

**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF HEALTH SCIENCE**  
**SCHOOL OF ALLIDE HEALTH SCIENCE**  
**DEPARTEMENT OF MEDICAL LABORATORY SCIENCE**



Assessment of knowledge, attitude and practices of Staffs Working in Histopathology laboratory and Associated Health risk towards xylene and other potential chemicals safety measures in selected health facilities of Addis Ababa, Ethiopia.

By: SemiraRahmeto

Advisors:

Kassu Desta (MSc, PhD candidate)

Associate Professor

Wajana Lakew ( Msc, PhD)

Assistant Professor

Fatuma Hassen (MSc, PhD candidate)

Assistant Professor

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## **ABBREVIATIONS**

AACAHB	Addis Ababa City Administration Health Bureau
AAU	Addis Ababa University
ACGIH	American Conference of Governmental Industrial Hygienists (ACGIH)
DML	Department of medical Laboratory
KAP	Knowledge, Attitude and Practice
ISO	International Standard Organization
MLT	Medical Laboratory Technology
OSHA	Occupational Safety and Health Administration
PEP	Personal protective equipment
QC	Quality Control
SLMTA	Strengthening Laboratory Management Towards Accreditation
TWA	Time-Weighted Average
WHO	World Health Organization

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## **Abstract**

**Background:** There have been many reports of the relative hazards of formaldehyde, xylene, and hot paraffin wax fumes in pathology laboratories. Staffs Working in Histopathology laboratory who routinely come in contact with xylene-contaminated solvents in the workplace are the population most likely to be exposed to high levels of xylene.

**Objective:** To assess KAP of Staffs Working in Histopathology laboratory and associated health risks towards xylene and other potential chemicals safety measures in selected health facilities of Addis Ababa, Ethiopia

**Methods:** A descriptive cross sectional study was used in quantitative approach by using self-administered structured questionnaire and physical observation by using check lists. A total of 221 Staffs Working in Histopathology laboratory were participated from selected health facilities were included. The level of knowledge categorized as high, moderate and low for those scored >26.25, 17.5-25.9 <17.5 question out of 35 question respectively. Level of attitude classified as positive, neutral and negative for those scored >5.25, 3.5-5.18 and <3.5 of the question out of 7 question respectively. Level of practice classified as good, fair and poor for those scored >6.75, 4.5-6.66 <4.5 of the question out of 9 questions respectively. SPSS version 20 software used for analysis and frequency, percentage, mean, standard deviation and the proportions, with their 95% confidence intervals (CI), of subjects were done.

**Result:** 121 study participants was included in this study, 67.8% respondents were males. The mean age (SD) of respondents was  $33.55 \pm 6.597$  years, the median duration of working experience was 6 years, and 50.5 % were pathology residents. The overall study finding revealed that, only 18(14.9%) of the participant categorized as having high level of knowledge. Huge number of subjects 53(43.8%) have found positive attitude and about 53(43.8%) participants had fair practice towards the safe use of chemicals.

**Conclusion:** Since the result of the study showed that there is knowledge attitude and practice gap, safety information, safety training and clear presentation of available legislation should be provided for the professionals to enhance as well as improve their knowledge and practice

**Key words:** Knowledge, Attitude, Practice, Hazard, Organic solvents

# 1 Introduction

## 1.1 Background

Xylene, or dimethyl benzene  $C_6H_4(CH_3)_2$  is an organic aromatic hydrocarbon. It is widely used in the manufacture of insecticides, pharmaceuticals, as a component of detergents, also as a solvent for paints, inks, and adhesives. Xylene usually used in industry and medical laboratory as a solvent. The individual isomers of xylene are: ortho-, meta-, and para-xylene, It is a colorless, sweet smelling liquid or gas occurring naturally in petroleum, coal and wood tar, and is so named because it is found in crude wood spirit (Gr. xy`lon- wood). Laboratory-grade xylene is composed of m-xylene (40–65%), p-xylene (20%), o-xylene (20%) and ethyl benzene (6–20%) and traces of toluene, trimethyl benzene, phenol, thiophene, pyridine and hydrogen sulfide. (1)

Exposure to xylene can occur via inhalation, ingestion, eye or skin contact. Xylene is mainly metabolized in the liver via oxidation of methyl groups, followed by conjugation with glycine to yield hippuric acid, which is excreted through urine. But high amount and dose of xylene harm the liver and even its metabolites damage the hepatocyte also. Some amount of xylene is eliminated via exhalation. Intensity of effects depends on exposure route, duration and level of exposure. Workers in histopathology laboratories, petrochemicals and steel manufacturing, leather and rubber industry are usually affected. (2)

There have been many reports of the relative hazards of formaldehyde, xylene, and hot paraffin wax fumes in pathology laboratories; these are "hands on" hazards which are hard to control by engineering controls only. These chemicals can cause severe burns, tissue damage, organ damage, asphyxiation, and genetic damage if used improperly. Care should be taken before using such and other potentially dangerous chemicals. Xylene, because of their lipophilic properties, are rapidly absorbed by all routes of exposure, so it has the capacity to irritate dermis and mucous membrane of respiratory, eyes, and GIT and also induce anesthetic and narcotic properties. (3, 4)

Histopathology has been one of the most fundamental sectors or divisions in the biology field. It refers to the study of the anatomy of tissues, cells and organs of plants and animals. The study involves examining organs, tissues and cells obtained from a patient at surgery or autopsy by sectioning and staining, and then examining them under a microscope for the purpose of diagnosis, prognosis and directing appropriate treatment. Histology laboratories incorporate unique, discrete, irreplaceable, solid and heterogeneous samples and involve over 4500 procedures which are diversified as a result of personal use and preferences. (5)

In histological laboratories xylene is used for tissue processing, staining and cover slips. Its high solvency factor permits extreme displacement of alcohol with excellent compatibility of alcohol and paraffin wax and renders the tissue apparent, improving paraffin infiltration. In staining procedures, it has intense de-waxing and clearing by removing alcohol and other dehydrates from tissues prior to infiltration of the embedding material (usually paraffin wax) competences that contribute to brilliantly stained slides. Other commonly used chemicals in the histopathology lab are also human irritants and carcinogenic in nature when it goes beyond the threshold level of the tissue like chloroform, potassium dichromate, dioxane, formaldehyde, nickel chloride and chromic acid and dyes such as auramine O, basic fuchsin and Congo red are. (6)

Histopathologist technicians who routinely come in contact with xylene-contaminated solvents in the workplace are the population most likely to be exposed to high levels of xylene. The current Occupational Safety and Health Administration permissible exposure limit for xylene is 100 ppm as an 8-h time-weighted average (TWA) concentration. Quality assurance in pathology and laboratory medicine is the practice of assessing performance in all steps of the laboratory testing cycle including pre-analytic, analytic, and post-analytic phases to promote excellent outcomes in medical care by applying this, The laboratory will be compliant with all national legal and statutory health and safety requirements. (7)

## 1.2 Statement of the problem

A relevant group to assess long term occupational risk is pathology laboratory technicians. These individuals are chronically exposed to xylene that is one of the most used solvents in pathology laboratories as a clearing agent to prepare tissues for microscopic analysis. Technicians who work with histopathology may be directly in contact with xylene and other potentially hazardous substances. Xylene inhalation causes irritation of nose and throat. Gastric discomfort, nausea and vomiting have also been reported in workers chronically exposed to xylene vapors. Furthermore, skin contact with xylene can cause urticarial, dryness and scaling of the affected area, and skin erythema. (8)

Besides occupational exposure, a variety of consumer products such as cigarette smoke, paints, varnish, rust preventives and shellac are sources of xylene. The principal pathway of human contact is via soil contamination from leaking underground storage tanks containing petroleum products. Xylene can leak into the soil, surface water or ground water where it may remain for months or more before it breaks down into other chemicals. However, as it evaporates easily, most of it goes into the air and gets broken down by sunlight into other less-harmful chemicals. Most people begin to smell xylene in air at 0.08–3.7 ppm (parts per million) and begin to taste it in water at 0.53–1.8 ppm. (9)

