Needle Stick Injury: The Incidence and Contributing Factors among Proficiency Certificate Level Nursing Students in Kathmandu Valley

Final Report

Submitted To:

Research Division

University Grant Commission

Sanothimi, Bhaktapur

Submitted By:

Binita Kumari Paudel

Kanchan Karki

Leena Dangol

Nepal Institution of Health Science

Boudha

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To,

The Director,

Research Division,

University Grant Commission

Sanothimi, Bhaktapur

Subject: Submission of Final Report (Faculty research)

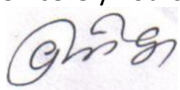
Dear Madam,

We would like to submit the final report of faculty research entitled “Needle Stick Injury: the Incidence and Contributing Factors among PCL Nursing Students in Kathmandu Valley”. This report has been finalized based on comments and suggestions from expert committee. Pleased find the 3 sets of reports in hard copy and softcopy of the reports in CD submitted herewith.

If you have any query related to this study and report, please feel free to contact me.

We would like to thank you once again for the financial support and encouragement. We are looking forward to receive such grant in future too.

Sincerely Yours’



Binita Kumari Paudel

Principal investigator

Nepal Institute of Health Science

Boudha, Kathamndu

Phone no: 9841609580

Email: binitapg@gmail.com

Abstract

An academic institution based cross- sectional survey was done to identify the incidence density of needle stick injury and its contributing factors among PCL level nursing students. Multi stage sampling method was used to select 407 samples from nursing students studying inside Kathmandu valley. Self administered questionnaire and review the records guideline were used as research tool. Incidence density was calculated and logistic regression model was fitted by using R software. Out of total students participated in the study, 46.9 % had already experienced NSIs and 44.7% of them experienced it more than once. The overall incidence density was found 5.82/person 1000 days exposure. Incidence density in night shift (6.86) and in second year (6.91) practicum period was found higher than morning +evening shift (5.41) and first year (4.21). Number of clinical posting days, year of study, universal precaution practice, vaccination and duty shifts were found associated with needle stick injury. Unexpectedly, college was also found significantly associated with needle stick injury. Out of total 298 injuries included for further analysis, 67.8 % were happened during medication, 41% while drawing medicine, 20% while recapping the needle and 45.1 % at medical ward. Only 46.6% injuries were reported and prophylaxis was used only in five injuries. However almost all the students (98.3%) stated that they follow universal precaution but only 28% practicing no-recapping. There is a practice of reusing syringe; therefore 31.3% stated that needle should recap properly by using one hand technique for the prevention of needle stick injury. Therefore, it is recommended that content in the curriculum and universal precaution training should revise in the context of Nepal and include the process of safe recapping the needle if it is necessary to reuse. It is also recommended to develop Standard Operating Procedure for proper post exposure management of needle stick injury.

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Secondly, they would like to express their deepest thanks to the head of all nursing institutions for coordination and support during field work and the participants of this study, all the PCL nursing students, for their valuable time and information. At last but not least, they would like to thank all the helping hands concerning this study.

Binita Kumari Paudel
Principal Investigators and team members

Table of Contents

Abstract ii
Acknowledgements iii
Table of Contents iv
List of tables vi
Abbreviations vii

Chapter I: Introduction

Background of the Study 1
Statement of the problem and Rational/Justification 2
Conceptual framework 4
Objectives of the study
General Objective 5
Specific Objectives 5

Chapter II: Literature Review

Incidence of Needle Stick Injury 6
Needle Stick Injury among Student of Health Science including Nursing 7
Factor associated with needle stick injury 7
Post-exposure Reporting and Prophylaxis 8
Needle Stick Injury in Nepal 8

C**hapter III: Methodology**

Research Design 9
Study Variables and their Measurement 9
Study Area and Study Population 10
Sample Size 10
Sampling Method 11
Data Collection Tools and Process 11

Quality Control of Data and Data Analysis Framework 11

Ethical Consideration 12

Expected Outcome 13

Chapter IV: Results

Socio-demographic Characteristics 14

Incidence and Post Injury Reporting 15

NSIs by Work and Procedure Related Factors 16

Practice of Universal Precaution and Vaccination 17

Factor Associated with Needle Stick Injury 19

Chapter V: Discussion, Conclusion and Recommendation

Discussion 21

Conclusion 23

Recommendation 24

Dissemination of findings 25

Reference

Appendices

A. Questionnaire
B. Review the record guideline
C. Budget and Action plan
D. Informed consent form
E. Approval letter from colleges
F. Ethical approval letter from NHRC

List of Tables

Table 1: frequency distribution of PCL nursing students studying inside Kathmandu valley by their socio-demographic characteristics 15

Table 2: frequency distribution, incidence density, post-injury reporting and prophylaxis status of needle stick injuries among PCL nursing students studying inside Kathmandu valley. 17

Table 3: frequency distribution of NSIs by work and procedure related factors among PCL nursing students studying inside Kathmandu valley (n=298 injuries) 18

Table 4: Bivariate analysis on possible factors and needle stick injury among PCL nursing students. 19

Table 5: Logistic regression on factors associated with needle stick injury among PCL nursing students 20

Abbreviations

NSIs: Needle Stick Injury/Injuries

HIV: Human Immune Deficiency Virus

AIDS: Acquired Immune Deficiency Syndrome

HBV: Hepatitis B Virus

HCV: Hepatitis C Virus

PCL: Proficiency Certificate Level

MDG: Millennium Development Goal

Chapter I

Introduction

Background of the Study

A Needle Stick Injury (NSI) is a percutaneous piercing wound typically set by a needle point, but possibly also by other sharp instruments or objects. Commonly encountered by people handling needles in the medical setting, such injuries are an occupational hazard in the medical community. These events are of concern because of the risk to transmit blood-borne diseases through the passage of the hepatitis B virus (HBV), the hepatitis C virus (HCV), and the Human Immunodeficiency Virus (HIV), the virus which causes AIDS. (wikipedia, 2011)

Needle sticks and sharp injuries (NSSIs) have been recognized as one of the common occupational hazards among health care workers. The study concerning exposures to blood and bodily fluids in health care workers found that on average 93.7 per 1000 health care employees were exposed annually. The majority of these exposures were found to occur in nursing personnel, with 35% of total exposures occurring via needle sticks (Goob, Yamada, Newman, & Cashman, 1999). The survey conducted among health care workers in Nepal revealed that fifty two subjects (74%) had a history of needle-stick injuries (Gurubacharya, 2003).

