CHAPTER I

1.1 Introduction

Hepatitis is an inflammation of the liver characterized by diffuse or patchy necrosis. Major causes are specific hepatitis viruses, alcohol, and drugs. Less common causes include other viral infections (e.g., infectious mononucleosis, yellow fever, cytomegalovirus infection) and leptospirosis.[1] VIRAL hepatitis, caused by any of the six hepatotropicviruses, viz. hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus (HDV), hepatitis E virus (HEV) and hepatitis G virus (HGV), represents a major health problem worldwide. Among these, HCV is now established to be the major causative agent of post-transfusional Non-A, Non-B hepatitis (PTNANBH). [2]

Epidemic jaundice was described by Hippocrates in the 5th century B.C.[3] Hepatitis C virus (HCV) is a new virus identified in the year 1989.[4] Screening assay for antibody to HCV became available late in 1990 and their use has subsequently become widespread. According to WHO estimations, about 3% of the world population may be infected with the hepatitis C virus. The relative prevalence of subtypes of this virus varies in different geographic areas.[5]

Hepatitis C infects nearly 200 million people worldwide and 4 million in the United States.[6] There are about 35,000 to 185,000 new cases a year in the United States, and hepatitis C is the leading cause of liver transplant in the USA. Co-infection with HIV is common and rates among HIV positive populations are higher. 10,000-20,000 deaths a year in the United States are from HCV; expectations are that this mortality rate will

increase, as those who were infected by transfusion before HCV testing become apparent. A survey conducted in California showed prevalence of up to 34% among prison inmates.[7] 82% of subjects diagnosed with hepatitis C have previously been in jail.[8]

Prevalence is higher in some countries in Africa and Asia. Egypt has the highest seroprevalence for HCV, up to 20% in some areas. There is a hypothesis that the high prevalence is linked to a now-discontinued mass-treatment campaign for schistosomiasis, which is endemic in that country.[9]

The main known routes of transmission are parenteral, intravenous drug abuse, contaminated injection devices and receipt of unscreened blood or blood products.[10] Intravenous drug use is by far the most important mode of transmission of HCV. It affects an estimated 170 million people worldwide.[11]

Health care workers who have occupational exposure to blood are at increased risk for acquiring blood-borne infections. The level of risk depends on the number of patients with that infection in the health care facility and the precautions the health care workers observe while dealing these patients. There are more than 20 blood-borne diseases, but those of primary significance to health care workers are hepatitis due to either the hepatitis B virus (HBV) or hepatitis C virus (HCV) and acquired immunodeficiency syndrome (AIDS) due to human immunodeficiency virus (HIV).[12]

Most of the time, both acute and chronic hepatitis C have no symptoms. However, chronic hepatitis C is a slowly progressive disease and results in severe disease in 20 to 30 percent of infected people. The symptoms of hepatitis C are difficult to recognize because they tend to be mild during the early stage of infection. The most common

symptom is fatigue, but it may take years to become manifest. Other symptoms include flu-like mild fever, muscle and joint aches, nausea, vomiting, loss of appetite, vague abdominal pain, and sometimes diarrhea. A small number of individuals have dark urine, light-colored stool, and jaundice. Itching of the skin and weight loss (5 to 10 pounds) occur occasionally. Disorders of the thyroid, intestine, eyes, joints, blood, spleen, kidneys, and skin may occur in about 20 percent of patients.[13] .

Most of the people infected by hepatitis C virus are asymptomatic at the beginning. Persons who develop acute HCV infection rarely recover completely; more than 80% of them remain HCV infected. The virus can stay in the body for many years, eventually leading to chronic hepatitis, cirrhosis of liver in 15- 20%, hepatic failure and in 0.7-1.3% of the cases hepatocellular carcinoma (HCC) after 20-30 years.[14]

There is no vaccine against this virus till today. The genomes of hepatitis C virus display significant sequence heterogeneity. Six types (1 to 6) and many subtypes have been identified.[15]Presence of various genotypes has epidemiologic and therapeutic implications. Seroprevalence of anti HCV in general population of Nepal has been estimated to be from 0.1%-1.7%[16] and in IDU 94%.[17] Seroprevalence study suggests that the overall anti-HCV positivity in blood donors is about 0.3% in Nepal3.[18]

1.2 Justification

The World Health Report (2002) reports that unsafe injection practices account for 30% of HBV infections, 31% of HCV infections, 28% of liver cancer, 24% of cirrhosis cases, 5% of HIV infections and 0.9% of deaths worldwide (WHO, 2002).

As well as the burden of morbidity and mortality, it is possible to calculate the burden of costs and years of life lost due to unsafe injection practices. Miller and Pisani estimate a global financial cost of US$535 million per year, and calculate that unsafe injection practices are associated annually with 1.3 million deaths and 26 million years of life lost (Miller and Pisani, 1999).[19] Prospective studies of health care workers exposed to HCV through a needle-stick or other percutaneous injury have found that the incidence of anti-HCV sero-conversion averages 1.8% (range 0%-7%) per injury.[20] . One study reported that transmission occurred only from hollow-bore needles as compared with other sharp objects.[21]

It is believed that only one out of three needle-stick injuries are reported in the US, while these injuries virtually go undocumented in many developing countries[22]

One study done on Kathmandu showed that 4% and 61% of the health care workers, respectively, were unaware of the fact that hepatitis B and hepatitis C can be transmitted by needle-stick injury[23].

As vital members of the health care team, medical laboratory professionals play a critical role in collecting the information needed to give the best care to an ill or injured patient.[24]

Laboratory health workers are particularly vulnerable to blood borne diseases as their major job is to collect blood samples to find out the pathology. In Nepal, there has been no research to assess their knowledge of hepatitis nor the risk behavior regarding hepatitis C infection among lab health workers. This study has researched the knowledge and risk behavior on hepatitis C infection among lab health workers in Kathmandu, Nepal. It will also help policy makers to develop and implement effective programs to solve the problem.

1.3 Operational definitions

Laboratory health workers: People working in medical pathology laboratory. In this study Lab Assistant and Lab Technician were considered as Laboratory health workers.

Knowledge: Knowledge refers to have information and concepts on Hepatitis C. Particularly cause, mode of transmission, sign and symptoms, consequences, high risk group, methods of prevention and vaccination on hepatitis C.

Knowledge level: In this study, among 24 questions related to knowledge, who answered only 0-13 as correct answer was considered as having poor knowledge and the respondent who answered 14-24 as correct answer was considered as having good knowledge

Risk behavior: Those activities that accounts harm to the lab health workers themselves as well as to the service receivers. In this study, activities like use of gloves during sample collection, use of sterilize instruments; practice of sharing needle and practice of recapping needle were considered as risk behavior.

Risk level: Among 4 variables, each correct behavior was given 1 point. Respondent receiving 3 or less point were considered as having High Risk behavior and those receiving 4 points were classified as having Low Risk behavior

Perception: Perception is the individual feeling towards the Hepatitis C infection. In this study, opinion on hepatitis c screening, following universal precaution during sample collection, and importance of workshop and training were included to assess perception.

Viral hepatitis: Inflammation of Liver due to viral infection like hepatitis c.

High risk group: Those people who have much more possibility of acquiring the hepatitis C infection than the normal population are termed as high risk group. Unscreened blood receivers, person with multiple sex partners, intravenous drug users, health workers and babies born with infected mothers are the high risk group for hepatitis C infection. Respondents of this study i.e. lab health workers are the high risk group of getting hepatitis c infection.

Mode of transmission: Refers to the modes through which HCV is spread from person to person. Unsafe sexual activities, unscreened blood transfusion, sharing common needle to inject drug, infected mother to child and tattooing / piercing are the important mode of transmission of hepatitis C.

Infection: Process of causing or getting a disease. This is identified by positive test results of hepatitis C.

Complication: Adverse effects due to hepatitis C infection. Chronic carrier, cancer of liver, cirrhosis of liver and death are the major complication due to hepatitis c infection.

1.4 Research question:

What is the prevailing level of knowledge and risk behavior on Hepatitis C infection among laboratory health workers in Kathmandu, Nepal?

CHAPTER II

LITERATURE REVIEW

Until a few years ago, the only types of viral hepatitis that could be confirmed were type A and type B. All others were described as non-A, non-B, that is neither hepatitis A nor hepatitis B; viral infection could be confirmed in blood tests of patients. Since the hepatitis C virus (HCV) was identified in the year 1989, it has been shown to be the major cause of parenterally transmitted non-A, non-B (PT-NANB) hepatitis.

The hepatitis C virus is a single stranded RNA virus with properties similar to those of flavivirus. It bears no genomic resemblance to hepatitis B or D. The virus is mainly transmitted through transfusion of contaminated blood or blood products. Up to 50% of cases are related to intravenous drug users who shares needles. The risk of sexual and maternal – neonatal transmission is small. A low rate of secondary transmission to household contacts has been recognized. For health care workers it is an occupational hazard requiring adherence to universal precautions. Traditional practices such as circumcision, tattooing and scarification with contaminated instruments can spread HCV infection. The incubation period averages 6-7 weeks, and clinical illness is often mild, usually asymptomatic with a high rate of (more than 50%) chronic hepatitis, which may lead to cirrhosis of liver or liver cancer. It may take as long as 20 years to develop into liver cancer, and is more likely to do so in women, and in alcohol consumers.

Since it is not known whether all PT-NANB hepatitis is due to HCV infection, the diagnosis of acute NANB hepatitis must first be established in persons with signs and symptoms consistent with acute hepatitis by ruling out acute HAV and HBV infections.

Currently, only immunoassays for antibodies to part of the non- structural region of HCV (anti-HCV) are available, as well as supplemental recombinant immunoblot assay (RIBA) tests used to confirm anti HCV positive results. Patients with acute PT-NANB hepatitis who are anti-HCV negative, at the onset of illness should be tested 6 months later, and if they are anti-HCV positive, the diagnosis of acute HCV can be made. Most RIBA positive persons are potentially infectious, as confirmed in research laboratories by use of polymerase chain reaction to detect HCV RNA. Testing donated blood for HCV has helped reduce the risk of transfusion-associated hepatitis C from 10% to 1%in the industrialized countries. In India, screening for HCV has been made mandatory for all blood banks from July 1, 1997.

The incidence of HCV infection worldwide is not well known, but from the review of published prevalence studies, WHO estimates that 3% of the world population is infected with HCV and around 170 million individuals are chronic carriers at risk of developing liver cirrhosis and liver cancer. In many countries, particular population sub groups, such as voluntary blood donors have a very high prevalence of HCV infection especially in the developing world. In the USA, an estimated 4 million people have contracted the disease, 4 times more than HIV infection. Approximately 30,000 new acute infections and 8000-10000 deaths occur each year. It has also become leading reason for liver transplantation.

