

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF ALLIED HEALTH SCIENCES

NURSING AND MMIDWIFERY DEPARTMENT

ASSESSMENT OF THE KNOWLEDGE AND PRACTICES TOWARDS
INFECTION PREVENTION AND ASSOCIATED FACTORS AMONG
HEALTHCARE PROVIDERS OF PUBLIC HEALTH FACILITIES IN WEST
ARSI, OROMIA REGIONAL STATE, ETHIOPIA.

By: GEROMA MORKA (Bsc, Nursing)

ADVISOR: BERHANU WORDOFA (Bsc, Msc)

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF
ADDIS ABABA UNIVRSITY IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER SCIENCE BY
MATERNITY AND REPRODUCTIVE HEALTH NURSING

JUNE 2015
ADDIS ABABA, ETHIOPIA

Approval by the board of examiners

This thesis by Geroma Morka is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of Master of Science in Maternity and Reproductive health Nursing.

Internal Examiner:

Full Name	Rank	Signature	Date
Sr. Zuriyash Mengistu	Bsc, Msc	_____	_____

Research Advisor/Supervisor:

Full Name	Rank	Signature	Date
<u>Ato Berhanu Wordofa</u>	Bsc, Msc	_____	_____

Chair of Department

Full Name	Rank	Signature	Date
<u>Daniel Mengistu</u>	<u>Assistant professor</u>	_____	_____

Acknowledgements

I appreciate Addis Ababa University, College of health science school of allied health sciences department of nursing and midwifery for financially supporting this thesis and writing letters that enabled me to communicate with all relevant organizations and offices.

My most gratitude goes to Mr. Berhanu Hordofa (Msc, Bsc) for continuous contribution as scientific advisors and constructive comments he provided me even during his private hours throughout the thesis work.

The West Arsi Zone Health office, Dodola and Kuyara hospital, Gobe health center, Kofele, Arsi Nagele, Shashamane, Dodola, and Asasa Woreda health offices, Shashamane Town health office welcomed the work of the thesis with great appreciation and facilitated the cooperation of local health center and hospital staff with the activities of data collection.

I would like to express my heartfelt gratefulness to the respondents of this study for devoting much of their invaluable time during the interview.

All data collectors and respondents are very much appreciated for their patience and strength to reach all selected health center no matter how difficult the topography of the area is.

At last but not least I also thank those whom I might have overlooked to cite, but contributed to the thesis work in one way or the other.

Table of content

Acknowledgements	I
Table of content	II
Acronyms and Abbreviations	IV
Lists of Tables	V
Lists of Figures	VI
Abstract	1
Introduction	2
1.1 Background.....	2
1.2. Statement of the problem.....	3
1.3. Rationale of the study	5
2. Literature review	6
2.1 Knowledge of health care provider	6
2.2. Practice of health provider literature	8
Conceptual Framework	11
3. Objective of the study.....	12
3.1. General objective.....	12
3.2. Specific objectives.....	12
4. Methodology	13
4.1. Study area and Period	13
4.2. Study Design	13
4.3. Population	13
4.3.1. Source Population	13
4.3.2. Study population	13
4.4. Inclusion and exclusion criteria	13
4.5. Sample size determination.....	13
4.6. Sampling procedure	14
4.7. Variables.....	14
4.7.1. Dependent variables	14
4.7.2. Independent variables.....	15
4.8. Operational Definitions.....	16

4.8.1 Knowledge	16
4.8.2. Practice	16
4.8.3 Health Care provider:	16
4.9. Data collection tool and procedure	17
4.10. Data quality control	17
4.11. Data Processing, analysis and interpretation	17
4.12. Ethical Consideration	18
4.13. Dissemination of the result plan.....	18
5. RESULTS	19
5.1 Socio-demographic Characteristics	19
5.2. Knowledge of health care providers on infection prevention.....	22
5.3. Practice of health care providers on infection prevention	26
5.4. Factors associated with knowledge of infection prevention among health care provider.....	30
5.5. Factors associated with practice of infection prevention among health care providers.....	32
6. Discussion.....	34
7. LIMITATIONS AND STRENGTH OF THE STUDY	37
7.1. Strength.....	37
7.2. Limitations.....	37
8. Conclusions and Recommendations.....	39
8.1. Conclusions.....	39
8.2. Recommendations	39
Reference.....	40
Annex I. Information and Consent Sheet.....	44
Annexes II. Questionnaire.....	46
Annex -III Map of study area	53
Annex IV: Schematic Diagram of sampling framework	54

Acronyms and Abbreviations

AOR	Adjusted Odd ratio
BBP	Blood Borne Pathogens
Bsc	Bachelor of Science
CDC	Communicable Disease Control
COD	Crude Odd Ratio
HAI	Health care Associated Infection
HBV	Hepatitis B virus HCW Health Care Workers
HVC	Hepatitis C virus
IC	Infection Control
HIV/AIDS	Human Immunodeficiency virus/ Acquired immunodeficiency disease Syndrome
Msc	Master of Science
PPE	Personal Protective Equipment
WHO	World Health Organization

Lists of Tables

Table 1: Distribution of Socio-demographic characteristic of health care providers in selected health facilities of West Arsi zone, Oromia Region, South East Ethiopia, and April, 2015.	20
Table 2 Distribution of Determinant Factors of Healthcare Providers in Selected Health Facilities of West Arsi zone, Oromia Region, South East Ethiopia, and April, 2015.	21
Table 3. The Distribution of knowledge of Health Care Providers on Infection Prevention in Selected Health Facilities of West Arsi Zone, Oromia Region, South East Ethiopia April, 2015.....	23
Table 4. Frequency Distribution on Practice of Health Care Providers at Health Care Facilities in Selected Health Facilities of West Arsi Zone, South East, Ethiopia 2015.....	28
Table 5 Comparison of health care providers' knowledge on infection prevention with selected socio-demographic characteristics in selected health facilities of West Arsi zone, Oromia region, south East Ethiopia April, 2015	31
Table 6 The Comparison of Healthcare Providers Practice on Infection Prevention with Socio-demographic Characteristics in Selected Health Facilities of West Arsi Zone, Oromia Region, South East Ethiopia, April, 2015.	33

Lists of Figures

Figure 1 A conceptual framework showing the factors affecting Knowledge and Practice of infection prevention and associated factors among health care provider in health care facilities developed from literature.	11
Figure 2 Knowledge of health care providers on disease transmitted by needle stick injury in West Arsi Zone in April, 2015	25
Figure 3 Practice of hand washing among health care providers in West Arsi Zone, in April 2015	27
Figure 4 Schematic presentation of Sampling Procedure January 2015	54

Abstract

Background: Health care workers (HCW) are at risk of infection with blood borne pathogens (BBP) through occupational exposure to blood and infectious body fluids presents the greatest risk for transmission in the health care settings(3). Health care associated infections place a significant economic burden` on the health care system. Infection control(IC) practices are paramount to minimize health care associated infections. This study was to assess the knowledge and practice of health care providers towards infection prevention and associated factors in health facilities in West Arsi Zone, 2015

Methods: A cross-sectional study was conducted in April six to ten 2015 in selected health facilities of West Arsi Zone. Six hundred eighteen health providers were included in the study. The sample size was assigned to each health facility proportional to their number of healthcare providers. Study subjects were selected by simple random sampling technique. Self administered structured questionnaire was used to collect information. Bivariate and Multivariate Logistic regression was used to identify factors associated with knowledge and practice of healthcare providers towards infection prevention. P-value<0.05.

Result: six hundred forty eighty participants with 95.3% response rate were involved in the study. Of these, (46.3%) had poor knowledge and 63.7% had unsafe practice health care provider`s score towards infection prevention. Having training on infection prevention were significantly associated with knowledge on infection prevention (AOR=5.019 CI of 95% (1.453, 8.585)). Having training on infection prevention was significantly associated with practice on infection prevention. (AOR= 5.305 CI of 95% (2.420, 11.629)).

Conclusion: Above one third of healthcare providers had relatively poor knowledge and nearly two third of them had unsafe practice on infection prevention. Infection prevention training and presence of infection guideline in the health facility are determinant factor to knowledge and practice. Further study is recommended.

Key words: Knowledge, Practice, Infection prevention, West Arsi Zone.

Introduction

1.1 Background

Infection prevention refers to policies and procedures used to minimize the risk of spreading infection, especially in hospitals (nosocomial infection) and human health care facilities. Infection control intervention such as hand hygiene, safe disposal of needles and use of PPE are vital for prevention and limitation of nosocomial infections and form an important part of modern operation department policies. The purpose of infection prevention is to reduce the occurrence of infectious disease. These diseases are usually caused by bacteria or viruses and can be spread by human to human contact, human contact with an infected surface, air born transmission through tiny droplets of infectious agents suspended in the air and contaminated materials (1).

Nosocomial infections have been recognized as a problem affecting the quality of health care and a principal source of adverse healthcare outcomes. It has been documented in the literature that within the realm of patient safety, these infections have serious impact. Increased hospital stay days, increased costs of healthcare, economic hardship to patients and their families and even deaths, are among the many negative outcomes. In the United States, recent data based on the Consumer Price Index in 2007 supports that the overall direct cost for in-patient hospital services related to nosocomial infections ranges from \$35.7 billion to \$45 billion yearly. A systematic review of published literature on costs attributable to nosocomial infections among only 28 community hospitals in southeastern region of U.S. over a one-year period, revealed that the annual cost associated with nosocomial infections exceeded \$26 million. These findings are indicative of the enormous economic burden associated with nosocomial infections (2).

1.2. Statement of the problem

Health care workers (HCW) are at risk of infection with blood borne pathogens (BBP) through occupational exposure to blood and infectious body fluids presents the greatest risk for transmission in the health care settings(3). HBV is a contagious and easy to be transmitted from one infected individual to another by blood to blood contact, mother to child, unprotected sexual intercourse sharing of eating utensils and other barbershop and beauty salon equipment (4).

Hospital acquired infections now a day reaches 7-10% of hospital admissions. These infections result from the transmission of microorganisms from hands of health care workers (HCW) in health institutions (5). Health care associated infections place a significant economic burden on the health care system (6, 7). Infection control(IC) practices are paramount to minimize health care associated infections. Health care associated infections particularly those that are surgery related, are important causes of pre-operative morbidity and mortality, prolonged hospital stay and increased cost. Health care workers (HCW) may be responsible for patient to patient transmission of infection. In addition, there is the risk of patient to practitioner transfer that may result in life of careers threatening of consequences (8).

The practice of modern medicine have contributed a lot in the increase of the case and spreading blood born disease like HIV and HBV due to lapse in the sterilization technique of instruments and improper hospital waste management because 10 to 20% health care waste is regarded as hazardous (9). Although high risk exposures to infected blood, body fluid and needle stick injuries are common occupational hazards for health care workers, statistics globally underestimate the severity of the problem because many HCWs don't report their exposures (10).

