CHAPTER ONE

INTRODUCTION

1.1 Background of the study

A parasite is an organism that feeds off another organism, called a host. Intestinal parasites are parasites that inhabit the gastro-intestinal tract in humans and other animals. They can live throughout the body, but most prefer the intestinal wall. Parasitic diseases caused by helminths and protozoa are major causes of human disease and misery in most countries of the tropics. Parasites suffer billions of people and kill millions annually, and inflict debilitating injuries such as blindness and disfiguration on additional millions (WHO, 2005). It further estimates that one person in every four harbors parasitic worms.

Ethnicity, culture and religion all play important roles in the range of foods we eat, how they are prepared and subsequently the range of parasites that individuals, with these different eating habits, will normally be exposed to Pork, a source of infection for *Toxoplasma gondii*, *Taenia solium* and *Trichinella* spp., is rejected by Jews, Orthodox Christians in Ethiopia and Muslims whose religious teachings forbid the consumption of meat from pigs. Beef, which may contain cysticerci of *Taenia saginata*, is not consumed by Hindus (Macpherson, 2005). Attitudes towards the role of animals in different societies varies widely and many animal species, which are restrictively viewed in some cultures as companion, work, wild or domestic animals, are viewed by others as important sources of protein. Well known examples include differing attitudes towards eating guinea-pigs, horses (a potential source of *Trichinella spiralis*), dogs (*T. gondii*) and a huge range of wildlife species (numerous parasite species). We can see that tourism, immigration and exposure via the media to 'exotic foods' and the increased popularity of these foods have broadened the existing eating habits within the particular population. The rapid transport and cool storage facilities enable the survival of parasites in food as well as surface contaminants. The importance of this route of transmission of

zoonotic infection has not been determined with certainty due to the long parasite pre-patent periods, the small number of organisms necessary for infection and the lack of adequate tools for surveillance and most cases therefore go unreported (Casemore, 1990).

Many kinds of human behavior can influence the epidemiology and control of parasitic diseases, probably many more kinds than we appreciate at present. Some forms of behavior are highly disease-specific in their epidemiological impact; others can affect transmission of a considerable variety of parasitic and infectious agents. The behavior of *Homo sapiens* has a pivotal role to play in the macro and micro-epidemiology of emerging or re-emerging parasitic infections. Changing demographics and the concomitant alterations to the environment, climate, technology, land use and changes in human behavior, converge to favor the emergence and spread of parasitic infections. The recent unprecedented movements of people, their animals and their parasites around the world, introduce and mix genes, cultural preferences, customs, and behavioral patterns. The increasing proclivity for eating meat, fish, crabs, shrimp, molluscs raw, undercooked, smoked, pickled or dried facilitates a number of protozoan (Toxoplasma), trematode (*Fasciola* spp., *Paragonimus* spp., *Clonorchis* spp., *Echinostoma* spp.) cestode (*Taenia* spp, *Diphyllobothrum* sp.) and nematode (*Trichinella* spp., *Capillaria* spp., *Parastrongylus* spp.) caused zoonoses (Macpherson, 2005). The increasing world population and the inability to keep pace with the provision of adequate sanitation and clean, safe drinking water, has led to an increased importance of waterborne zoonoses, such as those caused by Giardia, Cryptosporidium and Toxoplasma. Our close relationship with and the numerous uses to which we put companion animals and their ubiquitous distribution has resulted in dogs and cats unwitting participation in sharing over 60 parasite species including: Giardia, Cryptosporidium, Toxoplasma, most foodborne trematode species, Diphyllobothrum, Echinococcus spp., Ancylostoma and Toxocara.

Changing human behaviour through education, to encourage the proper cooking of food, which may have cultural and social significance, will remain as challenging as controlling stray and feral pet populations, improving hygiene levels and the provision of

safe drinking water and the proper use of sanctuary facilities. Long pre-patent periods and the normally insidious sub-clinical nature of most zoonoses makes advice requiring behavioural change for their control a difficult task.

Studies on the role of human behavior in influencing the emerging parasitic infection examine in some detail the intimate relationships between humans, the parasites and the environment including other hosts. Such studies reveal enormous gaps in our knowledge at both the macro and micro-epidemiological levels. Macro-epidemiological data, concerned with the broad patterns of distribution, prevalence and intensity of infection by age and sex, together with estimates of morbidity, mortality and economic impact relies on the existence of institutions, trained personnel, national policies and funding to generate such information (Nelson, 1990). If such data are available it can be imported into mathematical models describing the dynamics of transmission for use in the design and evaluation of control programs. Micro-epidemiology is concerned with the variability of the organisms themselves and with the relationship between the parasite and the host, both in the internal and external environments.

In low socio-economic countries, the World Bank estimated that over a third of the world's population reside and live on less than $USD 2.00 per day. Limited access to diagnosis and treatment means that most emerging or re-emerging parasitic diseases. This leads to a greater morbidity and mortality from such infections. Infectious and parasitic diseases are the second (15.6 percent female and 16.7 percent male) leading cause of deaths after Cardio-vascular diseases (WHO, 2004).

According to the United Nations Population Fund (UNFPA, 2004), global population now stands at 6.4 billion and is growing by 76 million persons per year. Ninety-six percent of the projected growth will be in developing countries with the 50 least-developed countries expected to grow by 228 percent to 1.7 billion by 2050. This dramatic increase leads to more than 60 percent of the population under 16 years of age and the age dependency ratios make education of the youth a major national and international challenge. In stark contrast, the populations of Europe and Japan are

declining and ageing and that of North America continues to grow at about 1 percent annually, mostly because of immigration. Human population growth has necessitated the migration of people into new ecologic regions for exploitation of the natural environment and to open up new areas for cultivation, development of roads and resources, such as water, constructing dams and irrigation systems, all of which have had an impact on the emergence of parasitic diseases (Patz et al., 2000). Urbanization has its own impact on human behavior. The rapid evolution of urban centers in developing countries, due mainly to migration, has meant the evolution of inadequate sanitation and garbage disposal, resulting in the creation of numerous breeding sites for vectors. The population increases have also resulted in inadequate safe drinking water supplies.

The migration of humans and their domestic animals has been the pathway for disseminating parasitic infections throughout recorded history and will continue to have an impact on the emergence, frequency, and spread of infections. The unprecedented movements of people, including immigrants, rural to urban migration, refugees and tourists, introduce and mix their cultural preferences, customs, and behavioral patterns. The concomitant changes in the environment, climate, technology, land use, human behavior, and demographics converge to favor the emergence of infectious diseases caused by a broad range of organisms (Wilson, 1995).

1.2 Statement of the problem

Infections with parasitic helminths occur worldwide and are most prevalent in the poorest communities of the developing world. The public health impact of helminth infection has been consistently underestimated in the past, but there is now a general consensus that diseases caused by intestinal helminths represent an important public health problem, especially for children (WHO, 1987). Some studies suggest that even moderate intensity of infection may have adverse effects on growth, development and cognitive function, particularly for children of school age (Savioli et al., 1992; Stephenson, 1987). Parasitic diseases are considered the leading cause of Disability Adjusted Life Years (DALYs) lost among school-age children in the developing regions (Bundy and Guyatt, 1995) and

globally, the DALY loss due to intestinal helminths was estimated at 43.5 million for the year 1990, second only to tuberculosis (46.5 million) (Chan, 1997).

The most common intestinal helminths in the world are *Ascaris lumbricoides* (round worm), *Trichuris trichiura* (whip worm), and hookworms. They are usually referred to as soil-transmitted helminthes since they are most commonly disseminated by contamination of soil and environment with infected faeces, especially by children. All these three parasites are found in Nepal, but proper data on knowledge on health, culture and intestinal parasitism among school children is lacking. Other helminths present in Nepal are *Vampirolepis nana* and *Enterobius vermicularis* (pinworm) (Uga et al., 2004). Besides contact with soil, autoinfection and person to person transmission are possible means of transmission for these two parasites. However, lack of knowledge and sanitation, poor water supply and unclean practices contribute to the spread of all intestinal helminth infections in the communities like Nepal.

This research focuses the current status of knowledge on health, culture and intestinal parasitism among secondary level students and its relationship to the epidemiology and control of parasitic diseases, with special reference to some of the diseases of greatest public health importance. Only a few careful and comprehensive studies exist of relationships between human behavior and parasitic diseases. The scarcity of such work reflects a long-standing separation of the behavioral disciplines from the physical and biomedical sciences.

Clearly there is a need for better communication between disciplines within medical anthropology and public health. If it is accepted that research on human behavior is one of the requisites for sound epidemiological understanding and more effective control of parasitic diseases, it is also certain that the research tasks are not the exclusive prerogative of any particular discipline(s). It has been lamented that, despite our clear understanding that human behavioral change has the potential to profoundly reduce the prevalence of disease, it is the forgotten factor in many disease control programs (Gillett,

1985). Indeed the challenge of changing human behavior to improve health and even to prevent mortality is daunting and can take decades to establish a lasting effect.

1.3 Objectives of the Study

This study examines the knowledge and practices of secondary school students on health, culture and parasitic infection. I consider how the knowledge and practices on culture is related to the health importance of parasitic infections. This research focuses on group of secondary school students. This group is selected to capture a realistic picture of behavioral and economic variation within the group and they are also well aware about their health. I chose to focus on intestinal parasites because their distribution is highly dependent on human behavior and they are often cited as diseases that decline in importance after "westernization" (Cockburn 1971; Dunn 1968; Wirsing 1985). The relationship between health and culture change is typically considered to involve a complex web of interacting variables. In this manner, intestinal parasites are used as a dynamic link between culture and parasitic infection.

Thus, this project has following specific research objectives:

- To analyze the prevalence of intestinal parasites among secondary school adolescents
- To identify the knowledge, behavior and perception on parasitic infection within respondents
- To identify the presence of latrine and parasitic infection within the respondents and their family members in past six months

To test the second objective I raised the following two questions and tried to find their answers based on my research

- Are there differences in respondents' knowledge on preventive methods of parasitic transmission?
- are the respondents' knowledge on parasites differ with their age, sex, religion, caste/ethnicity, parents' education and occupation status?

1.4 Significance of the study

The prevalence of parasitic diseases is affected by human behavior. Interventions involving modification of human behavior to reduce disease prevalence is neglected in many disease control programs. Improvement of health and reduction in morbidity and mortality from infections via changes in human behavior is a great challenge and can take years to make a permanent result. Educational programs for parasitic infections have to deal with a number of features which make the relation between cause and effect and the need for behavioral change difficult to describe for communities. These include giving the acceptable message and system to different at- risk groups. Provision of alternative sustainable and inexpensive solutions to cause behavioral change has also been a restraint for control programs. Improving hygiene, changing eating habits, amending animal rearing practices and providing safe drinking water and efficient sanitation are the essential simple interventions which can control human parasitic diseases.