Although chronic exposure to xylene is associated to harmful effects to human health, the World Health Organization does not consider this chemical substance as genotoxic or carcinogenic (WHO 1996) yet, The International Agency for Research on Cancer (IARC) classifies formaldehyde, universal fixative at histopathology lab as a human carcinogen that can cause nasopharyngeal cancer and they claim that they found strong evidence that can support a genotoxic and also cytotoxic mode of action for the carcinogenesis of inhaled formaldehyde in respiratory nasal epithelium.(10)

It is worth noting that xylene is present in many household solvents, air fresheners, stainless steel cleaners, floor polishers, and gasoline and that a total of 2.1 million workers in 42 sectors of the US economy were exposed to it in 1995, according to a projection of the 1981 to 1983 Hazard Surveillance Program of the National Institute for Occupational Safety and Health, with a total of 108 767 workers (69% women) belonging to the health service. (11)

Safety is important aspect of quality control in all histology laboratories. Researchers have established that there are enormous environmental and workplace hazards in histological laboratories for example in United States 2010, 5838 tons of xylene were emitted into the air from industrial sources. The laboratories are associated with hazardous chemical that may pose a potential risk to workers, as well as, the environment. For this reason, many nations have now passed standards and regulations that are designed to improve working conditions and overcome the potential threats .(4)

Information on the toxicity of xylene in humans comes from case reports, occupational studies, and studies on volunteers. At acute-duration inhalation concentrations as low as 50 ppm, xylenes produce irritant effects on the eyes, skin, and mucous membranes; impaired respiratory function; and mild central nervous system effects, including headache and dizziness. Increases in subjective reports of eye irritation, sore throat, and neurological effects (anxiety, forgetfulness, inability to concentrate, and a sensation of intoxication) were noted following chronic-duration occupational exposure at 14 ppm. Irritation of the eye may occur from contact with xylene vapor or from direct contact with xylene liquid, in which case photophobia, redness of the conjunctiva, and partial loss of the conjunctiva and corneal epithelia have been reported. (12)

The reason why I was interested in studying in assessing Staffs Working in Histopathology laboratory knowledge, practice and attitude towards xylene and other potential chemicals safety measures is that, Though different studies imply the harmful effects of this chemicals exposure, knowledge, practice and attitude gap is not known. This study showed the gaps in selected public and private hospitals. Knowing the gap is important to work hard in solutions to keep our valuable human resources healthier.

### **1.3 Significance of the study**

Considering the extensive use of xylene in histopathology and other laboratories as a solvents, the study can contribute a lot for laboratory professionals health in order to avoid direct physical contact with hazardous chemicals, to take appropriate cautions, to be aware of health hazard of this chemicals and find non-hazardous, less irritant and less toxic substitutes and encourage safe working practices in the laboratory. The study would help managers to be aware of safety practice gap and take their responsibility in crating awareness in different ways such as trainings and to carefully follow their subordinates

## 2 Literature review

Six-month clinical applications at one department of pathology was conducted to substitutes potential toxic and flammable nature of xylene by A novel, non-toxic xylene substitute (SBO), made from a mixture of 86% of white oil No.2 and 14% of N-heptane. To compare the effectiveness of SBO and xylene a wide range of tissue samples from rats and human beings were processed in parallel in SBO and xylene. Similar to the xylene-processed paraffin blocks, the SBO-processed counterparts were easy to section, revealed a good maintenance of cell morphology and structure, and a clear definition of the cytoplasm and the nucleus and comparable result seen in other histochemical and immunohistochemical staining's. The study indicated that SBO is a safe and efficient substitute of xylene without losing valuable diagnostic information. (13)

The research was done in three pathology laboratories at Brazil, by taking Peripheral blood and buccal cells from 18 technicians occupationally exposed to organic solvents, mainly Xylene and 11 non-exposed individuals to evaluate potential DNA damage and cytotoxicity. The technicians were sampled at two moments: Monday and Friday. In both moments the individuals of this group showed higher levels of DNA damage in relation to controls. The study concluded that pathology laboratory workers whom inappropriately exposed to organic solvents had increased levels of DNA damage. (7)

Experimental study was conducted at Sulaimani University/Iraq in forty adult albino *Mus musculus* species, BALB/c strain mice (20 males and 20 females) to investigate the role of UVB in synergizing toxicity effect of xylene on mouse skin. Four groups were there, G-A control group, G-B exposed to Xylene, G-C exposed to UVB light only and G-D exposed to Xylene and UVB. The control group showed normal epidermal thickness, in xylene group there was moderately increased of epidermal thickness as recorded as 37.064  $\mu\text{m}$ , In group C there was a huge epidermal thickness and recorded as 136.341 $\mu\text{m}$ , while epidermal thickness was slightly decreased in Xylene and UVB group and registered as 73.971 $\mu\text{m}$ , in comparison to UVB exposed group. The experiment demonstrated that UVB increased the effect of xylene several fold in relation to effect of xylene alone that have not been recorded in Xylene group. (5)

Rajan TS article reviews from Sri Ramachandra University on various researches done on acute and chronic health effects of xylene through various routes of exposure was done and inhalation, oral, respiratory, dermal, GI, ocular, neural and reproductive effect was observed and she concluded that Workers in certain groups are at a greater risk of exposure to high concentrations of xylene. Understanding of the toxic effects of the chemical, Proper handling, practice of personnel protective techniques and proper disposal of the used and unused chemical according to the state requirements can help to limit toxic health effects of xylene.(8)

Cross sectional study was conducted in Palestinian governmental hospitals in the West Bank, Using self-administered 5-point Likert Scale questionnaire. The study sample consists of all laboratory workers in the governmental hospitals. The results of the study showed that 64% exposed to chemical hazards. Results also showed that the degree of performance information and satisfaction was medium, and the laboratory workers apply safety measures. Moreover, there are no statistically significant differences of occupational hazards according to social status variable, educational level variable. Significant differences in the work environment, according to age, gender, monthly income, and years of experience variables were observed. Finally, the results showed that the participants have a very high degree of knowledge about occupational hazards, means of prevention and safety that related to work environment. Several recommendations have been suggested including creating a specialized section for occupational health and safety, linked directly to senior management and supervisors to provide follow- and control means and safety procedures. (14)

The study carried out in Tehran University of Medical Sciences in a pesticide-packing saloon area in the factory. Thirteen workers and one supervisor were exposed to xylene vapors daily to evaluate xylene vapor concentrations to guide the design and evaluation of local exhaust ventilation (LEV) system. Three canopy hoods were designed and installed with different capture velocities. A real time volatile organic compound (VOC) monitor was used to determine the workers' time weighted average (TWA) exposure. Worker's exposure to xylene (4.7;5.5 ppm) was lower than the standards recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) and the Occupational safety and health administration (OSHA) and found that an exhaust ventilation system had a significantly reduced occupational exposure to xylene vapor. (15)

The study was made in china factories to assess health effects of exposure to a mixture of toluene and xylene isomers on the fourth or fifth days of working weeks. The study populations' were exposed to the time weighted geometric mean (maximum) concentrations of toluene (3 (203) ppm) and xylenes (4(103) ppm). For comparison, 241 non exposed controls were recruited from the same regions. Urinalysis, hematology and serum biochemistry testes were done to the participants. The prevalence of some subjective symptoms significantly increased in the exposed population, and the symptom profiles were similar to those found after exposure to toluene or xylene alone. Hematology and serum biochemistry did not show notable changes. The result indicates that the effects of the toxicities of toluene and xylene in combination were doubled. (16)