Students exposed with invasive procedures with minimal experience therefore they are more prone to have needle stick injury. The study conducted on experience of needle stick injury among nursing students found out that of the total 96 sample, nine people reported receiving a needle stick injury, one injury per participant, resulting in a 9.4% injury rate. Five out of the nine needle stick injuries were received while in the student role; the remaining four occurred in the employee role (Blackwell & Bolding, 2007). Another study conducted

among the medical students found out that 59 students out of 417 had at least one needle stick injury which was an incidence of 14.1% (Narsayani & Hassim, 2003).

There are different factors contributing for the needle stick injury. The study conducted among student nurses found out that the majority of injuries occurred on a Medical-Surgical unit (Blackwell & Bolding, 2007). Equipment design, nature of the procedure, condition of work, staff experience, recapping and disposal of needle have been mentioned as factors that influence this occurrence.

The extensive study have been conducted on needle stick injury and factors contributed to this problem among the health workers but only fewer study have been done among the nursing students (Blackwell & Bolding, 2007). As per the researchers best search in the context of Nepal, only few studies have been conducted in this issue among health workers but the students were not included any of such study. Therefore there is information gap about the incidence of the needle stick injury, reporting system and contributing factors of this problem among Proficiency Certificate Level (PCL) nursing students in the context of Nepal. In order to fulfil this gap, this study aims to explore the incidence of needle stick injury and contributing factors for needle stick injury among Proficiency Certificate Level Nursing (PCLN) students in Kathmandu valley.

Statement of the Problem and Rationale / Justification

Needle sticks and sharp injuries (NSSIs) have been recognized as one of the common occupational hazards among health care workers. Students are more prone to have needle stick injury because they exposed with invasive procedures with minimal experience. Only few studies have been conducted in this issue among health workers but the students were not included in any of such study in the context of Nepal.

The knowledge on risk of injury and universal precaution is low and the skill of handling needle is also inappropriate among the students. There is no clear guideline on what to do after an incident happened. Neither the Academic institution nor the hospital authority is responsible for prophylaxis after exposure. Because of all these reasons, the incidence might remain unreported which is very much risk of increasing HIV/AIDS, Hepatitis B and C in the future. HIV/AIDS is not only a public health problem of the country but also an emerging social issue for Nepal. It is in the stage of concentrated epidemic which mean the incidence among high risk population is more than 60% in Nepal. The HIV-TB co-infection is another threat for the world. This is the scenario of HIV/AIDS in the context of Nepal and the world. The MDG goal no. 6 focused on combating with HIV/AIDS and targeted to achieve the target no. 7 "have halted by 2015 and begun to reverse the spread of HIV/AIDS" by 2015. The commitment of HIV/ AIDS day "Getting to ZERO" which mean zero incidence, zero discrimination and zero death due to AIDS. The **infectious disease** is in the **first priority issues** for research which includes the **hepatitis** (4^{th}) and **AIDS** (10^{th}) position according to Nepal Health Research Priority areas. Ministry of Health and Population also lunching program for controlling the HIV/AIDS as it's priority program.

On the other hand, health professional including nursing personnel are included in to the high risk population for HIV/AIDS. In order to achieve the slogan of zero incidences, the focusing should be given to the high risk population. Therefore, based on above mentioned evidence, the proposed study is very much relevant and significant not only to the national priorities and needs but also relevant to international context and priority. This study would give new ideas to take precaution in nursing profession.

Conceptual framework

The conceptual framework of the study is developed from the literature review. The incidence of needle stick injuries are considered as the outcome of the study. The contributing factors of needle stick injuries are 1) individual factors including class (year), knowledge on risk of needle stick injury and hours of exposure in clinical, 2) nursing procedure which including drawing blood sample, medication, venous puncture and suturing 3) working condition including types of practiced unit, duty shift and number of instructors during clinical practice 4) universal precaution practice which including recapping, dispose of needles using sharp containers and improper disposal, trolley setup.