Human behavior is influenced by cultural, religious, ethnic, age and gender related variables. So, variation in human behavior has great effect on transmission of parasitic infections and their emergence and reemergence. This study tries to understand the different possible cultural or behavioral factors that directly influence the peoples' knowledge on parasitic transmission and their preventive measures. This research is also an important connection between biological and social sciences.

1.5 Limitation of the study

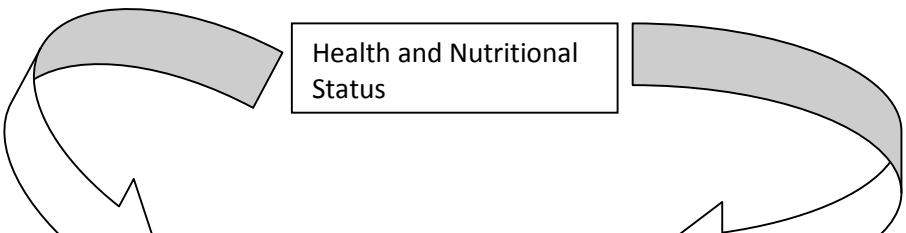
Doing research work is not an easy job. This research could not represent the whole population of the study area (Ratnanagar Municipality) except special group of secondary level students of two selected schools. It is also difficult to generalize its finding to broad spectrum as the socio-economic variation exists between study population and non study population. In some fecal samples the detection of parasitic eggs or cysts may be missed due to their low density in the fecal samples.

1.6 Organization of the Study

This section deal, how the chapters are organized here by. This study is divided into five chapters. The first chapter is introductory including background, statement of the problem, objective of the study, rational or significance of the study and limitation, organization of the study and conceptual frame work. The second chapter provides review of relevant literatures. The third chapter deals methodology of the study including study area, sample size, source of data, questionnaire design, methods of data collection, its processing and analysis. Socio-economic and demographic characteristics of the sample population are described in chapter four. This chapter also describes the prevalence of intestinal parasites among the study population. Chapter five provides knowledge of respondents' on parasites, vulnerable age and occupational groups of parasites, how these parasites can transmit and its preventive measures. Chapter six provides summary and conclusions.

1.7 Conceptual Framework

Individual and household variation in social and economic integration like educational status, material wealth, feeding behavior, wage labor and economic inequality may result in either an increase or decrease in the occurrence of infectious diseases (in this case internal parasitism). Healthy individuals with good nutrition have lower parasitic load in comparison to unhealthy individuals with poor nutrition who generally have higher parasitic burden. Therefore the individuals with poor health and low nutritional status are more susceptible to infectious diseases or intestinal parasitism. In this case internal parasitism is hypothesized to be negatively associated with health and nutritional status of an individual or a family. This means the individuals with infectious diseases or intestinal parasitism always have poor health and low nutritional supply. Therefore intestinal parasitism is used as a dynamic link between cultural and health. This concept is represented by the following conceptual framework.



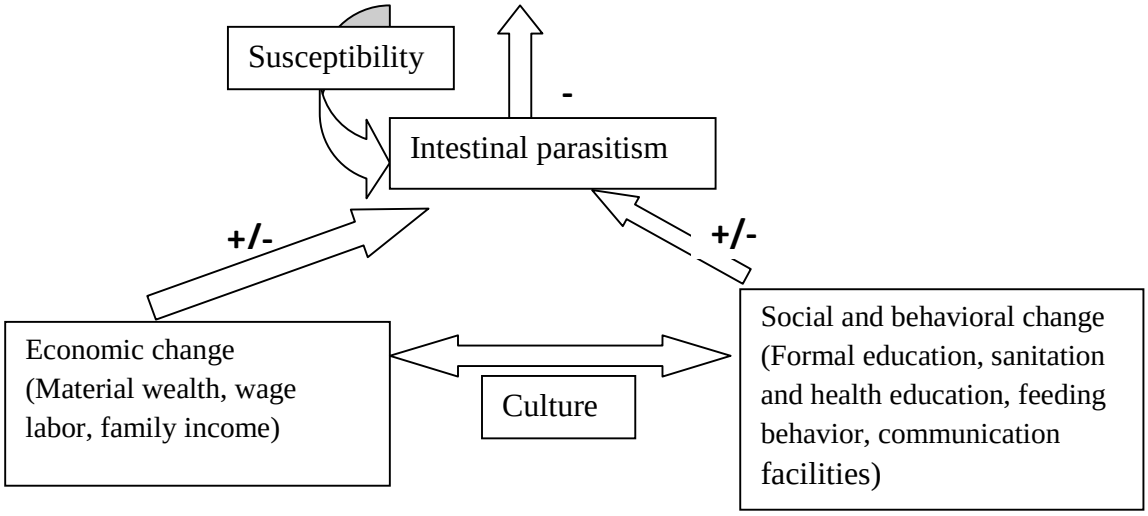


Figure no. 1.1 Overview of relationships between social and economic variations and health (adopted and modified form Tanner, 2005)

CHAPTER TWO

LITERATURE REVIEW

2.1 Literature review in the world context

Coimbra (1988) looked at the timing of human activities at both daily and seasonal scales in relation to mosquito behavior, availability of breeding sites, forest clearing, road construction, and alterations in fauna as a result of human activities (e.g., selective pressures on mosquitoes and consequent behavioral changes in the mosquitoes as a result of DDT spraying). He also discussed cultural knowledge and attitudes about malaria. In my research, I am going to find the percentage of respondents who had heard about malaria parasites.

Curtale et al. (1998) conducted operational research in Qena Governorate, Upper Egypt, to gather the information needed to design an integrated control programme for intestinal helminths in the area. The survey results showed that intestinal helminth infections were more prevalent in rural areas and in three of the 12 Governorate districts. Almost all the respondents considered worms harmful and were aware of the need for treatment. More than adequate knowledge was present on ways to prevent infection. Among the potential sources of infection listed on the questionnaire, food and soil were chosen most often. A good level of knowledge was observed also for ways of preventing infection, with ``washing hands" and ``washing vegetables" indicated by 73.3% and 62.2% of the respondents, respectively. More than half of the study population perceived worms to be ubiquitous, with 58.5% considering that all people were likely to become infected. When asked about the most affected age group, children were cited more often, compared to all ages. Farmers were considered the most affected occupational group. In present research, I am going to find out the percent of respondents who have heard about the parasites and tried to list their concept on parasites and parasitic transmission.

Olsen et al. 2001 conducted a research in Kisumu District, Kenya to identify important risk factors for infection with intestinal helminths using traditional epidemiological methods. The multiple logistic regression analysis revealed that the absence of latrines was a significant predictor for hookworm infection with an odds ratio (OR) of 1·9. The analysis also revealed that households without soap had a 2·6 times higher risk of being infected with *Ascaris lumbricoides* compared with households where soap was available, and that the number of inhabitants living in a household was a significant predictor for infections with hookworms (OR=3.2). Furthermore, the presence of children of 5 years and under in the household was a predictor for infection with *A. lumbricoides* (OR=2.7), while the absence of this age group was a predictor for hookworm infection (OR=3.8). The qualitative part of the study revealed that people did not consider worms as a serious health threat, but as a nuisance. Similar with this research, I am trying to list the respondents' concept on the harms caused by the parasites in our health.

Tanner (2005) studied the knowledge of intestinal parasitism among the Tsimane'. Her research clearly indicated that the Tsimane' have a well developed understanding of worm-like infections. There is a great deal of agreement surrounding the large and relatively common intestinal worm *A. lumbricoides (*Hoya) but less agreement regarding the smaller, more common hookworms. Like her study my study also indicated that the respondents have higher knowledge on parasites.

Zakai (2007) investigated the degree of awareness about parasitic diseases among intermediate, secondary and university students in Saudi Arabia. His study revealed that the mean level of awareness about parasites and parasitic infections among students was 2.9 of 6. He also mentioned that nationality, age, level of study, family income and previous exposure to intestinal parasites had a statistically significant influence on awareness about parasitic diseases. His final conclusion was there is a below average level of awareness about parasites and parasitic diseases among students. Like his study, I am also trying to find out that is there any perfect correlation between the parental educational and occupational status and the respondents' knowledge on parasitic influences

Azim et al. (2008) have attempted to compile from the literature of the last 45 years, to provide a single source of information covering many parasitic infections. Their findings suggested that customs, traditions, cultural and religious beliefs all have significant impact on the choices of Food, its preparation and consumption that determine the parasitic infections caused due to consumption of these foods. This study also suggested that Giardia, Cryptosporidium and Toxoplasma are the most common among waterborne parasites. Like this study, my study tried to list some commonly occurring intestinal parasites from the study samples.

Thronhill (2010) directly tested the differential predictive effects of zoonotic and non-zoonotic (both human-specific and multi-host) parasite prevalence on personality traits and societal values. Supporting the parasite-stress model, cross-national differences in personality traits (unrestricted sexuality, extraversion, openness to experiences) and in societal values (individualism, collectivism, gender equality, democratization) are predicted specifically by non-zoonotic parasite prevalence. Further, this work suggests that, among different ecological features, the prevalence of disease-causing parasites exerts a particularly important influence on human psychology and culture as the part of my present study.

2.2 Literature review in context of Nepal

Estevez at el. (1983) tested 40 fecal samples from western Nepal. Among them 90 percent were positive for parasites as determined by examination of direct wet mounts and trichrome smears. my present study also tried to estimate the percent positive samples of parasitic transmission within the respondents.

The Nepal study also combined traditional epidemiological research to determine rates of helminth infection with ethnographic methods to assess local attitudes about helminth types, cause of infection, symptoms, and treatment (Williams-Blangero et al., 1998). Like this study, I used the peoples' attitude about parasites and causes of parasitic infection/transmission.

Reddy et al. (1998) studied the intestinal parasites among children at Bharatpur, Nepal and found *Ascaris lumbricoides* as maximum isolates followed by *Giardia lamblia.* Mixed infections were also noted in a few children. The prevalence of *Enterobius vermicularis* was low in this study. But my study depicted that *Giardia lamblia* was the most prevalent parasite followed by Whip worm. The 0.9 percent co-infection with roundworm and *E. histolytica* was also recorded in this study.