To find out the prevalence of good knowledge, appropriate attitude and safe practice among printing workers exposed to organic solvents in Hong Kong, and to see if safe practice was influenced by the knowledge of and the attitude towards the harmful effects of organic solvents as well as other factors survey was conducted in a sample of 501 male printing 28 factories using questionnaire. The prevalence of good knowledge, appropriate attitude and safe practice was low, being 20.4%, 38.4% and 22.0% respectively. Good knowledge was positively associated with awareness of the relevant legislation; appropriate attitude depended on having good knowledge and younger age. Safe practice did not depend on knowledge and attitude, but was positively associated with being informed of safety precautions and being supplied with chemical information by supervisors. The majority of workers believed that their employers, the Government and other statutory bodies should be responsible for providing information on chemicals. (17)

The maximum concern was reached in Department of Biopsies and Cytological Diagnosis, Patho-Anatomical Bureau, Taganrog, Russia when a controlled study of 125 women, including 21 technicians, research students and researchers showed that malformations in fetuses occurred 13 times more frequently in those exposed to aromatic organic solvents (xylene included), concluding that it was prudent to minimize women's exposure to organic solvents during pregnancy because xylene readily passes through the placental barrier and is even present in the maternal milk. However, in spite of that and of being recognized as a reproductive toxin. 31% of US histology laboratories in 2007 still did not protect pregnant employees from xylene exposure. Other documented effects of xylene include bilateral auditory neuropathy (retro cochlear hearing loss), and possibly epithelial and stromal keratopathy, either as splash contamination or through its fumes. (18)

A cross sectional survey conducted to measure the KAP on occupational safety hazard among medical laboratory personnel (N=110) from the Pathology Department of Hospital Raja Permaisuri Bainun, Ipoh. Based on the results, Health and Safety Campaign was planned and conducted for three consecutive days as an intervention program. The impact of the campaign was assessed using the same set of questionnaire. The KAP before and after intervention was compared to evaluate the impact of intervention by using questioner. Detailed analysis of the gathered data was carried out using SPSS paired-t test and Mean score of 0-0.49 was valued. Knowledge on biohazard, oxidizing hazard symbol and OSH legislation were the areas which signified a need for improvement. Attitude towards OSH found to be good and remain unchanged. Practice of OSH showed a satisfactory increase in result and concluded continuous education and training are important to fill in the gaps and create safe working environment. (19)

Department of Community Health, Faculty of Medicine and Health Sciences, University Putra Malaysia made KAP survey on health awareness when handling organic solvents at the workplace. By comparing the Knowledge, Attitude and Practices (KAP) scores at the pre and post-intervention phase. Questionnaire was distributed to respondents for the program evaluation as well as to obtain their background information the program consisted of small group lectures and discussions, a short video show, display of posters and distributions of pamphlets. The result finally indicates, there were improvements in the KAP scores of the intervention group at the post-intervention phase. However, the practice was not significantly correlated to the knowledge; instead, it was influenced by the employment years in the heavily solvent exposed sections in the Painting Department indicating that their job experience and peer group interactions contributed to their work culture and behavior. (20)

## 3 Objectives

### 3.1 General Objective

- ✓ To assess knowledge, attitude and practice of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals safety measures in selected health facilities.

### 3.2 Specific objective

- ✓ To assess knowledge of Staffs Working in Histopathology laboratory toward xylene and other potential chemicals safety measures.
- ✓ To assess attitude of Staffs Working in Histopathology laboratory toward xylene and other potential chemicals safety measures.
- ✓ To describe practice of Staffs Working in Histopathology laboratory toward xylene and other potential chemicals safety measures.
- ✓ To assess factors associated with KAP of Histology Lab professionals hazard related with xylene and other potential chemicals

## 4 Materials and methods

### 4.1 Study design

A descriptive cross sectional study was used in quantitative approach by using self-administered structured questionnaire to assess knowledge, attitude and practice of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals safety measures and physical observation by using check lists. A total of 221 Staffs Working in Histopathology laboratory were participated from selected health facilities were included.

### 4.2 Study area

The study conducted among eight public hospitals. The public hospitals are TikurAnbessa specialized teaching hospital, St. Peters TB specialized hospital, St. Paul, Zewditu Memorial, Yekatit 12, Minilik II, RasDestaDamtew, ALERET and Ghandi memorial hospitals. Additional diagnostic laboratories including Arsho, International clinical laboratories (ICL) and Kadisco general hospital were included. Also private hospitals which have pathology laboratory were included for example Bet Zata hospital. The selected health facilities were based on the criteria of having histology laboratory.

TikurAnbessa Specialized Hospital (TASH) is the largest specialized hospital in Ethiopia and it is also a training center for undergraduate and postgraduate medical students, dentists, nurses, pharmacists, laboratory technicians, and others who shoulder the health problems of the community and the country at large. Black Lion Hospital is becoming a center of excellence in the diagnosis, treatment and care of patients with cancer. It has different departments and specialties. (21)

Zewditu Hospital is a hospital in central Addis Ababa, Ethiopia.. It is Ethiopia's leading hospital in the treatment of ART patients. The hospital also deals with palliative care, HIV counseling and testing, STI services and Post-exposure prophylaxis (PEP) services. It has different departments and specialties. (22)

St. Peter's TB Specialized Hospital established in 1953 E.C. it gives Laboratory Services, TB Testing, Voluntary counseling and testing, Health-facility based medical care, Universal precautions, Psycho-Social counseling and support, Information, education and communication and HIV/AIDS Research. The hospital aims being model TB general specialized Hospital in East Africa. (HRMD)

EPHI Research institute which aims to protect and promote the health of the Ethiopian people by addressing priority public Health and Nutrition problems. According to the human resources management department, It also works in establishing and maintaining quality laboratory system. The laboratory has different function include, Enrolling laboratories for strengthening laboratory management towards accreditation (SLMTA), Enable laboratories to achieve ISO 15189/ 17025 accreditation, Capacity building for national external Implementation quality assurance programs, Strengthen national systems for referral specimen transportation and result delivery and others.

St. Paul's Hospital is an acute care, teaching and research hospital located in Addis Ababa around Ethiopian public health institution. It is home to many medical and surgical programs, including heart and lung services, HIV/AIDS, mental health, emergency, critical care, kidney care, elder care and numerous surgical specialties. (23)

Ras Desta Damtew Memorial Hospital was built by Emperor Haile Selassie I in 1969 with the help of the German Evangelical Church. It aimed to serve the poor. A medical college was formed in 2007. it has different specialty and departments. (24)

Arsho is a brand name of private diagnostic Laboratory practices in Ethiopia. It originated in 1972 in a small individual practice and grows up to internationally accredited big service and name. Wide-ranging expertise in Arsho covers all disciplines of diagnostic Laboratory including Clinical Chemistry, Hematology, Histo&cyto-pathology, Microbiology/Virology, Serology and Molecular Diagnosis. It provides best quality medical results that support Medical Doctors, healthcare professionals, researchers and patients to determine or confirm diagnoses.

### 4.3 Population

#### 4.3.1 Source population

The sources of populations for this study were all Staffs Working in Histopathology laboratory working in Addis Ababa hospital laboratories.

#### 4.3.2 Study population

The study populations for this study were all Staffs Working in Histopathology laboratory working in selected health facility laboratories.

### 4.4 Sample size

There is no prior information about the proportion (p)

✓ Assume  $p=q=0.5$  (most conservative)

$$P = 0.5, n = (1.96)^2(0.5)(0.5) / (0.05)^2 = 384$$

Since study population is less than 10,000 and the actual numbers of the laboratory professional's in 15 hospitals are less than the calculated sample size, the correction formula for finite population will be used and the final sample size will be:

$$n_f = \frac{n_i}{1 + \frac{n_i}{N}} = \frac{384}{1 + \frac{384}{165}}$$

Where; N= number of Laboratory Professionals (N=)

$n_i$ = initial sample size;  $n_f$ = final (corrected) sample size

$n_f$  = Total sample size ( $n_t$ ) = 115

Assuming 10% none respondents rate the total sample size was 126 yet, due to the exclusion criteria total number of the study participant was 121.