The world health organization (WHO) estimated that at least 50% of the 12 billion injections administered each year in the developing world are unsafe –posing serious health risk to recipients, health workers and the public (11,12,13). Injuries from sharp devices have been associated with the transmission more than 40 pathogens, including HBV, HCV and HIV (12, 14, 15). Among the 35 million health workers worldwide, about 3 million experience percutaneous exposures to blood borne pathogens each year; two million of those to HBV, 0.9 million to HCV and 170000 to HIV. These injuries may result in 15000 HCV, 70000 HBV and 1000 HIV infections. More than 90% of these infections occur in developing countries (16).

In sub-Saharan countries the problems associated with patient safety is often hampered by inadequate data. However, prevalence studies on hospital-wide healthcare associated infection

from some African countries reported high infection rates (Mali 18.9%, Tanzania 14.8%, Algeria 9.8%) with patients undergoing surgery being the most frequently affected. In addition to HCAs, developing countries are hit hard by HIV/AIDS, pandemic hepatitis B and hepatitis C virus infection. In resource poor settings, rates of infection can exceed 20 % (17). Hospital wide health care associated infection prevalence varied between 2.5% and 14.5% in Algeria, Burkina Faso, Senegal and Tanzania. Over all HCAI cumulative incidences in surgical ward ranges from 5.7% to 45.8% in studies conducted in Nigeria and Ethiopia (18). High prevalence of sharp injuries was observed among health professionals working in Addis Ababa hospitals. Sharp injuries were associated with over use of injection, workload, recap, disassembling of needle and syringe, working in private hospitals, taking infection prevention training, taking injection safety training, and availability of safety box. A significant number of health professionals were infected by blood borne pathogens (19).

With health care providers having the most contacts with patients, understanding their knowledge, and practice patterns with regard to nosocomial infections may be an important mode by which this health care issue may be addressed. The purpose of this study will to investigate the level of knowledge and practice of health care providers with regards to infection prevention and associated factors and compare the knowledge, and practice in novice and experienced health care providers with regards to infection prevention.

1.3. Rationale of the study

Globally WHO estimates that every unsafe injections and needle stick injuries cause at least 8-12 million hepatitis B infections, 2.3-4.7 million hepatitis C infections and 160,000 HIV AIDS infections (13, 15). The center for disease control and prevention (CDC) in US estimated that each year 385,000 needle stick injuries are sustained by hospital based health care personnel (14).

Health care providers, planners and evaluators should not ignore this high morbidity and life threatening infection situation. On top of these, unless appropriate infection prevention is in practice health care facilities can be the source of infection and epidemic disease for the community at large. Therefore this study is intended to assess level of infection prevention practice and awareness among health care providers. The proposed study would have a momentous input in identifying and improving the patterns of infection prevention at the health facility level in the study area and baseline information for decision makers to put appropriate solution. This study will also help to clarify pictures of problems among infection prevention practice of health care providers in health facility. The study again will be important to create the necessary awareness of health care providers about methods of infection prevention in health facilities. It will also serve as source information for further study.

2. Literature review

Occupational risk of HIV transmission is a major concern for healthcare workers. Some healthcare workers are at a greater risk of acquiring HIV infection than others. These include those who are in close contact with body fluids like surgeons, obstetricians, midwives and laboratory personnel. These people need extra precaution while handling their patients (9). As a result of its numerous effects, HIV has significantly altered the delivery of healthcare and the lives of people virtually in all communities. The risk of transmission, particularly through needle-stick injuries, continues to be a major concern for all professionals working in healthcare settings (8, 9).

Health care workers are increasingly at risk of becoming infected with nosocomial infections. The greatest risk is for those that performs surgical procedures (Physicians, Nurses and Midwives); processes surgical instruments; and performs housekeeping and waste management tasks; including disposal of infectious waste items (20).

2.1 Knowledge of health care provider

The survey conducted on Healthy Hospitals Project in Ecuador indicated that overall training in occupational health and safety was relatively short, with 35.9% of respondents receiving one hour or less of total training. The largest proportion of workers receiving more than one hour of training across the three facilities was for waste disposal (48.2%), infection control (47.9%), hand hygiene (45.8%), personal protective equipment (36.1%), needle-stick injuries (33.7%), isolation procedures (24.2%), patient lifting procedures (12.0%), and violence prevention (5.4%).(21)

The study conducted in Ghana on the similar topic indicated that level of knowledge of respondents 92% on universal basic precaution (22). The study conducted on Compliance with Infection Prevention Guidelines by Health Care Workers at Ronald Ross General Hospital Mufulira District in Zambia 95% of the respondent had heard about Hospital Acquired Infection (HAI), with 86% having heard of Universal Precautions (UP) or Infection Prevention (IP) guidelines. 63.6% of respondents indicated that UP/IP were part of their training curriculum. The commonest known HAI was Pneumonia while the commonest known UP/IP guideline was hand hygiene. The commonest known mode of transmission for HAI was contact with blood and body fluids mentioned by 24.2% of the respondent while the least known was via needle prick injuries

9.1%. 21.5% of respondents Hand hygiene was mentioned as a means of preventing HAI while only 5.7% indicated proper disposal of medical waste in this study. 44.2% of respondent had medium knowledge of IP/HAI followed by 37.7% who had low knowledge with only 18.2 having had high knowledge.(23) From the study conducted in Nepal health care institution 22% had correct knowledge of universal precautions(24).

The study conducted in Addis Ababa indicated that 69% of HCWs had good knowledge infection control and also had better knowledge regarding tuberculosis infection control 83% versus hand hygiene 60%, 56% of respondents believed that gloves do not provide complete protection against acquiring or transmitting infection 71% of physicians vs. 41% of nurses. Only 59% knew that an alcohol-based hand sanitizer was as effective as soap and water when the hands were not visibly dirty 51% of physicians vs. 68% of nurses (25). Study conducted in Bahirdar city indicated that 84.2 % were knowledgeable and 55 (15.8%) were not knowledgeable in all health care facilities (26). Regarding prevention method of HCAs, while the most known prevention method mentioned was hand hygiene by 90.7% of the respondents, the least, 58.2% mentioned patient isolation as a technique for infection prevention. Majority of the respondent knew diseases transmitted by sharp injury and body fluid: 90.7 hepatitis B, 97.7% HIV, 44.6% hepatitis C, and least percent 17.2% Tuberculosis (26). After adjustment made those HCW working in hospitals were two times knowledgeable than HCW working in health centers and private clinic AOR (1.95(1.09, 3.51). Other variables had no association to knowledge of respondents (26).

2.2. Practice of health provider literature

Assessments were completed in 5 community health centers and district hospitals with Labor and Delivery rooms and Special Care Newborn Units in India on Infection control practices during labor and delivery and newborn care in resource limited Settings indicates that systems for cleanliness and general hygiene were conspicuously absent. And also Hand hygiene practices were poor due to lack of awareness & supplies. As well as Biological waste segregation was not appropriate and there were concerns regarding storage and disposal of bio-medical waste. .Exposure risk to healthcare workers including doctors, nursing staff, and support staff is area of major concern (27).

The study conducted in Ajman, university hospital United Arab Emirates, from the study participants 25.7%) of nurses had exposure to splashes of blood and body fluids into their eyes or mouth among them 53.8% had a work experience of less than five years and 98% of them it was important to rinse with plenty of running water if faced such problem (28).

The study done in Korea on Factors associated with needle stick and sharp injuries among hospital nurses survey incidence of Needle Stick Injuries among Registered Nurses during the past year was 70.4%(29).The study conducted in Ghana indicated that 88%, 84% and 24%) of respondents indicated that they wore gloves on patients, face masks and protective eye shields routinely when performing invasive procedures.(30).

The study conducted on Compliance With Infection Prevention Guidelines By Health Care Workers At Ronald Ross General Hospital Mufulira District in Zambia On the frequency of hand hygiene 61% , 32.5%, 2.6%, and 3.9% of respondents indicated all the time after patient contact or after a procedure, most of the times, some times and rarely respectively. In this article 36.4% of the respondents used hand-rub for their hand hygiene followed by 27.3% who used water with non-medicated soap. This article finding also indicated that 41.6%), 9.1% and 9.1% of respondents were motivated to wash hands for prevention of cross infection, appearance of the patient and patient's HIV status respectively and it also indicated that 100% of respondents not practiced re-use of needle. This article also indicates used needles and syringe 62.3% of disposed immediately in either puncture proof boxes where available or improvised carton boxes and 9.1% of respondents have had a needle stick injury in the last 12 months prior to the study. 95.8% have been using Personal Protective Equipment (PPEs) while performing various

procedures and commonly used PPE were gloves (32.4%) while the least used were boots (4.6%)(16)

The study conducted in the Nepal indicated that 73% of respondents follow universal precaution guidelines, 62% of respondents were regularly used protective gloves while handling patients and 72% of respondent were never used high-level disinfection to eliminate all microorganisms (bacteria, viruses, fungi, and parasites, including bacterial endo spores) from instruments and other items that would come into contact with broken skin or intact mucous membranes. Reasons for noncompliance included irregular supply of materials (31%); lack of an autoclave and other high-level disinfection equipment (50%); lack of knowledge and insufficient technical skills regarding universal precaution procedures (20%) (22).

Study conducted in Addis Ababa black lion hospital practice indicated that among physicians, low rates of hand hygiene were reported before patient contact (7%), before caring for a wound (42%) and after patient contact (48%). Physicians were most likely to practice hand hygiene when their hands felt or looked dirty (82%), after caring for a wound (85%) and after contact with blood or bodily fluids 97%. Nurses reported washing their hands more frequently than physicians; 71% of nurses reported washing their hands at least 6 times per day vs. 38% of physicians (25).