Rijal et al. (2001) conducted the study on gender variations in the prevalence of parasitic infections and the level of awareness in adolescents in rural Nepal. This study revealed that 40 percent (73 out of 182) samples were positive for parasitic infections and *Giardia lamblia* (33-18.1%) was the predominant parasite followed by hook worm (27-14.8%). The prevalence of worm infection was significantly higher in female children than male. In contrast to the high parasitic prevalence rate in females they possessed significantly higher levels of awareness about parasitic infections. Out of 119 males 99 (83.2%) and 61 (96.8%) of the 63 females knew that worms suck food from host body. Similar with this, my research tried to find out the differences between female and male respondents in their parasitic burden and present knowledge on parasites.

Sherchand et al. (2003) collected the information on people's knowledge, attitudes and behavior towards filariasis by means of a structured questionnaire. During the study period, the sample population was asked about their knowledge of lymphatic filariasis. Most of the people recognized the signs of lymphatic filariasis particularly elephantiasis by their social experience, but they had inadequate knowledge of recognition of adenolymphangitis (ADL), hydrocele, arm swelling and breast swelling as a disease of lymphatic filariasis. Of the total respondents (1,754 out of 4,488 individuals included in the study), 49.3% said that filariasis was caused by mosquito bites, 15% mentioned flies and insects, 5% blamed bad weather, 5.6% blamed poor living status, 7.5% believed that evil spirits were responsible and 9.6% did not know. Like this study, my study also collects the information on people’s knowledge, attitude and behavior towards intestinal parasitic infection by means of structured questionnaire.

Uga et al. (2004) performed a research on intestinal parasites of 396 diarrheal stool samples collected from individuals aged 1 to 68 years in Nepal. Samples were collected at different medical centers located in Kathmandu and from two public schools in a village setting in Kathmandu Valley and outside. Of a total of 396 fecal samples investigated, 193 (49%) were positive for some kind of parasite. Altogether, 15 species of parasites were detected. *Giardia intestinalis* topped the list of protozoa, whereas *Trichuris trichiura* was the most frequently detected among helminth parasites as my study also recorded highest prevalence of *Giardia lamblia* as a protozoan parasite and *Trichuris trichura* as a helminth parasites. Of the 193 positive samples, 109 (56%) had single parasite infections, whereas 84 (43%) had multiple infections with a maximum of five species. Of the total positive, 45 (23%) had both protozoa and helminths whereas 37 (19%) had only protozoa. Females (52%) and children (15 years and under) (52%) had a marginally higher prevalence compared with males (46%) and adults (45%), respectively. My study also depicted the gender variation in the prevalence of intestinal parasitism.

Parajuli et al., 2009 performed a study to evaluate the role of behaviors and the nutritional status of people with geohelminth infection in two indigenous ethnic groups in lowland Terai, Nepal. One hundred and fourteen individuals (55 Mushar and 59 Tharu) aged 20–60 years participated, and a structured questionnaire was used to investigate socioeconomic status and behaviors as in my present study.

In conclusion we can say that human behavior, their cultural practices, age and sex factors have direct influence on the prevalence of intestinal parasitic infection and the respondents' knowledge on parasites and parasitic transmission. But the research related with human behavior and parasitic infections are very scarce in Nepal. This research tried to connect the knowledge of biological science with social science in our context.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

This study was carried out on March to June 2011 in two selected secondary schools of Ratnanagar, Chitwan. Chitwan district, a part of Narayani zone, is one of the seventy-five districts of Nepal and situated in the central part. It has 36 village development committees (VDCs), two municipalities and 3 electoral divisions. This district covers an area of 2,218 km² and has a population (2001) of 4,72,048. The literacy rate (6 years and above) is 63 percent and 79.3 percent for female and male respectively. Brahmin (hill) (29.3 percent), Tharu (12.7 percent), Chhetri (11 percent), and Tamang (7.4 percent) are the main caste/ethnic group of this district.

Agriculture is the main occupation of the people who stay in this district. Along with agriculture, some people also involved in business, government services, daily wages and in other private sector employments. There are many public and private schools and colleges in this district. In this research, I selected two schools, namely Ekata Shishu Niketan and Buddha Jyoti from Ratnanagar municapality.

I have had the opportunity to do some survey work already in my study area in and around Ratnanagar, Chitwan. This area was studied as part of my master's thesis in zoology (parasitology) and presently I am working in and around Chitwan for my PhD dissertation on parasites related issues. So, this area is consequently familiar to me and far more accessible to me than other more remote parts of Nepal which present many logistical difficulties. Furthermore, this is my home town where I worked as a secondary level teacher (part time) at least in above two schools.

3.2 Nature and Source of Data

This study is based on primary data collected from the secondary level students of two secondary schools of Ratnanagar municipality of Chitwan district. The primary data on the demographic and household characteristics and the knowledge on health, culture and intestinal parasitism among respondents were collected. However, some secondary sources for the advancement of this study were also used. The nature of data was mostly from quantitative questions by the use of structured questionnaires and the fecal samples collected from the respondents. The secondary sources were mainly described in the literature review.

3.3 Sample Size

First the study area was selected using purposive sampling. Again, the same method was applied in selecting the grade because the study population primarily should have been secondary level students as it was the case study of secondary level students. The sample size was selected to optimize the validity and reliability of the research. In this case 55 percent of students were selected from two selected schools including the equal number of boys and girls. Two schools were chosen for the study to obtain the higher variability within the selected samples. The distribution of sample size by schools is presented in Table no. 3.1.

Table no. 3.1: Distribution of sample size by schools

S.N.	Name of the Schools	Total number of students in secondary level	Sample taken
1	Ekata Shishu Niketan	131	72 (36 boys and 36 girls)
2	Buddha Jyoti	70	38 (19 boys and 19 girls)
Total		201	110

3.4 Method of Data Collection

This study is primarily based on primary data as the main source of information. Primary data is collected from the field study through surveying in the class 9 to 10 students using

structured (pre-determined) questionnaire. Secondary data have been employed also taken from annual reports and publications various case study reports of UNFPA and WHO, journal articles and related literatures as mentioned in references.

During the time of data collection respondents were planned in such environment that made them to feel as they are in exam rooms so that they could not talk with each other and could not be able to copy answer of another person (Photo Plate no. 1 and 2). Then the questionnaires were distributed to the respondents. The respondents were carefully supervised during the distribution of questionnaires to minimized data error. Self administered technique was used.

3.4.1 Fecal sample collection, preservation and detection of parasites

The respondents were asked to bring their fecal sample in a provided clean screw capped plastic tubes with their name, age and sex and thoroughly mixed with an equal volume of potassium dichromate solution and stored in a refrigerator. The samples thus collected were observed by using a direct wet mount method. A direct wet mount required to prepare a slide with an appropriate fecal sample and then viewing the slide under a microscope for evidence of parasites. The age and sex of subjects were noted. The identification of the parasites were done by observing the morphology of the eggs or cyst (Chatterjee, 1998) under the microscope in the temporary laboratory set at researcher's home where he performed his all microscopic work needed for his PhD dissertation in Biological sciences from the University of New Mexico.

3.4.2 Questionnaire design

Questionnaire constituted the major tool of study in social sciences. It was designed to explore the necessary information with respect to secondary school students about knowledge on cultural influences on intestinal parasitism. This study utilizes quantitative research approach to collect information from the respondents' questionnaires. Individual schedule was designed to collect the information on demographic, economic, educational, general knowledge, awareness and behavioral factors that influence the epidemiology of common parasites and their infections.

3.5 Analysis Method

The analysis was simply based on descriptive type. The collected information through various methods and techniques were compiled together and analyzed in separate chapters of interpretation according to the nature of data in an excel sheet. They were further split into separate sections as well as simple frequency tables, cross tables, figures bar and pie chart obtained from appropriate statistical tools and percentage was used to analysis data related study.

CHAPTER FOUR

Background Characteristics of the Respondents

This chapter shows the specific characteristics like age, sex, caste/ethnicity, religion, facility at home, parent's education, and parent's occupation of the respondents.

4.1 Age-Sex

Age-sex structure plays major role to determine the knowledge, perception and behavior of respondents towards parasitic infections. Age indicates the maturity of persons. In order to know the age-sex of respondents the questions were asked about it and the distribution of the respondents by age and sex obtained from the field is presented in Table no. 4.1.

Table no. 4.1: Distribution of respondents by age-sex

Age	Male		Female		Total	
	Number	%	Number	%	Number	%
< 15 years	12	21.8	21	38.2	33	30
15-19 years	43	78.2	34	61.8	77	70
Total	55	100	55	100	110	100

Source: Field Survey, 2011

Table no. 4.1 showed that 30 percent of the respondents are below 15 years and 70 percent are between 15 and 19 years of age. Among total respondents around 22 percent male and around 38 percent female are below 15 years and around 78 percent male and 62 percent of female respondents are between 15 to 19 years of age. By common sense as students get older and proceed to a higher level in their studies, their awareness about parasites and parasitic infection increases. The study made by Zakai, 2007 found that the age of the respondents has profound effect in the degree of awareness about parasites and parasitic diseases ($p<0.01$). In my study female students have higher knowledge on the parasitic infection that can be explained by their differences in personal behavior, socio-economic background and cultural practices. This finding is similar with the finding made by Rijal et al., 2001 where they noticed that the female respondents possessed

significantly higher levels of awareness about parasitic infections rather than male respondents.

4.2 Caste/Ethnicity

Caste/ethnicity is the most important factor responsible to determine the knowledge and attitude about parasitic infection and culture. In order to obtain the information about caste/ethnicity of the respondents the question was asked to the respondents. Distribution of respondents by caste/ethnicity is presented in Table no. 4.2.

Table no. 4.2: Distribution of respondents by caste/ethnicity

Caste/Ethnicity	Male		Female		Total	
	No.	%	No.	%	No.	%
Brahmin	30	54.5	26	47.3	56	50.9
Chhetri	8	14.5	8	14.5	16	14.5
Newar	4	7.3	8	14.5	12	10.9
Tharu	7	12.7	4	7.3	11	10
Tamang	1	1.8	3	5.5	4	3.6
Gurung	1	1.8	1	1.8	2	1.8
Others	4	7.3	5	9.1	9	8.2
Total	55	100	55	100	110	100

Source: Field Survey, 2011

Table no. 4.2 shows that around 51 percent respondents are from Brahmin, around 15 percent from Chhetri community, around 11 percent from Newar, 10 percent are from Tharu community, around 4 percent from Tamang, around 2 percent from Gurung and around 8 percent from others group.