#### **4.5 Sampling techniques**

Convenient sampling technique was used in order to select the study participants and the study site. 18 supervisor, 14 research staff, 29 technicians, 49 pathology residents and 11 other non-professional supportive workers were included, and also private and also public health facilities and diagnostic laboratories which have histopathology laboratory was included

#### **Inclusion and exclusion criteria**

All Staffs Working in Histopathology Laboratory and other supportive workers and non-professional supportive workers, who present in study period, work more than one year and willing to participate were included. And professionals who were not present in the study period, work less than one year and aren't willing to participate were excluding.

#### **4.6 Study variable**

##### **4.6.1 Dependent variable**

Dependent variable of the study were knowledge, attitude and practice towards xylene and other potential chemicals

##### **4.6.2 Independent variable**

Age, sex, educational level and working experience and role in laboratory were independent variable of the study.

#### **4.7 Data collection procedure**

Self-administered structured questionnaire used to collect data regarding the socio-demographic, knowledge, attitude and practice aspects of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals.

Physical observations were done to get deeper understanding about working environment, by using observation check list, all of the 15 health facilities and diagnostic laboratories were assessed by observation check list during data collection moment and the data entered to SPSS version20 statistical software and Descriptive statistics such as frequency, percentage done. (See annex IV)

#### **4.8 Data quality assurance**

Before collecting the data the quality of data was assured by involvements of expertise during questioner preparation and near supervision of advisors. Before actual data collection all data collection tools were pre-tested and appropriate modification was made. During data collection near supervision of advisors and careful follow-up and high commitment of researcher was very high in order to maintain the data quality. While during data entry unique Id number was given to each questioner and double entry was made in order to validate the quality of the data entry.

For observational data pre-analytically by brainstorm to develop a list of questions and then prioritize which questions are of most importance that matches with study purpose the quality was assured. During process time by taking notes appropriately, recording it and by careful follow up of different actions the quality of the information was assured. Post-analytically a amore integrated view of the overall topic being discussed end up the study with good result.

#### **4.9 Data management and analysis**

Data was coded and entered in to analysis software SPSS. Data also checked for missing values by using SPSS. Variables analyzed by using Chi-Square test and P-value  $>0.05$  was taken significantly important. Descriptive statistics such as frequency, percentage, mean and standard deviation used primarily to summarize and describe the data to make it more graspable. The proportions, with their 95% confidence intervals (CI), of subjects with good knowledge, appropriate attitude and safe practice was calculated to identify the major factors that influenced the knowledge, attitude and practice of the professionals.

The scoring references taken for classifying knowledge, attitude and practice is based on response percentage. For knowledge and practice classification,  $<50\%$  Poor knowledge,  $50-74\%$  Fair knowledge and  $\geq 75\%$  Good knowledge, also for attitude classification  $<50\%$  Negative attitude,  $50-74\%$  neutral and  $\geq 75\%$  Positive attitude (21)

Regarding observational data by Comprehensive note taking and summarization of “big ideas” the observation check list was summarized by using SPSS version 20 statistical software and Descriptive statistics such as frequency, percentage were done.

#### **4.10 Ethical consideration**

Ethical approval was obtained from departmental research and ethical review committee (DRERC) Addis Ababa University, department of medical laboratory science and from Addis Ababa City Administration Health Bureau and permission from selected health facilities was gained. An official letter of cooperation was also written from the university to the study sites and informed consent was obtained from each study participant and told them to answer willingly and the confidentiality of the data will be kept. The information that was collected by the study was kept confidential, without mentioning the name of the study site (institution), but a code number was assigned to it. Such information's was not be revealed to anyone except the principal investigator and was kept locked with key

#### **4.11 Dissemination of result**

Findings of the result will be submitted to DMLS, AAU, AACAHB and research health institutes. It will also disseminate to the public through local magazines, Journals, workshops and seminar.

#### 4.12 Operational Definition

**Hazard:** is something that has potential to cause harm.

**Knowledge:** knowledge is theoretical or practical understandings and skill obtained by education and learning experience, ability of sorting out different occupational exposures that potentially cause infection of disease, physical as well as other sickness of the study.

**High Level Knowledge:** the level of knowledge categorized as high level for those scored  $>26.25$  of the question out of 35 question.

**Moderate level knowledge:** the level of knowledge categorized as moderate level for those scored  $17.5-25.9$  of the question.

**Low level knowledge:** the level of knowledge categorized as low level for those scored of  $<17.5$  the question out of 35 question..

**Attitude:** is a state of mind tendency or affinity to respond Staffs Working in Histopathology laboratory among high risk group, infection prevention and control methods positively, negatively or neutral.

**Positive attitude:** is classified as positive attitude for those scored  $>5.25$  of the question out of 7 question.

**Neutral:** is classified as neutral attitude for those scored  $3.5-5.18$  of the question out of 7 question

**Negative attitude:** is classified as negative attitude for those scored  $<3.5$  of the question out of 7 question

**Practice :** is actual observable actions of the study subject in real situation day to day responses to a motivation activities to prevent or protect others or Owen body from work place hazard exposure and promote good practice.

**Good practice:** is categorized as good practice for those scored  $>6.75$  of the question out of 9 question.

**Fair practice:** is categorized as fair practice for those scored  $4.5-6.66$  of the question out of 9 question

**Poor practice:** is categorized as poor practice for those scored  $<4.5$  of the question out of 9 question.

## 5 Result

### 5.1 Socio- demographic characteristics of the respondents

In this study a total of 121 Staffs Working in Histopathology laboratory were included, out of them 49(40.5%) were pathology residents. The study revealed that over half 82(67.8%) respondents were males. The mean age (SD) of respondents was  $33.55 \pm 6.597$  years, while 55 (45.5 %) were between 30 and 39 years. the respondents' median duration of working experience was 6years, though 43.8% had worked for between 1 and 5 years. In addition, most respondents (50.5 %) are pathology residents. (Table 1)

**Table1 socio-demographic characteristics of the respondents working in selected health facility laboratories Addis Ababa, Ethiopia 2019 (n=121).**

Variables	category	Frequency	Percent
<b>Education level</b>	High School	12	9.9%
	College/ Bachelor's Degree	8	6.6%
	Graduate Degree	33	27.3%
	Pathology resident	68	56.2%
<b>Sex</b>	Male	83	67.8%
	Female	38	33%
<b>Age in years</b>	20-29	42	34.7%
	30-39	55	45.5%
	40-49	16	13.2%
	50-59	6	5%
<b>Role in laboratory</b>	Supervisor	18	14.9%
	Research staff	14	11.6%
	technician	29	24%
	Pathology resident	49	40.5%
	Others	11	9.1%

<b>Working experience</b>	1-5	53	43.8%
	6-10	37	30.6%
	11-15	20	16.5%
	16-20	6	5%
	>20	4	3.3%

### 5.1.1 Knowledge of the respondents towards xylene and other potential chemicals safety measures

More than half 83(68.6%) of the respondents have routine contact with formaldehyde followed by xylene 76(62.85). Only 47.1% get health and safety information from current employer were as 64(52.9%) never get information on currently used organic solvents. The most usually used source of information was Posters / signs on the wall (31.4%) and most of the information was on how to use personal protective. More than half of the respondents 68.6% don't take health and safety training on currently used organic solvent. Almost all 115 (95%) of the respondents know that organic solvents can harm body through dermal contact.