The annual incidence of HCV infection in SEAR countries is largely unknown, primarily because over 50% of infectious cases are asymptomatic. In addition, many symptomatic acute HCV cases are not laboratory- confirmed since testing of patients for HCV markers

is not commonly done. In India HCV antibodies have been found in 2% of voluntary blood donors. Testing of blood samples from patients with hepatocellular carcinoma has shown that 42% of the patients in India, 29% in Indonesia and 35% in Myanmar had markers of HCV infection. A high prevalence of HCV markers have also been detected in patients with chronic liver disease.[25]

WHO estimates that about 170 million people, 3% of the world's population, are infected with HCV and are at risk of developing liver cirrhosis and/or liver cancer. The prevalence of HCV infection in some countries in Africa, the Eastern Mediterranean, South-East Asia and the Western Pacific (when prevalence data are available) is high compared to some countries in North America and Europe.[26]

Unlike the case for HIV and hepatitis B, the risk of occupational transmission of hepatitis C virus to health care workers has not been well-defined. A study from 16 urban Italian hospitals begins to shed light on this issue. Over 3000 hospital employees -- including 1462 nurses, 644 housekeepers, and 512 physicians -- were initially tested for hepatitis C antibodies by second-generation tests; 2.2 percent were positive. Although age over 46, previous transfusion or hepatitis, and employment in housekeeping were significantly associated with a higher seroprevalence rate, risk factors such as history of surgical interventions or occupational needle stick exposures were not. Of the 3006 seronegative employees, 87 percent were retested a year later, and three (0.1 percent) had seroconverted, none of the three recalled occupational exposures. In addition, 133 health care workers sustained exposures (mostly needle sticks) from sources positive for

hepatitis C. All of the workers were seronegative at the time of the exposure. At six months, one person (a nurse with a needle stick after blood drawing) had seroconverted.[27]

The study conducted on 70 health care workers shows some demographic characteristics of the studied health care workers. Of the 70 health care workers 47 (67%) were females, 65 (93%) were aged between 30 to50 years (mean 38.7+6.6 years), and 46 (66%) were nurses in the wards. Forty-eight (69%) of the subjects had been working as health care workers for 10-20 years, and 54% have been working in Saudi Arabia for 5-10 years The same study shows the level of knowledge and preventive measures taken by health care workers regarding needle stick injuries. Our study showed that 21% and 30% of the health care workers, respectively, were unaware of the fact that AIDS and hepatitis C can be transmitted by needle stick injury. Fifty-two subjects (74%) out of 70 had a history of needle stick injury and of those, 34 (67%) had 1- 2 pricks per year. Only 4 subjects (7%) reported the injuries to doctors to get post-exposure treatment, and only 27% of were in the habit of using gloves regularly for phlebotomy procedures. Twenty subjects (29%) were of the impression that needles should be recapped after use, and only 43 (61%) were aware of universal precaution guidelines, while only 50% of subjects had adequate knowledge of new needle devices and the safety features.[28]

294 health care workers from 21 different departments were tested for hepatitis C antibodies by means of the Ortho ELISA test. Only six (2%) were found positive. Health care workers having direct contact with the patient, such as doctors and nurses, seem to be at a higher risk of infection than those with only indirect contact, such as laboratory

technicians and cleaning personnel. In the geriatric ward the risk is possibly slightly higher than in other departments. However, in general risk of infection with HCV for health care workers seems to be low.[29]

Hepatitis C virus (HCV) infection, a global health problem, is also prevalent in India. HCV is a parenterally transmitted virus that may pose an occupational hazard to the health care workers. There are very few studies from India regarding the prevalence of HCV infection as an occupational hazard in the high risk groups of health care staff working in hospitals. The present study was therefore designed to determine the seroprevalence of HCV infection amongst health care workers (HCWs) of a tertiary level care centre in New Delhi. The study was conducted in Lok Nayak Hospital, New Delhi during the period from June 2003 to August 2003. The study included a total of 100 subjects comprising of health care workers (resident doctors, nurses, technicians and those working in haemodialysis units, haematological laboratories, blood bank, dental units, etc.) employed in the hospital. A total of 128 health care workers were contacted of which 113 consented for the study. A questionnaire was used to initially screen the subjects for inclusion in the study. 13 subjects were excluded from the study based on history suggestive of any hepatobiliary disease or daily alcohol intake of more than 40 g/day. The subjects were also asked to mention the unit of the hospital where they were working, and the duration (in years) for which they had been working in the present position. The subjects were then divided into subsets based on the unit where they were working at the time of this study. After initial clinical assessment, 5 ml blood sample was drawn from each subject under aseptic conditions. Serum was separated and stored at -

70oC until use. Repeated thawing and freezing of the serum was avoided. The serum samples were tested for anti-HCV antibodies by using Hep-Chex C kit (Qualigens Fine Chemicals, New York) (sensitivity 87.50%, specificity 99.45%). Chi-square test was applied to test the significance of the factors studied in relation with the seroprevalence of anti-HCV antibodies. The study included 46 males and 54 females with the mean age of 34.62 + 5.04 yr. Seroprevalence of HCV was found to be 4.0 per cent. The average duration of occupational exposure among the subjects was 4.10 + 2.64 yr. The duration of occupational exposure was not found to be a significant factor for HCV infection. The seroprevalence of anti-HCV antibodies was found to be 8.33 (2 of 24), 5.56 (1 of 18) and 4.0 per cent (1 of 25) amongst HCWs working in the haemodialysis unit, blood bank and haematological laboratory, respectively. None of the subjects from dental units and biochemical and other laboratories tested positive for anti-HCV antibodies. In this study, the overall seroprevalence of HCV in the health care workers of Lok Nayak Hospital, New Delhi was found to be 4.0 per cent. This figure is comparable to previous reports. It was observed that the duration for which the health care worker has been working in the hospital was not a significant factor for the prevalence of HCV. The seroprevalence of HCV in the general population has been studied extensively and reports from different parts of Indi show the seroprevalence of HCV infection to be as varied as 0.3 to 11.3 per cent. But most of the studies have shown the prevalence of HCV to be less than 2 per cent in the general population. In our study, the seroprevalence of anti-HCV in health care workers was found to be considerably higher than in the general population. The high prevalence of HCV among health care workers may be due to their exposure to

infected blood/blood products of patients of HCV infection. This increased exposure may be in the form of accidental needle-pricks, contact of cut skin surface with blood/blood products, improper disposal of infected medical waste, etc.The results of this study support the prevailing evidence for HCV as an occupational hazard to health care workers. Considering the limited size of the study, it would be prudent to evaluate the results of this study with a larger sample. It is imperative however; that health care workers are sensitized about universal precautions and safe disposal of needles and other contaminated materials, to decrease the risk of infection.[30]

In one study, hospital-acquired infections were reduced 25% by handwashing with soap plus antiseptic compared to a control group who washed with soap alone. The absolute indications for handwashing with plain soaps and detergents versus handwashing with antimicrobial-containing products are not known because of the lack of well- controlled studies comparing infection rates when such products are used. The effects of handwashing in the prevention of disease transmission from person to person are undeniable; however, the goal of effective compliance remains unmet Most transient organisms can be removed by 30 seconds of proper scrubbing with soap and water. Hand washing by medical professionals occurs at only 30% of the ideal rate. Failure to wash one's hands before and after each patient contact is probably the most important contributor to the spread of infections.[31]

The institutional based descriptive cross- sectional study done on “Safe injection practices and awareness among Health Care Workers in Tertiary level Hospitals Kathmandu, Nepal” has shown that 88.98 percent of the respondents were females. The

mean age (standard deviation -7.82) of the respondents was 28.70 year. The majority, 61.02 per cent employees were between 21 to 30 years.

More than fifty percent respondents had knowledge of universal precaution, risk minimization procedure during injection practices, protection of blood borne disease, hand washing for infection prevention, proper disposal of used syringes and needles, proper use of gloves, importance of infection control, decontamination and sterilization process, laboratory required infection, sharp management into recommended containers, causes of infection to health care workers in health care setting, blood borne hepatitis, protection of health workers and patients and importance of glove usage.

It was seen that 50.58 percent health care workers were injured by needle sticks within a year. The occurrence of needle stick injury was higher among the nursing staff than laboratory staff. All the respondents used disposable syringes and needles and they never bent the used needle. And washing after activities, cleaning injecting areas with antiseptic/ microcides, recapping of needles, usages of puncture proof box to dispose needles and syringes, usage of disposable containers to dispose other than needles and syringes, usages of prescribed sites for injection, use of non touch technique during injection practices were followed by more than half of the respondents.76.27 percent health care workers followed non touch technique during injection practices. The percentage of the nursing staff was higher (81.3%) than the percentage of the laboratory staff (35.11%).[32]

The study done on **"**Health care workers' Knowledge of hepatitis C and attitudes towards patients with hepatitis C: A pilot study**"** has shown that the bulk of participants were between the ages of 20-30 (43%; n=25), while 34.5% (n=20) were aged 31-40, 15.5% (n=9) were aged 41-50, 5% (n=3) were aged 51-60, and 2% (n=1) were over 60. 35% (n=20) had 1-5 years of experience as a health care worker, 29% (n=17) had 6-10 years, 14% (n=8) had 11-15 years, 3% (n=2) had 16-20 years, and, 19% (n=11) had greater than 20 years experience. Tertiary qualifications were held by 78% (n=45) of respondents, while 22% (n=13) had either secondary school qualifications, certificate level qualifications or other unspecified qualifications. 64% (n=37) of respondents were females and 36% were males (n=21). 16% (n=9) of respondents personally knew someone who had HCV, 59% (n=34) had contact with a HCV positive patient in the previous six months, 9% (n=5) had experienced a sharps injury in the previous 12 months, and over one-third (36%; n=21) had a splash to the eyes or mucous membranes of blood or body fluids whilst at work.

The majority of staff answered 11 of the 13 questions incorrectly. Questions 15 and 21 were worth two marks each as one mark was awarded for getting the answer partially right and two marks were awarded for getting all the answers right. Thus, the total marks were out of 15. Knowledge scores ranged from 1-10 (mean 4.6 + 0.3).

Knowledge scores were significantly higher if the staff member had recently had contact with an HCV-positive patient (mean 5.24±0.59) when compared with those who couldn't remember if they had (mean 2.55±0.50) (1-way ANOVA, F=7.2160, p=0.0017; Tukeys HSD 0.05). Knowledge also differed significantly between professional groups (1-way

ANOVA, F=10.5779, Willingness to treat 25, 32, 33,34,37,38 0.7026 Perception of personal risk 22, 26 0.7035 Risk-taking personality 24, 29 0.7466 p=0.000). Post hoc analysis (Tukey's HSD 0.05) showed that doctors (mean 8.0±0.83) scored significantly higher on the knowledge test than the other groups, and RNs (mean 5.35±0.37) scored significantly higher than PTs (mean 3.72±0.48) and WPs (mean 3.40±0.45). Scores on the knowledge test were also higher in the group with more than 15 years experience (mean 5.77±0.47) compared to those with one to five years experience (mean 3.75±0.52) (1-way ANOVA, F=3.2666, p=0.0282; Tukey's HSD 0.05). There were no significant relationships between the level of knowledge and the other demographic variables: age, gender and qualifications. The majority of respondents (88%; n=51) reported that they did not treat persons with HCV differently to other patients, did not try to avoid looking after patients with HCV, (87%; n=50), or avoid spending time with them (85%; n=49), and 69% (n=40) reported that they were comfortable touching someone with HCV.

Almost 90% (n=52) felt that it was the duty of health care workers to care for people with HCV and 85% (n=49) were not influenced by the way the person acquired HCV. Three-quarters of respondents (n=43) rarely if ever worried about acquiring HCV in the workplace, although only 45% (n=26) felt they were at low risk of contracting HCV in the workplace. Forty five percent (n=26) agreed or strongly agreed that mandatory testing upon admission to hospital was not necessary, although just over half (n=30) of the respondents felt that patients undergoing surgery should be tested compulsorily. Just under three-quarters (72%; n=42) agreed or strongly agreed that patients who were HCV-positive should disclose their infective status to their carers.