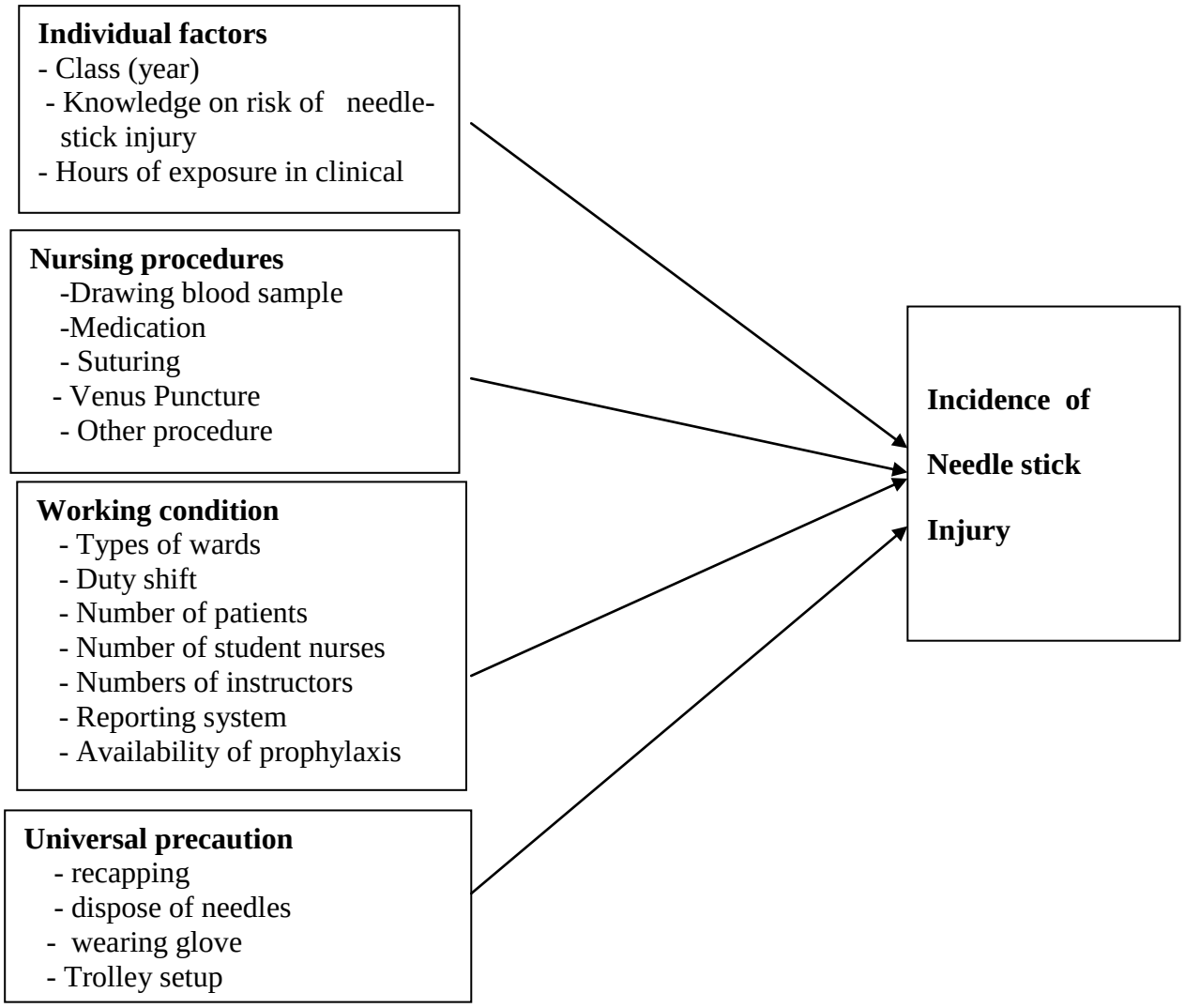

Figure 1: Conceptual framework

Research Objectives

General Objective: To explore the incidence of needle stick injury and contributing factors for needle stick injury among Proficiency Certificate Level Nursing (PCLN) students in Kathmandu valley.

Specific Objective: 1. To assess the incidence of needle stick injuries among PCLN students in Kathmandu valley.

2. To identify the contributing factors for needle stick injury among PCLN students in Kathmandu valley.

Research Questions

1. What is the incidence density of needle stick injury among PCLN students in Kathmandu valley?
2. What are the factors associated with needle stick injury among PCLN in Kathmandu valley?

Chapter II

Literature Review

The extensive number of studies have found on needle stick injury and factors contributing to this problem conducted among the health workers around the world. But only few studies found among the health science students and even less were conducted among nursing students. As per the researchers best search in the context of Nepal, few studies have been conducted in this issue among health workers but the students were not included in any of such studies.

Incidence of needle stick injury

Needle sticks and sharp injuries (NSSIs) have been recognized as one of the common occupational hazards among health care workers. The study concerning exposures to blood and bodily fluids in health care workers found that on an average 93.7 per 1000 health care employees were exposed annually. The majority of these exposures were found to occur in nursing personnel, with 35% of total exposures occurring via needle sticks (Goob et al., 1999). Based on systematic review of peer reviewed literature from developed countries, It is estimated that annual incidence of NIs is 384,000 in the United States, 100,000 in the United Kingdom, 700,000 in Germany, 29,719 in France, 28,200 in Italy, and 21,815 in Spain .The Health Care Workers (HCWs) who contributed most to this numbers (estimated NSIs 700,000) were nurses (47%), physicians (23%), and nurses' aides (12%) in Germany (Saia, M., Hofmann F. et al, 2010). In Nigeria, Seventy seven PHCWs (31.2%) have had needle stick injury in the past out of which 35(45.5%) had the needle stick injury in the last 3 months (Akeem , Abimbola & Idow, 2011). The study conducted in neighbouring country Pakistan found that sixty seven (67%) of nurses got needle stick injury during job and thirty nine

(39%) of the nurses sustained needle stick injuries more than once (Habib, Ahmed & Aziz, 2011).

Needle stick injury among student of health science including nursing

Students exposed with invasive procedures with minimal experience therefore they are more prone to have needle stick injury. The study conducted on experience of needle stick injury among nursing students found out that of the total 96 sample, nine people reported receiving a needle stick injury, one injury per participant, resulting in a 9.4% injury rate. Five out of the nine needle stick injuries were received while in the student role; the remaining four occurred in the employee role (Blackwell & Bolding, 2007). Another study conducted among the medical students found out that 59 students out of 417 had at least one needle stick injury which was an incidence of 14.1% (Narsayani & Hassim, 2003). The study conducted among nursing students in Uganda found that 25.3% students had suffered an NSI; and 50% of the NSI cases were from potentially infective sources (Hulme, 2009)

Factor associated with needle stick injury

There are different factors contributing for the needle stick injury. The commonly reported factors are poor practice of universal precaution, knowledge, experience and skill of handling needle, types of procedure, working areas, duty shift, work load, guidance and supervision.

The study conducted in Pakistan found that majority (81%) of nurses experienced NSI in ward or bedside whereas only few got NSI in Emergency Room (9%) and Operation Theatre (6%). Needle is the most injury causing instrument (48%) followed by ampoule (18%) and blade (1%). One third (33%) of nurses experienced NSI in morning shift where as other sustained NSI in evening (15%) and night (6%). More than half of nurses (55%) were

attending 11-30 patients per day whereas one fifth (20%) of the nurses were attending more than 50 patients (Habib, Ahmed & Aziz, 2011). The study conducted among student nurses found out that the majority of injuries occurred on a Medical-Surgical unit (Blackwell & Bolding, 2007). The study among medical students found that the incidence of needle stick injury during vein puncture was 9.23 % followed by 4.8% during setting up the drip and 2.4 % during giving parenteral injection. (Narsayani, & Hassim, 2003)

Post-exposure reporting and prophylaxis

Different literature suggested that both post exposure reporting and receiving Post Exposure Prophylaxis (PEP) is very low not only in developing country but also in developed country. Although the importance of monitoring and preventing NIs is recognized in US and European law, under-reporting persists significantly (Saia, M., Hofmann F. et al, 2010). In Nigeria only 19.5% of incidence reported to the health authority (Akeem, et al, 2011). In Uganda, PEP was not used by any students who experienced needle stick injury. (Hulme, 2009). In Pakistan almost all the nurses (99.3%) didn't report their injury to hospital administration and 99% of those nurses who didn't report their injury consider absence of reporting system in the hospitals as main cause of non reporting the NSI incidents (Habib, et al, 2011). Reasons for this under reporting may include the time-consuming reporting process, the belief that NIs are minor incidents, and fear of a positive test result for a serious infection (Saia, et al, 2010), absence of reporting system (Habib, et al. 2011).