Respondents practices were assessed for the main element of infection prevention practice like hand hygiene, use of personal protective equipment and injection safety; based on this their finding indicates 54.2% of respondents had safe practice and 45.8 % of them had unsafe practice. The finding also indicates health care workers estimation of their own hand hygiene practice, majority of health care workers 82.5 % had hand hygiene practice after completing the procedure they perform and about 50.8 % wash their hand before the procedure. The overall hand hygiene practice score was 69.0%.98% use soap and water, whereas only 8.8% used disinfectant solution for hand washing practice. The reason given by the respondent those who didn't practice hand hygiene were due to unavailability of hand washing facilities 38.1%, it takes time 31.4%, if glove used not necessary 11. %, and the least response not necessary 1.4 % 87.6% had ever wore at least one type of personal protective equipment (PPE) while providing patient care or caring equipment's. Among the participants who used PPE almost all 99.4%, of the healthcare providers used working gown regularly but only15.8% used caps, 73.4% of the respondents used gloves for all procedures that necessitate donning glove, 31.1% of the health workers were using

gloves when caring all patients that require patient care regardless of their disease condition. The overall practice of PPE was 35.6%. 53.7 % use safety box for needle collection after injection , 73.2 %)avoid recap needle after injection and the rest 44.1 % avoiding using swab before intramuscular and subcutaneous injection. Their safe injection practice was 57% and unsafe practice was 43 %, Sharp injury history 46.9% ever had needle stick injury or sharp injury and 19.5 % of health care worker had sharp or needle stick injury within the previous one year (26). The presence of IP committees was positively associated with HH compliance of HCPs. Those health care providers who know the presence of IP committee are about 2.6 times more likely to compliance than those who didn't know the presence of IP committee (32) The study conducted in Bahirdar city indicates Result of multiple logistic regression analysis showed that working experience greater than 10 years (AOR= 3.79 (95% CI=2.33, 6.17)) and availability PPE (AOR= 6.79 (95% CI=2.83, 17.27)) had positive association with infection prevention (26). Study conducted in Perceptions and Determinants of Compliance in the Emergency and Trauma Triage of a Tertiary Care Hospital in South India About 17% reported at least one needle stick injury in the past year but only 5.6% received medical attention (33).

Conceptual Framework

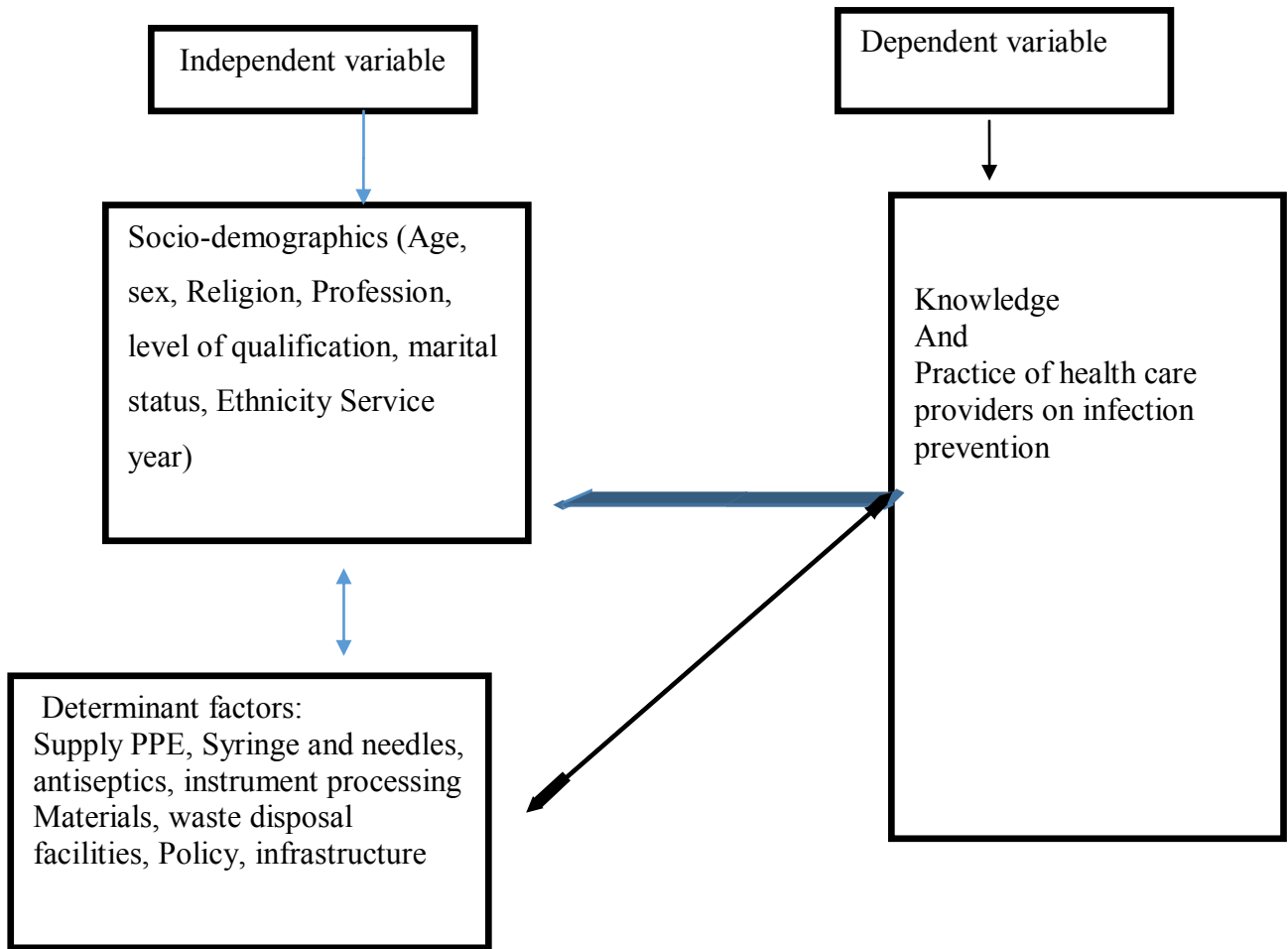


Figure A conceptual framework showing the factors affecting Knowledge and Practice of infection prevention and associated factors among health care provider in health care facilities developed from literature.

3. Objective of the study

3.1. General objective

- ✓ To assess knowledge and practice towards infection prevention and associated factors among health care providers in public health care institution in West Arsi Zone, Ethiopia, 2015.

3.2. Specific objectives

- ✓ To determine knowledge of health care providers towards infection prevention.
- ✓ To identify factors associated with knowledge of infection prevention among health care providers
- ✓ To describe practice of health care providers towards infection prevention.
- ✓ To identify factors associated with practice of infection prevention health care providers.

4. Methodology

4.1. Study area and Period

The study was carried out in six woreda's and two hospitals of West Arsi Zone Administration. West Arsi Zone is in Oromia Regional State located in the South East part of Ethiopia.

There is one zonal hospital, two district hospital and eight one health centers. There were 2175 health care workers who are actively working in the hospitals and health centers of the study area. The health care providers are composed of nurses, laboratory technicians, pharmacy technicians, sanitarians, health officers, physicians. The study period was from April six to ten, 2015.

4.2. Study Design

The study was Institution based cross sectional survey design.

4.3. Population

4.3.1. Source Population

The source population was all health care workers who were on duty during study period.

4.3.2. Study population

Health care workers identified with simple random sampling method were included in the study.

4.4. Inclusion and exclusion criteria

Inclusion criteria

Healthcare providers those who were providing service at the public health facility.

Exclusion criteria: Those who were on sick, maternity and annual leave.

4.5. Sample size determination

Sample size was determined by single proportion formula by considering proportion of Knowledge and practices of infection prevention method: 84.2% and 54.2% respectively, from the study conducted in Bahidar City Administration (23), 95%CI and 5% of marginal error.

Sample size estimate using the following assumption like;
$$n = \frac{(Z_{\alpha/2})^2 \times P \times (1-P)}{d^2}$$

Where, n = minimum sample size

$Z_{\alpha/2}$ = Z value at ($\alpha = 0.05$) = 1.96

D = Margin of error (0.05).

So, minimum sample size, $n = 204.428 \sim \underline{204}$ when $p = 84.2\%$.

Minimum sample size $n = 381.44 \sim \underline{381}$ when $p = 54.2\%$

Accordingly, for knowledge level the calculated sample size become 204 and for practice level sample size became 381. Then, I took the largest sample size which was 381 and finite population correction formula was applied

$= 324.207 \sim 324$

A design effect was assumed by 2. So, the sample size calculated as; $324 * 2 = \underline{648}$ by considering 5% of non-respondent rate, the final sample size was $648 * 5\% = 680.4 \sim \underline{680}$

4.6. Sampling procedure

Among all public health facilities in West Arsi Zone first sample were included and the desired sample size of the participants was selected based on the number of their profession in each selected public health facilities using proportional sampling and selected using simple random sampling method.

$$n = \frac{nf * N \text{ in a health facilities}}{N_{\text{total}}}$$

Where, N= Total number of health professions in public health institution, nf= Total sample size and N_{total} = Total number of specific profession in the selected public health facilities. After sample size was proportional allocated for health facilities and finally the required sample size of study subjects were selected by using simple random sampling from each health facility (Figure 1).

4.7. Variables

4.7.1. Dependent variables

- ✓ Knowledge of health care providers on infection prevention
- ✓ Practice of infection prevention by health care providers

4.7.2. Independent variables

- ✓ Socio-demographic characteristics
- ✓ Availability of Infection prevention guideline
- ✓ Previous training on infection prevention
- ✓ Availability of Personal protective Equipment
- ✓ Presence of infection prevention committee

4.8. Operational Definitions

4.8.1 Knowledge

Knowledge of individual health care providers was classified into two groups (knowledgeable and not knowledgeable). Respondents who score more than mean of correct answer were classified as knowledgeable. Respondents who had score less than mean value of correct answers were classified as not knowledgeable on infection prevention assessment tool.

4.8.2. Practice

Infection prevention practice of health care providers was classified into two groups (safe practice and unsafe practice). Respondents who score more than mean of correct answer were classified as safe practiced. Respondents who had score less than mean value of correct answers were classified as unsafe practiced on infection prevention assessment tool.

4.8.3 Health Care provider:

Providers who were giving service in public hospitals and health centers those their education level was diploma and above (doctors, health officer, nurse, environmental health, laboratory, midwifery, and dental).

4.9. Data collection tool and procedure

Data was collected by using pretested, structured self-administered questionnaire which consists of socio-demographic information, knowledge, and practice of health care providers on infection prevention. The tool was developed by reviewing related literatures, prepared by English version and it's prepared to assess the knowledge, and practice of healthcare provider on infection prevention in hospital and health center.

After five data collection facilitators (diploma nurses) and two supervisors (Bsc health professionals) were employed, training was given for one day on clarification of some terms and assessment tools, aim of the study, concerning need for strict confidentiality of respondents information, time of data collection, timely collection and reorganization of the collected data from respective hospital and health center and submission on due time. The questionnaire was filled by healthcare providers and data was collected for six days including training and pretest, facilitated by data collection facilitators and supervisors.

4.10. Data quality control

Training was given for data collectors and the questionnaire was pre-tested in Bale Zone. In addition to appropriate recruitment and training of data collectors the quality of the data were monitored frequently both in the field and during data entry. This was done in the field through close supervision of data collectors. Data quality tables were utilized. All completed questionnaire were examined for completeness and consistency during data collection. Data was double entered using a programmed computer software package.