Out of the total participant 105(86.8%) were identified skin sensitization as a work place hazard followed by cancer 102(84.3), while only 50(41.3%) identified abortion as a health hazard. Irritation of nose, eyes and throat was the most known symptom 82(67.8%) responded. concerning knowledge of hazard symbol 83(68.6%) don't know meanings of hazard symbols whereas 76(67.8%) have knowledge on the best methods of controlling exposure to formalin, formaldehyde and xylene that is Knowledge on methods of controlling exposure to formalin, formaldehyde and xylene that is use of low fume hums. (Table 2)

**Table2 knowledge of the respondents working in selected health facility laboratories Addis Ababa, Ethiopia 2019 (n=121)**

<b>Knowledge Evaluation Item</b>	<b>Response</b>	<b>Number</b>	<b>Percentage(Yes)</b>	
<b>Use of these chemicals routinely in laboratory</b>	Formalin	83	68.6%	
	Xylene	76	62.8%	
	Formaldehyde	58	47.9%	
	Ethyl eter	40	33.1%	
	Acetyl alcohol	50	41.3%	
<b>Getting information on health and safety</b>	Yes	57	47.1%	
	No	64	52.9%	
<b>Information format</b>	Company orientation	36	29.8%	
	Demonstration on how to use	26	21.5%	
	Leaflet or information sheet	23	19.0%	
	Online training	12	9.9%	
	Posters / signs on the wall	38	31.4%	
<b>Content of information</b>	The potential health hazards	52	43%	
	How to use personal protective	46	38%	
	How to clean up organic spills	28	23%	
	Chemical hazards	42	34.7%	
	Employers' responsibilities	31	25.6%	
<b>Availability of any health and safety training on currently used organic solvents</b>	Yes =1	38	34.7%	
	No =2	83	68.6%	

<b>Organic solvents can harm body through</b>	Ingestion	79	65.3%
	Inhalation	108	89.3%
	Dermal contact	115	95%
	Through contact with eyes	109	90.1%
<b>Health hazards associated with formalin and xylene</b>	Can cause occupational asthma	84	69.4%
	May cause skin sensitization	105	86.8%
	Can be toxic if swallowed	95	78.5%
	Can cause cancer in humans	102	84.3%
	Can cause abortion	50	41.3%
	May cause eye irritation	77	63.6%
<b>Symptoms of the effect</b>	Headaches and dizziness	77	63.6%
	Nausea and vomiting	68	56.2%
	Irritation of nose, eyes and throat	82	67.8%
		77	63.6%
	Nervous system effects		

### 5.1.2 Knowledge level of the respondents towards xylene and other potential chemicals safety measures

The participants' knowledge was valuated based on 34 potential requests. According to the study result only 18(14.9%) of the participant categorized as having high level of knowledge, greater number of respondents 59(48.8%) have low level of knowledge, whereas 44(36.4%) had moderate level of knowledge.

### 5.1.3 Associated factor affecting Knowledge level of the respondents towards xylene and other potential chemicals safety measures

Regarding Associated factor affecting Knowledge level; age, role in the laboratory, availability of safety information and safety training were found strongly associated affecting Knowledge level of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals safety measures with the result of (p=0.05), (p=0.04) , (p=0.01), (p=0.01), (p=0.01), (p=0.01) correspondingly, but the study did not show other significant association with gender, educational status, work experience and further socio-demographic characteristics.(Table 3)

**Table 3 Study participants Knowledge and Associated factor affecting itin selected health facility laboratories Addis Ababa, Ethiopia 2019**

Variables	Knowledge			p-value	Fisher exact test	
	Low	Moderate	High			
Gender (n=121)	Male	35(42.7%)	32(39.0%)	15(18.3%)	0.30	2.373
	Female	21(53.8%)	15(38.5%)	3(7.7%)		
Age(n=119)	20-29	29(69.0%)	11(26.2%)	2(4.8%)	0.12	16.85
	30-39	19(34.5%)	26(47.3%)	10(18.2%)		
	40-49	3(18.8%)	9(56.2%)	4(25.0%)		
	50-59	4(66.7%)	1(16.7%)	1(16.7%)		
Educational status (n=92)	High School	4(33.3%)	4(33.3%)	4(33.3%)	0.159	8.621
	BSC	2(25.0%)	3(37.5%)	3(37.5%)		
	MSC	18(54.5%)	11(33.3%)	4(2.1%)		
	Pathology resident	3(47.1%)	29(42.6%)	7(10.3%)		
Working experience (n=120)	1-5	29(54.7%)	18(34.0%)	6(11.3%)	0.712	5.260
	6-10	13(35.1%)	18(48.6%)	6(16.2%)		
	11-15	8(40.0%)	7(35.0%)	5(25.0%)		
	16-20	3(50.0%)	2(33.3%)	1(16.7%)		
	>20	3(75.0%)	1(25.0%)	0(0.0%)		

Role in laboratory (n=121)	Supervisor	5(27.8%)	7(38.9%)	63(3.3%)	0.01	17.573
	Research Staff	30(61.2%)	15(30.6%)	4(8.2%)		
	Technician	30(61.2%)	15(30.6%)	4(8.2%)		
	Pathologist	4(28.6%)	10(71.4%)	0(0.0%)		
Safety information( n=121)	Yes	11(19.3%)	30(52.6%)	16(28.1%)	0.001	33.60
	No	45(70.3%)	17(26.6%)	2(3.1%)		
Safety training (n=121)	Yes	4(10.5%)	21(55.3%)	13(34.2%)	0.001	38.103

## 5.2 Attitude of study participants towards xylene and other potential chemicals safety measures

Most of the study participant 75(62.8%) believes that exposure to organic solvents has harmful effect to health. About 66(54.5%) strongly agree the idea of finding less toxic substitutes for currently used chemicals. Nearly 42 (34.7%) are neutral that use of PPE to reduce the risk. some respondents 43(35.5%) were opposed that risks associated with organic solvents are sufficiently controlled. Additionally 42(34%) professionals worry about hazard associated with organic solvents while 24(18.2%) disagree. (Table 4)

**Table4 Attitude of study participants working in selected health facility laboratories Addis Ababa, Ethiopia 2019**

Attitude subject	Strongly agree	Agree	Neutral	Strongly disagree	Disagree
professionals worry about hazard associated with organic solvents n=119	29 24%	42 34%	22 18.2%	24 18.2%	2 1.7%
exposure to organic solvents has harmful effect to health n=119	76 62.8%	32 26.4%	7 5.8%	2 1.7%	2 1.7%
use of PPE to reduce the risk n=	23 19%	18 14.9%	42 34.7%	21 17.4%	13 10.7%
risks associated with organic solvents are sufficiently controlled n=116	8 6.6%	18 14.9%	28 23.1%	43 35.5%	19 15.7%
if we use them properly don't have harmful effect n=102	15 12.4%	40 33.1%	27 22.3%	19 15.7%	1 2.42%
pregnant should not interact with this chemicals n=118	44 36.4%	33 27.3%	33 27.3%	6 5%	2 1.7%
less toxic substitutes are important n=119	66 54.5%	34 28.1%	4 3.3%	2 1.7%	13 10.7%

### 5.2.1 Attitude level of study participants towards xylene and other potential chemicals safety measures

To estimate the status of respondents' attitude towards xylene and other potential chemicals safety measures, a total of 7 questions were asked with a simple likert-scale. According to the study data findings large amount of subjects 53(43.8%) are found in positive attitude, least amount 17 (14%) found negative attitude and 43(35.5) found neutral.