In my present study overall Gurung respondents have higher knowledge on parasites. But it is hard to generalize this finding due to weak sample size of other respondents except Brahmins.

4.3 Religion

After the onset of multi-party democracy in Nepal in 1990, religion has become a sensitive topic in ethnically diverse Nepali society. It is taken to be the most important factor in our society. In Nepal people believe in different religion like Hinduism, Buddhism, Muslim, Christianity etc. Nepal is predominated by Hindu religion, although there are different religions prevailing in Nepalese society. Distribution of respondents' by religion is presented in Table no. 4.3.

Table no. 4.3: Distribution of respondents by religion

Religion	Male		Female		Total	
	No.	%	No.	%	No.	%
Hindu	47	85.5	48	87.3	95	86.4
Buddhist	3	5.5	4	7.3	7	6.4
Christian	2	3.6	1	1.8	3	2.7
Muslim	1	1.8	1	1.8	2	1.8
Others	2	3.6	1	1.8	3	2.7
Total	55	100	55	100	110	100

Source: Field Survey, 2011

The above table indicates that among the total respondents around 86 percent were Hindu, around 6 percent were Buddhist, around 3 percent were Christian, around 2 percent were Muslim and around 3 percent were others.

It seems the Muslim and Christian respondents have good knowledge on parasites than other religious group in my study. As this is probably the first case study to show the culture influences on the knowledge of parasites, further detail study with sufficient sample size in different religious groups is needed in this regard to draw a well defined conclusions like above.

4.4 Parent's Educational Status

Education is both a means and end of development. Education helps a person in developing his family, community and country. Knowledge, skill and attitude can

develop through the medium of education as a result skilled and specialized man power is produced. Parent's education may play important role in determining the knowledge and attitude on human culture and parasitism because educated parents may have proper knowledge on children's physical and biological change and may open with their children in providing information. Only an educated person can contribute to the family, community and nation by doing good work. Educated person shows good behavior to other person.

Because of the male dominated society father's education and their decision in the family is followed by mother and family. Father's education is also one of the social factors that influence overall status of adolescent knowledge towards parasitic infection. Distribution of respondents by father's educational status is presented in Table no. 4.4.

Table no. 4.4: Distribution of respondents by father's educational status

Father's Education level	Male		Female		Total	
	No.	%	No.	%	No.	%
Literate	49	89	52	94.5	101	91.8
Illiterate	6	11	3	5.5	9	8.2
Total	55	100	55	100	110	100
If Literate						
No Schooling	1	2	0	0	1	1
Primary	4	8.2	5	9.6	9	8.9
Lower Secondary	7	14.3	9	17.3	16	15.8
Secondary/SLC	28	57.1	22	42.3	50	49.5
Intermediate	4	8.2	7	13.3	11	10.9
Bachelor and above	5	10.2	9	17.3	14	13.9
Total	49	100	52	100	101	100

Source: Field Survey, 2011

Table no. 4.4 clarifies that 92 percent respondent's father are literate and 8 percent respondent's father are illiterate. Among literate, around 32 percent passed SLC, 24 percent primary followed by 18 percent lower secondary, 11 percent no schooling, 5

percent intermediate and 3 percent bachelor and above. This table also indicates that majority of the respondent's father are literate but the proportion of getting higher education is relatively low.

It is generally expected that the respondent's with good educational background at their home has good knowledge on parasites. In contrast this study does not show any perfect correlation between the fathers' educational status and the respondents' knowledge on parasitic influences. Such results were unexpected and may be explained by the lack of good communication between parents and their children in this matter as explained by Zakai, 2007.

4.5 Mother's Education

Mother is considering as source of inspiration. Most of the women in Nepal are housewives. The care for children is mainly done by mothers only. Therefore, children are very close to mother rather than father. So, mother's education plays vital role in this study. Distribution of respondents by their mother's education is presented in Table no. 4.5.

Table no. 4.5: Distribution of respondents by mother's educational status

Mother's Education Level	Male		Female		Total	
	No.	%	No.	%	No.	%

Literate	49	89	47	85.5	96	87.3
Illiterate	6	11	8	14.5	14	12.7
Total	55	100	55	100	110	100
If Literate						
No Schooling	0	0	1	2.1	1	1
Primary	9	18.4	5	10.6	14	14.6
Lower Secondary	11	22.4	8	17	19	19.8
Secondary/SLC	22	44.9	25	53.2	47	49
Intermediate	4	8.2	4	8.5	8	8.3
Bachelor or above	3	6.1	4	8.5	7	7.3
Total	49	100	47	100	96	100

Source: Field Survey, 2011

Table no.4.5 shows that around 87 percent respondent's mothers are literate and around 13 percent respondent's mother are illiterate. Among literate, 49 percent passed SLC, around 20 percent passed lower secondary followed by primary (around 15 percent), intermediate (around 8%), bachelor and above (around 7%) and no schooling (1%). This table also indicates that majority of the respondent's mother are literate but the proportion of getting higher education is relatively low. Like the role of fathers' educational status, this study does not show any perfect correlation between the mothers' educational status and the respondents' knowledge on parasitic influences. Such results were unexpected and may be explained by the lack of good communication between parents and their children in this matter as explained by Zakai, 2007.

4.6 Father's Occupation

Father's Occupation plays important role to determine the economic level of a family. If the father's income level is high there should be no problem of children's health, education, cloth and other demand. Father's occupation is the most important factor to find the behavior of the children and their knowledge on human behavior parasitic infection. Distribution of respondents by father's occupation is presented in Table no. 4.6.

Table no. 4.6: Distribution of respondents' by father's occupation

Father's Occupation	Male		Female		Total	
	No.	%	No.	%	No.	%
Agriculture	20	36.4	19	34.5	39	35.5
Government employee	3	5.5	5	9	8	7.3
Private employee	7	12.7	9	16.4	16	14.5
Business	16	29	19	34.5	35	31.8
Daily wages	0	0	0	0	0	0
Others	9	16.4	3	5.5	12	10.9
Total	55	100	55	100	110	100

Source: Field Survey, 2011

Table no. 4.6 shows that around 36 percent of the respondents are from agriculture background followed by business, private employee, others occupation and government employee with 31.8 percent, 14.5 percent, 10.9 percent and 7.3 percent respectively.

This research revealed that there is no effect on the parent's occupational status on the degree of awareness about the most prone occupational group to the parasitic infection. As like the case of parental educational status such results were unexpected and may be explained by the lack of good communication between parents and their children in the parasites related matters as explained by Zakai, 2007.

4.7 Mother's Occupation

Interviewer were asked to the respondents about mother's occupation to know different prevalent among the respondents according to mother's occupation. Mother's occupation also determines the attitude, knowledge and perception of children towards human behavior and parasitic infection. Distribution of respondents by mother's occupational status is presented in Table no. 4.7.

Table no. 4.7: Distribution of respondents by mother's occupational status

Mother's Occupation	Male		Female		Total	
	No.	%	No.	%	No.	%

Agriculture	27	49	20	36.4	47	42.7
Government employee	0	0	1	1.8	1	0.9
Private employee	3	5.5	3	5.5	6	5.5
Business	11	20	7	12.7	18	16.4
Daily wages	5	9	4	7.3	9	8.2
House wife	8	14.5	19	34.5	27	24.5
Others	1	1.8	1	1.8	2	1.8
Total	55	100	55	100	110	100

Source: Field Survey, 2011

Table no. 4.7 shows that majority of the respondents' (around 43 percent) mothers are engaged in agriculture and least proportion (around 1 percent) mothers are engaged in government employment. House wife, business, daily wages, private employment and other occupation occupied 24.5 percent, 16.5 percent 8.2 percent, 5.5 percent and 1.8 percent respectively. The present research finding has similar result with the role of fathers' occupational status

4.8 Facility at Home

The household facilities of respondents are electricity, communication facility as e-mail/ internet, radio, T.V. etc. These are the fundamental things to get information about human behavior and parasitism and the status and type of toilet determines the economic condition and knowledge on sanitation. Distribution of respondents by facility at home is presented in Table no. 4.8.

Table no. 4.8: Distribution of respondents by facility at home

Facility at Home	Male	Female	Total

	No.	%	No.	%	No.	%
Computer	26	47.3	30	54.5	56	50.9
E-mail/Internet	18	32.7	12	21.8	30	27.3
Electricity	55	100	55	100	110	100
Radio	47	85.5	45	81.8	92	83.6
T. V.	54	98.2	54	98.2	108	98.2
Phone	45	81.8	48	87.3	93	84.5

Source: Field Survey, 2011

Table no. 4.8 shows that among male respondents all have electricity followed by TV (around 98 percent), radio (around 86 percent), phone (around 82 percent), computer (around 47 percent) and e-mail/internet (around 33 percent). Similarly, among female respondents all have electricity followed by TV (around 98 percent), phone (around 87 percent), radio (around 82 percent), computer (around 55 percent) and e-mail/internet (around 22 percent).

4.9 Distribution of the parasitic infection

Of the total 110 stool samples tested, 43 (39.1%) were positive for parasitic infection. 19 (34.5 %) males and 24 (43.6 %) females were positive for parasitic infection. This showed that higher level of parasitic infection was found in females than in males. The highest rate of infection was *Giardia lamblia* followed by *Trichuris trichura*, *Ascaris lumbricoides*, *Entamoeba histolytica*, hook worm, *Entamoeba coli* and co-infection with round worm and *E. histolytica*. *Trichuris trichura* was the most commonly prevalent parasites in males and *Giardia lamblia* in females. The distribution of respondents based on their parasitic prevalence is depicted in Table no. 4.9.