4.11. Data Processing, analysis and interpretation

Each questionnaire was checked for completeness, missed values and unlikely responses and then manually cleaned up on such indications. The coded data was entered on to computer using Epi info version 3.3 soft ware for its customizing and skip benefit, then after data cleaning, it was exported to SPSS version 21. The data was analyzed descriptively for socio demographic and other study variables. Bivariate Analysis was assessed. Frequency and percentage was used to check the association between variables. 95% Confident interval was used to determine the strength of association between variables. Those variables which had significant association were selected for further analysis. Results were interpreted as association if $p < 0.05$.

4.12. Ethical Consideration

Ethical clearance was obtained from University of Addis Ababa College of health science school of allied health sciences department of nursing and midwifery Ethical Board Committee and received letter from West Arsi zone health office, Woreda health office and selected health centers and hospitals. Informed consent was obtained from respondents who were participated in the study. Confidentiality was maintained by omitting their name and personal identification and participant was not compelled to the study.

4.13. Dissemination of the result plan

The results of this study will be disseminated or communicated to University of Addis Ababa College of Health Science school of Allied Health science Department of Nursing and Midwifery, West Arsi Zone Health Office, Federal Ministry of Education as well as Ministry of Health, Regional health bureau, local institutions and other concerned bodies through reports and publication on an appropriate journal.

5. RESULTS

5.1 Socio-demographic Characteristics

A total of 680 health care providers were sampled for this study. From total of study participants six hundred forty eight (95.3%) responded to the study. Among health care providers 446 (68.8%) were males and 202 (31.2%) were females. The mean age of the study participants was ($\pm$ SD) of 28.23 ± 5.2 . Most of the study participants were Oromo 592(91.4%). Concerning the professional categories of the study participants, 398 (61.4%) were nurses followed by 104 (16%) Midwifery and the rest were 51(7.9) health officers, 22 (3.4%) physicians and 73(11.3) were others. Among study participants 394(60.8%) were Diploma, 220(34.0%) were Bsc, 22(3.4%) were physician and 12(1.8%) were Msc. Regarding experience of the study participants 390 (60.2%) had below five years work experience [Table 1]. Among the participants only 184 (28.4%) had taken training on infection prevention and 464 (71.6) had not taken training on infection prevention [Table 2].

Table : Distribution of Socio-demographic characteristic of health care providers in selected health facilities of West Arsi zone, Oromia Region, South East Ethiopia, and April, 2015.

Variables		Frequency	percentage
Age	18-27	345	53.2
	28-37	262	40.4
	38-47	36	5.6
	48-57	3	0.5
	58-67	2	0.3
Sex	Male	446	68.8
	Female	202	31.2
Religion	Orthodox	236	36.4
	Muslim	287	44.3
	Protestant	11	18.1
	Waqefata	8	1.2
Profession	Nurse	398	61.4
	Health officer	51	7.9
	Midwife	104	16
	Physician	22	3.4
	Others	73	11.3
level of qualification	Msc	12	1.9
	Dr.	22	3.4
	BSc	220	34.0
	Diploma	394	60.8
Marital status	Married	284	43.8
	Single	349	53.9
	Divorced	13	2.0
	Widowed	2	0.3
Ethnicity	Oromo	592	91.4
	Amhara	42	6.5
	Sidama	5	0.8
	Other	9	1.4
Service year	<5 yrs	390	60.2
	5-10 yrs	170	26.2
	10-15 yrs	48	7.4
	>15yrs	40	6.2

NB: others(pharmacist, lab Technician, anesthetist, druggist, environmental health)

Table Distribution of Determinant Factors of Healthcare Providers in Selected Health Facilities of West Arsi zone, Oromia Region, South East Ethiopia, and April, 2015.

facility water supply	Yes	521	80.4
	No	127	19.6
source of water	Pipe line	387	74.3
	Hand pump	114	21.9
	River	20	3.8
Infection prevention committee	Yes	430	66.4
	No	218	33.6
infection prevention guideline	Yes	310	47.8
	No	338	52.2
Minimize(affects) quality of infection prevention(Multiple Response)	Lack of supply	579	89.4
	lack of training	619	95.5
	ignorance	488	75.3
	infrastructure of facility	180	27.8
	policy	15	2.3

5.2. Knowledge of health care providers on infection prevention

Among the study respondents five hundred seventy five (88.7%) heard about infection prevention. Three hundred eighty five (59.4%) were believed that gloves cannot provide complete protection against acquiring infection. Four hundred twenty nine (66.2%) of study participant responded that Washing hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens. Concerning level of safety boxes filling and sealing respondents three hundred twenty (49.4%), were three fourth, one hundred eight 16.6%) respondents were one half and two hundred twenty (34.0%) respondents were full before sealing and closing. Concerning the preparation formula for preparing 0.5% chlorine solution 365(56.5%) and 283(43.7%) respondents had knew preparation formula. [Table 3] Regarding the disease transmitted by needle stick injury 636(98.1%), 511(78.9%), 302(46.6%), and 7(1.1%) of respondent were HIV, HBV, HCV, and TB transmitted by needle stick injury, respectively [Figure 2].

Table . The Distribution of knowledge of Health Care Providers on Infection Prevention in Selected Health Facilities of West Arsi Zone, Oromia Region, South East Ethiopia April, 2015.

Variable	Response	Frequency	Percentage
Heard about infection prevention	Yes	575	88.7
	No	73	11.3
Gloves cannot provide complete protection against acquiring infection	Yes	385	59.4
	No	263	40.6
Health care- associated pathogens can be found on normally intact patient skin	Yes	469	72.4
	No	179	27.6
Washing your hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens	Yes	429	66.2
	No	219	33.8
Use of an alcohol based antiseptic for hand hygiene is as effective as soap and water if hands are not visibly dirty	Yes	422	65.1
	No	226	34.9
Gloves should be worn if blood or body fluid exposure is anticipated	Yes	403	62.2
	No	245	37.8
There is need to wash hands before doing procedures that do not involve body fluid	Yes	300	46.3
	No	348	53.7
Can you not wear the same pair of gloves for multiple patients as long as there is no visible contamination on the gloves?	Yes	248	38.3
	No	400	61.7
TB is carried in airborne particles that are generated from patients with active pulmonary TB	Yes	471	72.7
	No	177	27.3

Table 3. Continued

knowledge of specific waste disposal buckets	Yes	416	64.2
according to the level of their contamination	No	232	35.8
knowledge of preparation formula for preparing	Yes	365	56.3
0.5% chlorine solution	No	283	43.7
Knowledge on the level safety boxes filled before	Full	223	34.4
closing and sealing	One half	107	16.5
	Three fourth	318	49.1

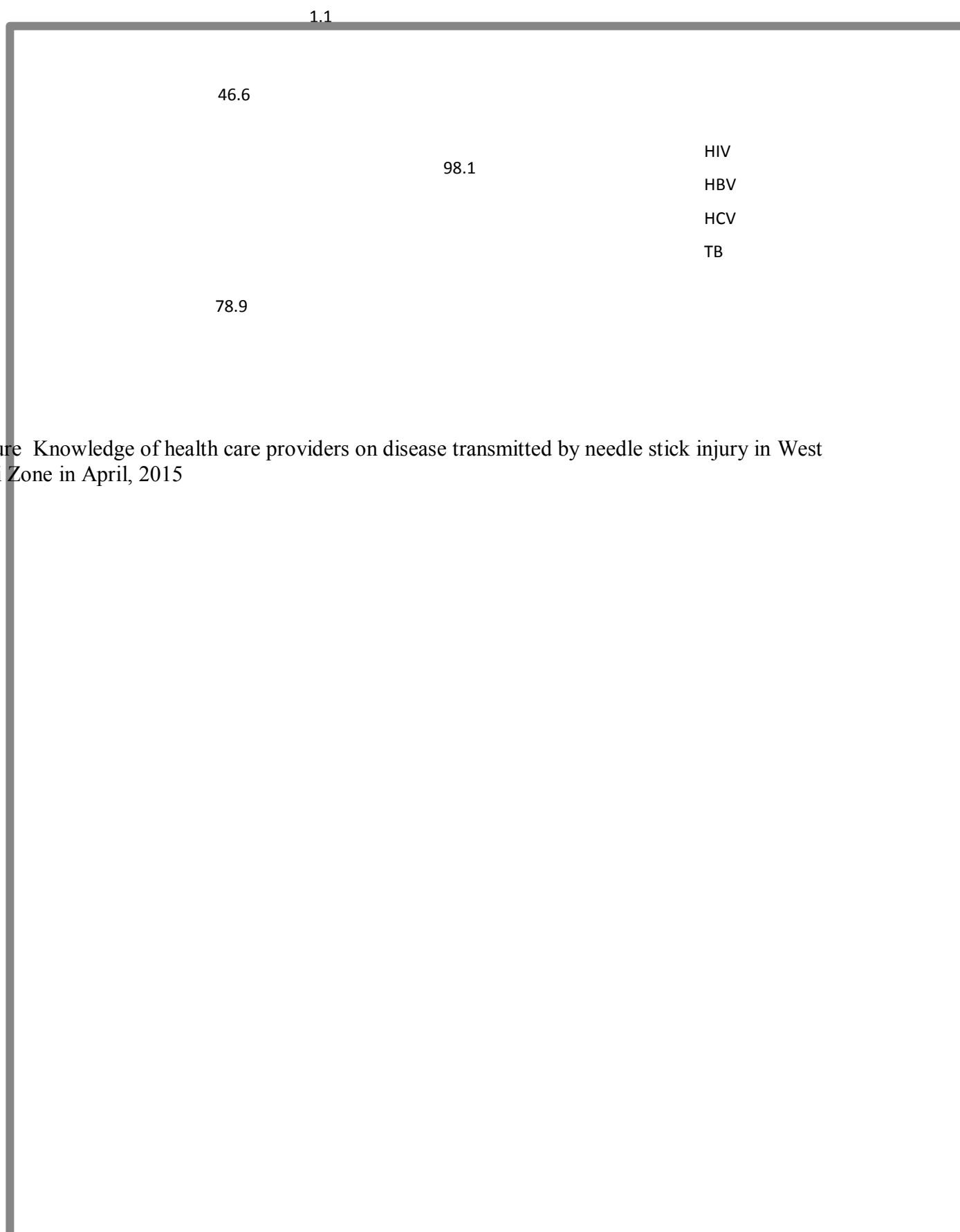


Figure Knowledge of health care providers on disease transmitted by needle stick injury in West Arsi Zone in April, 2015

5.3. Practice of health care providers on infection prevention

Regarding the time of hand washing 364(56.2%), 450(69.4%), 335(51.7%), 412(63.6%), 378(58.3%), 412(49.2%), 390(60.2%), and 416(64.2%) of them were washing their hands before patient care, after patient care, if it look dirty, after toilet, after contact with blood or body fluid, before care of wound , after care for wound and after removing gloves, respectively [Figure 3]

Regarding uses of soap; 560(90.4%) were used to wash their hands while 8(1.2%) were used nothing to wash their hands. Concerning the uses of all personal protective equipment for infection prevention 258(39.8%) were used all personal protective equipments while 390(60.2%) not used. Concerning the reason not use personal protective equipments to prevent infection 386(59.6%), 59(9.1%) and 73(11.3%) respondent were lack of materials, lack of awareness and carelessness respectively.