Needle stick injury in Nepal

As already mentioned, only few studies have been conducted in Nepal among health workers but students are not included in any studies. The survey conducted among health care workers in Nepal revealed that fifty two subjects (74%) had a history of needle-stick injuries and only 21% reported the injuries to the hospital authority (Gurubacharya, 2003).

Chapter III

Methodology

Research Design:

"Quantitative" research method and "Descriptive Cross Sectional" research design was used for this study to find out the incidence and contributing factors of needle stick injury among PCL nursing students of Kathmandu valley.

Study Variables and their Measurement

Incidence density of needle stick injury (dependent variable): To estimate the incidence density of needle stick injury, the numbers of needle stick injury during clinical practice in the past 12 months were collected from the PCLN students. The incidence rate was calculated as the following formula;

$$\textbf{Incidence density} = \frac{\textbf{Number of needle stick injuries during clinical practice in the past 12 months}}{\textbf{Total person days of clinical practice in the past 12 months}} \times 100$$

The contributing factors (independent variables): To explore the contributing factors of needle stick injury, the structured questionnaire and review the records guideline were developed by researcher which including;

- Individual factors including – Class (year), knowledge on risk of needle stick injury and hours of exposure in clinical were collected by reviewing the record as well as by using semi-structured questionnaire developed by the researchers.
- Nursing procedures questionnaire including types of nursing procedures and the number of injuries due to each nursing procedure was developed and gathered information on contributing factors related to nursing procedures.

- Working condition related information such as types of practiced wards, duty shift, number of instructor and students, reporting system and availability of prophylaxis during each needle stick injury was gathered by using same questionnaire.
- Universal precaution practice was measured through the precaution practice during needle stick injured. The question had "Yes", "No" response and asked whether the students do the universal precaution which including non-recapping, dispose of needles, and wearing glove

Study Area and Study Population:

All the PCL Nursing colleges affiliated with CTEVT and Tribhuwan University residing inside the Kathmandu valley was selected as study area and all the students studying either in second year or third year of PCL nursing course in the nursing colleges situated inside the study area were study Population. The rationale behind selection of Kathmandu valley was because the density of nursing colleges in Kathmandu is very high in comparison to other part of the country. Besides this, the colleges residing Kathmandu valley would represent the colleges outside of the valley in the context of exposure to different kinds of hospitals such as government hospitals, community hospitals, district level hospitals, private hospitals, tertiary level hospitals.

Sample Size

Sample size was calculated based on the formula mentioned below. From the calculation 369 respondents are needed for the study. It was assumed that 10% would be non-response so 36 subjects were added. Therefore the sample size was 400 students for this study.

Sample size (*n)* = [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)]

Where, N = Population size (Null)

p = Estimate prevalence of needle stick injury (0.2)

d = Precision (0.05)

DEFF = Design effect (1.5)

Z1-α/2 = 1.96

Sampling Method

The multistage sampling method was used for this study. First of all, the name lists of all the colleges were obtained from CTEVT and Tribhuwan University. The colleges were stratified in two groups based on affiliation. There were only two colleges affiliated with TU inside study area that included into the study. Six out of total 27 CTEVT affiliated colleges were selected randomly. Three extra colleges were also selected as an alternative sample. The sampling frame of the study population was prepared from the second and third year students' attendance sheet. The numbers of students in each college were not equal in each college. As sample needed for this study was about 59% of total students from all the college so number of students from each colleges were decided based on proportionate to population size (PPS) and selected randomly by using lottery method.

Data Collection Tools and Process

The self administered questionnaire was prepared including all the variables under interest and validated by the 3 experts. The pre testing of the tool was also done among 10 % of total sample (40 subjects) in similar settings. The modification and finalization of the tool

was done based on comments from experts and pre-testing. Review the records guideline was also prepared to collect the information on their total posting days and absenteeism in the clinical period.

Coordination with the campus chief of randomly selected colleges was done by telephone contact. The official letter to obtain the permission for data collection was dropped personally and the objectives and method of the study was explained to the campus chief. Two colleges were not interested to participate in the study therefore substitute was done by another randomly selected college. Official permission letter was obtained and submitted to Nepal Health Research Council for ethical approval. The sampling frame was developed from the name list of attendance sheet. The students were explained about the purpose of the study and excluded those who are not interested. Fifty nine percent of the total students were selected randomly by doing lottery. Then the selected students were kept in the separate classroom. Questionnaire was distributed and explained the instruction on how to fill out the questionnaire. The questionnaire was collected from students immediate after completion then the collected questionnaire was checked for completeness and consistency before leaving the class room.

Quality Control of Data and Data Analysis Framework

In order to control the quality of quantitative data, the instrument was pre-tested and reviewed by experts. All the questionnaires were reviewed for completeness and consistency by the researcher and the research supervisors before leaving from the field work. Coding, editing and cleaning data was also done. The data were managed and analyzed by using R software.

Descriptive statistics were calculated as frequency, percentage and average for the independent variables of the study. The incidence density of needle stick injury was

calculated and presented as rate of incidence per person days exposure as mentioned in the formula above. Bivariate analysis was done by using tableStack command in R and explored the factors associated with NSIs. All these significant factors were included into the full logistic regression model. Non significant variables were dropped from the model as suggested by drop1 command in R.

Ethical Consideration

Ethical approval was obtained from Ethical Review Board of Nepal Health Research Council (NHRC). Written permission was obtained from the concerned nursing institute and submitted to NHRC. Informed consent was obtained from the participants of this study. Confidentiality of the obtained information and anonymity was maintained.