### 5.2.2 Associated factor affecting attitude level of study participants xylene and other potential chemicals safety measures

Regarding Associated factor affecting Attitude level; gender, age, working experience, role in the laboratory, safety training and awareness of legislation were found strongly associated affecting Attitude level of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals safety measures with the result of (p=0.05), (p=0.00) , (p=0.03), (p=0.00), (p=0.03), (p=0.012) correspondingly, but the study did not show other significant association with educational status, safety training and further socio-demographic characteristics. (Table 5)

**Table 5** Study participants attitude and associated factor affecting it in selected health facility laboratories Addis Ababa, Ethiopia 2019

Variables	Attitude			p-value	Fisher Exact Test	
	Negative	Neutral	Positive			
Gender	Male	30(40.5%)	34(45.9%)	10(13.5%)	<b>0.05</b>	5.824
	Female	23(59.0%)	9(23.1%)	7(17.9%)		
Age	20-29	28(70.0%)	9(22.5%)	3(7.5%)	<b>0.001</b>	21.327
	30-39	20(39.2%)	19(37.3%)	12(23.5%)		
	40-49	4(28.6%)	10(71.4%)	0(0.0%)		
	50-59	1(16.7%)	5(83.3%)	0(0.0%)		
Educational status	High School	2(16.7%)	5(41.7%)	5(41.7%)	0.06	10.04
	BSC	6(75.0%)	2(25.0%)	0(0.0%)		
	MSC	17(53.1%)	12(37.5%)	3(9.4%)		
	Pathology resident	28(45.9%)	24(39.3%)	9(14.8%)		
Working experience	1-5	31(60.8%)	12(23.5%)	8(15.7%)	<b>0.03</b>	15.369
	6-10	13(38.2%)	15(44.1%)	6(17.6%)		
	11-15	5(26.3%)	12(63.2%)	2(10.5%)		
	16-20	3(60.0)	1(20.0%)	1(20.0%)		
	>20	0(0.0%)	3(100.0%)	0(0.0%)		

Role in laboratory	Supervisor	52(7.8%)	7(38.9%)	6(33.3%)		
	Research Staff	30(61.2%)	15(30.6%)	4(8.2%)	<b>0.001</b>	29.08
	Technician	14(48.3%)	11(37.9%)	4(13.8%)		
	Pathologist	4(28.6%)	10(71.4%)	0(0.0%)		
Safety information	Yes	29(49.2%)	23(39.0%)	7(11.9%)		
	No	29(49.2%)	23(39.0%)	7(11.9%)	0.609	1.001
Safety training	Yes	13(37.1%)	15(42.9%)	7(20.0%)	0.339	2.257
	No	40(51.3%)	28(35.9%)	10(12%)		
Awareness of legislation	Yes	16(34.0%)	19(40.4%)	12(25%)		
	No	37(56.1%)	24(36.4%)	5(7.6%)	<b>0.01</b>	8.668

### 5.2.3 Practices of study participants towards xylene and other potential chemicals safety measures

From the total participant 54(44.6%) have both habit of labeling chemicals and reading labels. About 22(18.2%) rarely eat, drink and apply cosmetics in the laboratory. Nearly 35(30.6%) allow entrance of an authorized person. Almost 66(54.5%) wash their hand at the end of every work and similarly 75 (62 %) always wear gown, yet only 19(15.2%) of the respondents use masks and goggles routinely. (Table 6)

**Table 6 practices of study participants working in selected health facility laboratories Addis Ababa, Ethiopia 2019**

Practice subject	Never	Rarely	Sometimes	Often	Always
Habit of labeling chemicals	17 14%	13 10.7%	16 13.2%	15 12.4%	54 44.6%
Habit of reading chemicals	12 9.9%	8 6.6%	21 17.4%	21 7.4%	55 45.5%
Habit of eating, drinking and applying cosmetics	67 55.4%	22 18.2%	11 9.1%	6 5%	15 12.4%
Placing reagents properly	21 17.4%	24 19.8%	20 16.5%	14 11.6%	36 29.8%
Habit of following appropriate closing	11 9.1%	30 24.8%	31 25.6%	21 17.4%	28 23.1%
Hand washing habit	5 4.1%	7 5.8%	15 12.4%	27 22.3%	66 54.5%
Glove wearing habit	10 8.3%	8 6.6%	15 12.4%	13 10.7%	75 62%
Habit of using masks and goggles	19 15.2%	22 18.2%	47 38.8%	12 9.9%	19 15.7%
Practice of allowing entrance of an authorized person	37 30.6%	29 24%	37 30.6%	9 7.4%	9 7.4%

#### **5.2.4 Practice level of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals safety measures**

To determine each professional's practical characteristics towards xylene and other potential chemicals safety measures, level of practice was classified in to poor, fair and good. The overall study finding indicates about 53(43.8%) participant were founded with fair practice, while 43(35.5%) and 17(14%) were good and as well as poor respectively.

### 5.2.5 Associated factor affecting practice level study participants towards xylene and other potential chemicals safety measures

Regarding Associated factor affecting practice level; age, role in the laboratory, availability of safety information, safety training and other socio demographic factors did not show significant association. Awareness of legislation found to be strongly associated factor affecting practice level of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals safety measures with the result of ( $p=0.03$ ). (Table 7)

**Table 7 Study participant’s practices and associated factor affecting itin selected health facility laboratories Addis Ababa, Ethiopia 2019**

Variables		Practices			p-value	Fisher Exact Test
		Poor	Fair	Good		
Gender	Male	47(57.3%)	16(19.5%)	19(23.2%)	0.55	1.153
	Female	24(61.5%)	8(20.5%)	7(17.9%)		
Age	20-29	24(57.1%)	9(21.4%)	9(21.4%)	0.36	5.837
	30-39	29(52.7%)	12(21.8%)	14(25.5%)		
	40-49	12(25.0%)	2(12.5%)	2(12.5%)		
education level	50-59	5(8.3%)	11(6.7%)	0(0.0%)	0.36	5.837
	BSC	6(75.0%)	1(12.5%)	1(12.5%)		
	MSC	16(48.5%)	8(24.2%)	9(27.3%)		
	Pathology residents	42(61.8%)	12(17.6%)	14(20.6%)		
Working experience	1-5	33(62.3%)	10(18.9%)	10(18.9%)	0.29	8.026
	6-10	17(45.9%)	8(21.6%)	12(32.4%)		
	11-15	13(65.0%)	4(20.0%)	3(15.0%)		
	16-20	3(50.0%)	2(33.3%)	1(16.7%)		
	>20	4(100.0%)	0(0.0%)	0(0.0%)		
	Research Staff	28(57.1%)	11(22.4%)	10(20.4%)		
	Technician	14(48.3%)	8(27.6%)	7(24.1%)		

	Pathologist	13(92.9%)	0(0.0%)	1(7.1%)		
	Others	7(63.6%)	0(0.0%)	4(36.4%)		
Safety information	Yes	33(57.9%)	10(17.5%)	14(24.6%)		
	No	38(59.4%)	14(21.9%)	12(18.8%)	0.36	2.015
Safety training	Yes	23(60.5%)	3(7.9%)	12(31.6%)		
	No	48(57.8%)	21(25.3%)	14(16.9%)	<b>0.03</b>	17.869
Awareness of legislation	Yes	3(60.0%)	9(16.4%)	13(23.6%)		
	No	38(57.6%)	15(22.7%)	15(19.7%)	0.965	0.112

### 5.3 Observational assessment result

To maintain and support the evaluation of qualitative data and observe the physical environment safety for working area, all of the 15 health facilities and diagnostic laboratories were assessed by observation check list during data collection moment and the data entered to SPSS version20 statistical software and Descriptive statistics such as frequency, percentage done.

The results showed that more than 50% of the health facilities have adequate PPEs for the professionals including gown, glove, masks, and eye goggle. Only 21% of the facilities have a well-ventilated and standardized laboratory working rooms. Eye Wash facility, toilet and hand washing sinks were available on all facilities yet, few of them have emergency shower emergency exits, a first aid box, 10.7% of observed laboratory posted biohazard signs on door entrances and 7.5% of laboratory were posted authorized persons should be allowed to enter the laboratory working areas. All health facilities visited had separated room for histology laboratory even though, few of the laboratories have separate reception, grossing, staining, sectioning and result releasing room usually they are near to one another.

