uffan *et al.*, 2018; Ibuna & Jabonete 2016) working in Egypt and Nigeria do agree with the above findings of this study.

Conclusions and Recommendations

Occurrence of incidences of NSSIs among health care workers is a serious health risk as it is serious source of transmission of blood borne pathogens including the human immunodeficiency virus, Ebola, hepatitis B and C virus among health care workers. The results of this study show that the prevalence of NSSIs among workers in this hospital was very high.

It is therefore strongly recommended that the hospital administration should re-emphasize and strengthen the occupational health and safety guidelines including use of PPE and provision of regular awareness programs on NSSIs. Similarly, the hospital administration should revise and reduce the workload of its staff in terms of

number of daily working hours, so as to reduce their likelihoods of being exposed to NSSIs.

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