Cronbach's alpha was used to measure the internal consistency of the attitude scale. Cronbach's alpha was 0.6671 for the scale overall, however, the scale reached an alpha of 0.7003 if Question 30 was deleted. The value of Cronbach's alpha improved slightly if the scale was divided into three subscales, which were named 'willingness to treat', 'perception of personal risk', and 'risk-taking personality'. Willingness to treat persons with HCV was correlated significantly with perceptions of personal risk (Pearson's correlation coefficient =0.2839, p=0.032), (ie the lower the person perceived their risk the more willing they were to care for persons with HCV). Willingness to treat was not significantly correlated to risk-taking behavior (p=0.052). No significant relationships were noted between knowledge scores and attitudes to caring for HCV-positive persons.

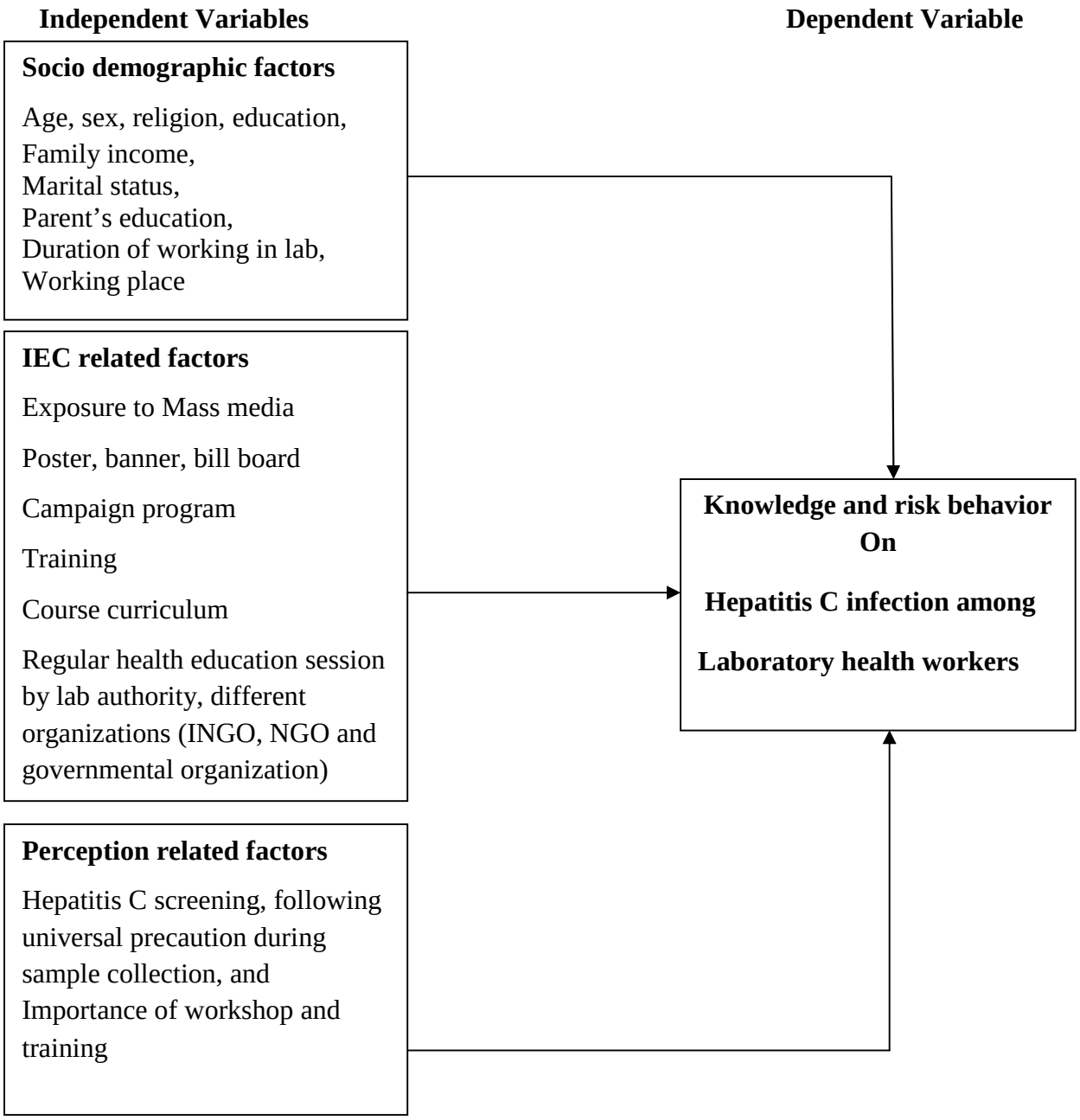
Relationships between background factors and attitude subscales

Knowing someone personally who had HCV, having recently cared for a HCV-positive patient, or having had a needle stick injury or splash incident were not related significantly to willingness to treat persons with HCV, with feelings of personal risk, or with a risk-taking personality. There were several significant relationships between demographic factors and the scales. Staff with 11- 15 years of experience were less willing to treat patients with HCV than persons with less or more experience (1- way ANOVA, F=2.8241, p=0.0474; Tukey's HSD 0.05). Perceptions of personal risk of acquiring HCV in the workplace were lower amongst PTs than amongst RNs and WPs (1-way ANOVA, F=5.6065, p=0.002; Tukey's HSD 0.05), and staff with degrees saw themselves as at lower risk than staff with secondary school education only (1-way ANOVA, F=2.3592, p=0.0436; Tukey's HSD 0.05).[33]

Chapter III

RESEARCH METHODOLOGY

3.1 Conceptual Framework



3.2 Study objectives:

3.2.1 General objective:

- To assess the prevailing level of knowledge and risk behavior on Hepatitis C infection among laboratory health workers in Kathmandu, Nepal.

3.2.2 Specific objectives:

- To describe the socio-demographic characteristics of Laboratory health workers in Katmandu, Nepal.
- To assess the level of knowledge on Hepatitis C infection among laboratory health workers in Katmandu, Nepal.
- To assess the risk behavior on hepatitis c infection among lab health workers in Kathmandu, Nepal.
- To find out the association between socio-demographic characteristics and knowledge on hepatitis c infection among laboratory health workers in Kathmandu, Nepal.
- To find out the association between knowledge and risk behavior on Hepatitis C infection among laboratory health workers in Katmandu, Nepal.

3.3 Study design

An analytical cross-sectional study design was conducted to explore the knowledge and risk behavior on hepatitis C among laboratory health workers of government and private health institutes.

3.4 Target population and sample population

Lab assistants and Lab technicians, working in randomly selected 20 laboratory health centers was the target population of the study. 160 laboratory health workers who were interviewed and 24 lab health workers participated on FGD were the sample population.

3.5 Study site and study area

Twenty health centers (10 under government and 10 under private sector) situated in the Kathmandu district of Bagmati Zone, Central Development Region, Nepal was study site.

3.6 Study period

Study period was November 2008 to April 2009

3.7 Sample size

The sample size for the study was determined by using the following equation:

$$n \text{ X} \frac{Z^2_{\sim} pq}{d^2}$$

Where,

n = desired sample size

z = standard normal deviate, usually considered 1.96 at 95% confidence interval (CI)

$\sim$ =level of statistical significance

p = proportion of the target population with particular character

q = 1-p

d = desired degree of accuracy, considered 0.05.

Sample size was estimated for two variables knowledge and risk behavior,

The World Health Report (2002) reports that unsafe injection practices account for 31% of HCV infections, as considering this as proportion of risk behavior, p= 31%, 0.30 q=1-p=0.70, By using formula, $n \text{ X} \frac{Z^2_{\sim} pq}{d^2}$, n= $(1.96)^2$ 0.3 x 0.7 / $(0.05)^2$ n= 323	For knowledge no study found related to this study so for sample size calculation, proportion of population having good knowledge was considered as 50%, So, p=50%, 0.5 q=1-p=0.5 By using formula, $n \text{ X} \frac{Z^2_{\sim} pq}{d^2}$, n= $(1.96)^2$ 0.5 x 0.5 / $(0.05)^2$ n=384

Here, the calculated sample size for two variables knowledge and risk behavior was 384 and 323. Though larger sample size was preferred, it was taken as 20 | 8=160 due to resources constraint. Among 160, 74 were from government institution and 86 were from private institution.

Three focus group discussions each with 6-10 participants were conducted and health workers in 20 laboratories were observed during duty hours.

3.8 Inclusion and exclusion criteria

3.8.1 Inclusion criteria

- Lab assistants who had given consent and participated in the study.
- Those laboratory health workers who was presented at the time of study.

3.8.2 Exclusion criteria

- Laboratory health workers other than lab assistant and lab technician.
- Those who refused to give informed consent and not participated in the study.
- Those who was not presented at the time of study.

3.9 Sampling technique

Twenty laboratory health centers were selected by using multistage sampling techniques. Health centers were selected randomly by using random table. Among them 10 were government and 10 were private institutes. Face to face Interview of 160 respondents (74 from government and 86 from private health institute) was conducted by following purposive sampling technique. For Focus Group Discussions, those participants were selected who were not interviewed and were from different health institutions.

3.10 Data collection tools

A “Pretested semi structured questionnaire” was used for face to face interview. “Focus group discussion guidelines” with seven major issues was used in focus group discussions. Data were collected in written form and by using audio and visual recording. Structured “Observation checklist for infection prevention” was used for observation of health institute.

3.11 Data management and analysis plan

The completed questionnaires were checked for completeness and clarity of the information and compiled. The data from all the completed questionnaires were entered into SPSS software 16 version and analyzed by using SPSS 16 version, EPI info 3.5 version and Stata 8.1 version. Findings were presented in narrative form with tables, graphs and charts

3.12 Quality control and Quality assurance

Measures were taken from the beginning to the end of the study to ensure quality control and quality assurance. Optimal utilization of guidance and support from the Supervisor and other faculty members and from course Advisor throughout the study period, exploration and use of experiences of the senior students, similar researches and available knowledge and information in the study topics, careful design of the study, translation and pre-testing of data collection tools/questionnaires on 10% of sample population and cross checking of 5% of the completed questionnaires for consistency of

the responses were important strategies applied for quality control of the study. Data analysis was also done by standard software packages.

3.13 Ethical consideration

The study was conducted after the approval from the Ethical Committee of Northern University, Bangladesh. The WHO and Nepal Health Research Council's guidelines was followed for ethical consideration for the study in Nepal. In particular, the informed consent of each participant, individual participant's right for not to participate in the study and confidentiality of the information provided by the participants, was respected fully. Participants were ensured for their right to drop from the study at any time they wanted.

3.14 Limitations of the study

- The study finding will be only applicable having similar situation in Nepal and neighboring countries
- Finding could be associated with information and selection biases but by following inclusion and exclusion criteria and statistical modeling the biases were minimized.
- Constraints of time and money.