Among the respondents on chlorine solution changing time 352(54.3%) were 24hours, 173(26.7%) were after two days and 123(19.0%) had not known when to change. Among respondents on the needle stick injury 210(32.4%) had had needle stick injury. From them 131(62.38%) were one time, 52(24.76%) were two times and 27(12.86%) were more than three times had needle stick injury. From those respondents who had needle stick injury 58(27.62%), 72(34.29%), 110(52.38%), 9(4.29%) and 10(4.76%) were during securing IV, during recapping, during suturing, during disposing waste and during sample taking faced needle stick injury, respectively[Table 4].

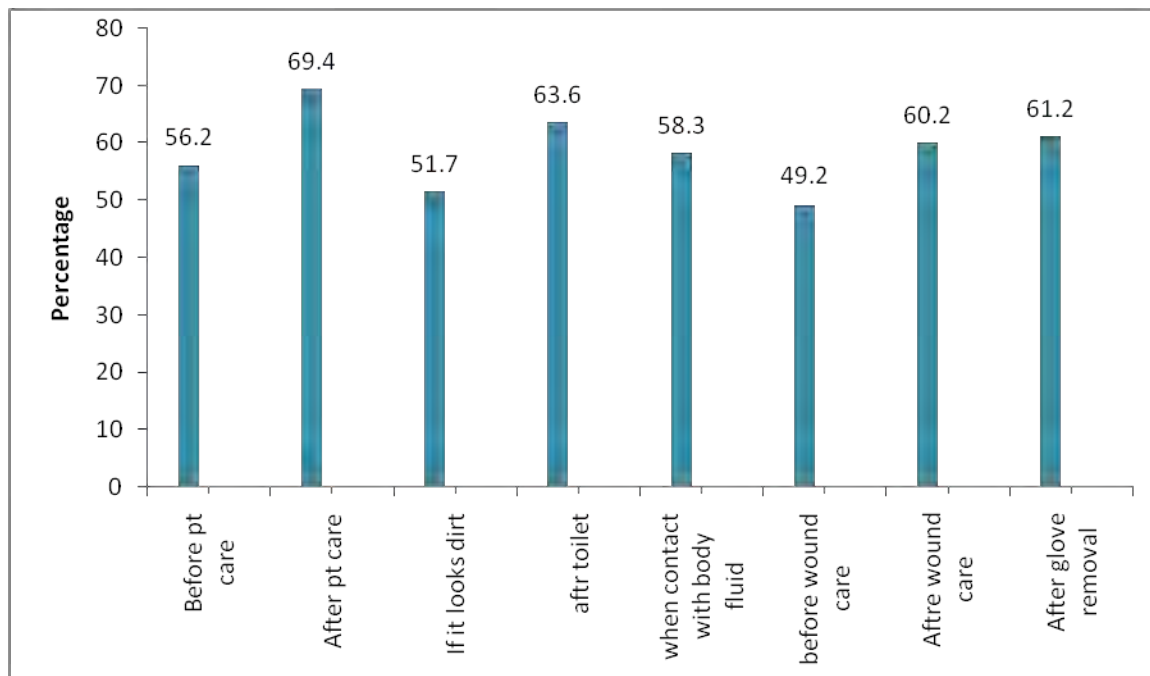


Figure Practice of hand washing among health care providers in West Arsi Zone, in April 2015

Table . Frequency Distribution on Practice of Health Care Providers at Health Care Facilities in Selected Health Facilities of West Arsi Zone, South East, Ethiopia 2015.

variables		frequency	percentage
material for hand washing	Soap	587	90.6
	Alcohol	266	41.0
	Nothing	8	1.2
use of antiseptic hand rub	Yes	403	62.2
	No	245	37.8
use of all PPE	Yes	390	60.2
	No	258	39.8
Reason for not using PPE (multiple response)	Lack of materials	391	59.6
	Lack of awareness	59	9.1
	Carelessness	73	11.3
	Other	3	0.5
Chlorine solution changing time	Every 24hrs	351	54.2
	After two days	174	26.8
	Not know	123	19.0
Duration of soaking instrument into chlorine solution	10 minutes	375	57.9
	1 hrs	203	31.3
	24 hrs	40	6.2
	5 minute	30	4.6
Frequency of gloves use	Always	339	52.3
	Sometimes	303	46.8
	I do not use	6	0.9
Not incinerated /burning hazard waste	Yes	251	38.7
	No	397	61.3
Burning sharp materials	Yes	388	59.9
	No	260	40.1

Table.4 Continued

Times to wear personal protective barriers	Always	253	39.0
	Sometimes	381	58.8
	Never	11	1.7
	Not sure	3	0.5
Not mix dry and liquid wastes	Yes	443	68.4
	No	205	31.6
Level disinfection practiced at your institution	Yes	377	58.2
	No	271	41.8
Site cleaning before IV canula secure	Yes	564	87.0
	No	84	13.0
If yes, with what	Water	147	26.1
	Alcohol/sablon	412	73.05
	Nothing	5	.9
History of needle stick injury	Yes	210	32.4
	No	438	67.6
if yes, how many times	One time	131	62.38
	Two times	52	24.76
	Three and above	27	12.86
when you faced needle stick injury	During securing iv	58	27.62
	During recap	72	34.29
	During suturing	110	52.38
	During disposing waste	9	4.29
	during sample taking	10	4.76
History of contact with body fluid/blood	Yes	253	39.0
	No	395	61.0
What measure did you take if you are exposed to blood or fluids, needle stick injury?	Taking PEP	292	45.1
	Clean by alcohol	261	40.3
	Washing with water	392	60.5
	Other specify	8	1.2
Facility sterilization technique	Boiling	291	44.9
	steam sterilization	321	49.5
	other(autoclave)	36	5.6
Where to put safety boxes	In high traffic area	153	23.6
	At corridor	394	60.8
	Any where	101	15.6

5.4. Factors associated with knowledge of infection prevention among health care provider

In this study the association of different background factors of the respondents with knowledge of health care providers on infection prevention was investigated at both Bivariate and multivariate levels. In health facility midwives two times less likely knowledgeable on infection prevention than nurses COR= 0.519(.331, .813) but after adjusting for other socio demographic variables, the difference failed to show its significance. In health facilities physicians were less likely knowledgeable on infection prevention than nurses, AOR=.145 (.047, .449). There was no statistically significant between other profession. There was also no significant difference of knowledge on infection prevention among level of education. The health care providers in the Health facilities who reported to had work experience of 10-15 were more likely knowledgeable than those who have working experience less than five years on infection prevention AOR=3.414(1.220, 9.552). A health care providers who had infection prevention committee in their health facility more likely knowledgeable than those health care providers who have no infection prevention committee, AOR=1.779 (1.013, 3.125). Health care providers who had infection prevention guideline in their facility more likely knowledgeable than those who have no guideline, AOR =2.440(1.446, 4.119). Health care providers who taken on jobs training on infection prevention more likely knowledgeable than those who had not took training, AOR=5.019(1.453, 8.585). [Table 5].

Table Comparison of health care providers' knowledge on infection prevention with selected socio-demographic characteristics in selected health facilities of West Arsi zone, Oromia region, south East Ethiopia April, 2015

socio-demography		IP Knowledge		Odds Ratio and 95% C.I	
		knowledgeable	Not knowledgeable	Crude	Adjusted**
profession	Nurse	197	201	1	1
	Midwifery	68	36	0.519(.331, .813)*	0.490 (.235, 1.023)
	Physician	17	5	0.288(.104, .796)*	0.145 (.047, .449)*
	H O	29	2	0.744(.413, 1.339)	0.541 (.212, 1.379)
	Others	37	36	0.954(.579, 1.571)	0.940 (.465, 1.901)
		201	193	1	1
level of education	Diploma	8	4	0.521(.154, 1.757)	0.750 (.123, 4.576)
	Msc	17	5	0.306(.111, .846)*	
	Doctors	122	98	0.837(.601, 1.165)	1.157 (.669, 2.000)
	Bsc	212	17	1	1
Service year	<5years	92	78	1.399(.716, 2.736)	1.005 (.590, 1.712)
	5-10 years	19	29	1.413(.696, 2.867)	3.414(1.220, 9.552)*
	10-15years	293	228	1	1
water supply	yes	55	72	0.594(.402, .879)	0.163(.037, .724)*
	No	228	159	1	1
Source of H2O	Pipe line	59	56	1.361(.896, 2.067)	0.792(.458, 1.370)
	Hand pump	13	14	1.544(.707, 3.374)	1.619 (.502, 5.220)
	River	281	149	1	1
IP committee	yes	67	57	2.35 (.166, .334)	1.779 (1.013, 3.125)*
	No	231	79	5.523(3.932, 7.758)	2.440 (1.446, 4.119)*
IP guideline training on IP	yes	117	221	1	1
	no	174	10	3.564(1.492, 5.636)	5.019(1.453, 8.585)*
	yes	174	290	1	1
	no				

NB: P<0.05, CI= 95%

5.5. Factors associated with practice of infection prevention among health care providers.

In this study the association of different background factors of the respondents with practice of health care providers on infection prevention was investigated at both Bivariate and multivariate levels. Midwives less likely practice on infection prevention than nurses, (AOR=.280 (.115, .685)), there was no statistically significant between other profession. Those health care workers who have from 10-15 years working experience more likely to safe practice on infection prevention than those who have working experience less than five years but after adjusting for other socio demographic variables, the difference failed to show its significance COR=2.053(1.007, 4.112). There was no significant difference of practice on infection prevention among level of education, water supply in the facility, source of water supply, and lack of material or supply. Health facility who reported to have an Infection prevention committee to those who have no infection prevention committee more likely to practice on infection prevention than those who have no infection prevention committee but after adjusting for other socio demographic variables, the difference failed to show its significance. Those health care providers who have infection prevention guideline more likely practiced than those who have no infection prevention guideline, AOR = 3.343(1.653, 6.761). Health care providers took training on infection prevention more likely practiced than those who have no training infection prevention AOR = 5.305(2.420, 11.629) [Table 6].

Table The Comparison of Healthcare Providers Practice on Infection Prevention with Socio-demographic Characteristics in Selected Health Facilities of West Arsi Zone, Oromia Region, South East Ethiopia, April, 2015.

