Dongola University

Faculty of Medicine

Community department

RESEARCH PROPOSAL

Prevalence of Needle Stick and Sharps Injury among Nurses Working at Dongola Specialized Hospital 2026

Group Members:

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1. Background Information:

A needle stick injury is the penetration of the skin by a needle point, and the term sharps injury also covers other piercing or cutting instruments such as scalpel blades, lancets and broken glass ampoules [1].

Worldwide, HCWs suffer more than 2 million occupational needle stick injuries every year [2].

Globally, the prevalence is 44.5% among HCWs and 40.97% among nurses [2,3]. Regionally, it reaches 53.5% in the Eastern Mediterranean Region and 41.7% in Africa [2], and 43% among nurses in a referral hospital in Ethiopia [1]. Locally, studies in Sudan reported prevalence of 46% in Khartoum [4] and 50.5% in Eastern Sudan, with under-reporting (only 35.0% of injuries reported) [5].

This shows that NSSI is common among nurses in countries around and similar to Sudan, which makes local data from Dongola Specialized Hospital necessary.

2. Problem Statement

Needle stick and sharps injury is a major occupational health problem for nurses.

Globally: A systematic review and meta-analysis of 87 studies (50,916 HCWs from 31 countries) found a one-year pooled prevalence of NSI of 44.5% among HCWs, and hypodermic needles were responsible for 55.1% of the injuries [2]. Among nurses specifically, the global pooled prevalence was 40.97%, and it was significantly higher in developing countries (46.6%) than in developed countries (30.5%) [3].

NSI also affects specialized practitioners: in a multicenter survey of 578 acupuncture practitioners in 98 hospitals in southwest China, 34.3% had sustained at least one NSI in the previous three years, and 46.0% of the reported injury episodes (195 of 424) were never reported to the hospital infection control committee [6]. Among these episodes, 41.3% occurred during needle removal and 75.0% occurred while no gloves were worn [6]. The same study, citing WHO estimates, noted that NSI accounts for about 39%, 37% and 4.4% of hepatitis C, hepatitis B and HIV infections among HCWs, respectively [6].

Regionally:

WHO regional estimates: the pooled prevalence of NSI was 58.2% in South-East Asia, 53.5% in the Eastern Mediterranean Region, 41.7% in Africa [2].

Eastern Mediterranean countries: In Egypt, a study at Tanta University Hospitals reported NSSI in 60.4% of healthcare workers, with a higher rate among nurses (67.9%) than physicians (39.8%) [7]. In Yemen, 95.4% of 151 nurses working in three public hospitals in Taiz had sustained NSSI [8]. In Saudi Arabia, a national survey found a one-year incidence of 22.2% among healthcare workers (34.8% among nurses), and 53.8% of the injuries were not reported [9].

Iran: A meta-analysis of 44 studies found a pooled NSSI prevalence of 42.5% among Iranian hospital healthcare workers, with a higher prevalence in women (47%) than in men (42%) [10]. Under-

reporting is also a problem in Iran, where more than half of nurses are reported not to report their injuries [11].

Africa (neighboring Ethiopia): A national systematic review and meta-analysis found that 40.5% of Ethiopian healthcare workers had experienced NSSI, and needle recapping, lack of training and non-adherence to routine precautions increased the odds of injury [12]. Among nurses, 43% of staff nurses at Dessie Referral Hospital reported NSSI [1].

However, there is no data on how common NSSI is among nurses working at Dongola Specialized Hospital, so the size of the problem and its risk factors in this hospital remain unknown.

3. Justification

There is a gap in the published literature: the available Sudanese studies were conducted in Khartoum and Eastern Sudan [4,5], and, to the best of the authors' knowledge, no study has assessed the prevalence of NSSI among nurses at Dongola Specialized Hospital. The results will provide baseline data for the hospital administration and infection control team.

4. Research Questions

1. What is the prevalence of needle stick and sharps injury among nurses working at Dongola Specialized Hospital?

5. Study Variables

Type	Variables
Dependent variable	Occurrence of needle stick and sharps injury (NSSI) during the past 12 months (Yes / No).
Independent variables	**Socio-demographic:** age, gender, marital status, educational level. **Occupational:** years of experience, department/ward, shift pattern (including night shifts), working hours per week. **Safety-related:** training on infection prevention, needle recapping practice, glove use, availability of safety boxes, availability of infection-prevention guidelines, hepatitis B vaccination status.