3.15 Timeline of the study

SN	Activities	Timeline (Month/week)																							
		Nov				Dec (2008)				Jan (2009)				Feb				March				April			
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1	Develop proposal																								
2	Literature review																								
3	Proposal defense																								
4	Pre-test questionnaire																								
5	Data collection																								
6	Data analysis																								
7	Report writing																								
8	Submit Draft report																								
9	Defense																								
10	Submit final report																								

CHAPTER IV

RESULT

The results of the study have been presented in tabular, graphical and narrative form in this chapter under the following main headings:

4. A. Findings from face to face interview

4. A.1. Socio demographic information

4. A.2. Knowledge related information

4. A.3. Risk behavior related information

4. A.4 IEC related information

4. A.5. Perception related information

4. A.6. Association between level of knowledge and socio demographic characteristics

4. A.7. Association between level of knowledge and level of risk behavior

4. B. Findings from focus group discussions

4. C. Findings from observations

4. A. Findings from face to face interview

4. A.1. Socio demographic information

Each of the respondents was asked at the beginning of the interview about his/her socio demographic characteristics. Details of these characteristics were presented below.

Age and sex – In both institutions, most of the respondents were of 20-30 years age group i.e. 40 (54%) from government and 61(71%) from private. Also 19 (25.6%) respondents from government institutes were of 31-40 yrs age group. Median age of the respondents working in the government institutes was 29 yrs and in the private institutes was 24 yrs. Whereas Median age of all respondents was 26 yrs. Most of the respondents in both institutions, 58 (78%) from government and 49 (57%) from private, were male.

Marital status- Almost same number of the respondents, 52 (70%) from government and 59 (68.6%) from private institutes were married.

Educational status- Regarding educational status, most of the respondents 49 (66%) from government and 68 (79%) from private were Lab assistant whereas rest of the respondents were lab technician. It was found that there were more lab technicians on government institutes than private.

Monthly family income- Among the total respondents, most of the respondents 66 (89%) from government and 77 (89.55%) from private had less than 30000 NRs (at that time 75 NRs = 1 USD) monthly family income. Similarly, 8 (10.7%) of government and same percent of respondents from private institutes had monthly family income more than 30,001. Median Monthly family income of the respondents working in government

and private institutes were 12000 NRs and 18750 NRs respectively whereas median monthly family income of the total respondents was 16000 NRs with range of 6000-100000 NRs.

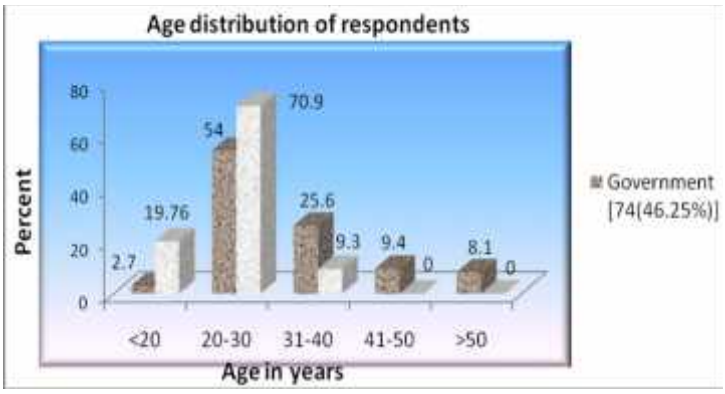
Working experience- Among the total respondents, Most of the respondents 27(37%) from government had working experience of 5-10 yrs whereas 70 (81%) from private had working experience below 5 yrs. Median working experience of respondents from government and private were 7 yrs. and 3 yrs respectively whereas median working experience of the total respondents was 5 yrs. It was found that respondents working in government had more experience than private.

Summary of the socio demographic characteristics had been presented on the table-1 below-

Table- 1 Distribution of the respondents according to their socio demographic characters

Socio demographic characters	Government (n=74)		Private (n=86)		Total (n=160)	
	No.	%	No.	%	No.	%
Age of the respondents in years						
<20	2	2.7	17	19.76	19	11.87
20-30	40	54	61	70.9	101	63.12
31-40	19	25.6	8	9.3	27	16.87
41-50	7	9.4	0	0.0	7	4.37
>50	6	8.1	0	0.0	6	3.75
Median	**29**		**24**		**26**	
Sex						
Male	58	78.37	49	56.9	107	79.62
Female	16	21.62	37	43.02	53	33.12
Marital status						
Unmarried	22	29.7	59	68.6	81	50.62
Married	52	70.2	24	27.9	76	47.5
Others	0	0.0	3	3.4	3	1.87
Educational status						
SLC/ lab assistant	49	66.21	68	79.06	117	73.12
Intermediate/ lab technician	25	33.78	18	20.9	43	26.87
Family income/month in RS.						
<10000	35	47.3	32	37.2	67	41.9
10,000-30000	31	41.9	45	52.3	76	47.5
>30001	8	10.9	9	10.4	17	10.7
Median	12000		18750		16000	
Range	**6000 – 100000**					
Working experience in years						
<5	26	35.1	70	81.4	96	60.0
5 to 10	27	36.5	16	18.6	43	26.9
11 to 15	7	9.4	0	0.0	7	4.37
16 to 20	5	6.7	0	0.0	5	3.12
>20	9	12.16	0	0.0	9	5.62
Median	**7**		**3**		**5**	

Fig-1 Distribution of respondents by their age



As shown in graph, majority of the age group lies in between 20-30 yrs, 54% from government and 71% from private institutes.

Fig -2 Distribution of respondents by their sex

As shown in graph, majority of the respondents were male, 78% in government and 57% in private.

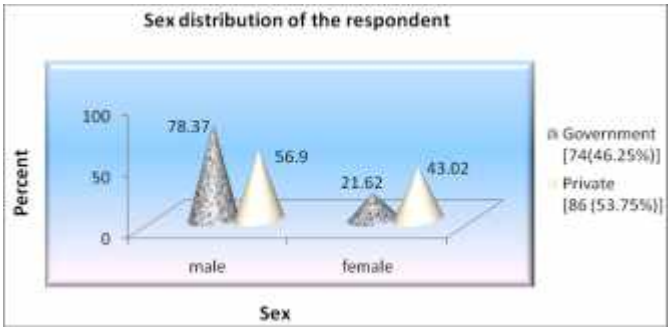
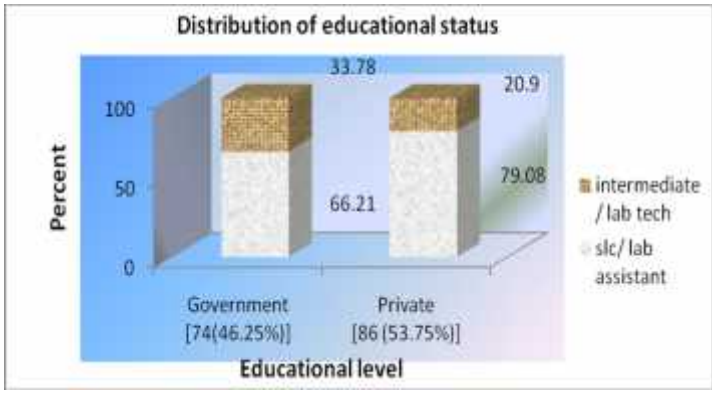


Fig -3 Distribution of respondents by their educational status



As shown in graph below, majority of the respondents were Lab assistants, 79.08% in private and 66.21% in government.

Fig-4 Distribution of respondents by their working experience

As shown in graph, majority of the respondents working in private institute, about 81%, had experience below 5 yrs and about 37% respondents from government institute had experience of 5-10 years.

4. A.2 Distribution of the respondents on the basis of Knowledge related information

Regarding knowledge related information on hepatitis c infection there were altogether 25 questions. Questions were asked on the basis of causative agent, symptoms, mode of transmission, consequences, high risk group, methods of infection prevention and vaccination on hepatitis C. Details of the information were as follows.

Regarding causative agent of hepatitis C, 75 (46.25%) respondents from government and 71 (44.37%) respondents from private had given correct answer as virus. Regarding symptoms, 54 (72.9%) from government and 45 (52.32%) from private had answered fatigue as symptoms. Of total, 59(80%) from government and 47 (54.65) from private had answered anorexia as symptoms. Vomiting as another symptoms was answered by 63 (85.13%) from government and 46 (53.48%) from private. Of government 69 (93.2%) and 59 (68.60%) from private had answered jaundice as symptom. Similarly abdominal pain was answered as symptoms by 61 (82.43%) from government and 53 (61.62%) from private organization. Regarding mode of transmission, 59(80%) respondents from government and 62 (72%) respondents from private had answered

unsafe sexual activities as the mode of transmission. Unscreened blood transfusion as mode of transmission was answered by 68(92%) from government and 71(82.5%) from private institutes. Of government 69(93.2%) and 65(75.58%) from private had answered mode of transmission of hepatitis C as sharing needle. Trans placental transmission as mode of transmission of hepatitis C was answered by 71(95.9%) from government and 63 (73%) from private institutes. Similarly, 63(85.15%) from government and 53 (61.62%) from private had answered tattooing/ piercing as mode of transmission of hepatitis C. Regarding consequences of hepatitis C infection, 69(93%) from government and 65 (75.58%) from private had answered cirrhosis of liver as yes. 64(86.4%) from government and 50 (58.13%) from private had answered cancer of liver as consequences of hepatitis C infection. Chronic carrier as consequences was answered by 62(83.78%) from government and 61(71%) from private. Similarly death as consequences of hepatitis C was answered by 67(90.5%) from government and 64 (74.4%) from private institutes. Regarding high risk group of hepatitis C infection, 72(97%) from government and 67 (78%) from private had answered unscreened blood receivers as yes. Of government 65(87.8%) and 61 (71%) from private had answered having multiple sex partner as high risk group of hepatitis C infection. IDUs was answered by 72(97%) from government and 68(79%) from private institutes. Health workers was answered by 64 (86.48%) from government and 64 (74.41%) from private. Similarly babies born with infected mother as high risk group was answered by 67(90.54%) from government and 64 (74.41%) from private institutes. Regarding methods of prevention of hepatitis C infection, 65(87.83%) from government and 63 (73.25%) from private had answered

avoiding unsafe sex as yes. Of government 73(98.64%) and 67 (77.9%) from private had answered avoiding sharing needle as method of prevention of hepatitis C infection. Screening of blood before transfusion was answered by 68(92%) from government and 69(80%) from private. Using sterile needles for tattooing and piercing was answered by 69 (93%) from government and 60 (69.76%) from private institutes as method of prevention of hepatitis C infection.

Regarding vaccination, 40(54%) from government and 42 (49%) from private had given correct answer whereas 17 (23%) from government and 13 (15%) from private had answered incorrectly. Similarly, 17 (23%) respondents from government and 31 (36%) respondents from private institutes answered they don't know about vaccination on hepatitis C.