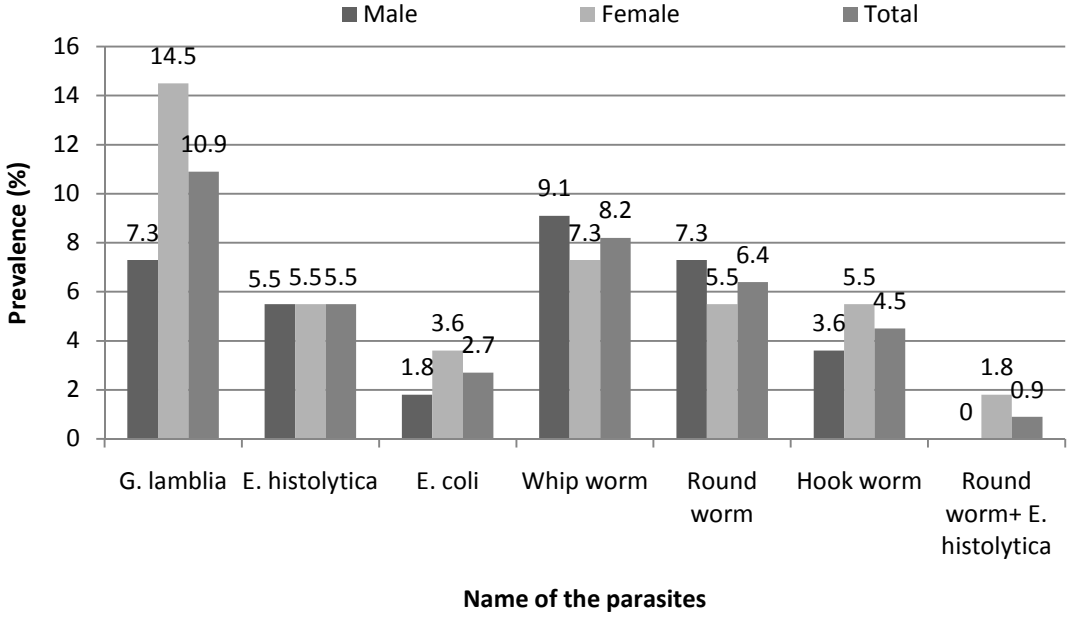
Table no. 4.9 Distribution of parasitic infection based on gender of the respondents

Name of the parasites	Male	Female	Total	Prevalence (%)

Giardia lamblia	4 (7.3)	8 (14.5)	12	10.9
Entamoeba histolytica	3 (5.5)	3 (5.5)	6	5.5
Entamoeba coli	1 (1.8)	2 (3.6)	3	2.7
Trichuris trichura (Whip worm)	5 (9.1)	4 (7.3)	9	8.2
Ascaris lumbricoides (Round worm)	4 (7.3)	3 (5.5)	7	6.4
Hook worm	2 (3.6)	3 (5.5)	5	4.5
Round worm+ *E. histolytica*	0 (0.0)	1 (1.8)	1	0.9
Total positive cases	19	24	43	39.1
Total no. tested	55	55	110	
Prevalence rate (%)	34.5	43.6		

The following diagram clearly showed that *Giardia lamblia* was the most common parasites among the female respondents and whip worm was most common among the male respondents. The co-infection with round worm and *E. histolytica* was only recorded from the female respondents.

Figure no. 4.1 Prevalence of parasitic infection among respondents



CHAPTER FIVE

KNOWLEDGE, ATTITUDE AND BEHAVIOR OF RESPONDENTS TOWARDS PARASITIC INFECTIONS

This chapter describes with the intent of knowledge gap about human behavior and parasitic infection among secondary level students. Knowledge on parasites, vulnerable age and occupational groups of parasites, how these parasites can transmit, its preventive measures, sources of information and their prevalence in past six months within the family members of the respondents' are concerned in this topic.

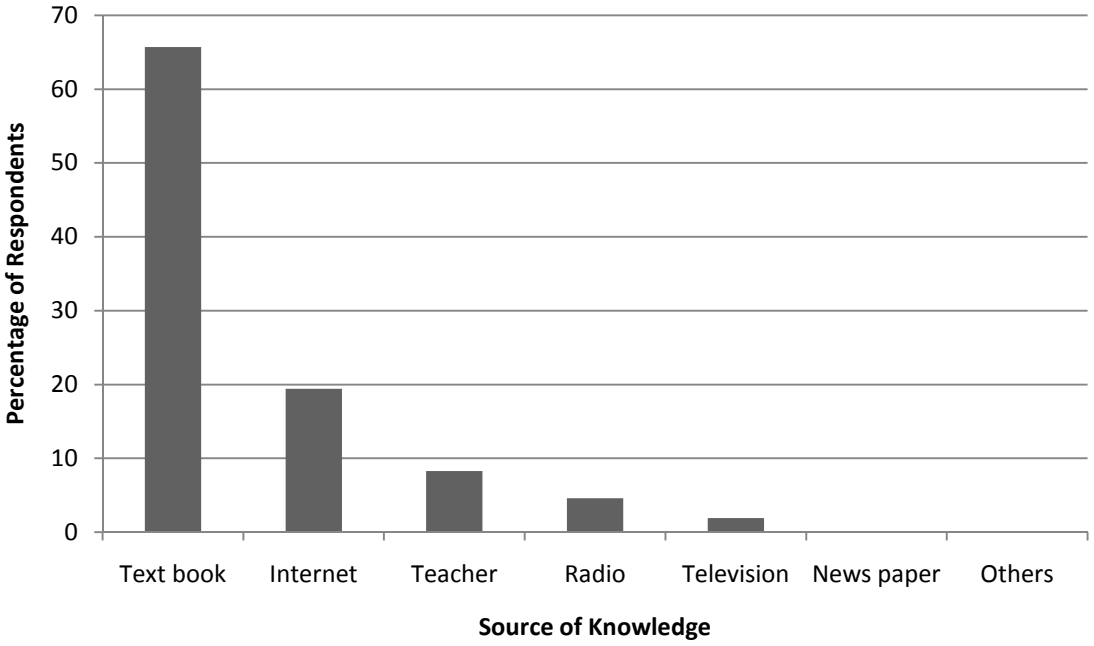
5.1 Knowledge on Health, Culture and Intestinal Parasitism

Means of parasitic exposure include: ingestion of undercooked meat, drinking infected water or eating infected food and skin absorption. Intestinal parasitism is a major burning issue all over the world. Nepalese people are also not far from intestinal parasitism. Nepal has been trying to solve such problem but these efforts are inadequate.

5.1.1 Heard of Parasites

When people heard about anything they gain knowledge of something. Only awareness and training program on parasitic diseases can change the behavior of person on that issue. Only hearing is not a top level of knowledge but it is the basis for knowledge. If people heard about something they are more interested to elaborate their knowledge in this regards. Out of 110 respondents, most of the students (98.2 %) had heard about the parasites. Among male and female students, all female had heard about parasites but only 96.4 percent of the male had heard about the parasites. Most of the respondents (about 76%) had heard about Malaria parasites followed by Hookworms (about 57%), Tape worms (around 56%), Liver flukes (about 40%), Round worm (about 39%), Whip worm (around 8%) and Others (around 2%). The total percentage is greater than 100 due to multiple responses.

Figure No. 5.1: Distribution of respondents by the source of knowledge



The above figure shows that majority of the respondents had obtained knowledge on parasites from text books, followed by internet, teacher, radio and television, whereas news papers and other sources have no role in disseminating knowledge on parasites among the respondents. Although around 85 percent of respondents' families follow up news paper and around 98 percent have TV at their home, there was no good relationship between these two factors and the level of awareness among the respondents. The lack of good instructive TV programs and lack of media coverage about parasites, parasitic infections and mode of their transmission may explain this situation.

5.1.2 Knowledge on the potential source of parasitic transmission

Most of the respondents (about 86%) consumed meat. Majority of the respondents who didn't consume meat simply because they don't like it. So, it seems no correlation between avoiding meat and knowledge on potential health hazards caused by unhealthy meat products. The distribution of respondents based on their knowledge on the source of parasite transmission is depicted in Table no 5.1

Table no. 5.1: Distribution of respondents based on their knowledge on the source of parasite transmission

Name of the Parasites	Sources of Transmission				
	Infected Meat (%)	Water-borne (%)	Companion with animals (%)	Eating invertebrates (%)	Infected soil (%)
Tape worms	10 (9.3)	42 (38.9)	-	-	-
Trichinella spiralis	29 (26.9)	-	-	-	-
Ascaris	15 (13.9)	-	-	19 (17.6)	8 (7.4)
Hook worms	7 (6.5)	-	-	-	49 (45.4)
Giardia	-	4 (3.7)	-	26 (24)	-
Cryptosporidium	-	7 (6.5)	-	-	-
Filariasis	-	24 (22.2)	-	-	18 (16.7)
Toxocara canis (dog round worm)	-	-	28 (25.9)	-	-
Ancyclostoma caninum (dog hook worm)	-	-	12 (11.1)	-	-
Echinococcus	-	-	7 (6.5)	-	-
Toxoplasm (protozoa)	-	-	24 (22.2)	-	-
Paragonimus spp. (lung fluke)	-	-	-	18 (16.7)	-
Angiostrongylus (round worm)	-	-	-	5 (4.6)	-
Malaria parasites	-	-	-	-	7 (6.5)
Don't know	47 (43.5)	31 (28.7)	34 (31.5)	37 (34.3)	25 (23.1)
Others	0	0	3 (2.8)	3 (2.8)	1 (0.9)

Source: Field Survey, 2011

The above table showed that around 44 percent of the respondents do not know that the infected meat is responsible to transmit certain parasites. Similarly around 29 percent,

around 32 percent, around 34 percent, and around 23 percent of the respondents respectively do not know that contaminated water, companion with animals like cat and dog, eating invertebrates like crab, crayfish and snails and infected soil respectively have role to transmit different types of parasites.

Similarly, around 27 percent of the respondents claimed that *Trichinella spiralis* was transmitted by the infected meat, around 39 percent claimed tape worms were transmitted by contaminated water, around 26 percent claimed dog round worm was transmitted by close companion with domestic animals, 24 percent claimed giardia was transmitted by eating invertebrates like Cray fish, crabs and snails and around 45 percent claimed hook worms were transmitted by infected soil.

5.1.3 Opinion of Respondents' on Parasites

Opinion of respondent's on parasites play important role to control parasites transmission. Percent distribution of respondents' views towards parasites by background characteristics is represented in Table no. 5.2.