Socio-Demographic characteristic		practice on IP		Odds Ratio and 95% C.I	
		safe practice	unsafe practice	Crude	Adjusted*
Profession		134	264	1	1
		60	44	0.372(.239, .579)	0.280(.115, .685)*
	Nurse	19	3	3.215(.935, 11.056)	2.997(.249, 36.084)
	Midwifery	17	34	1.015(.547, 1.884)	0.441(.146, 1.339)
	Physician	21	52	1.257(.727, 2.174)	2.825(.831, 9.601)
	HO	143	251	1	1
Level of education	Others	4	8	1.139(.337, 3.851)	2.944(.371, 23.368)
	Diploma	3	19	3.608(1.050, 12.405)*	1.205(.608, 2.386)
	Msc	85	135	0.905(.644, 1.272)	
service year	Doctors				
	Bsc	147	243	1	1
	<5years	61	109	1.081(.743, 1.572)	0.571(.178, 1.828)
	5-10 years	11	37	2.053(1.007, 4.112)*	0.499(.149, 1.668)
	10-15years	16	24	0.907(.467, 1.764)	3.173(.474, 21.237)
	>15 years	203	318	1	1
H2O supply	yes	32	95	1.895(1.223, 2.936)	0.348(.062, 1.962)
	no				
	Pipe line	159	228	1	1
	Hand pump	36	79	1.530(.983, 2.384)	1.367(.676, 2.762)
source of H2O	River	12	15	.872(.387, 1.912)	1.516(.428, 5.369)
	yes	199	231	1	1
IP committee	no	36	182	4.355(2.906, 6.528)	1.204(.553, 2.621)
	yes	167	143	4.637(3.277, 6.562)*	3.343(1.653, 6.761)*
IP guideline	no	68	270	1	1
	yes	126	58	7.077(4.849, 10.324) *	5.305(2.420, 11.629) *
IP training lack of supply	no	109	355	1	1
	yes	118	273	1	1
	no	9	7	0.336(.122, .924)*	0.370(.096, 1.422)
	yes				

NB: P<0.05, CI= 95%, *= had association

6. Discussion

This study showed that 53.7% of Health care providers were knowledgeable and 46.3% were not knowledgeable about Infection prevention. This study finding is low when compared with finding from Bahirdar City which revealed that 84.2 % of the Health care providers were knowledgeable (26). This discrepancy may be due to sample size, study setting and characteristics of study participants. It's also low when compared with study conducted in Addis Ababa revealed that 69% of HCWs had good knowledge on infection control (25). This difference also may be due to study setting and characteristics of study participants".

About Sixty percent of health care provider believed that gloves cannot provide complete protection against acquiring infection. This finding agree when compared with the study conducted in Addis Ababa which revealed 56% of respondents believed that gloves do not provide complete protection against acquiring or transmitting infection (25).

This study also found that 88.7% of health care providers heard about infection prevention. These study findings agree with study conducted on Compliance with Infection Prevention Guidelines by Health Care Workers at Ronald Ross General Hospital Mufulira District in Zambia which is 86% (23).

This study found that, 98.1% HIV, 78.9% HBV, 46.6% HCV, and 1.1% TB of health care providers were believed that those disease transmitted by needle stick injury. This study finding different with study conducted in Bahirdar city which was, 90.7 hepatitis B, 97.7% HIV, 44.6% hepatitis C, and least percent 17.2% Tuberculosis (26). This may be due to time difference and study setting.

This study finding indicated 36.3% of health care providers were safe practiced on infection prevention while 63.7% were unsafe practice. This study finding is low when compared with finding from Bahirdar City which revealed that 54.2% of the Health care providers were safe practice while 45.8 % of them had unsafe practice (26). This difference may be due to setting of the study, lack of person protective barriers supply, lack of training and lack of infection prevention guideline.

This study finding also indicates that health care provider's estimation of their own hand hygiene practice; majority of health care workers 69.4% had hand hygiene practice after patient care while 56.2 % wash their hand before the patient care. This result indicates low practice of hand

washing when compared with finding from Bahirdar city which revealed that 82.5 % of health care providers had hand hygiene practice after completing the procedure while high when compared with 50.8 % of health care providers were wash their hand before procedure (26). This difference may be due to awareness, materials (supply) and study setting.

In another way this study finding shows that 32.4% of health care providers faced at list once needle stick injury during his/her jobs. This is too high when compared with study which conducted in Perceptions and Determinants of Compliance in the Emergency and Trauma Triage of a Tertiary Care Hospital in South India. About 17% reported at least one needle stick injury in the past year (33). The differences of this finding may be due to country context.

This study indicated about 52.3% of health care providers used gloves regularly while handling patients. This indicates low practice when compared to the study conducted in the Nepal shows that 62% of health care providers were regularly used gloves while handling patients (22). This difference may be due to study setting, study participants and supply.

Concerning hand washing 90.4% of health care providers used soap and water for hand hygiene, while 62.2% of health care providers used antiseptic hand rub. This study finding indicates well practice when compared with similar study conducted in Bahirdar city which was 98% use soap and water, whereas only 8.8% used disinfectant solution for hand washing practice (26).

This study found that about thirty nine percent (39.0%) of health care providers had history of contact with blood/ body fluid and 45.1% of them believed that take PEP, 40.3% of them believed that clean by alcohol and 60.5% of them it's important to wash/rinse by water if faced such problems. This finding is too high when compared with study conducted in Ajman, university hospital United Arab Emirates which revealed 25.7% of nurses had exposure to splashes of blood and body fluid and 98% of them it was important to rinse with plenty of running water if faced such problem (28). This difference may be due to country context.

This study found that 28.4% of health care providers had taken training on infection prevention. This finding low when compared to survey conducted on Healthy Hospitals Project in Ecuador in which overall training in occupational health and safety was 35.9%.(21). The difference of this finding was may be due to country context.

This study found that physicians were less likely knowledgeable on infection prevention than nurse (AOR=.145 (.047, .449). This finding may show that physicians give more attention on curative than prevention and number of physician.

This study also found that health care providers had work experience of 10-15 years were more likely knowledgeable than those who had working experience less than five years on infection prevention AOR= 3.414(1.220, 9.552). This study finding also shows that those health care providers who had infection prevention guidelines were more likely knowledgeable than those who had no infection prevention guideline AOR =2.440 (1.446, 4.119) and this study also revealed that health care providers who had took training on infection prevention were more likely knowledgeable than those who had not took training on infection prevention, AOR=5.019(1.453, 8.585). This study finding is shows more associated variables when compared with finding from Bahirdar City which revealed that variables had no association to knowledge of respondents (26). This significant association may be due to study setting, sample size; the investigator may not consider guideline and training as variable.

This study shows that midwives less likely practice on infection prevention than nurses (AOR=0.280 (0.115, 0.685)), but other profession had no association. This study also indicated that health care providers who had infection prevention guideline were more likely to practice infection prevention than those who had no infection prevention guideline, AOR = 3.343(1.653, 6.761). Those health care providers who had took training on infection prevention more likely to practice than those who were not took training on infection prevention (AOR =5.305(2.420, 11.629)). study finding in Bahirdar city indicate that health providers having experience of less than ten year were more likely to practice infection prevention than those who have experience of more than ten years [4.36 (2.76,6.87)](26). This difference may be due to variable consideration by the principal investigator.

7. LIMITATIONS AND STRENGTH OF THE STUDY

7.1. Strength

1. This study explored knowledge and practice of health care providers on infection prevention perspective by covering rural and urban setting at zonal level.
2. Adequate sample size was applied according to single population proportion formula.

7.2. Limitations

1. It is better if this study was supported by qualitative methods.
2. Generalization of the findings of this study in other settings needs careful consideration due to geographical and infrastructural differences.
3. This study is vulnerable for the all drawbacks of cross section study design.

8. Conclusions and Recommendations

8.1. Conclusions

Generally, the results of this study revealed that about half of health care providers had low knowledge on infection prevention and more than half of healthcare providers had unsafe practice towards infection prevention. Only one fourth of health care providers were trained on infection prevention. Presence of infection prevention manual and training on infection prevention significantly associated with knowledge and practice and it is independent determinant factor for knowledge and practice.

8.2. Recommendations

1. The studied Health care facilities should Integrate IP standard with routine works and improving sustainable supplies like PPE, and encouraging the healthcare providers to use PPE and IP guideline.
2. West Arsi Zone health office and Oromia Health Bureau supervision and monitoring of the health care providers practice toward Infection Prevention as one of health service activities and training for health care providers would be recommended.
3. Further study including non-professional health care worker, private health facility, health extension workers and managers which include quantitative and qualitative study is recommended.

Reference

1. Mark M. and Berkow R, MD editors. Immunization for adults. section 13.chapter 152. in the Mark Manual of diagnosis and therapy. 2004.
2. Kamunge, Eunice W., "Exploring Knowledge, Attitudes and Practices of Registered Nurses Regarding the Spread of Nosocomial Infections" 2013. Seton Hall University Dissertations and Theses (ETDs). Paper 1865.
3. Stein Etal. "Risk of infection with blood borne pathogens through occupational exposure".2003; 5(1) , 380-410.
4. Yaya K, Asfaw D, Hailemariam K ,Mengistu A, Biniam H etal.(2009) of institution and persons. Ethio . J. Health, 23 (especial issue) 173-223
5. Haley etal, Infection prevention in facilities. 1985; 5(3), 110-18
6. Plowman R, Graves N, Griffin, "The rate and cost of hospital acquired infections occurring in patient admitted to selected specialists of a district general hospital in England and the various burden imposed". J hosp infection 2001; 4 (7) 198- 209.
7. Fry D. "The economic cost of surgical site infection" Surgical infection 2002;3(1) 37
8. Bolyard EA Talban O Williams WW Pearson ML Shapiro Neath man S .Guideline for infection control in health care personnel.AMJ infect control 1998, 2(6) 289 -354.
9. Tanja N, Biswal M. "safe disposal of infectious waste in India", Respective journal of hospital infection 2009, 6(2), 4.
10. Garabacharya , Mathura K, Karki "KAP among H Ws on needle stick injuries" 2003;1 91 4
11. L. Simonsen, A. Kane, J. Lloyd, M. Zaffran, and M. Kane. Unsafe injections in the developing world and transmission of blood borne pathogens: a review. BWHO 1999; 77(10): 789-800
12. Giving safe injections using Auto-disable syringes for immunization. 2001:1-10. Available online at: <http://path.org/resources/safe-inj-pdf.htm>