Summary of the knowledge related information had been presented in the table-2 below-

Table-2 Distribution of respondents on the basis of knowledge

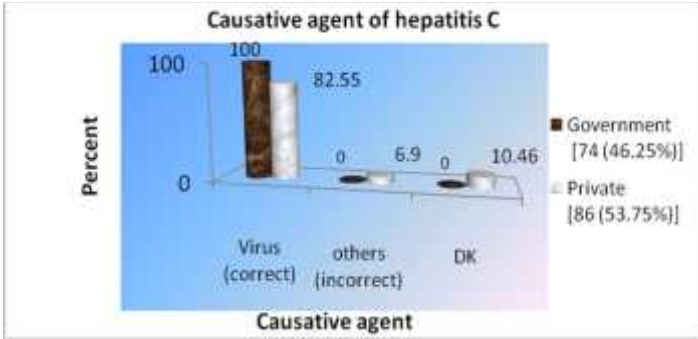
Knowledge related	Government (n=74)	Private (n=86)	Total (n=160)

Knowledge related information		Government (n=74)		Private (n=86)		Total (n=160)	
		No.	%	No.	%	No.	%
What is causative agent of Hep C?							
Virus (correct)		74	100	71	82.55	145	90.62
Others (incorrect)		0	0.0	6	6.9	6	3.75
DK		0	0.0	9	10.46	9	5.62
Symptoms of Hep C?							
Fatigue	**Yes**	54	72.97	45	52.3	99	61.87
	No	16	21.6	24	27.9	40	25
	DK	4	5.4	17	19.76	21	13.12
Anorexia	**Yes**	59	79.72	47	54.65	106	66.25
	No	11	14.86	22	25.58	33	20.62
	DK	4	5.4	17	19.76	21	13.12
Vomiting	**Yes**	63	85.13	46	53.48	109	68.12
	No	7	9.4	27	31.39	34	21.25
	DK	4	5.4	13	15.11	17	10.62
Jaundice	**Yes**	69	93.24	59	68.6	128	80
	No	4	5.4	15	17.45	19	11.87
	DK	1	1.3	12	13.95	13	8.12
Abdominal pain	**Yes**	61	82.43	53	61.62	114	71.25
	No	11	14.86	21	24.41	32	20
	DK	2	2.70	12	13.95	14	8.75
How hep. C is transmitted?							
Unsafe sexual activities	**Yes**	59	79.72	62	72.09	121	75.62
	No	13	17.56	13	15.11	26	16.25
	DK	2	2.70	11	12.79	13	8.12
Unscreened blood transfusion							
	Yes	68	91.89	71	82.55	139	86.87
	No	2	2.70	4	4.6	6	3.75
	DK	4	5.4	11	12.7	15	9.37
Sharing needle							
	Yes	69	93.24	65	75.58	134	83.75
	No	5	6.75	9	10.46	14	8.75
	DK	1	1.3	11	12.7	12	7.5
Tattooing/piercing							
	Yes	63	85.13	53	61.62	116	72.5
	No	4	5.4	19	22.09	23	14.37
	DK	7	9.4	14	16.27	21	13.12
Consequences of Hep C?							

Cirrhosis of liver							
	Yes	69	93.24	65	75.58	134	83.75
	No	2	2.70	7	8.13	9	5.62
	DK	3	4.05	14	16.27	17	10.62
Cancer of liver							
	Yes	64	86.48	50	58.13	114	71.25
	No	7	9.4	19	22.09	26	16.25
	DK	3	4.05	17	19.76	20	12.5
Chronic carrier							
	Yes	62	83.78	61	70.93	123	76.87
	No	6	8.10	7	8.13	13	8.12
	DK	6	8.10	18	20.93	24	15
Death							
	Yes	67	90.54	64	74.41	131	81.87
	No	3	4.05	11	12.79	14	8.75
	DK	4	5.4	11	12.79	15	9.37
<u>High risk group of persons</u>							
Unscreened blood receivers							
	Yes	72	97.29	67	77.90	139	86.87
	No	2	2.70	8	9.3	10	6.25
	DK	0	0.0	11	12.79	11	6.87
Having multiple sex partners							
	Yes	65	87.83	61	70.93	126	78.75
	No	4	5.4	14	16.27	18	11.25
	DK	5	6.7	11	12.79	16	10
Intravenous drug users							
	Yes	72	97.29	68	79.06	140	87.5
	No	1	1.3	7	8.13	8	5
	DK	1	1.3	11	12.79	12	7.5
Health workers							
	Yes	64	86.48	64	74.41	128	80
	No	9	12.16	12	13.95	21	13.12
	DK	1	1.3	10	11.62	11	6.87
Babies born with infected mother							
	Yes	70	90.45	66	76.74	136	85
	No	3	4.05	9	10.46	12	7.5
	DK	1	1.3	10	11.62	11	6.87
<u>Hepatitis C can be prevented</u>							
Avoiding sharing needle							
	Yes	73	98.64	67	77.90	140	87.5
	No	1	1.3	9	10.46	10	6.25
	DK	0	0.0	10	11.62	10	6.25
Screening of blood							
	Yes	68	91.89	69	80.23	137	85.62
	No	5	6.7	7	8.13	12	7.5
	DK	1	1.3	10	11.62	11	6.87
Knowledge related information		**Government (n=74)**		**Private (n=86)**		**Total (n=160)**	

		No.	%	No.	%	No.	%
Using sterile needle for tattooing/piercing							
	Yes	69	93.24	60	69.76	129	80.62
	No	5	6.7	10	11.62	15	9.37
	DK	0	0.0	16	18.6	16	10
Avoiding unsafe sex							
	Yes	65	87.8	63	73.3	128	80
	No	6	8.1	11	12.8	17	10.6
	DK	3	4.1	12	14.0	15	9.4
Is there vaccination on hep C?							
	Yes	17	22.97	13	15.11	30	18.75
	No	40	54.05	42	48.83	82	51.25
	DK	17	22.97	31	36.04	48	30

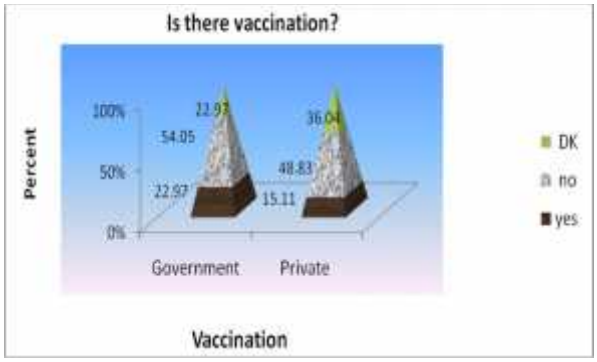
Fig-5 Distribution of respondents by their knowledge on causative agent



As shown in graph, all of the respondents from government had given correct answer regarding causative agent of hepatitis C whereas only 82.55% of respondents from private had given correct answer.

Fig- 6 Distribution of respondents by their knowledge on vaccination

As shown in graph below, majority of the respondents, 48% from private and 54% from government had given correct answer about vaccination.



4. A.2.1 Distribution of the respondents according to the level of knowledge

To assess the level of knowledge among the respondents scaling was done, all variables related to knowledge was computed and then recoded. Among 25 variables, who answered 13 questions or less as correct answer were considered as having poor knowledge and the respondents who answered 14 or more questions as correct answer were considered as having good knowledge.

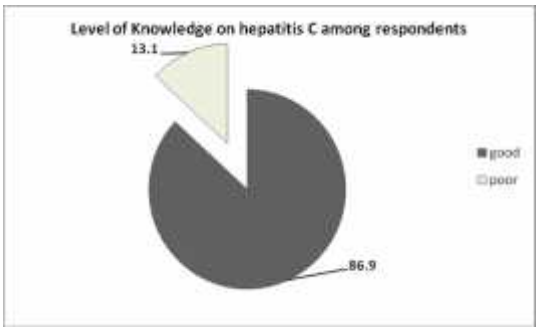
It was found that 139(86.9%) had good knowledge whereas 21(13.1%) had poor knowledge. Result had shown that 98.6% from government and 76.7% from private institutes had good knowledge. It was found that most of the respondents from government institutes had good knowledge than private. There was significant p=0.00 ($p<0.05$) association between level of knowledge and working institutions. Details of the respondents according to the level of knowledge and working institutions had been mention in the table below-

Table -3 Association between knowledge and type of working institution

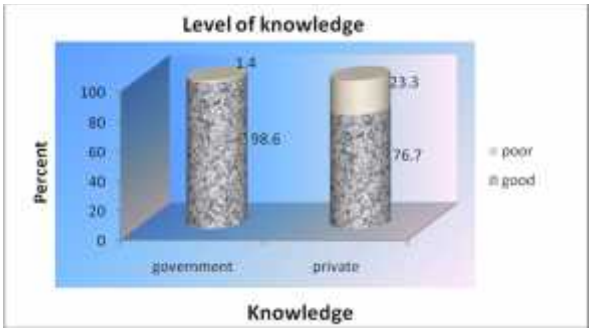
		Institutions				¡² *	df*	P value
		Government n=74		Private n=86				
		No.	%	No.	%			
Knowledge level	Poor	1	1.4	20	23.3	16.73	1	0.00
	Good	73	98.6	66	76.7			

***¡² is chi-square test; df is degree of freedom**

Fig- 7 Distribution of respondents by their level of knowledge



Graph- 7.1



Graph- 7.2

As shown in the above figures, Graph-7.1 indicates about 87% of the respondents had good knowledge and 13% had poor knowledge. Graph-7.2 indicates most of the respondents from government (98.6%) had good knowledge than from private (76.7%).

4. A.3 Risk behavior related information.

Regarding risk behavior, there were altogether 4 questions. Details of the information were as follows.

Regarding use of gloves during sample collection, 67(90.05%) respondents from government and 69(80.23%) respondents from private had answered it as right behavior. Using sterilizes instruments as right behavior was answered by 82(95.34%) respondents from private institutes and 73(98.64%) respondents from government institutes. Regarding sharing of needle, all of the respondents from government and private institutes had answered it as wrong behavior. Similarly, 24(32.43%) respondents from government and 26(30.23%) respondents from private institutes had answered that they were practicing recapping after using needle and syringe.

Details of distributions of the respondents on the basis of Risk behavior is presented in the table below-

Table-4 Distributions of the respondents on the basis of Risk behavior

Risk behavior	Government (n=74)		Private (n=86)		Total (n=160)	
	No.	%	No.	%	No.	%
Do you use gloves during sample collection?						
Yes	73	98.64	85	98.83	158	98.8
No	1	1.3	1	1.16	2	1.2
Do you use sterilize instruments?						
Yes	74	100	85	98.83	159	99.4
No	0	0.0	1	1.16	1	0.6
Have you ever practiced of sharing needle?						
Yes	0	0.0	0	0.0	0	0.0
No	74	100	86	100	160	100
Have you ever practiced of recapping after using needle and syringe?						
Yes	24	32.43	26	30.23	50	31.2
No	50	67.56	60	69.76	110	68.8

4. A.3.1. Distribution of the respondents according to the technique of medical waste disposing

This was open ended question. So, answers from all of the respondents were compiled and then categorized according to the given answers. Among the total respondents, 149 had responded this question. Most of the respondents 60% told that they were disposing medical waste by incineration. 26% were disposing by burning, 7% by landfill, 4% by dumping and 3% by municipal container disposing. A detail of this information has been mentioned in the table below.