None of the laboratories had specific person assigned to deal with hazardous and only one laboratory has functioning laboratory feud hums. In my observation I noticed that most of the professionals already adapted the work and the working area and don't take greater care while working.

## 6 Discussion

Pathology laboratory technicians are a relevant group to assess long term occupational risk because they are directly in contact with xylene and other potentially hazardous substances chronically. In this study more than half 83(68.6%) of the respondents have routine contact with formaldehyde followed by xylene 76(62.85%), formalin 58(47.9%) and ethyl eter 40(33.1%) this is comparable with study done in Palestinian governmental hospitals also indicate that 64% exposed to chemical hazards. (27)

Regarding to the knowledge level greater number of respondents 59(48.8%) have low level of knowledge, only 18(14.9%) of the participant categorized as having high level of knowledge, this result is comparable with several studies done in different countries, which have reported far lower proportion of good knowledge in Abeokuta (3.7%), Vietnam (3.72%), Iran (10.5%), Hong Kong(20.4%) and Thailand (34.1%).(26,28,29,30,31).

However, this result incomparable with studies done in Nigeria; India and Thailand which showed that the workers had high knowledge about the hazards they were exposed to at work this may be due to sample size countries condition, study setting, and background of study participants. (26, 27, 29)

In this study the most usually used source of information were Posters / signs on the wall (31.4%) and the least was internet source 12(9.9%) and most of the information were on how to use personal protective yet, similar study done in Nigeria Edo state indicate that mostly used information source was internet(65%), This could be due to internet access, study participant utilization behavior, attitude and awareness and opportunities of source of information in the health facilities as well as in the country.(30)

In this study 115 (95%) of the respondents know that organic solvents can harm body through dermal contact yet, this study is incomparable with study done in pesticide users in west India more than half (60%) were un aware that skin and eye are root of exposure , this is not surprising because the comparisons made was between professionals and pesticide user which usually have low level of education and these difference could be due to the background of the study participants and the study setting. Even though, that the skin is the most common route that can cause acute exposures which readily manifest as skin burns and skin itching that is why 105(86.8%) participants in this study were identified skin sensitization as a work place hazard.(27)

Having good knowledge was positively associated with an awareness of the related legislation; this is similarly with the survey done in Knowledge, Attitude and Practice regarding Organic Solvents among Printing workers in Hong Kong with p-value of 0.001.(17)

Even though, education level didn't have association with knowledge of safety measure, most respondents (40.5 %) are pathology residents, the reasons might be that majority of the pathology residents didn't have direct contact with the pre-analytical and the post analytical stage they focus on analytical stage and also during data collection time there were many third year and fourth year students who were in practice so this may be another reason.

According to this study data findings large amount of subjects 53(43.8%) are found in positive attitude, this is in line with a study carried out in Iran 267 which showed that 75.7% of the organic chemical workers had positive attitude towards occupational health and safety<sup>[26]</sup>. Nigeria (16.7%), Hong Kong (38.4%), India (50%) and Vietnam (4.2%) have shown garment workers with a far lower positive attitude towards workplace hazards, this variation may be due to the nature of study participants.(26,17,30,31)

Most of the study participant 75(62.8%) believes that exposure to organic solvents has harmful effect to health. About 66(54.5%) strongly agree finding of less toxic substitutes for currently used chemicals, this result concise with survey done in textile dye workers in Sokoto, Nigeria over 80% of the respondents in the study believe that they were exposed to hazards in the workplace. This is not surprising as a good percentage of the respondents had primary school education as their lowest level of education and this could account for positive attitude.

In this study 54(44.6%) have both habit of labeling chemicals and reading labels. About 22(18.2%) rarely eat, drink and apply cosmetics in the laboratory this is in consonance with a study among printing workers in Hong Kong that found 49.7% of the respondents read labels on containers, 75.6% used gloves;56.1% washed hands before eating and drinking and 85% covered lids of containers after use. Despite this, only 17(14%) were having poor practice this appears worrisome as maintaining a safe and healthy environment which is a fundamental right of every worker would be undermined.

In this study only 19(15.2%) of the respondents use masks and goggles routinely, This is comparable with studies done in Kwara and Edo states which indicated that less than 15% of the workers always used any form of protective device, while less than 5% of the workers wore face masks or protective clothing/boots at work. Also, a study among small industries in Saudi Arabia found that about 12% of the workers used personal protective measures all the time while 60% did not use any. (31)

The study show gender, age, working experience, role in the laboratory, safety training and awareness of legislation were found strongly associated with attitude this may be due to that being responsible, training and awareness of legislation empowers workers to have good attitude, However, awareness of legislation was the significant factor found to be associated with good practice, this is similar with the result in Hong Kong among printing workers study among printing workers. (17)

## **7 Strength and Limitation of the study**

### **7.1 Strengths**

- ❖ The study became a base line for future studies and future appearing histopathology labs to develop safe measures.

### **7.2 Limitations**

- ❖ Lack of prior research studies literatures for further discussions and comparisons. As a result most of the figures in the discussion sections have wide vibration. This is due to different study setting such as factories which are very far from health care setup. The other one is in these set up the skill level or over all background of the study participants were so much different, which can have effect to compare their knowledge, attitude and practice level.

## 8 Conclusion and recommendation

### 8.1 Conclusion

The overall study finding revealed that, only 18(14.9%) of the participant categorized as having high level of knowledge. Huge number of subjects 53(43.8%) have found positive attitude and about 53(43.8%) participants had fair practice.

### 8.2 Recommendation

Based on the study finding to improve the professionals knowledge, attitude and practices as well as to minimize future work place hazards the following ideas recommended;

- Since, more than half of the respondents 68.6% don't take health and safety training on currently used organic solvent every professional should take safety training specific to the work
- Alternative strategies would be sought for those chemicals which is hazardous!!
- Posters/signs on the wall and Demonstration might only improve the general awareness, but workers using chemicals in their job would probably require more elaborate and concrete information to be communicated in the form of publications, talks and online training.
- Histology laboratory should be given special attention from the routine laboratories, the professionals also should be given special care and compensation and the
- Safe practice does not necessarily depend on good knowledge and appropriate attitude of the workers. Front line supervisors can improve safe practices of workers by informing them of the necessary precautions and providing them with the relevant chemical information.
- Safety information, safety training and clear presentation of available legislation should be provided for the professionals to enhance as well as improve their knowledge and practice while using hazardous chemicals.

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## ANNEXES

### Annex I English version subject information sheet

#### ADDIS ABABA UNIVERSITY COLLAGE OF HEALTH SCIENCE DEPARTEMENT OF MEDICAL LABORATORY SCIENCE

Questioner for Assessment of knowledge, attitude and practice of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals in selected health facilities.

**Identification:** Type of faculty \_\_\_\_\_ Name of faculty \_\_\_\_\_

**Address:** Keble \_\_\_\_\_ sub city \_\_\_\_\_ Telephone` \_\_\_\_\_

My name is \_\_\_\_\_ I am currently student of Addis Ababa University, Department of Medical Laboratory science going to conduct a research. I would like to collect information from you by self-administered questioner. The objective of the survey is to assess knowledge, attitude and practice of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals in selected health facilities.it will contribute a lot for laboratory professionals health in order to avoid direct physical contact with hazardous chemicals, to take appropriate cautions, to be aware of health hazard of this chemicals and find non-hazardous, less irritant and less toxic substitutes. Your willingness and cooperation in answering questioner question is very important, valuable and very important to the level and identify the gap related to the issue. I assure you all the collected information by this questioner will never release to any parties and will be kept strictly confidential. You are requested to participate voluntarily and you are not obligated to answer any question you are not willing to answer .do I have your permission to continue?

If yes, continue to the next page.