13. Panlilio AL, Cardo DM, Campbell S, Srivastava PU, Jagger H, Orelie JG et al. Estimate of the annual number of percutaneous injuries in U.S. health care workers [Abstract S-T2- 01]. In: Program and abstracts of the 4th International Conference on Nosocomial and Healthcare-Associated Infections; Atlanta, March 5-9, 2000:61.
14. Collins CH, Kennedy DA. "Microbiological hazards of occupational needle stick and other sharps injuries". 1987; 62:385-402.
15. Hutin, Y. et al "Best injection practices for intra-dermal, subcutaneous and intramuscular needle injection" WHO, 2003;81: 491-500
16. Health care worker safety
17. Donna H, "prevention of sharps injuries in health care workers, injury prevention" 2003, 76-80.
18. Singhal V, "Hepatitis B in health care workers Indians scenario" journal of laboratory physicians 2009, 1(2): 41-48.
19. WC Huskins, V Manchanda, N Singh "infection control practices during labor and delivery and newborn care in resource limited setting: Assessment and recommendations for improvement" Huskinset al, Antimicrobial resistant and infection control 2013, 2 (suppl 1): P269. <http://www.aircjournal.com/content/2/S1/P269>.
20. CDC. "Recommendations for preventing transmission of infections among chronic hemodialysis patients". Morbidity and Mortality weekly report 2001; 50(RR05): 1-43 Master of Public Health Thesis (April, 2007).
21. Marie-Claude Lavoie, Annalee Yassi, Elizabeth Bryce ,Ronaldo Fujii, Milton Logronio Maritza Tennessee and the Healthy Hospital Project Team "International collaboration to protect health workers from infectious diseases in Ecuador" ev Panam Salud Publica 27(5), 2010
22. A.A.J. HESSE, N.A. ADU-ARYEE, K. ENTSUA-MENSAH AND L. WU "Knowledge attitude and practice universal basic precautions by medical personnel in a teaching hospital" GHANA ME I AL JOU NAL Volume 40 Number 2 June 2006

23. Katowa P. Mukwato .M. Ngoma M. Maimbolwa “ ompliance With Infection Prevention Guidelines By Health Care Workers At Ronald Ross General Hospital Mufulira istrict” Medical Journal of Zambia Volume 35 Number 3
24. Narhari Timilshina Mohammad Aslam Ansari Vinita ayal “ isk of infection among primary health workers in the Western Development Region, Nepal: knowledge and compliance” J Infect ev tries 2011; 5(1):018-022.
25. Admasu Tenna, MD, Edward A. Stenehjem, MD, MSc, Lindsay Margoles, MD, Ermias Kacha M Henry M. lumberg M and ussell . Kempker M MSc “Infection Control Knowledge, Attitudes, and Practices among Healthcare Workers in Addis Ababa, Ethiopia” Infect ontrol Hosp Epidemiol. 2013 eember ; 34(12): 1289–1296. doi:10.1086/6739
26. Kelemua Gulilat Gebeyaw Tiruneh “Assessment of knowledge attitude and practice of health care workers on infection prevention in health institution Bahir Dar city administration” Science Journal of Public Health 2014; 2(5): (<http://www.sciencepublishinggroup.com/j/sjph>)
27. W Huskins V Manchanda N Singh “Infection control practices during labor and delivery and newborn care in resource limited settings: assessment and recommendations for improvement” Huskinset al. Antimicrobial esistance and Infection ontrol 2013 2(Suppl 1):P269 <http://www.aricjournal.com/content/2/S1/P269>.
28. Jayadevan Sreedharan, Jayakumary Muttappallymyalil,Manda Venkatramana “Knowledge and practice of standard measures in occupational exposure to blood and body fluids among nurses in a University Hospital in the United Arab Emirates” JPH - Year 8, Volume 7, Number 1, 2010.
29. Eunhee Cho, Hyeonkyeong Lee, Mi young Choi, Su Ho Park, Young Yoo a Linda H. Aiken “Factors associated with needle stick and sharp injuries among hospital nurses: A cross-sectional questionnaire survey” International Journal of Nursing Studies 50 (2013) 1025–1032
30. A.A.J. HESSE, N.A. ADU-ARYEE, K. ENTSUA-MENSAH AN L. WU “knowledge attitude and practice universal basic precautions by medical personnel in a teaching hospital” GHANA ME I AL JOU NAL June 2006 Volume 40 Number 2

31. Christine L. Case, Ed.D. Microbiology Professor at Skyline College. Biography, In: Access Excellence collection, Hand washing. Available online at: http://www.accessexcellence.org/LC/SS/ferm_biography.html
32. Nura Muhammed Abdella, Mekuriaw A Tefera, Abebaw E Eredie, Timothy F Landers, Yewunetu D Malefia³ and Kefyalew Addis Alene “Hand hygiene compliance and associated factors among health care providers in Gondar University Hospital” BMC Public Health 2014, 14:96 <http://www.biomedcentral.com/1471-2458/14/96>
33. Sangini Punia,¹ Suma Nair, Ranjitha S. Shetty “Health Care Workers and Standard Precautions: Perceptions and Determinants of Compliance in the Emergency and Trauma Triage of a Tertiary Care Hospital in South India” Hindawi Publishing Corporation International Scholarly Research Notices Volume 2014, Article ID 685072, 5 pages <http://dx.doi.org/10.1155/2014/685072>

Annex I. Information and Consent Sheet

Information sheet and consent form is prepared for health workers who are participated in research project, a cross-sectional study to assess knowledge, and practice on infection prevention and associated factors among health care worker in public health care facilities West Arsi zone, south East, Ethiopia, 2015.

Name of Principal investigator: Geroma Morka

Name of the organization: Addis Ababa University, College of Health Sciences, School of Allied Nursing and Midwifery.

Name of the Sponsor: Addis Ababa University

This information sheet and consent form is prepared to explain the study you are being asked to join. Please listen carefully and ask any questions about the study before you agree to join. You may ask questions at any time after joining the study. The investigator is final year Master of Maternity and Reproductive Health graduate student from the school of allied nursing and Midwifery, college of health science, Addis Ababa University, and one advisor from Addis Ababa University.

Purpose of Research Project: - I am hopeful that this research will contribute for reducing mortality and morbidity of client and health care provider through investigate Knowledge and Practice of health providers on infection prevention and associated factors among health care workers at public health care facilities.

Procedure

To assess knowledge, and practice of health worker on infection prevention and associated factors at public health care facilities in West Arsi Zone. You are invited to take part in this project. If you are willing to participate in this project, you need to understand and tick yes on the agreement form. Then after, you will receive the questionnaire from the data collector to give your response. You do not need to write your name on the questionnaire and all your responses and the results obtained will be kept confidentially by using coding system whereby no one will have access to your response.

Risk/ Discomfort:-By participating in this research project, you may feel that it has some discomfort especially on wasting time about 30 minutes. We hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits: If you participate in this research project, there may not be direct benefit to you but your participation is likely to help us in assessing the Knowledge and Practice of health providers on infection prevention and associated factors at public health care facilities. Ultimately, this will help us to identify the gap and take the appropriate intervention by the authorized stakeholder.

Incentives:-You will not be provided any incentive or payment to take part in this project.

Confidentiality:-The information collect from this research project will be kept confidential and information about you that will be collected by this study will be stored in a file, without your name, but a code number assigned to it. In addition, it will not be revealed to anyone except the principal investigator and will be kept locked with key.

Right to refuse or withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have also the full right to withdraw from this study at any time you wish, without losing any of your right.

Persons to contact:

If you have any question to ask, please contact

Geroma Morka. Tel: +251-913239355, Email = geeroma6@gmail.com

Annexes II. Questionnaire

Addis Ababa University

College of Health Science

Department of Nursing and Midwifery

Consent form: - This questionnaire is prepared to assess the knowledge, and practice of infection prevention and associated factors among health care providers in public health care facilities of West Arsi zone, south East, Ethiopia, 2015. The assessment is made for the partial fulfillment of Master's Degree in Maternity and Reproductive Health. The results of the study will be used as base line information to design appropriate intervention strategies to increase health workers capacity of infection prevention in public health care facilities. The questionnaire contains both closed ended questions and will be provided in self-administered form. You are therefore kindly requested to provide genuine answers to the questions. The information you provide is confidential and is used only for the purpose of this study. If you have any question, don't hesitate to ask the data collector. Your cooperation and participation until the completion of the questionnaire is very necessary for the successful completion of the assessment. We therefore ask your genuine willingness. However, you have the right to turn down if you are not voluntary to participate fill -No" in the box below.

If you are voluntary Yes ☐ No ☐

Thank you in advance for your cooperation

Data collectors Name _____ sign: _____

I. Socio-Demographic questionnaires of Health Workers

All questionnaires are completed anonymously. We would appreciate if you answer all the questions and answer as honestly as possible. Please circle on the number you select that best answers the question. Kindly make only one Selection unless otherwise instructed.

Ser.no	Socio-Demographic	Response	Remark
101	Sex	1. Male 2. Female	
102	Age	___ in years	
103	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Other(specify)_____	
104	Profession	1. Nurse 2. Midwife 3. Physician 4. Health officer 5. Other (specify)_____	
105	level of qualification	1. MSc 2. Dr. 3. BSc 4. Diploma 5. Other (specify) _____	
106	Marital status	1. Married 2. Single 3. Divorced 4. Widowed	
107	Ethnicity	1. Oromo 2. Amhara 3. Sidama 4. Other (specify)_____	

108	Service year	1. <5 yrs. 2. 5-10 yrs. 3. 10-15 yrs. 4. >15yrs	
109	Does your facility have water supply?	1. Yes 2. No	
200	If yes what is the source of water?	1. Pipe line 2. Hand pump 3. River 4. Other specify_____	
201	Does your facility have infection prevention committee?	1. Yes 2. No	
202	Do your health facility have an infection prevention guideline?	1. Yes 2. No	
203	Do you have training on infection prevention?	1. Yes 2. No	

II. Knowledge related Questionnaire on infection prevention

104	Are you heard about infection prevention?	1. Yes 2. No	
205	Gloves cannot provide complete protection against acquiring/transmitting infection	1. yes 2. no	
206	Healthcare-associated pathogens can be found on normal, intact patient skin	1. Yes 2. No	
207	Washing your hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens.	1. Yes 2. No	
208	Use of an alcohol based antiseptic for hand hygiene is as	1. Yes	

	effective as soap and water if hands are not visibly dirty.	2. No	
209	Gloves should be worn if blood or body fluid exposure is anticipated	1. Yes 2. No	
300	There is no need to wash hands before doing procedures that do not involve bodily fluids	1. Yes 2. No	
301	No need to wear the same pair of gloves for multiple patients as long as there is no visible contamination.	1. Yes 2. No	
302	TB is carried in airborne particles that are generated from patients with active pulmonary TB	1. Yes 2. No	
303	Do you know specific waste disposal buckets according to the level of their contamination?	1. Yes 2. No	
304	Do you know written formula for preparing 0.5% chlorine solution?	1. Yes 2. No	
305	Do you know to what level safety boxes should be filled before closing and sealing?	1. Full 2. One half (1/2) 3. Three fourth (3/4)	
306	Which of the following disease is transmitted by needle stick injury? (More than one answer is possible)	1. HIV 2. HBV 3. HCV 4. TB 5. Other (specify)	