Table -5 Distribution of the respondents according to the technique of medical waste disposing

Disposing technique	No. of respondents (n=149)	Percent
Incineration	90	60.4
Burning	39	26.17
Dumping	6	4.0
Landfill	10	6.71
Municipal container disposing	4	2.6

4. A.3.2. Distributions of the respondent according to the use of sterilize technique.

Sterilize technique	Government(74)		Private(86)		Total	
	No.	%	No.	%	No.	%
Autoclave	66	89.2	64	74.4	130	81.2
Dry heat	5	6.8	10	11.6	15	9.4
Boiling	3	4.1	6	7.0	9	5.6
Chemical Disinfection	7	9.5	9	10.5	16	10.0

4. A.3.3. Distribution of the respondents on the basis of level of risk behavior

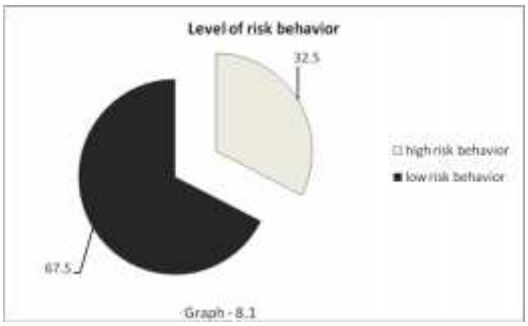
To assess the level of risk behavior among the respondents, scaling was done. All variables related to risk were computed and then recoded. Among 4 variables, each correct behavior was given 1 point. Respondents who had received 3 or less point were considered as having High Risk behavior and those receiving 4 points were classified as having Low Risk behavior. Result has shown that among total respondents 52 (32.5%) had high risk behavior whereas 108(67.5%) had low risk behavior. Among total respondents, 25(33.78%) from government and 27(31%) from private had high risk behavior.

Details of the distribution of the respondents with type of institutions and risk behavior has been mention in the table below-

Table -6 Association between type of institution and risk behavior

Risk behavior	Government (n=74)		Private (n=86)		¡ ²	df	P value
	No.	%	No.	%			
High	25	33.78	27	31.39	0.103	1	0.748
Low	4	66.21	59	68.60			

Fig- 8 Distribution of respondents by their level of risk



In these figures, graph 8.1 shows level of risk behavior among the total respondents, 32% had high risk behavior and 68% had low risk behavior. In Graph-8.2, respondents from government (34%) had more high risk behavior than private (31%).

4. A.4 Distribution of the respondents on the basis of IEC related information

The study explored that most of the respondents, 42% and 39% from government institutes were using mass media and course curriculum as a source of information about hepatitis C. Similarly, 34% and 42% from private institutes were using mass media and course curriculum respectively. 11% from government and 15% from private institutes

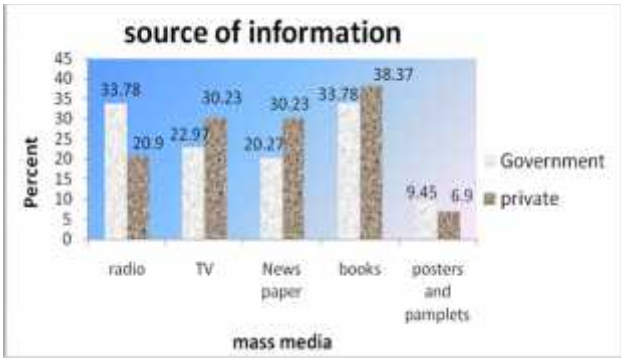
had told training as their source of information to gain knowledge on hepatitis C. Regarding mass media, most of the respondents 34% from government institutes had told radio and books and 38% respondents from private had told books and 30% TV and newspapers. 15% respondents from government and 17% from private institutes had told they had training on hepatitis c infection prevention. Among the total respondents 53% from government and 37% from private institutes had told they had participated on health education session. Regarding most effective source of disseminating information on hepatitis C, 66% respondents from government and 57% from private had told mass media as effective source.

Details of the IEC related information has been mentioned in the table below

Table -7 Distributions of the respondents by IEC related factors

IEC related factors	Government (n=74)		Private (n=86)		Total (n=160)	
	No.	%	No.	%	No.	%
Source of information regarding Hepatitis C						
Mass media	31	41.89	29	33.72	60	37.5
Course curriculum	29	39.18	36	41.86	65	40.6
Campaign program	1	1.35	8	9.3	9	5.6
Training	11	14.86	15	17.45	26	16.2
Mass media using for information						
Radio	25	33.78	18	20.9	43	26.9
T V	17	22.97	26	30.23	43	26.9
News paper	15	20.27	26	30.23	41	25.6
Books	25	33.78	33	38.37	58	36.2
Posters and pamphlets	7	9.45	6	6.9	13	8.1
Even participated on health education session	39	52.7	32	37.2	71	44.4
Most effective source of disseminating information						
Mass media	49	66.21	49	56.9	98	61.2
Course curriculum	7	9.45	9	10.46	16	10
Campaign program	5	6.75	6	6.9	11	6.9
Training	6	8.10	20	23.25	26	16.2
Others	7	9.45	2	2.3	9	5.6

Fig- 9 Distribution of respondents by their source of information



As shown in the graph below, most of the respondents in government (34%) were using radio and books as source of information about hepatitis C whereas in private, 38% were using books and 30% were using TV and newspapers.

4. A.5.Distribution of the respondents on the basis of perception related information

Perception related information was assessed by interviewing the respondents with three questions related to perception about hepatitis C.

Details on perception related information has been mentioned in the table below-

Table -8 Distributions of the respondents by perception related information.

	Government (n=74)		Private (n=86)		Total (n=160)	
Perception related information	**No.**	**%**	**No.**	**%**	**No.**	**%**
Do you think Hepatitis C Screening is important?						
Yes	73	98.6	78	90.69	151	94.4
No	1	1.3	8	9.3	9	5.6
Is Using universal precaution during sample collection important?						
Yes	73	98.6	75	87.2	148	92.5
No	1	1.3	11	12.7	12	7.5
Is Workshop and training essential?						
Yes	71	95.94	81	94.18	152	95
No	3	4.05	5	5.8	8	5

4. A.6. The association between level of knowledge and socio demographic characteristics

To find out the association between level of knowledge and socio demographic characteristics independent t-test and chi-square test were done (as mentioned in table-8). All of the respondents of more than 30 yrs age group had good knowledge. Also, 86% of 20-30 yrs age group and 63% of less than 20 yrs age group had good knowledge. It was found that respondents of higher age had good knowledge than younger one. There was significant association, $p=0.00$ ($p<0.05$) between age of the respondents and the level of knowledge. More male about (95%) had good knowledge than female (70%). There was significant association, $p=0.00$ ($p<0.05$) between sex and level of knowledge. It was found that 100% lab technician had good knowledge whereas 82% lab assistant had poor knowledge. There was significant association $p=0.00$ ($p<0.05$) between level of knowledge and educational status.

It was found that all of the respondents who had more than 10 yrs experience had good knowledge. 81% respondents having less than 5 yrs experience had good knowledge and 93% respondents having 5-10 yrs experience had good knowledge. There was significant $p=0.00$ ($p<0.05$) association between level of knowledge and working experience.

Details of the distribution of the respondents by socio demographic characteristics and level of knowledge has been mentioned in the table below-

Table -9 Association between level of knowledge and socio demographic characteristics

Socio demographic characters		Poor Knowledge (n=21)		Good knowledge (n=139)		Independent sample t-test	df	P value
		No.	%	No.	%			
Age of the Respondents (in yrs)	<20	7	36.8	12	63.2	-5.629	52	0.00
	20-30	14	13.9	87	86.1			
	>31	0	0.0	40	100			
Family income (in NRs)	<10000	11	16.4	56	83.6	-0.122	140	0.90
	10000-30000	5	6.6	71	93.4			
	>30001	5	29.41	12	70.59			
Working experience								
	<5	18	18.8	78	81.2	-5.76	88	0.00
	5-10	3	7.0	40	93.0			
	>11	0	0.0	21	100			

Socio demographic characters		Poor Knowledge (n=21)		Good knowledge (n=139)		i^2	(df)	P value
		No.	%	No.	%			
Educational Status	SLC/lab assistant	21	18.3	94	81.7	9.45	1	0.002
	Intermediate/ lab technician	0	.0	45	100			
Sex	Male	5	4.7	102	95.3			
	Female	16	30.2	37	69.8	20.23	1	0.00

4. A.7. Association between Level of knowledge and Risk behavior

To investigate the association between level of knowledge and risk behavior, chi-square test was done. The study revealed that 68% of the respondent who had the good knowledge had low risk behavior and 67% of the respondent who had poor knowledge,

also had low risk behavior. There was no significant p=0.93 (p>0.05) association between level of knowledge and risk behavior.

A detail of the distribution of the respondents by the level of knowledge and level of risk behavior has been mentioned in the table below.

Table -10 Association between level of knowledge and level of risk behavior

Risk behavior	Poor Knowledge (n=21) No.	%	Good Knowledge (n=139) No.	%	¡ 2	df	p value
High	7	33.3	45	32.4			0.93
Low	14	66.7	94	67.6	0.008	1	

4. B. Report of Focus Group Discussions (Qualitative Methods)

Three Focus Group Discussion (FGD) sessions were conducted among the Laboratory health workers of three different health institutes. Among three, two were private and one was government institute. Altogether 24 lab health workers were participated. Among total participants, 20(83%) were lab assistants and others were lab technician. Findings from FGD were as follows-

Regarding first issue, “what could be mode of transmission of hepatitis C?”, most of the participants told “needle sharing, infected blood transfusion, unsafe sexual contact with infected people, from infected mother to child, breast feeding by infected mother” were the important mode of transmission whereas some of the participants added “sharing of razor, blades, scissors and physical contact with infected person” as mode of

transmission. One of the participants told that hepatitis C may be transmitted by sharing food with infected people.

"High risk group for getting hepatitis C" was second issue; most of the participants told "drug addict, sex worker and the sexually active persons, and health workers were the high risk group. One of the participant told that "illiterate people are the high risk group". He explained it as "illiterate people are deprived of knowledge, they are not aware about hepatitis C infection and they don't follow preventive measures as a result they get infection".

Regarding third issue, preventing measures for hepatitis C infection, most of the participants told that "use of gloves during sample collection, use of mask and apron in front of patients or when on duty, use of sterile equipments for the procedure to carry out, proper waste disposing are the methods of prevention". Two of the participants added that "careful during sample collection, careful on recapping needle and syringe after use" were the preventive measures but most of them didn't know that recapping needle should be avoided. One of the participants told that "avoiding infected person is the good idea to be safe from getting hepatitis C infection" but others were disagree with him, "it is not possible to find out the patient status every time and its unethical to restrict the patient."

Risk behavior on hepatitis C infection was fourth issue, most of the respondents told "careless during sample collection, misunderstanding of disease, do not use of gloves, mask, apron, sharing of needles, recapping needle and syringe, not disposing syringe, needle and medical waste properly are the risk behavior for hepatitis C infection"

whereas 4-5 participants added "Lack of proper knowledge about the site of sample collection may lead to infection" and one of the participants told "do not use of sterile instruments could be the risk behavior" and other participants were also agreed with him. Summary of the findings are presented on the table below-

Table - 11 Main issues and important findings from FGD

Issue no. 1 **Mode of transmission**	Needle sharing Blood transfusion Sexual contact Infected Mother to child Breast feeding Sharing of razor, blades, scissors etc. Physical contact with infected person Sharing food with infected person
Issue no. 2 **High risk group**	Drug addicts Sex workers Sexually active people Health workers Illiterate people
Issue no. 3 **Preventive measures for hepatitis C infection**	Use of gloves, mask and apron Use of sterile equipments Proper waste dispose Careful during sample collection Careful on recapping needle and syringe Avoiding infected person
Issue no. 4 **Risk behavior on hepatitis C**	No use of gloves, mask, apron Sharing of needles Recapping needle and syringe Not disposing syringe, needle and medical waste properly

infection	Careless during sample collection Misunderstanding of disease Lack of proper knowledge that sample may collect from wrong site Not using sterile instruments

4. C. Findings from observation

Observation was done on 20 health institutes, among which 10 were government and 10 were private. It was done on the basis of observation checklist for infection prevention with main headings on environment cleanliness, hand washing practices, techniques of sterilization, safe practice and waste disposal. Most of the institutes were visited on duty hour (11:00 am to 3:00 pm) and observed. Data were entered in SPSS 16 version and analyzed. Findings from the observation were as follows.