For any information you can contact

Ms. SemiraRahmeto E-mail [semirarahmeto46@gmail.com](mailto:semirarahmeto46@gmail.com) telephone 09 20 84 26 52



### Annex III: English Version of Questioner

Study area code \_\_\_\_\_

participant code \_\_\_\_\_

Self-administered structured questionnaire to assess knowledge, attitude and practice of Staffs Working in Histopathology laboratory towards xylene and other potential chemicals in selected health facilities.

#### Part I socio-demographic questions

Dear participant the following question prepared to know your attitude toward xylene and other potential chemicals, please **circle** the best choice of your answer code.



<b>N<sub>o</sub></b>	<b>Questions</b>	<b>Coding classification</b>	<b>Code</b>
101	Age in years	_____ Year	
102	Gender	Male =1 Female =2	
103	If female, are you pregnant	Yes=1 No =2	
104	Education level	High School=1 College/ Bachelor's Degree=2 Graduate Degree=3 Phatology resident=4	
105	Working experience	_____ Year	
106	Role in the laboratory	Supervisor=1 Research Staff=2 Technician=3 other (please specify)	

## Part I knowledge questions

Dear participant the following question prepared to assess your knowledge about xylene and other potential chemicals, please **circle** the best choice of your answer code.

No	Questions	Coding classification	Code	
201	Have you been using these chemicals routinely as part of your laboratory work?  <b>(Please check all that apply)</b>	Formalin	Yes	No
		Xylene	Yes	No
		Formaldehyde	Yes	No
		Ethyl eter	Yes	No
		Acetyl alcohol	Yes	No
202	Have you ever received any health and safety information from your current employer?	Yes =1 No =2		
203	9. If yes, what format did this take?  <b>(Please check all those that apply)</b>	Company orientation	Yes	No
		Demonstration on how to use	Yes	No
		Leaflet or information sheet	Yes	No
		Online training	Yes	No
		Posters / signs on the wall	Yes	No
204	Did this information include any of the following?  <b>(Please check all that apply)</b>	The potential health hazards	Yes	No
		How to use personal protective	Yes	No
		How to clean up organic spills	Yes	No
		Chemical hazards	Yes	No
		Employers' responsibilities	Yes	No
205	Have you ever received any health and safety training on any of the organic solvents you currently use	Yes =1 No =2		

206	Are you aware of the relevant legislation governing the use of any of the organic solvents you currently use in the laboratory?	Yes =1 No =2		
207	Do you feel you have adequate knowledge about any of the organic solvents you currently use in the laboratory?	Yes =1 No =2		
208	Organic solvents can harm your body through  <b>(please check all that apply)</b>	Ingestion	Yes	No
		Inhalation	Yes	No
		Dermal contact	Yes	No
		Through contact with eyes	Yes	No
		Do not know	Yes	No
209	What are the potential health hazards associated with formalin and formaldehyde?  <b>(Please Check all that apply)</b>	Can cause occupational asthma	Yes	No
		May cause skin sensitization	Yes	No
		Can be toxic if swallowed	Yes	No
		Can cause cancer in humans	Yes	No
		Can cause abortion	Yes	No
		May cause eye irritation	Yes	No
210	Which of the following are possible symptoms of being exposed to high levels of xylene?  <b>(Please Check all that apply)</b>	Headaches and dizziness	Yes	No
		Nausea and vomiting	Yes	No
		Irritation of nose, eyes and throat	Yes	No
		Skin sensitization	Yes	No
		Nervous system effects	Yes	No

211	 <p>The hazard symbol  is displayed on all organic solvents. Does this mean that these solvents are?</p>	Dangerous to the environment	Yes	No
		Corrosive	Yes	No
		Harmful or an irritant	Yes	No
		Toxic	Yes	No
		Do not know	Yes	No
212	The most effective way of controlling your exposure to formalin, formaldehyde and xylene is to switch to low fume hoods to reduce your laboratory footprints.	True=1 False=2 Do not know=3		

### Part III attitude questions

Dear participant the following question prepared to assess your attitude toward xylene and other potential chemicals, please **circle** the best choice of your answer code.

No	Questions	Coding classification	Code
301	People worry more than necessary about the hazards associated with xylene and formaldehyde	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	
302	Exposure to organic solvents has harmful effects to health	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	

303	Given the opportunity, I would use further measures to help protect my health when using the organic solvents mentioned in this survey.	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	
304	I think the risks associated with formalin and xylene, are sufficiently controlled in my workplace.	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	
305	I can help protect my health and safety when using benzene and dichloromethane by making slight changes to the way I work.	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	
306	I think the organic solvents mentioned in this survey are safe as long as they are handled and used in the correct.	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	
307	I see no reason why I cannot eat or drink in the laboratory.	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	
308	I think pregnant should not have interaction with xylene and formaldehyde	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	

309	I see importance of finding less toxic substitutes for xylene and formaldehyde	Strongly agree=1 Agree=2 Neutral =3 Disagree =4 Strongly disagree=5	
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### Part III practice questions

Dear participant the following question prepared to assess your safety practice when using xylene and other potential chemicals, please **circle** the best choice of your answer code.

<b><u>No</u></b>	<b>Questions</b>	<b>Coding classification</b>	<b>Code</b>
401	Do you label all chemicals which you prepare from stock solution?	Never=1 Rarely=2 Sometimes =2 Often =4 Always =5	
402	Do you read labels on containers of organic solvents?	Never=1 Rarely=2 Sometimes =2 Often =4 Always =5	
404	Do you place reagents and solvents in suitable closed vessels, within fire-resistant cupboards, cabinets or bins containing spill trays?	Never=1 Rarely=2 Sometimes =2 Often =4 Always =5	
405	Do you wear fully covered shoes, confine long hair and avoid loose clothing?	Never=1 Rarely=2	

		Sometimes =2 Often =4 Always =5	
406	Do you wash your hands with proper detergent at the end of any occupation?	Never=1 Rarely=2 Sometimes =2 Often =4 Always =5	
407	Do you wear gloves when working with organic solvents?	Never=1 Rarely=2 Sometimes =2 Often =4 Always =5	
408	Do you use mask or eye goggle?	Never=1 Rarely=2 Sometimes =2 Often =4 Always =5	
409	Do you allow entrance of un authorized person in the laboratory?	Never=1 Rarely=2 Sometimes =2 Often =4 Always =5	

**Thank you for your participation!!!**

#### Annex IV: English Version Observation check list

No	Questions	Yes	No	Remark
501	Is the size of laboratory suitable for safe practice			
502	Are the rooms well ventilated			
503	Is there enough PEP available			
505	Dose the professionals use available PEPs			
506	Are all chemicals labeled, including hazard symbols where appropriate?			
507	Is there separate place for hazardous chemicals?			
508	Is there clear guideline available while using hazardous chemicals?			
509	Does all laboratory staff wear fully covered shoes, confine long hair and avoid loose clothing?			
511	Is there provision for the secure storage of outdoor clothing out of the laboratory area, or in secure cupboards/ lockers within the area			
512	Is there a person, with appropriate experience and knowledge, designated to deal with hazardous substances?			
513	Are emergency procedures and emergency phone numbers clearly posted on all laboratory doors?			

## **Annex V Declaration**

### **Declaration**

I, the undersigned, declare that this MSc thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been duly acknowledged.

**M.Sc. candidate: Semira Rahmeto (B.Sc.)**

Signature: \_\_\_\_\_

Date of submission: \_\_\_\_\_

This proposal has been submitted with our approval as advisors.

**Advisor: Kassu desta (MSc, PhD fellow, Assistant Professor of Medical Microbiology)**

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Place: Addis Ababa, Ethiopia.

**Advisor: wajana Lakew(MSc.PhD)**

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Place: Addis Ababa, Ethiopia.

**Advisor: Fatuma Hassen(MSc, PhD fellow)**

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Place: Addis Ababa, Ethiopia.