6. Hypothesis

Null hypothesis (H0): There is no statistically significant association between the socio-demographic, occupational and safety-related factors and needle stick and sharps injury among nurses working at Dongola Specialized Hospital.

Alternative hypothesis (H1): There is a statistically significant association between the socio-demographic, occupational and safety-related factors and needle stick and sharps injury among nurses working at Dongola Specialized Hospital.

7. Objectives

General objective

To determine the prevalence of needle stick and sharps injury among nurses working at Dongola Specialized Hospital, Northern State, Sudan, in 2026.

Specific objectives

1. To estimate the prevalence of NSSI among nurses during the past 12 months and during their career.
2. To describe the devices, procedures and circumstances associated with the injuries.
3. To identify the socio-demographic, occupational and safety-related factors associated with NSSI.
4. To assess the reporting and post-exposure management of NSSI among injured nurses.

Operational definitions

Needle stick injury: accidental penetration of the skin by a needle used on a patient.

Sharps injury: accidental penetration or cut of the skin by other sharp instruments (scalpel, lancet, broken ampoule, etc.).

One-year prevalence: the proportion of nurses who sustained at least one NSSI in the 12 months before the survey.

8. Summaries of Three Similar Published Papers

8.1 Global study

Abdelmalik et al. (2023) [3] conducted a systematic review and meta-analysis of the global prevalence of needle stick injuries among nurses, using a random-effects model. The pooled worldwide prevalence was 40.97% (95% CI: 31.29–50.63). The prevalence was highest in South-East Asia (49.9%) and lowest in the USA (25.1%), and it was significantly higher in developing countries (46.6%) than in developed countries (30.5%). The study confirms that NSI is common among nurses worldwide, especially in low-resource settings like Sudan.

8.2 Regional study

Abebe et al. (2018) [1] conducted an institution-based cross-sectional study among staff nurses at Dessie Referral Hospital, Amhara region, Ethiopia (151 participants). The overall prevalence of needle stick and sharp object injury was 43%. This study was done among nurses in a hospital in a low-resource African setting with a design and population similar to ours.

8.3 Local study

Dafaalla et al. (2016) [4] conducted a cross-sectional knowledge, attitude and practice study among 249 healthcare workers in a tertiary hospital in Khartoum, Sudan. The prevalence of NSI was 46%, and nurses made up 40% of the injured workers. Only 54.1% of the participants knew the latest universal precaution guidelines for managing needle stick injuries. This is the closest study to our setting, and its prevalence (46%) was used to calculate our sample size.

9. Materials and Methods

Study design:

An analytical cross-sectional hospital-based study.

Study area:

The study will be conducted at Dongola Specialized Hospital in Dongola, the capital of the Northern State, Sudan. The hospital provides secondary and specialized services, and nurses work in departments such as emergency, surgery, medicine, obstetrics and gynecology, pediatrics, intensive care, operating theatres and outpatient clinics.

Study period:

Three months (September – November 2026), including data collection over four weeks.

Study population:

Inclusion criteria: all registered nurses (diploma, BSc and above) working in clinical departments of Dongola Specialized Hospital who consent to participate.

Exclusion criteria: Those not present at time of data collection.

Sample size and sampling technique:

The sample size will be calculated with the single population proportion formula, a 95% confidence level (Z = 1.96) and a 5% margin of error (d):

$n_0 = Z^2 \times p(1 - p) / d^2$

Because the source population is un known yet (to be updated from the hospital human resources records before data collection):
Adding 10% for non-response gives a final sample size .

A stratified random sampling technique will be used: nurses will be stratified by department, and participants will be selected from each stratum by simple random sampling (using the duty roster as the sampling frame) with proportional allocation.

Methods and tools of data collection:

Data will be collected using a structured, self-administered questionnaire developed from the reviewed literature and written in Arabic and English.

It has four sections: 1/socio-demographic data,

2/ occupational data,

3/safety practices and training,

4/ NSSI experience (occurrence, devices, procedures, reporting and post-exposure management).

Data analysis:

Data will be entered and analyzed using IBM SPSS Statistics. Descriptive statistics (frequencies, percentages, mean ± SD) will be used to describe the participants and the prevalence of NSSI. The

association between NSSI and the independent variables will be tested using the Chi-square test (or Fisher's exact test when expected counts are small). A p-value < 0.05 will be considered statistically significant, and the null hypothesis will be rejected accordingly.