Expected Outcome of the Study

It was expected that this study would identify the incidence of needle stick injury and contributing factors of this problem among PCL nursing students. The findings of this study would have many applications for nursing program, nursing students and for other health care workers as well. The study would identify the magnitude of the needle stick injury and this information increase attention of concerned person like nursing students, their guardians, academic institutions and policy makers.

It was also expected that this study would explore the contributing factors related to needle stick injury such as low knowledge score on risk of needle stick injury and the universal precaution, supervision from student supervisor and working environment. This information provide evidence to update curriculum for increased education on risk of needle stick injury, the appropriate use of sharps devices including universal precaution and increased supervision of nursing students while performing the procedure that have more risk

of injury. The findings would also provide information for making rotation plan of the students for clinical posting.

Limitation of the study

However there were some limitations in this study, the research team tried their best to handle those limitations. The first limitation was recall bias as the students were asked to recall the events from past 12 months. Review the records guideline was developed and collected possible information like attendance, posting hospitals, wards and duty shifts by reviewing the records. Consistency of the information was checked from review the records. However it was not possible to calculate the person time exposure in each stratum, the team tried to calculate stratum specific incidence density where ever the information was available. Because of the study design, temporal association could not be established. Although multivariate analysis was done, this is only a descriptive study to explore the contributing factors.

Chapter IV

Results

Socio-demographic Characteristics

Table 1: frequency distribution of PCL nursing students studying inside Kathmandu valley by their socio-demographic characteristics

Socio-demographic characteristics	Frequency	percentage
Name of the college		
Lalitpur Nursing college	54	13.2
Nepal Institute of Health Science	47	11.5
Vinayak	47	11.5
BP memorial	47	11.5
CHEA	47	11.5
OM	47	11.5
Himalayan	47	11.5
IOM, Maharajgunj	71	17.4
current year of studying		
2nd year	194	47.7
3rd year	213	52.3
Age		
16 & 17 years	65	16.0
18 years	117	28.7
19 years	109	26.8
20 + years	103	25.3
not mentioned	13	3.2
Mean age ± SD		18.99 ± 2.036
Marital status		
Married	27	6.7
Unmarried	380	93.3
Ethnicity		
Brahman/Chhetri	174	42.8
Newar	58	14.3
Gurung/Magar/Tamang/ Sherpa	66	16.2
Rai/Limbu/Kirat	13	3.2
Other	26	6.4
not mentioned	70	17.2
Address		
Inside Kathmandu valley (Kathmandu/lalitpur/Bhaktapur)	194	47.7
Outside Kathmandu valley (all other districts)	213	52.3

Four hundred and seven nursing students from eight nursing institutes residing Kathmandu valley were participated in the study. There was nearly an equal participation of students from both second (47.7%) and third (52.3%) year in the study. However the age of

students' ranges between 16 to 32 years, more than half were at the age of 18 and 19 years and mean age 18.99 years with standard deviation 2.03. Almost all (93.3%) of the students were unmarried female. Nearly half (42.8%) students were from Brahman/Chhetri ethnic group followed by Gurung/Magar/Tamang/Sherpa (16.2%) and Newar (14.3%). Nearly half (47.7%) of the students were from Kathmandu, Lalitpur and Bhaktapur districts (Table 1).

Incidence and Post Injury Reporting

The students were asked about NSI occurred ever in the past exposure and during the clinical posting of recently completed academic year. Two hundred and four students (50.1%) had injured ever in the past exposure and one hundred and ninety one students (46.9%) were injured during recently completed academic year. Out of total students (191) who got injured in recently completed academic year, more than half (55.3) had only one injury followed by two injuries among 31.1% students. The number of injuries ranges between one to five times but the mean injury was 1.64±0.867. The incidence density was calculated by dividing the total number of injuries during one academic year clinical posting by total person time exposure during the academic year. The overall incidence density was found 5.82/person 1000 days' exposure. Second year exposure period had higher incidence density (6.91) comparing to first year exposure period (4.21). Night shift had higher incidence density (6.86) comparing to morning + night shift (5.41). However total injuries were 311, thirteen injuries were excluded from further analysis due to incomplete detail information. Out of total 298 injuries included for further analysis, only 46.6% were reported to the concerned person. Out of total reported injuries, more than half (56.1%) were reported to the clinical supervisor. Only five injuries received prophylaxis in free of cost from hospital among the students studying in Lalitpur Nursing Campus. (Table 2)

Table 2: frequency distribution, incidence density, post-injury reporting and prophylaxis status of needle stick injuries among PCL nursing students studying inside Kathmandu valley.

Description	Frequency	Percentage
Have you ever injured by needle stick? (n= 407)		
Yes	204	50.1
Needle stick injury during clinical posting of recently completed academic year? (n= 407)	191	46.9
Yes		
Number of needle stick injuries/ student who had an injury (n=191)		
Only one	105	55.3
Two	59	31.1
Three and more	26	13.7
Mean injury ± SD	1.64± 0.867	
Total incidence density rate	5.82/person 1000 days exposure	
Incidence density during first year clinical exposure period	4.21/person 1000 days exposure	
Incidence density during second year of clinical exposure period	6.91/person 1000 days exposure	
Incidence density in night shift	6.86/person 1000 days exposure	
Incidence density in morning + evening shift	5.41/person 1000 days exposure	
Have you report injury to the concerned person? (n=298)		
YES	139	46.6
If reported, whom did you report? (n=139)		
Clinical Supervisor	78	56.1
Ward In-charge/ward staff	61	43.9
Have you received Prophylaxis? (n=139)		
Yes	5	1.7

NSIs by Work and Procedure Related Factors

Out of total 298 injuries, 67.8 % were happened during medication followed by 16.6% during collecting blood sample. The information was also asked about specific activity with needle while occurs injury. Forty one percent injuries were occurred while drawing medicine followed by 32% and 20% while opening the cap from needle and recapping the needle respectively. Nearly half of the injuries were occurred in morning shift (46.8%) and at medical ward (45.1%). (Table 3)

Table 3: frequency distribution of NSIs by work and procedure related factors among PCL nursing students studying inside Kathmandu valley (n=298 injuries)