Table no. 5.2: Percentage distribution of respondents' views towards parasites by background characteristics

Background Characteristics		Very harmful (%)	Harmful (%)	Neither harmful nor useful (%)	Don't know (%)	Total	
						No.	%
Age	<15	12 (37.5)	16 (50)	2 (6.3)	2 (6.3)	32	97
	15-19	37 (48.7)	31 (40.8)	5 (6.6)	3 (3.9)	76	98.7
Sex	Male	26 (49.1)	20 (37.7)	4 (7.5)	3 (5.7)	53	96.4
	Female	23 (41.8)	27 (49.1)	3 (5.5)	2 (3.6)	55	100
Religion	Hindu	45 (48.4)	39 (41.9)	5 (5.4)	4 (4.3)	93	97.9
	Buddhist	2 (28.6)	3 (42.9)	1 (14.3)	1 (14.3)	7	100
	Christian	1 (33.3)	2 (66.7)	0 (0)	0 (0)	3	100
	Muslim	0 (0)	2 (100)	0 (0)	0 (0)	2	100
	Others	1 (33.3)	1 (33.3)	1 (33.3)	0 (0)	3	100
Caste/ Ethnicity	Brahmin	28 (50.9)	23 (41.8)	1 (1.8)	3 (5.5)	55	98.2
	Chhetri	8 (50)	5 (31.3)	2 (12.5)	1 (6.3)	16	100
	Newar	4(33.3)	6(50)	2 (16.7)	0 (0)	12	100
	Gurung	0 (0)	2 (100)	0 (0)	0 (0)	2	100
	Tamang	1 (25)	2 (50)	1 (25)	0 (0)	4	100
	Tharu	4 (40)	4 (40)	1 (20)	1 (20)	10	90.9
	Others	4 (44.4)	5 (55.6)	0 (0)	0 (0)	9	100
Father's Education	Illiterate	2 (28.6)	3 (42.9)	1 (14.3)	1 (14.3)	7	77.8
	No Schooling	0 (0)	1 (100)	0 (0)	0 (0)	1	100
	Primary	3 (33.3)	5 (55.6)	0 (0)	1 (11.1)	9	100
	Lower Secondary	6 (37.5)	7 (43.8)	2 (12.5)	1 (6.3)	16	100
	Secondary/SLC	24 (48)	20 (40)	4 (8)	2 (4)	50	100
	Intermediate	6 (54.5)	5 (45.5)	0 (0)	0 (0)	11	100
	Bachelor & Above	8 (57.1)	6 (42.9)	0 (0)	0 (0)	14	100
Mother's Education	Illiterate	4 (33.33)	5 (41.7)	1 (8.3)	2 (16.7)	12	85.7
	No Schooling	0 (0)	1 (100)	0 (0)	0 (0)	1	100
	Primary	5 (35.7)	7 (50)	1 (7.1)	1 (7.1)	14	100
	Lower Secondary	7 (36.8)	10 (52.6)	2 (10.5)	0 (0)	19	100
	Secondary/SLC	27 (57.4)	16 (34)	2 (4.3)	2 (4.3)	47	100
	Intermediate	3 (37.5)	5 (62.5)	0 (0)	0 (0)	8	100
	Bachelor & Above	3 (42.9)	3 (42.9)	1 (14.3)	0 (0)	7	100
Father's Occupation	Agriculture	14 (37.8)	17 (45.9)	3 (8.1)	3 (8.1)	37	94.9
	Employee	11 (45.8)	12 (50)	1 (4.2)	0 (0)	24	100
	Business	16 (45.7)	15 (42.9)	2 (5.7)	2 (5.7)	35	100
	Daily wages	0 (0)	0 (0)	0 (0)	0 (0)	0	100
	Others	8 (66.7)	3 (25)	1 (8.3)	0 (0)	12	100
Mother's Occupation	Agriculture	24 (52.2)	15 (32.6)	4 (8.7)	3 (6.5)	46	97.9
	Employee	3 (42.9)	4 (57.1)	0 (0)	0 (0)	7	100
	Business	7 (38.9)	9 (50)	1 (5.6)	1 (5.6)	18	100
	Daily wages	3 (37.5)	5 (62.5)	0 (0)	0 (0)	8	88.9
	House wife	11 (40.7)	13 (48.1)	2 (7.4)	1 (3.7)	27	100
	Others	1 (50)	1 (50)	0 (0)	0 (0)	2	100

Source: Field Survey, 2011

Age composition of the respondents plays an important role on the degree of awareness. As the respondents get older, their awareness about parasitic infection increases as the

amount of information they obtain increases. So, slightly higher percent (89.5% vs. 87.5%) of the students of age group 15-19 years gave the correct concept on parasites, i.e. they are very harmful or harmful. This finding is perfectly matched with the finding of Zakai, 2007 where he noticed that the degree of awareness influenced the degree of awareness about parasites and parasitic diseases among the respondents.

Sex composition of the respondents also has some role on the degree of awareness about the parasites. This is due to the differences in the value given to male and female by the society. This also may be influenced by some biological differences between male and female. In this study female respondents (89.9%) have good response towards the harms caused by the parasites than male respondents (86.8%). This finding is similar with the finding made by Rijal et al., 2001 where they noticed that the female respondents possessed significantly higher levels of awareness about parasitic infections rather than male respondents.

According to the respondent's religious point of view all Christian and Muslim respondents have correct concept on the harms caused by the parasitic worms whereas 14.3 percent Buddhist and 4.3 percent Hindu don't know about the harms caused by the parasitic worms. As this is probably the first case study to show the culture influences on the knowledge of parasites, further detail study with sufficient sample size in different religious groups is needed in this regard to draw a well defined conclusions.

Caste/ ethnicity of the respondents also have importance influences on the degree of awareness in this issue. Gurung, other caste, Newar and Tamang respondents are relatively highly awareness about the parasites in contrast to Tharu, Chhetri and Brahmin. But it is hard to generalize this finding due to weak sample size of other respondents except Brahmins.

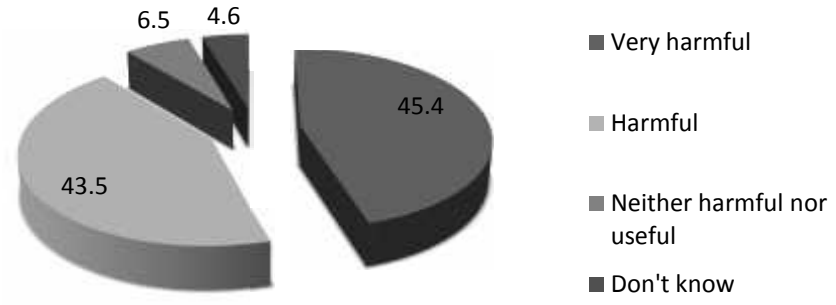
Parents' educational status also has significant influence on the respondents' knowledge on parasites. It is generally expected that the respondent's with good educational background at their home has good knowledge on parasites. In this research it is true for only for the respondents whose parents are illiterate. This is because 14.3 percent and 16.7 percent of the respondents whose father and mother are illiterate respectively have

no ideas about the harms caused by the parasitic worms. In case of literate parents, this study does not show any perfect correlation between the parental educational status and the respondents' knowledge on parasitic influences. Such results were unexpected and may be explained by the lack of good communication between parents and their children in this matter as explained by Zakai, 2007.

Similarly, Parents' occupational status also has significant influence on the respondents' knowledge on parasites. But this research revealed that there is no effect on the parent's occupational status on the degree of awareness about the harm caused by the parasitic infection. As like the case of parental educational status such results were unexpected and may be explained by the lack of good communication between parents and their children in the parasites related matters as explained by Zakai, 2007.

The overall summary on the respondent's opinion on parasites is shown in figure no. 5.2.

Figure No. 5.2: Overall distribution of respondents based on their opinion to parasites

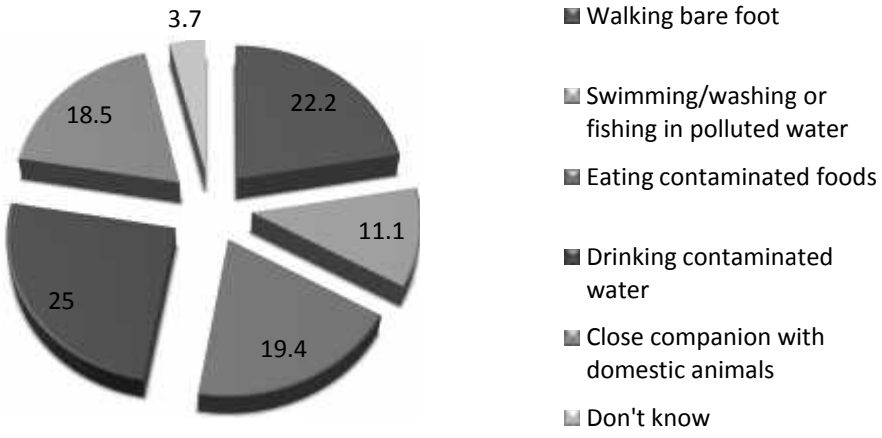


According to the above figure, most respondents (45.4 %) were well aware that worms are very harmful. Whereas 43.5 percent claimed that the parasites were harmful, 6.5 percent claimed that the parasites were neither harmful nor useful and 4.6 percent have no idea about them.

5.1.4 Knowledge on Potential Sources of Parasitic Transmission

The knowledge on potential sources of parasitic transmission shows about the respondent's perception on parasitic infections. There may be misconception among the secondary schools students about the potential sources of parasite transmission. In order to find respondent's perception on the potential sources of parasitic transmission, they were also asked about the most potential source of parasitic transmission. Percentage distribution of respondents by their knowledge on the potential source of parasitic transmission is presented in Figure no. 5.3.

Figure no 5.3. Distribution of respondents based on their knowledge on the most potential source of parasitic transmission



The above figure showed that 25 percent of the respondents know that drinking contaminated water is the most potential source of parasitic transmission followed by walking bare foot (22.2 %), eating contaminated foods (19.4 %), close companion with domestic animals (18.5 %), swimming/washing or fishing in polluted water (11.1 %) and don't know (3.7 %).

5.1.5 Knowledge on Preventive Methods of Parasitic Transmission

The knowledge on ways of parasitic transmission shows about the respondent's perception on parasitic infections. There may be misconception among the secondary schools students about the ways of parasite transmission. In order to find respondent's

perception on parasites, they were also asked about the ways of parasitic transmission. Percentage distribution of respondents by their knowledge on the ways of parasitic transmission is presented in Table no. 5.3.

Table no. 5.3. Distribution of respondents by their knowledge on the preventive methods of parasitic transmission

Preventive Methods	No. of respondents	Percentage
Wash hand before eating and after toilet	24	22.2
Washing fruits and vegetables before eating	9	8.3
Avoid walking bare foot	15	13.8
Protect food from house flies or other insects	13	12
Do not eat contaminated food	12	11.1
Do not drink contaminated water	10	9.3
Proper use of latrine	21	19.4
Don't know	4	3.7

Source: Field survey, 2011

The above table showed that majority of the respondents (22.2 %) said that washing hand before eating and after toilet was the main preventive method of parasitic transmission. Similarly 19.4 percent claimed proper use of latrine, 13.8 percent claimed avoid walking bare foot, 12 percent claimed protect food from house flies or other insects, 11.1 percent claimed not eating contaminated food, 9.3 percent claimed do not drink contaminated water and 8.3 percent claimed washing fruits and vegetables before eating were the main preventive methods of parasitic transmission. Whereas 3.7 percent of the respondents had no knowledge in this issues.