Regarding environment cleanliness, floor was observed, it was found that in 1(10%) government institute floor was not clean but all others had clean floors. Among total institute observed, most of the institute 9(90%) from government and 9 (90%) from private had clean tables. Environment of private was clean in comparison to government. It was found that the entire institute had the facilities for hand washing. In 3(30%) private institute, it was found that lab health workers did not wash hand with soap and water properly (up to 15-30 sec in proper technique). Though all lab health workers in government institutes were found washing hand properly, only in 1(10%) they washed hand after each procedure. Similarly, In 7(70%) private health institutes, it was found that lab health workers didn’t wash hand after each procedure.

Regarding techniques of sterilization, it was found that entire institute was using autoclave and chemical disinfection as decontamination procedure. In 7(70%) of government institutes and 5(50%) of private institutes dry heat was using. Similarly in 9(90%) of government institutes and 5(50%) of private institutes boiling was used as decontamination procedure.

Regarding safe practice, lab health workers in 9(90%) private health institutes were wearing sterile gloves before each procedure than lab health workers in 6(60%) government institute. In all health institutes lab health workers were found using sterile equipments. Lab health workers in 10(100%) government institutes and in 9(90%) private institutes were found recapping needle and syringe but it was not found sharing needle in all institutes. Evidence of improper waste disposal was found in 3(30%) of both institutes. Similarly, in same number of both institutes, it was found that waste was not segregated in proper containers. Chemical waste containers of all health institutes were found appropriately handled and stored. Among the total institute, in 7(70%) government and 5(50%) private institute, sharps container were used and disposed properly. In most of the government institutes 9(90%) pit or incinerator was available whereas in private it was available only in 4(40%).

A detail of this information is presented in the table below-

Table - 12 Presentation of the findings from observation

Main issues observed		Type of health institution					
		Government(10)		Private(10)		Total(20)	
		No.	%	No.	%	No.	%
Environment cleanliness Clean floors	No	1	10.0	0	.0	1	5.0
	Yes	9	90.0	10	100.0	19	95.0
Clean tables	No	1	10.0	1	10.0	2	10.0
	Yes	9	90.0	9	90.0	18	90.0
Hand washing practice							
Facilities for hand washing	Yes	10	100.0	10	100.0	20	100.0
Washes hand after each procedure	No	9	90.0	7	70.0	16	80.0
	Yes	1	10.0	3	30.0	4	20.0
Hand washing practice, washes hand with soap and water	No	0	.0	3	30.0	3	15.0
	Yes	10	100.0	7	70.0	17	85.0
Decontamination Autoclave, techniques of sterilization		10	100.0	10	100.0	20	100.0
Dry heat		7	70.0	5	50.0	12	60.0
Boiling		9	90.0	5	50.0	14	70.0
Chemical disinfection		10	100.0	10	100.0	20	100.0
Safe Practice							
Wears glove before procedure	No	4	40.0	1	10.0	5	25.0
	Yes	6	60.0	9	90.0	15	75.0
Use sterile equipments	Yes	10	100.0	10	100.0	20	100.0
Recapped needle after use	Yes	10	100.0	9	90.0	19	95.0
	No	0	.0	1	10.0	1	5.0
Sharing of Needle	No	10	100.0	10	100.0	20	100.0

Main issues observed Waste disposal		Type of health institution					
		Government(10)		Private(10)		Total(20)	
		No.	%	No.	%	No.	%
Evidence of improper waste disposal	Yes	3	30.0	3	30.0	6	30.0
	No	7	70.0	7	70.0	14	70.0
Wastes segregated in proper containers	No	3	30.0	3	30.0	6	30.0
	Yes	7	70.0	7	70.0	14	70.0
Chemical waste Containers appr. handled and stored	Yes	10	100.0	10	100.0	20	100.0
Sharps containers used and disposed properly	No	3	30.0	5	50.0	8	40.0
	Yes	7	70.0	5	50.0	12	60.0
Pit or incinerator available	No	1	10.0	6	60.0	7	35.0
	Yes	9	90.0	4	40.0	13	65.0

4. C.1. Distribution of the health institute by environment cleanliness

Regarding environment cleanliness it was observed floors and tables. If one was found not cleaned, considered as poor and it was considered good environment for those where both were found cleaned. On the basis of this 2(20%) government were found having poor environment than 1(10%) private.

Table -13 Distribution of the health institute by environment cleanliness

Main issues observed		Type of health institution						P value
		Government(10)		Private(10)		Total		
		No.	%	No.	%	No.	%	
Environment cleanliness	Poor	2	20.0	1	10.0	3	15.0	1.00
	Good	8	80.0	9	90.0	17	85.0	

Fig- 10 Distribution of the health institute by environment cleanliness

As shown in graph 2 (20%) government institutes were found having poor environment than 1(10%) private institute.

4. C.2. Distribution of health institute by hand washing practice

Regarding hand washing practice three issue were observed. The institute where it was practiced up to 2 in right way was considered as following poor hand washing practice and where 3 were practiced in right way were considered as following good hand washing practice. On the basis of that it was found in government 9(90%), hand washing practice was poor than private 7(70%).

Table - 14 Distribution of the health institute by hand washing practice

Main issues observed		Type of health institution				Total (20)		P value
		Government (10)		Private (10)				
		No.	%	No.	%	No.	%	
Hand washing practice	Poor	9	90.0	7	70.0	16	80.0	0.582
	Good	1	10.0	3	30.0	4	20.0	

Fig- 11 Distribution of the health institute by hand washing practice

As shown in graph hand washing practice in 9(90%) government institute was poor whereas 7(70%) poor in private institute.

4. C.3 Distribution of the health institute by the safe practice

Regarding safe practice 4 issues were observed and recoding was done. 0-2 score was considered as poor practice and 3-4 score was considered as good practice. On the basis of that it was observed in most of the government 4(40%) institute practiced was poorer in comparison to private 1(10%).

Table -15 Distribution of the health institute by the safe practice

Main issues observed		Type of health institution				Total		P value
		Government		Private				
		No.	%	No.	%	No.	%	
Safe Practice	Poor	4	40.0	1	10.0	5	25.0	0.303
	Good	6	60.0	9	90.0	15	75.0	

Fig -12 Distribution of the health institute by the safe practice

As shown in graph, practice in 4(40%) government institute and 1(10%) private institute was poor.

4. C.4. Distribution of the health institute by waste disposal practice

To assess the waste disposal practice 5 issues were considered and recoding was done. Those scoring 0-3 were considered as having poor waste disposal practice and with 4-5 score was considered as having good waste disposal practice. On the basis of that it was observed most of the private 4(40%) with poor waste disposal practice than 3(30%) government.

Table – 16 Distribution of the health institute by waste disposal practice

Main issues observed		Type of health institution				Total (20)		P value
		Government (10)		Private (10)				
		No.	%	No.	%	No.	%	
Waste disposal	**Poor**	3	30.0	4	40.0	7	35.0	1.00
	Good	7	70.0	6	60.0	13	65.0	

Fig- 13 Distribution of the health institute by waste disposal practice

As shown in graph, 4 (40%) private institute had poor waste disposal practice than 3(30%) government.

CHAPTER V
DISCUSSION

There was no large scale survey has been conducted yet to access the level of knowledge and risk behavior on hepatitis C among the Lab health workers. For the reliability of the study, it was correlated with the findings from study done among health workers with similar issues.

The total of 160 respondents was interviewed of which 46 per cent were from government institutes and 54 per cent were from private institute. The median age of the respondents from government and private institutes were 29 yrs and 24yrs. Most of the respondents were male of 20-30 yrs age group from both organizations. 73 per cent of the total respondents were Lab assistant. 66 per cent respondents among total respondents from government institutes and 79 per cent among total respondents from private institutes were Lab assistants. As the most of the respondent was from young age group, working experience found more in less than 5 yrs group. Among total respondents from government 47 per cent had 5-10 yrs experience whereas 70 per cent respondents from private had working experience less than 5 yrs. One of the studies related with health care workers done in Kathmandu showed that the mean age of the respondents was 28.7 year with standard deviation -7.82, and most of the respondents were female. The majority, 61.02 per cent employees were between 21-30 years. Majority of the respondents (48.31%) had an experience of 0-4 years.[32] In this study most of the respondents were female because most of the respondents were staff nurse.

In this study 51 per cent had correct knowledge on vaccination and study done on Kathmandu also suggest that 39 per cent respondents had a got correct knowledge about importance of immunization and 40 per cent of the respondents did not have knowledge about the blood borne hepatitis diseases that means 60 per cent had got correct knowledge on immunization on hepatitis disease. [32]

Result has shown that 87 per cent of the respondents had good knowledge whereas 13 per cent had poor knowledge. Finding from FGD also suggest that most of the respondents had good knowledge on hepatitis C. 99 per cent from government and 77 per cent from private organization had good knowledge on hepatitis C. Knowledge level among respondents of government is higher due to more number of respondents with higher age groups in government, with more than 30 yrs age groups had good knowledge than younger age and in government 47 per cent were of more than 30yrs age group compare to 9 per cent in private. 78 per cent of the respondents from government and 57 per cent respondents from private were male, higher percentage (95%) of male had good knowledge. Most of the respondents from government (76%) had more working experience than respondents from private (30%), and also 53 per cent of the respondents from government had participated on health education session regarding hepatitis than 37 per cent of the respondents from private. There was highly significant $p=0.00$ ($p<0.05$) association between level of knowledge and working organization. Also there was significant association between knowledge and socio demographic characters like age, sex, educational status and working experience. In one of study done in Australia had shown that knowledge scores were significantly higher if the staff member had recently

had contact with an HCV-positive patient when compared with those who couldn't remember if they had. Knowledge also differed significantly between professional groups showed that doctors scored significantly higher on the knowledge test than the other groups. Scores on the knowledge test were also higher in the group with more than 15 years experience compared to those with one to five years experience. There were no significant relationships between the level of knowledge and the other demographic variables: age, gender and qualifications.[33] This may be due to the variation in socio demographic characteristics between Nepal and Australia.