Descriptions	Frequency	Percentage
Nursing procedure in which injury occurred		
During medication	200	67.8
Drawing blood sample	49	16.6
Opening I/V line	14	4.7
Assist in suturing	6	2.0
Other (bed making, shaving)	26	8.8
Specific activity with needle while occurring injury		
Drawing medicine	122	41.1
Opening Cap of needle	95	32.0
Recapping the needle	61	20.5
Others (bed making, pricking to the patients, cleaning equipments at OT, suturing, shaving)	19	6.4
Area of work where injury occurred		
Medical ward	134	45.1
Surgical ward	101	34.0
Other (Emergency, OT, Obstetric, lab, OPD)	62	20.9
Duty shift in which injury occurred		
Morning	139	46.8
Evening	125	42.1
Night	33	11.1

Practice of Universal Precaution and Vaccination

Almost all (98.3%) students reported that they follow the universal precaution. But only 28% of the students used practice of no recapping. According to their view on preventive measures of NSIs, 31.3% stated that needle should recap properly by using one hand technique or recap by keeping the cap on the table where as 40.6% stated about no recapping and 85.5% stated about proper disposal of needle. Complete trolley setup including preparation for disposal of needle was found only in 10% events out of total NSIs (298) events. Nearly half (44%) students had already completed vaccine against Hepatitis B and 32% of them have not completed yet where as 23% had not started vaccine yet.

Table 4: Bivariate analysis on possible factors and needle stick injury among PCL nursing students.

	Needle stick injury			
	No (216)	Yes (191)	Test stat.	P value
Colleges			Chisq. (7 df) = 97.74	< 0.001
LNC	19 (8.8)	35 (18.3)		
NIHS	8 (3.7)	39 (20.4)		
Vinayak	39 (18.1)	8 (4.2)		
BP Memorial	19 (8.8)	28 (14.7)		
CHEA	44 (20.4)	3 (1.6)		
OM campus	31 (14.4)	16 (8.4)		
Himalaya	31 (14.4)	16 (8.4)		
IOM	25 (11.6)	46 (24.1)		
Current year of study			Chisq. (1 df) = 20.1	< 0.001
2nd year	126 (58.3)	68 (35.6)		
3rd year	90 (41.7)	123 (64.4)		
Ethnic group			Chisq. (3 df) = 7.69	0.053
Brahman/Chhetri	108 (56.8)	66 (44.9)		
Newar	24 (12.6)	34 (23.1)		
Gurung/Magar/Tamang	36 (18.9)	30 (20.4)		
Others	22 (11.6)	17 (11.6)		
Age group			Chisq. (3 df) = 0.74	0.865
16+17 Yrs	33 (15.9)	32 (17.2)		
18 Yrs	60 (28.8)	57 (30.6)		
19 Yrs	57 (27.4)	52 (28)		
20+ yrs	58 (27.9)	45 (24.2)		
Number of day posting to clinical			Ranksum test	< 0.001
median(IQR)	140 (100,150)	150 (140,150)		
Marital Status			Chisq. (1 df) = 0.77	0.38
Married	17 (7.9)	10 (5.2)		
Unmarried	198 (92.1)	181 (94.8)		
Knowledge on Risk of NSIs			Chisq. (1 df) = 0.67	0.413
No	4 (1.9)	7 (3.7)		
Yes	212 (98.1)	184 (96.3)		
Universal precaution practice			Fisher's exact test	0.01
No	0 (0)	6 (3.1)		
Yes	216 (100)	185 (96.9)		
Participation in any training on NSIs			Chisq. (1 df) = 2.81	0.094
No	195 (91.1)	182 (95.8)		
Yes	19 (8.9)	8 (4.2)		
Hepatitis B Vaccination			Chisq. (2 df) = 14.53	< 0.001
No	60 (27.9)	35 (18.3)		
Yes/complete dose	103 (47.9)	77 (40.3)		
Yes/incomplete dose	52 (24.2)	79 (41.4)		

Factor Associated with Needle Stick Injury

While doing bivariate analysis (tableStack command in R), the factors that significantly ($p<0.05$) associated with NSIs were college, year of study, number of days posting to clinical, universal precaution practice, participation in any training related to NSIs and vaccination against Hepatitis B. (Table 4). Only two predictors were fitted in the final logistic regression model (Table 5). College and year of study were found significantly associated with needle stick injuries. Sixty five percent students of Lalitpur Nursing Campus had experienced needle stick injury. While fitting the logistic model, treatment contrast was used so Lalitpur nursing campus was considered as reference group. Based on the model, in comparison with Lalitpur Nursing Campus, IOM Maharajgunj and BP Memorial colleges do not have significant difference in needle stick injury. But Nepal Institute of Health Science had found significantly higher and Vinayak, OM and Chakrabarti (CHEA) had found significantly lower needle stick injury comparing to Lalitpur Nursing Campus. Comparing to second year students (first year exposure), third year students (second year students) had 3.1 times high rate of needle stick injury ($p<0.001$).

Table 5: Logistic regression on factors associated with needle stick injury among PCL nursing students

Factors	Odd ratio	95% CI
Colleges (Lalitpur college as reference group)		
Nepal Institute of Health Science	2.80*	1.06 - 7.41
Vinayak	0.11***	0.04 - 0.29
BP memorial	0.98	0.42 – 2.28
CHEA	0.03***	0.01- 0.13
OM	0.27**	0.11-0.65
Himalayan	0.27**	0.11- 0.63
IOM, Maharajgunj	1.07	0.49- 2.31
Year of study (second year as reference)		
Third year	3.15***	1.96- 5.06

Note: *$p < .05$; **$p < .01$ and ***P<0.001

Chapter V

Discussion, Conclusion and Recommendation

Discussion

Needle stick injuries have been recognized as common occupational hazards among health care workers. This study also revealed that NSIs are common in nursing students. The PCL nursing students usually expose in clinical practicum for 20-30 weeks in one academic year. Out of total students participated in the study, 46.9 % had already experienced NSIs even during this short period of time. This finding is very high comparing to findings among medical students which was only 14.1% (Narsayani & Hassim, 2003) and among nursing students was 25.3% in Uganda (Hulme, 2009) and 9.4% in Greenwood (Blackwell & Bolding, 2007).