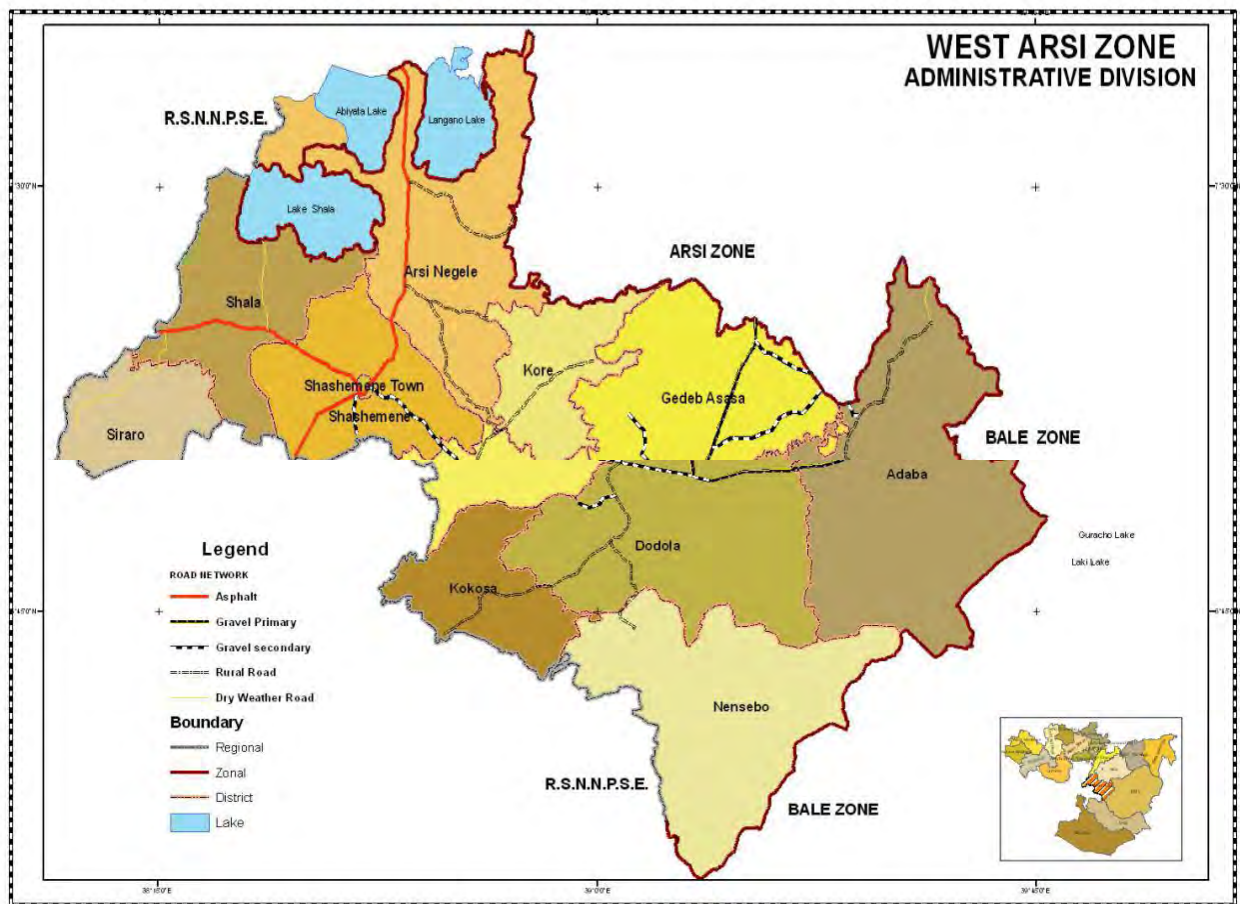
III. Health care providers Practice related questionnaires on infection prevention.

Ser. No	Practice related question	Response	remark
307	When do you wash your hands?	1. before Patient Contact 2. After Patient Contact 3. If they look or feel dirty 4. After going to the toilet 5. After contact with blood or bodily fluids 6. Before caring for a wound 7. After caring for a wound 8. After removing gloves	
308	What do you use to wash your hand?	1. Soap 2. Alcohol 3. Nothing 4. Other (specify)	
309	Do you use antiseptic hand rub?	1. Yes 2. No	
400	Do you use all personal protective equipment's to prevent infection?	1. Yes 2. No	
401	. If no, why?	1. Lack of materials 2. Lack of awareness 3. Carelessness 4. Other (specify)	
402	When do you change chlorine solutions?	1. Every 24hrs 2. After two days 3. Not know	
403	For how long instrument soaked in the chlorine solution?	1. 10minute 2. 1hrs 3. 24hrs	

		4. Other specify	
404	How often do you use glove?	1. Always 2. Some times 3. I don't use	
405	Did hazard wastes (heavy metal, chemicals) are incinerated/buried?	1. Yes 2. No	
406	Did you bury sharp materials?	1. Yes 2. No	
407	When do you wear personal protective barriers?	1. Always 2. Sometimes 3. Never 4. Not sure	
408	Did you mix dry and liquid wastes?	1. Yes 2. No	
409	Did high level disinfection practice at your institution?	1. Yes 2. No	
500	Do you clean the site before IV cannula secure?	1. Yes 2. No	
501	If yes Q42, with what?	1. Water with soap 2. Alcohol 3. Nothing	
502	Have you ever had needle stick injury?	1. Yes 2. No	
503	. If yes Q45, how many times?	1. One times 2. Two times 3. More than three times	

504	When have you faced needle stick injury?	1. During securing IV cannula securing 2. During recapping syringe 3. During suturing 4. During disposing wastes 5. Other (specify)	
505	Have you ever exposed to blood or other body fluids of patients through contact or unprotected skin?	1. Yes 2. No	
506	What measure did you take if you are exposed to blood or fluids, needle stick injury?	1. Taking Post exposure prophylaxis (PEP) 2. Clean by alcohol 3. Washing with water 4. Other specify _____	
507	What is your facility sterilization technique?	1. Boiling 2. steam sterilization 3. Other specify	
508	Where do you put safety boxes?	1. In high traffic area 2. At corridor 3. Any where	

Annex -III Map of study area



Annex IV: Schematic Diagram of sampling framework

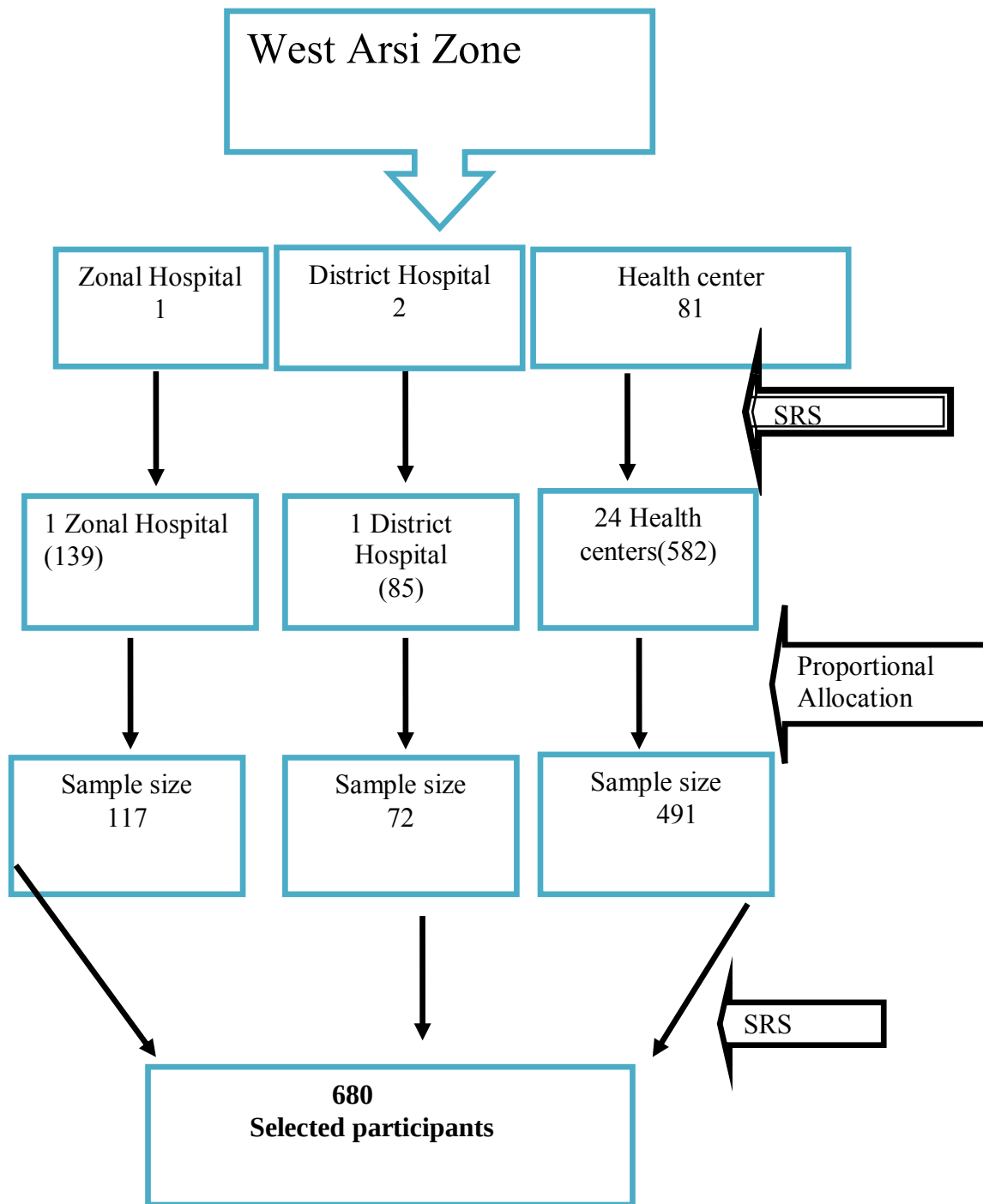


Figure Schematic presentation of Sampling Procedure January 2015

Declaration

I the undersigned declare that this is my original work and has not been presented in this or any other University and all source of materials used for the thesis have been fully acknowledged.

Name of principal investigator: Geroma Morka

Signature: _____

Date: _____

Place: Addis Ababa University College of Health Science School of Allied Health Science

Department of Nursing and Midwifery

This thesis has been submitted for approval to:

Advisor: Berhanu Wordofa

Signature: _____

Date: _____