5.1.6 Knowledge of Respondents on most Vulnerable age group of Parasitic Infection

People of different age group have different frequency of parasitic infection. This is due to different activities of people that expose them to the sources of parasites. Children have more chances of having parasitic infection as they are likely to play with mud, eating vegetables without cleaning properly. The distribution of respondents by their views towards most prone age group of parasitic infection is depicted in Table 5.4.

Table 5.4: Percent Distribution of Respondents by their View towards most Vulnerable age group of Parasitic Infection by their Background Characteristics

Background Characteristics		Children (%)	Adolescents (%)	Youth (%)	Old (%)	Don't know (%)	Total	
							No.	%
Age	<15	20 (62.5)	3 (9.4)	2 (6.3)	4 (12.5)	3 (9.4)	32	97
	15-19	57 (75)	6 (7.9)	3 (3.9)	6 (7.9)	4 (5.3)	76	98.7
Sex	Male	32 (60.4)	5 (9.4)	4 (7.5)	7 (13.2)	5 (9.4)	53	96.4
	Female	45 (81.8)	4 (7.3)	1 (1.8)	3 (5.5)	2 (3.6)	55	100
Religion	Hindu	68 (73.1)	8(8.6)	4 (4.3)	7 (7.5)	6 (6.5)	93	97.9
	Buddhist	3 (42.9)	1 (14.3)	1(14.3)	1 (14.3)	1 (14.3)	7	100
	Christian	2 (66.6)	0 (0)	0 (0)	1 (33.3)	0 (0)	3	100
	Muslim	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2	100
	Others	2 (66.6)	0 (0)	0 (0)	1 (33.3)	0 (0)	3	100
Caste/ Ethnicity	Brahmin	36 (65.5)	6 (10.9)	3 (5.5)	6 (10.9)	4 (7.3)	55	98.2
	Chhetri	11 (68.8)	2 (12.5)	1 (6.3)	1 (6.3)	1 (6.3)	16	100
	Newar	10 (83.3)	0 (0)	0 (0)	1 (8.3)	1 (8.3)	12	100
	Gurung	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2	100
	Tamang	3 (75)	0 (0)	1 (25)	0 (0)	0 (0)	4	100
	Tharu	8 (80)	0 (0)	0 (0)	1 (10)	1(10)	10	90.9
	Others	7 (77.8)	1 (11.1)	0 (0)	1 (11.1)	0 (0)	9	100
Father's Education	Illiterate	4 (57.1)	0 (0)	1(14.3)	0 (0)	2 (28.6)	7	77.8
	No Schooling	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1	100
	Primary	7 (77.8)	1 (11.1)	0 (0)	1 (11.1)	0 (0)	9	100
	Lower Secondary	13 (81.3)	1 (6.3)	0 (0)	1 (6.3)	1 (6.3)	16	100
	Secondary/SLC	32 (64)	5 (10)	3 (6)	6 (12)	4 (8)	50	100
	Intermediate	10 (90.9)	0 (0)	0 (0)	1 (9.1)	0 (0)	11	100
	Bachelor & Above	10 (71.4)	2 (14.3)	1 (7.1)	1 (7.1)	0 (0)	14	100
Mother's Education	Illiterate	9 (75)	1 (8.3)	0 (0)	1 (8.3)	1 (8.3)	12	85.7
	No Schooling	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1	100
	Primary	11 (78.6)	1 (7.1)	0 (0)	1 (7.1)	1 (7.1)	14	100
	Lower Secondary	16 (84.2)	0 (0)	1 (5.3)	1 (5.3)	1 (5.3)	19	100
	Secondary/SLC	29 (61.7)	5 (10.6)	4 (8.5)	5 (10.6)	4 (8.5)	47	100
	Intermediate	6 (75)	1 (12.5)	0 (0)	1 (12.5)	0 (0)	8	100
	Bachelor & Above	5 (71.4)	1 (14.3)	0 (0)	1 (14.3)	0 (0)	7	100
Father's Occupation	Agriculture	25 (67.6)	3 (8.1)	2 (5.4)	4 (10.8)	3 (8.1)	37	94.9
	Employee	18 (75)	2 (8.3)	1 (4.2)	2 (8.3)	1 (4.2)	24	100
	Business	25 (71.4)	3 (8.6)	2 (5.7)	3 (8.6)	2 (5.7)	35	100
	Daily wages	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	100
	Others	9 (75)	1 (8.33)	0 (0)	1 (8.33)	1 (8.33)	12	100
Mother's Occupation	Agriculture	32 (69.6)	4 (8.7)	3 (6.5)	4 (8.7)	3 (6.5)	46	97.9
	Employee	5 (71.4)	1 (14.3)	0 (0)	1(14.3)	0 (0)	7	100
	Business	13 (72.2)	1 (5.6)	1 (5.6)	2 (11.1)	1 (5.6)	18	100
	Daily wages	6 (75)	0 (0)	0 (0)	1(12.5)	1 (12.5)	8	88.9
	House wife	19 (70.4)	3 (11.1)	1 (3.7)	2 (7.4)	2 (7.4)	27	100
	Others	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2	100

Source: Field Survey, 2011

Table 5.4 shows that 62.5 percent respondents below 15 years of age mentioned that children are more vulnerable to parasitic infection, whereas 9.4 percent have no knowledge in this regards. Similarly, 75 percent respondents between 15-19 years also

claim that children are more vulnerable to parasitic infection. But 5.3 percent respondents of this age group have no knowledge in this issue.

Among male respondents, 60.4 percent said that children, around 13 percent said old, around 9 percent said adolescence and around 8 percent said youth as most vulnerable age group of parasitic infection. Among female respondents, around 82 percent said children, around 7 percent reported adolescence, around 6 percent said old and around 2 percent said youth as most susceptible age group of parasitic infection. In fact children are the most risk group of parasitic infection due to their different unhealthy practices such as playing with pets and soil, eating foods without proper cleaning and lack of good health knowledge. In this regards female students have higher knowledge on the most prone group to parasitic infection as higher percentage of female students claimed that children are the most risk group. The male and female differences in their knowledge on most vulnerable age group of parasitic infection can be explained by their differences in personal behavior, socio-economic background and cultural practices. This finding is similar with the finding made by Rijal et al., 2001 where they noticed that the female respondents possessed significantly higher levels of awareness about parasitic infections rather than male respondents.

All Muslim respondents followed by Hindu (73.1%), Christian (66.6%), others (66.6%) and Buddhist (42.9%) argue that children were the most unprotected age group of parasitic transmission. 14.3 percent Buddhist and 6.5 percent Hindu respondents have no knowledge in this regards. As this is probably the first case study to show the culture influences on the knowledge of parasites, further detail study with sufficient sample size in different religious groups is needed in this regard to draw a well defined conclusions.

All Gurung respondents said children were the most prone age group to parasitic transmission followed by Newar (83.3%), Tharu (80%), others (78%), Tamang (75%), Chhetri (69) and Brahmin (65.5%). Ten percent Tharu, 8.3 percent Newar, 7.3 percent Brahmin and 6.3 percent Chhetri respondents claimed that they don't know in this regards. But it is hard to generalize this finding due to weak sample size of other respondents except Brahmins.

Around 29 percent and around 8 percent of the respondents whose father and mother were illiterate respectively have no knowledge on the most vulnerable age group to parasitic infection. It is generally expected that the respondent's with good educational background at their home has good knowledge on parasites. In contrast this study does not show any perfect correlation between the parental educational status and the respondents' knowledge on parasitic influences. Such results were unexpected and may be explained by the lack of good communication between parents and their children in this matter as explained by Zakai, 2007.

This research revealed that there is no effect on the parent's occupational status on the degree of awareness about the most prone age group to the parasitic infection. As like the case of parental educational status such results were unexpected and may be explained by the lack of good communication between parents and their children in the parasites related matters as explained by Zakai, 2007.

5.1.7 Knowledge on most Vulnerable Occupational group of Parasitic Infection

People of different occupational group have different frequency of parasitic infection. This is due to different activities of people that expose them to the sources of parasites. Farmers are more prone to have parasitic infection as they have more chances to expose the sources of parasites. The distribution of respondents by their views towards most vulnerable occupational group of parasitic infection is depicted in Table no. 5.5.

Table 5.5: Percentage distribution of respondents by knowledge on most vulnerable occupational group of parasitic infection by their background characteristics