Needle stick injury is not a single life time event. Usually health care workers experience it more than once. This study found that nearly half (44.7%) out of those who had an injury, had more than one injuries where as 39% nurses in Pakistan also had more than once (Habib, et al, 2011). Therefore, the information on proportion of workers having injury may not provide actual information about magnitude of the problem. This study calculated the incidence density of NSIs. The overall incidence density was found 5.82/person 1000 days exposure. It means 5.8 injuries would be expected if one person exposed for 1000 days. Similar study in India found the occurrence rate of about 3.47% per annum among health care workers (Sharma, et al, 2010)

More than 90% of the injuries were occurred in morning and evening shift but in fact night shift had higher incidence density (6.86) comparing to morning + night shift (5.41). Out of total 298 injuries, 67.8 % were happened during medication, drawing medicine (41%) and at medical ward (45.1%). These findings were supported by other similar studies. This

also may be because students are more responsible in medication, blood sample collection posted mainly to medical surgical ward.

All health science students learn about universal precaution and almost all (98.3%) students of this study also reported that they practice it which includes no recapping of the needle. But in practice re-use of syringe is very common in some countries including Nepal: like in Nigeria 85% of the health facilities recapped the needle. In such a context, students must recap needle for next use mainly to the same patient. One third of the student of this study mentioned one of the preventive measures as "one hand recapping technique"..

However Post exposure prophylaxis (PEP) is very effective and useful in prevention of blood born diseases, the PEP was not used by Ugandan students unless it is being indicated (Hulme, 2009). Although, the reporting of NSIs was 46.6% and only five injuries out of total were found managed with prophylaxis in this study. Unlike this finding, the reporting within one hour was found 94% and PEP against HIV/AIDS was found among one fourth (25%) of the exposed health care workers in Kenya (Mbaisi, et al, 2013) and 7.8% in India (Sharma, et al, 2010) .

Second year had higher incidence density (6.91) comparing to first year (4.21). The year of study was also found significantly associated with NSIs in multivariate analysis. This can be because second year students assigned to do more invasive procedure than first year students based on their curriculum. Unexpectedly, the college was found significantly associated with NSIs. Some reasons behind this difference among colleges can be mainly due to duration of clinical posting, opportunity to expose in different procedure, bed occupancy ratio of the hospital where students were posted and unequal sample from each college. Therefore it can be assumed that students from different colleges have different level of exposure.

However there were some limitations in this study, the research team tried their best to handle those limitations. The first limitation was recall bias as the students were asked to recall the events from past 12 months. Review the records guideline was developed and collected possible information like attendance, posting hospitals, wards and duty shifts by reviewing the records. Because of the study design, temporal association could not be established. Although multivariate analysis was done, this is only a descriptive study to explore the contributing factors.

As expected the findings of this study is new to the context in Nepal, this study would provides the basis for further study as well basis for catching attention of concern persons including students themselves for positive changes to minimize the magnitude of problem.

Conclusion

On the basis of analysis and interpretation of the findings, this study concluded that:

- Needle stick injury was found very high among PCL nursing students studying in Kathmandu valley.
- More than half injuries occurred in medical ward during medication, nearly half while drawing medicine and one fifth while recapping the syringe.
- Reporting of the incident and use of post injury prophylaxis was found very low. Only the students belongs to Lalitpur Nursing Campus received PEP in free of cost from Patan hospital.
- Unlike in the theory based on curriculum, the study found common practice of reusing syringe for the same patients mainly for IV bolus medication. Therefore students were involved in recapping syringe although it was taught not to recap in universal precaution.

- College, year of study, number of days posting to clinical, universal precaution practice, participation in any training related to NSIs and vaccination against Hepatitis B were found significantly associated with NSIs.

Recommendation

A. Recommendation for further study

- This cross sectional study has just explored the smell of the association between needle stick injury and other possible variables. Therefore follow up study is recommended for the accurate calculation of incidence density and detailed person time exposures on possible contributing factors. The findings of this study may be useful to formulate the hypothesis for analytical study.
- Unexpectedly, college was found associated with NSIs so further study is recommended to identify in detail.

B. Recommendation for prevention of NSIs and post exposure management

- However students were taught not to recap the needle, the study found one fifth of the injuries were occurred during recapping because there is a common practice of reusing syringe for same patient. Therefore it is recommended that universal precaution and the nursing curriculum should include the content on how to recap the needle safely and how to handle used syringe safely.
- To address the low rate of NSIs reporting and almost no use of post exposure prophylaxis, proper post exposure management by developing Standard Operating Procedure (SOP) is urgently recommended. The SOP should include information on proper reporting system and provision of counseling and post exposure prophylaxis for the students.

Dissemination of the findings

- Three copies of final report is going to submit to University Grant Commission
- Hard copy of the report is going to submit to Nepal Health Research Council Library, Maharajgunj Nursing Campus library and NIHS library.
- Finding sharing seminar to the participants of this study was conducted. About 50 students and 6 nursing teachers were presented in the seminar.
- At least two manuscripts are going to prepare and submit for publication in peer reviewed journal published in Nepal or in neighbouring counties.

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Code no: …….

Nepal Institute of Health Science
Affiliated to Purbanchal University
Boudha 6, Kathmandu

Self Administered Questionnaire

Namaskar!! We, Binita Kumari Paudel, Kanchan Karki and Leena Dangol are the faculty members working in the Nursing department of Nepal Institute of Health Science. The study entitled **"Needle Stick Injury: The Incidence and Contributing Factors among Proficiency Certificate Level Nursing Students in Kathmandu Valley**" aims to explore the incidence of needle stick injury and contributing factors for needle stick injury among Proficiency Certificate Level Nursing (PCLN) students in Kathmandu valley. We would like to assured you that the information that you provided will be kept confidential and use only for the study purpose and benefit for the nursing professionals.

This is the self administered questionnaire. It takes about 45 minute to complete it. It would be allow you to withdraw from the study at any time if you do not want to participate any more or to leave any question if you do not want to answer it. We also would like to inform you that this would be your voluntary participation for the benefit of nursing professionals.

Direction: Please circle the right option as well fill in the blanks as necessary.

Section 1: General Information

1. Name of your college:
2. In which year are you studying?
    a. PCL Nursing 2nd Year
    b. PCL Nursing 3rd Year
3. Completed age (in years): ……..
4. Ethnicity: …….
5. Marital status: ……
6. Permanent address: …….