Ethical clearance:

Ethical approval will be obtained from the research ethics committee of the Faculty of Medicine, Dongola University, and permission from the administration and nursing directorate of Dongola Specialized Hospital. Participation is voluntary, written informed consent will be obtained from every nurse after explaining the aim of the study, and participants may withdraw at any time.

10. Research Plan

Time-line (3 months):

Activity	Month 1 (Sep)				Month 2 (Oct)				Month 3 (Nov)			
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
Topic selection and literature review												
Proposal writing and supervisor approval												
Ethical clearance and hospital permission												
Questionnaire preparation and pilot test												
Data collection												
Data entry and cleaning												
Data analysis												
Report writing and revision												
Submission and group seminar												

10.2 Budget breakdown

#	Item	Details	Cost (SDG)
1	Transportation of the research team	10,000 × 30 days	300,000
2	Communication and internet	40,000 × 3 months	120,000
3	Data entry and statistical analysis	Lump sum	300,000
4	Printing of the report	Lump sum	150,000
5	Contingency (10%)	10% of 870,000	87,000
	Total		**957,000**

The cost will be covered by the research group. Prices may change with the fluctuation of the exchange rate.

11. References (Vancouver Style)

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12. Kaweti G, Feleke T. Prevalence and associated factors of needlestick and sharp object injuries among healthcare workers in Ethiopia: a systematic review and meta-analysis. Front Epidemiol. 2024;4:1385417. doi:10.3389/fepid.2024.1385417.

Annexes:

Annex 1: Informed Consent and Questionnaire

Informed consent: We are a group of medical students at the Faculty of Medicine, Dongola University. We are conducting a study on needle stick and sharps injuries among nurses at Dongola Specialized Hospital. Participation is voluntary and the questionnaire is anonymous; your answers will be kept confidential and used for research purposes only. You may refuse or stop at any time without any consequence. If you agree to participate, please tick: ☐ I agree

Section A: Socio-demographic data

1. Age (years): ☐ <25 ☐ 25–34 ☐ 35–44 ☐ ≥45
2. Gender: ☐ Male ☐ Female
3. Marital status: ☐ Single ☐ Married ☐ Other
4. Educational level: ☐ Diploma ☐ Bachelor ☐ Postgraduate

Section B: Occupational data

5. Years of experience: ☐ <2 ☐ 2–5 ☐ 6–10 ☐ >10
6. Department: ☐ Emergency ☐ Surgery/Operating theatre ☐ Medicine ☐ Obstetrics & Gynecology ☐ Pediatrics ☐ ICU ☐ Outpatient ☐ Other
7. Shift pattern: ☐ Day shift only ☐ Rotating including night shifts
8. Working hours per week: ☐ ≤40 ☐ >40

Section C: Safety practices and training

9. Have you received training on infection prevention / sharps safety? ☐ Yes ☐ No
10. Do you recap used needles? ☐ Always ☐ Sometimes ☐ Never
11. Do you wear gloves during procedures? ☐ Always ☐ Sometimes ☐ Never
12. Are safety (sharps) boxes available in your ward? ☐ Always ☐ Sometimes ☐ No
13. Is an infection-prevention / NSSI guideline available in your ward? ☐ Yes ☐ No
14. Hepatitis B vaccination: ☐ Fully vaccinated (3 doses) ☐ Partially ☐ Not vaccinated

Section D: Needle stick and sharps injury

15. Have you ever had a needle stick or sharps injury during your career? ☐ Yes ☐ No
16. Have you had one in the past 12 months? ☐ Yes ☐ No
17. If yes, how many times in the past 12 months? ☐ 1 ☐ 2–3 ☐ >3
18. Device causing the injury: ☐ Hypodermic needle ☐ IV cannula ☐ Suture needle ☐ Scalpel/blade ☐ Lancet ☐ Glass ampoule ☐ Other
19. Procedure at the time of injury: ☐ Injection ☐ Recapping ☐ Blood sampling ☐ IV insertion ☐ Sharps disposal ☐ Suturing ☐ Other
20. Did you report the injury? ☐ Yes ☐ No If no, why? ☐ Not important ☐ Fear of blame ☐ No time ☐ Don't know how
21. Did you wash the site immediately? ☐ Yes ☐ No
22. Did you receive post-exposure management (testing/prophylaxis)? ☐ Yes ☐ No

Thank you for your cooperation.