In this study 92 per cent had answered they were using gloves during sample collection and 68 per cent were practicing recapping of needle after use. A study report on Knowledge, attitude and practices among health care workers on needle-stick injuries in Kathmandu showed that 23 per cent were in the habit of using gloves for phlebotomy procedures all the time. 79 per cent were of the impression that needle should be recapped after use. Only 66 per cent were aware of Universal Precaution Guidelines.[32] Another study has shown that only 4.2 per cent of healthcare workers used gloves during vein puncture or intravenous injecting and to handle the soiled linen/ instruments/ specimens.[34] It may be due to that the respondents of this study were of specific area, it means of laboratory. Result has shown that among total respondents 33 per cent had high risk behavior whereas 68 per cent had low risk behavior. One of the study has shown that there have been 31 documented cases of transmission of hepatitis C by needle stick injury whereas there have been only three documented cases of transmission by a blood splash to the conjunctiva or mucous membranes among health care workers, "Health care

workers' knowledge of hepatitis C and attitudes towards patients with hepatitis c: a pilot study" done in Australia.[33] The World Health Report (2002) reports that unsafe injection practices account for 31 per cent of HCV infections worldwide (WHO, 2002).[19] Among total respondents, 34 per cent from government and 31 per cent from private had high risk behavior. Findings from observation also revealed that there was poor practice in 40 per cent government institutes and poor practice in 10 per cent of private institute. To investigate the association between level of knowledge and risk behavior, the study revealed that 68 per cent of the respondent who had the good knowledge, had low risk behavior and 67 per cent of the respondent who had poor knowledge, also had low risk behavior. There is no significant $p=0.93$ ($p>0.05$) association between level of knowledge and risk behavior among the respondent. It is due to that risk behavior is not only determined by the level of knowledge. Turning knowledge into behavior is crucial in the prevention of health, social and economic problems.[35]

From observation it was found that 20 per cent had good hand washing practice and also one study had shown that hand washing by medical professionals occurs at only 30 per cent of the ideal rate. [32]

CHAPTER VI
CONCLUSION AND RECOMMENDATION

6.1 Conclusion:

The following conclusions have been drawn from the study findings:

Socio demographic characteristics

The total of 160 respondents was interviewed of which 46 per cent were from government institutes and 54 per cent were from private institute. Most of the respondents were male of 20-30 yrs age group and the median age of the respondents from government and private institutes were 29 yrs and 24yrs. Among total 73 per cent was Lab assistants, 66 per cent of government institutes and 79 per cent of private institutes were Lab assistants. Among total respondents, most of the respondents from government, 47 per cent had 5-10 yrs experience whereas 70 per cent from private had working experience less than 5 yrs.

Knowledge on hepatitis C infection among Lab health workers

Result has shown that 87 per cent of the respondents had good knowledge whereas 13 per cent had poor knowledge. 99 per cent from government and 77 per cent from private institutes had good knowledge on hepatitis C. Finding from FGD also suggested that most of the respondents had good knowledge on hepatitis C. Knowledge level of respondents from government was found higher than from private institutes.

Risk behavior of Lab health workers on Hepatitis C infection

Result has shown that 33 per cent of the respondents had high risk behavior whereas 68 per cent had low risk behavior. Among total respondents, 34 per cent from government and 31 per cent from private institutes had high risk behavior. Findings from observation revealed high risk behavior in 40 per cent of government institutes and in 10 per cent of private institutes.

The study revealed that 68 percent of the respondents, who had good knowledge, had low risk behavior and 67 percent of the respondents who had poor knowledge, also had low risk behavior. That is, there was no significant $p=0.93$ ($p>0.05$) association between level of knowledge and risk behavior. Thus knowledge has no effect on behavior.

6.2 Recommendations

Based on the study findings and conclusions, the following recommendations have been made:

A. Recommendation for further study:

1. There was no large scale survey had been done on this issue, particularly in health care setting, large scale study should be conducted.
2. Though, in this study triangular method (Interview, focus group discussion and observation) of data collection tool has been applied and assessed the socio demographic characteristics, knowledge and risk behavior of the Lab health workers, due to its limited scope, nature and resources the study could not go into as depths as wanted. So, further study is required to understand further depth of

the issues such as preventive practice on hepatitis C infection and attitude of lab health workers towards hepatitis C infected patient and major issue such as unsafe practice accounted seroprevalence of hepatitis C infection among lab heath workers could be another related study.

B. Recommendation for programme implementation

Programme should be implemented to improve the high risk behavior of lab health workers. Under the programme "Behavior change communication" all health workers, regardless of their knowledge of hepatitis C, should be trained in appropriate behavior to ensure the control of hepatitis C infection within laboratories.

C. Recommendation for policy implementation

National policy should be formulated to improve risk behavior of Lab health workers. Policy should emphasize programme on "Behavior change communication". Policy should include regular supervision to make the program effective.

References

1. Hepatitis C: Introduction. [Online]. [cited 2008 Oct 12]; Available from: URL: http://www.merck.com/mmhe/sec10/ch137/ch137a.html

2. Choo QL, Weiner AJ, Overby LR, Kuo G, Houghton M, Bradley DW. Hepatitis C virus: the major causative agent of viral non-A, non-B hepatitis. [Online]. 1990 Apr [cited 2008 Oct 17]; Available from: URL:http://www.ncbi.nlm.nih.gov/pubmed/2116212

3. Wu SJ. Viral hepatitis-History. [Online]. 2004 Apr 12 [cited 2008 Oct 12]; Available from: URL: http://olddoc.tmu.edu.tw/chiaungo/profes/vh-histo.htm

4. Choo QL. Isolation of cDNA clone derived from a bloodborne non-A, non-B viral hepatitis genome. Science 1989; 244:359.

5. Ebeling F. Epidemiology of hepatitis C virus. Vox Sang 1998;74 Suppl 2:143-6.

6. Ruiz J, Molitor F, Plagenhoef J. Hepatitis C Infection, The National Institute on Drug Abuse (NIDA).1994 versus 1999. AIDS 16 (16): 2236–8.2002.

7. Campbell J, Hagan H, Latka M, Garfein R, Golub E, Coady M, et al, editors. High prevalence of alcohol use among hepatitis C virus antibody positive injection drug users in three US cities. Drug Alcohol Depend **81** (3): 259–65.2006.

8. McGovern B, Wurcel A, Kim A, Schulze Z, Wiesch J, Bica I,et al, editors. Acute hepatitis C virus infection in incarcerated injection drug users. Clin Infect Dis 42 (12): 1663–70. 2006.

9. Frank C, Mohamed M, Strickland G, Lavanchy D, Arthur R, Magder L, et al, editors. The role of parenteral antischistosomal therapy in the spread of hepatitis C virus in Egypt.Lancet 355 (9207): 887–91. 2000.

10. Ebeling F. Epidemiology of hepatitis C virus . Vox Sang 1998; 74 Suppl 2:143-6.

11. Georg M, Bruce D W. Hepatitis C virus Infection. N Engl J Med 2001; 345:41-52.

12. Calver J. Occupational Health Services . Am J Infect Control 1997; 25: 363-5.

13. Hepatitis C: The silent killer [Online]. 2002 [cited 2008 Oct 13]; Available from: URL:http://www.infoplease.com/cig/dangerous-diseases-epidemics/hepatitis-c-silent-killer.html

14. Hepatol J, Poynard T, Bedossa P, Opolon P. Natural history of liver fibrosis progression in patients with chronic hepatitis C. Lancet 1997;349:825-32 National Institutes of Health Consensus Development Conference Panel statement: management of hepatitis C. Hepatology 1997;26 International Consensus Conference on Hepatitis C: Paris, 26-28, February 1999,consensus statement.

15. Bukh J, Miller RH, Purcell RH. Genetic heterogenity of hepatitis C virus: quasispecies and genotypes. Sem Liver Dis 1995;15:41-63.

16. Sawayama Y. A ten year serological survey of hepatitis A, B and C virus's infection in Nepal . J Epidemiol 1999 Nov;9(5):350-4. Nakashima K et al: Human T-lymph tropic

virus type-I, and hepatitis A, B and C viruses in Nepal: a serological survey. J Trop Med Hyg 1995 Oct;98(5):347-50

17. Shrestha SM et al: Epidemiology of hepatitis C virus infection in Nepal. Trop Gastroenterol 1998 Jul-Sep;19(3):102-4

18. Singh R. Prevalence of hepatitis -C in Blood Donors- A Pilot Study. J Nepal Med Assoc 1991; 30: 1-6.

19. Kermode M. Unsafe injections in low income country health settings: need for injection safety promotion to prevent the spread of blood borne viruses. Health promotion international . [Online] . [Cited 2008 oct 17];

Available from: http://heapro.oxfordjournals.org/cgi/content/full/19/1/95

20. Manian FA. Hepatitis C after needle stick injuries. Ann Intern Med 1992; 116:345-6.

21. Puro V, Petrosilla N, Ippolito G. Italian Study Group on Occupation Risk of HIV and other Blood-borne Infections. Risks of hepatitis C seroconversion after occupational exposure in health care workers . Am J Infect Control 1995; 23: 273-7.

22. Roy E, Robillard P. Under-reporting of accidental exposures to blood and other body fluids in health care setting: an alarming situation. Adv Exposure Prev 1995; 14: 11-3.

23. Gurubacharya DL. KC Mathura. Karki DB . Knowledge, attitude and practices among health care workers on needle-stick injuries. [Online]. [cited 2008 Oct 17]; Available from:

URL:http://www.kumj.com.np/site/index.php?journal=kumjjournal&page=article&op=viewDownloadInterstitial&path%5B%5D=26&path%5B%5D=26

24. Medical laboratory technology. [Online]. 2006 [cited 2008 Oct 17]; Available from: URL: http://www.padmashree.org/BMLT.html

25. K Park, Park's Text book of preventive and social Medicine, Banarsidas Bhanot publication, 19th Edition, Feb, 2007.page-179-180.

26. World health organization. Hepatitis C. [Online]. 2000 [cited 2008 Nov 21]; Available from: URL: http://www.who.int/mediacentre/factsheets/fs164/en/

27. Puro V. Occupational hepatitis C virus infection in Italian health care workers. Am J Public Health [serial online] 1995 Sep 8 [cited 2008 Nov 21]; Available from: URL:http://general-medicine.jwatch.org/cgi/content/full/1995/929/2

28. Maqbool Alam. Knowledge, attitude and practices among health care workers on needle-stick injuries. [Serial Online] [cited on 2008 July 25] Available from: URL: http://www.kfshrc.edu.sa/annals/225_226/02-034.pdf

29. Hofmann H, Kunz C. Low risk of health care workers for infection with hepatitis C virus. Infection [Serial online] 1990 sep [cited 2008 Nov 21]:18(5):[286-288]. Available from: http://www.springerlink.com/content/q3505hlr165463j6/

30. Jindal N, Jindal M, Jilani, Kar P. Seroprevalence of hepatitis C virus (HCV) in health care workers of a tertiary care centre in New Delhi. [Online]. 2004 Aug 11 [cited 2008 Nov 21]; Available from: URL:http://icmr.nic.in/ijmr/2006/February/0215.pdf

31. Infection Prevention and Control Best Practices for Long Term Care. Home and Community Care including Health Care Office. [Serial Online] 2007 June [cited on2008 July 13] Available from: URL:http://www.cpsa.ab.ca/collegeprograms/attachments_ipac

32. Bhandari TR. Safe injection practices and awareness among health care workers in tertiary level hospitals Kathmandu, Nepal. JNHRC 2008 Apr; 6, 1, 12: 22-26

33. Mortel TF. Health care workers' knowledge of hepatitis C and attitude towards patients with hepatitis C: a pilot study. Australian journal of advanced Nursing 2002 may 1;20: 16-17

34. Hitesh D, Alka B, Tulika G, Mahanta A. Study on the Knowledge, Attitude and Risk Perception among the nursing students with accidental needle stick injury. A paper presentation. Indian Public Associations: 51st All India Conference, Kolkata: 2007.

35. Behavior Change Communication Planning. [Online]. 2007 Oct 16 [Cited 2009 May 1] ; Available from: URL: https://www.comminit.com/en/node/105792/306