Section 2: Questions Related to Needle Stick Injury

7. What do you mean by needle stick injury?

   _____

   _____

   _____

8. Have you ever injured by needle stick during your clinical period?
   a. Yes
   b. No
9. Have you injured by needle stick during the your **1st year OR 2nd year** practicum period? **(Please exclude injury in your current study year)**
   a. Yes
   b. No

If yes,

10. How many times have you got injury by needle stick during your **1st year OR 2nd year** practicum period? **(Please exclude injury in your current study year)**

   ……..

Please provide the detail information about each injury:

11. If yes, specify the nursing procedure in which needle stick injury occurred.

Procedures	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Drawing blood					
Injecting medicine					
Opening I/V line					
Suturing					
Specify if other…….					
…….					

12. What were you doing with the needles when you got needle stick injury?

Procedure	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Opening cap of needle					
Drawing medicine					

Recapping the needle					
While carrying to the bed site					
Specify if other…….					
…….					

13. In which area were you working while you had each needle stick injury?

Procedure	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Medical					
Surgical					
Obstetric					
OT					
Emergency					
Specify if other…….					
…….					

14. In which duty shift needle stick injury occurred?

Duty Shift	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Morning					
Evening					
Night					
Any other…….					

15. How many instructors were available in that shift while you had a needle stick injury?

No of instructors	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5

16. How many students (approximately) were present during that shift?

Number of students	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5

17. Did you report the incidence of needle stick injury to the concerned person?

Report the incidents	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Yes					
No					

18. Were you well prepared for the procedure?

Prepared the following	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Trolley setup					
Wearing protective equipment					
Preperation for disposal					

19. Whom did you report the incidence of needle stick injury?

Reporting to whom?	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Clinical supervisor (to the college)					
Ward In-charge (to the concern hospital)					

20. Have you received any prophylaxis?

Received prophylaxis	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
Yes					
No					

21. If received prophylaxis, was the prophylaxis free of cost?

    a. Yes
    b. No

22. If it was free, from where you got if?

From where received free prophylaxis	Injury 1	Injury 2	Injury 3	Injury 4	Injury 5
……..					
…….					

Section 3: knowledge related to risk of needle stick injury and preventive measures

23. Do you know about the risks of needle stick injury?
    a. Yes
    b. No
24. If yes, what are the risks of needle stick injury?

    ……..

25. Do you follow universal precaution practice for nursing procedures?
    a. Yes
    b. No
26. If yes which universal precaution do you follow?
    a. Wearing personal protective equipments (gloves, masks, apron)
    b. Proper disposal of needles
    c. No recapping
27. What are the preventive measures of needle stick injury?
    a. ……..
    b. ……..
    c. ……
    d. ……
28. Have you participated in any training/session related to needle stick injury?
    a. Yes
    b. No
29. Have you received vaccination against Hepatitis B?
    a. Yes/ complete dose
    b. Yes/ incomplete dose
    c. No
30. Anything more would you like to tell us more about needle stick injury?

    …….

    ……

    ……

Thank you very much for your kind cooperation.

"Needle Stick Injury: The Incidence and Contributing Factors among Proficiency Certificate Level Nursing Students in Kathmandu Valley"

Guidelines for review the records for duration of clinical posting days and absentism.

Name of the college:

Year: First /second

1. List out the hospitals where the students were sent for clinical practicum.
    a. ……
    b. ……..
    c. ……..
    d. ……..
    e. ……..

2. Total no of clinical posting days in their last academic year: …….
3. Total number of days absent during that specific period: ……..

Reviewed by:…… Date:……

Note: Please calculate the absent days of only those students who are selected and participated in our study. Exclude other students who are not included in our sample.

SN	**Activities**	**Months**												**Remarks**
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Ethical approval from IRC at Stupa/NHRC	****	****	****										Completed but more than expected time.
2	Planning for data collection													
	Coordination with concerned colleges	**	**	**	**									Completed
	Tool development	**	**											Completed
	Pretesting and finalizing the tool					**	**							Completed
3	Sharing the progress to UGC and NIHS							**						Completed
4	Data collection							**	**					Completed
5	Data management and analysis							**	**	**				Completed
6	Report writing (Draft)									**	**			Completed
7	Report Presentation to UGC											**		Completed
8	Findings presentation to the respondents											**		Completed
9	Report writing (Final)											**	**	Completed
10	Submission of Final Report to UGC												**	In the process
11	Manuscript writing and submission for publication												**	Going on

Table: Budget for purposed study

	Description		Rate (Rs.)	Unit	times	Total
1	**Remuneration**					
	PI	per days	1200	35	1	42000
	Co-PI	per days	800	15	2	24000
2	**Cost for ethical approval**		1000	1	1	1000
3	**Field work**					
	Travel to colleges(8 colleges)	per college	2200	8	1	17600
	Field allowance (team members)	persons/day	1000	3	8	24000
4	**Communication/internet**					
	phone call: 10 calls/college	calls/colleges	50	10	8	4000
	Internet for literature search	per hour	20	150	1	3000
5	**reports/journals/books needed for the study**	**lump sum**				5000
6	Refreshment for the progress report presentation to UGC representative and faculty members of NIHS	per persons	100	25	1	2500
7	**Stationary**					
	Diary/pen/ paper/clip files etc for admin and researcher's use	lump sum				5000
	pencil/eraser/sharpner for respondents	per persons	15	400	1	6000
8	**Questionnaire printing and photocopy**					
	Printing questionnaire (draft/final)	per page	4	7	2	56
	Photocopy of tool(draft + final)	per page	2	7	440	6160
9	**Data entry(double entry)**	per questionnaire	30	400	2	24000
9	**Report Printing and photocopy**					
	Printing(draft/final)	per page	4	150	2	1200
	photocopy (draft and final both 5 copies)	per page	2	150	10	3000
	Report Binding	per piece	50	12	1	600
10	**Report dissemination**					
	Publication (peer reviewed journal of Nepal)	per page	300	3	1	900
	Sharing the research findings (seminar) to respondents (2 events)	per persons	100	50	2	10000
	Total					**180016**
	overhead cost(10% of total budget)					18001.6
	Grand Total					**198017.6**