Background Characteristics		Farmers (%)	Employers (%)	Business men (%)	Others (%)	Don't know (%)	Total	
							No.	%
Age	<15	25 (78.1)	1 (3.1)	2 (6.3)	1 (3.1)	3 (9.4)	32	97
	15-19	67 (88.2)	2 (2.6)	2 (2.6)	0 (0)	5 (6.6)	76	98.7
Sex	Male	43 (81.1)	2 (3.8)	1 (1.9)	0 (0)	4 (7.5)	53	96.4
	Female	49 (89)	1 (1.8)	3 ()	1 (1.8)	4 (5.5)	55	100
Religion	Hindu	80 (86)	3 (3.2)	4 (4.3)	1 (1.1)	5 (5.4)	93	97.9
	Buddhist	5 (71.4)	0 (0)	0 (0)	0 (0)	2 (28.6)	7	100
	Christian	3(100)	0 (0)	0 (0)	0 (0)	0 (0)	3	100
	Muslim	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2	100
	Others	2 (66.7)	0 (0)	0 (0)	0 (0)	1 (33.3)	3	100
Cast/ Ethnicity	Brahmin	46 (83.6)	2 (3.6)	2 (2.6)	1 (1.8)	4 (7.3)	55	98.2
	Chhetri	14 (87.5)	1 (6.3)	0 (0)	0 (0)	1 (6.3)	16	100
	Newar	11 (91.7)	0 (0)	0 (0)	0 (0)	1 (8.3)	12	100
	Gurung	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2	100
	Tamang	3 (75)	0 (0)	1 (25)	0 (0)	0 (0)	4	100
	Tharu	8 (80)	0 (0)	1 (10)	0 (0)	1 (10)	10	90.9
	Others	8 (88.9)	0 (0)	0 (0)	0 (0)	1 (11.1)	9	100
Father's Education	Illiterate	5 (71.4)	1 (14.3)	0 (0)	0 (0)	1 (14.3)	7	77.8
	No Schooling	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1	100
	Primary	8 (88.9)	0 (0)	0 (0)	1 (11.1)	0 (0)	9	100
	Lower Secondary	14 (87.5)	0 (0)	1 (6.3)	0 (0)	1 (6.3)	16	100
	Secondary/SLC	40 (80)	2 (4)	3 (6)	0 (0)	5 (10)	50	100
	Intermediate	11 (100)	0 (0)	0 (0)	0 (0)	0 (0)	11	100
	Bachelor & Above	13 (92.9)	0 (0)	0 (0)	0 (0)	1 (7.1)	14	100
Mother's Education	Illiterate	10 (83.3)	1 (8.3)	0 (0)	0 (0)	1 (8.3)	12	85.7
	No Schooling	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1	100
	Primary	13 (92.9)	0 (0)	0 (0)	0 (0)	1 (7.1)	14	100
	Lower Secondary	16 (84.2)	1 (5.3)	1 (5.3)	0 (0)	1 (5.3)	19	100
	Secondary/SLC	37 (78.7)	1 (2.1)	3 (6.4)	1 (2.1)	5 (10.6)	47	100
	Intermediate	8 (100)	0 (0)	0 (0)	0 (0)	0 (0)	8	100
	Bachelor & Above	7 (100)	0 (0)	0 (0)	0 (0)	0 (0)	7	100
Father's Occupation	Agriculture	30 (81.1)	1 (2.7)	2 (5.4)	1 (2.7)	3 (8.1)	37	94.9
	Employee	21 (87.5)	0 (0)	1 (4.2)	0 (0)	2 (8.3)	24	100
	Business	31 (88.6)	1 (2.9)	1 (2.9)	0 (0)	2 (5.7)	35	100
	Daily wages	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	100
	Others	10 (83.3)	1 (8.3)	0 (0)	0 (0)	1 (8.3)	12	100
Mother's Occupation	Agriculture	37 (80.4)	2 (4.3)	2 (4.3)	1 (2.2)	4 (8.7)	46	97.9
	Employee	7 (100)	0 (0)	0 (0)	0 (0)	0 (0)	7	100
	Business	16 (88.9)	0 (0)	1 (5.6)	0 (0)	1 (5.6)	18	100
	Daily wages	7 (87.5)	1 (12.5)	0 (0)	0 (0)	0 (0)	8	88.9
	House wife	23 (85.2)	0 (0)	1 (3.7)	0 (0)	3 (11.1)	27	100
	Others	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2	100

Source: Field survey, 2011

Table 5.5 shows that 78.1 percent respondents below 15 years of age mentioned that farmers are more vulnerable to parasitic infection, whereas 9.4 percent have no knowledge in this regards. Similarly, 88.2 percent respondents between 15-19 years also

claim that farmers are more vulnerable to parasitic infection. But 6.6 percent respondents of this age group have no knowledge in this issue. Higher percent of the students of age group 15-19 years gave the correct concept on parasites, i.e. farmers are more prone to parasitic infection. This finding is perfectly matched with the finding of Zakai, 2007.

Among male respondents, 81.1 percent said that farmers are most vulnerable occupational group of parasitic infection. Among female respondents, around 89 percent also said farmers as the most susceptible occupational group of parasitic infection. In fact farmers are the most risk group of parasitic infection due to their different unhealthy practices such as close company with their pets and soil, eating foods without proper cleaning and lack of good health knowledge. In this regards female students have higher knowledge on the most prone group to parasitic infection as higher percentage of female students claimed that farmers are the most risk group. The male and female differences in their knowledge on most vulnerable occupational group of parasitic infection can be explained by their differences in personal behavior, socio-economic background and cultural practices. This finding is similar with the finding made by Rijal et al., 2001 where they noticed that the female respondents possessed significantly higher levels of awareness about parasitic infections rather than male respondents.

All Muslim and Christian respondents argue that farmers were the most unprotected occupational group of parasitic transmission. 33.3 percent other, 28.6 percent Buddhist and 5.4 percent Hindu respondents have no knowledge in this regards. As this is probably the first case study to show the culture influences on the knowledge of parasites, further detail study with sufficient sample size in different religious groups is needed in this regard to draw a well defined conclusions like above.

All Gurung respondents said farmers are mostly infected with parasites followed by Newar (91.7%), others (88.9%), Chhetri (87.5%), Brahmin (83.6%), Tharu (80%), Tamang (75%), and 11.1 percent others, 10 percent Tharu, 8.3 percent Newar, 7.3 percent Brahmin and 6.3 percent Chhetri respondents claimed that they don't know in this regards. But it is hard to generalize this finding due to weak sample size of other respondents except Brahmins.

Around 14.3 percent and around 8.3 percent of the respondents whose father and mother were illiterate respectively have no knowledge on the most vulnerable occupational group to parasitic infection. It is generally expected that the respondent's with good educational background at their home has good knowledge on parasites. In contrast this study does not show any perfect correlation between the parental educational status and the respondents' knowledge on parasitic influences. Such results were unexpected and may be explained by the lack of good communication between parents and their children in this matter as explained by Zakai, 2007.

This research also revealed that there is no effect on the parent's occupational status on the degree of awareness about the most prone occupational group to the parasitic infection. As like the case of parental educational status such results were unexpected and may be explained by the lack of good communication between parents and their children in the parasites related matters as explained by Zakai, 2007.

5.2 Availability of latrine in respondent's house and its use

Availability and the use of latrine plays very important role to control the intestinal parasites that are easily transmitted by fecal-oral route. In this study all the respondents have latrine and they are also using it properly in daily manner. This result perfectly matched with the result of table no. 5.3 in which majority of the respondents (22.2%) claimed that washing hand before eating and after toilet was the main preventive method of parasitic transmission following the proper use of latrine (19.4%). The distribution of respondents' latrine based on its location is represented in the following Venn diagram.

Figure no. 5.4: Distribution of respondents' latrine based on its location

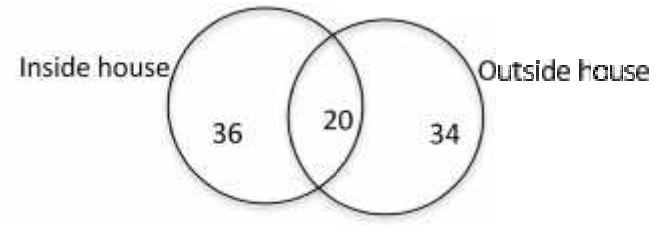


Figure 5.4 showed that among 110 respondents, 50.9 percent (56) have latrine inside the house and 49.1 percent (54) have latrine outside the house whereas 18.2 percent (20) have latrine in both inside and outside the house. The total percentage in this case is higher than 100 percent due to multiple responses of the respondents.

5.3 Presence of Parasitic Infection within past six Month

Presence of parasitic infection within the family members in the past has great role to have knowledge on parasites among the respondents. If some family members of the respondents had parasitic infection in the past, they have more chance to know and discussed about it. The distribution of respondents who have parasitic infection within their family members in past six month period is represented in figure no. 5.5.

Figure no. 5.5: Distribution of respondents based on their knowledge on the presence of parasitic infections in their family members within past six months

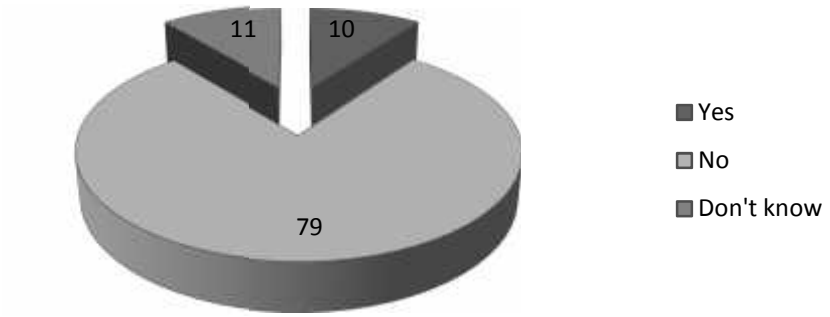


Figure 5.5 showed that out of total 110 respondents 10 percent said that they have noticed some parasitic infection within their family members in the past six months. 79 percent respondents said that their family members have no parasitic infection within past six months. Whereas 11 percent respondents noticed that they have no ideas in this issue. Most of the respondents with infected family members within past six months claimed that they have hook worm infection followed by malaria or tape worm.

CHAPTER SIX

Summary and conclusions

6.1 Summary

This study is done to determine the secondary level students' knowledge on cultural influences on intestinal parasitism. Out of total 110 respondents, 30 percent were below 15 years and 70 percent were between 15 and 19 years of age. Among total respondents around 22 percent male and around 38 percent female were below 15 years and around 78 percent male and 62 percent of female respondents were between 15 to 19 years of age.

In this study around 51 percent respondents were from Brahmin, around 15 percent from Chhetri community, around 11 percent from Newar, 10 percent were from Tharu community, around 4 percent from Tamang, around 2 percent from Gurung and around 8 percent from others group. Among the total respondents around 86 percent were Hindu, around 6 percent were Buddhist, around 3 percent were Christian, around 2 percent were Muslim and around 3 percent were others.

92 percent respondents' fathers were literate and 8 percent respondents' fathers were illiterate. Among literate, around 32 percent passed SLC, 24 percent primary followed by 18 percent lower secondary, 11 percent no schooling, 5 percent intermediate and 3 percent bachelor and above. Similarly around 87 percent respondents' mothers were literate and around 13 percent respondents' mothers were illiterate. Among literate, 49 percent passed SLC, around 20 percent passed lower secondary followed by primary (around 15 percent), intermediate (around 8%), bachelor and above (around 7%) and no schooling (1%).

Based on occupational status, around 36 percent of the respondents were from agriculture background followed by business, private employee, others occupation and government employee with 31.8 percent, 14.5 percent, 10.9 percent and 7.3 percent respectively.

Majority of the respondents' (around 43 percent) mothers were engaged in agriculture and least proportion (around 1 percent) mothers were engaged in government employment. House wife, business, daily wages, private employment and other occupation occupied 24.5 percent, 16.5 percent 8.2 percent, 5.5 percent and 1.8 percent respectively.

Among male respondents all have electricity followed by TV (around 98 percent), radio (around 86 percent), phone (around 82 percent), computer (around 47 percent) and e-mail/internet (around 33 percent). Similarly, among female respondents all have electricity followed by TV (around 98 percent), phone (around 87 percent), radio (around 82 percent), computer (around 55 percent) and e-mail/internet (around 22 percent).

Of the total 110 stool samples tested, 43 (39.1%) were positive for parasitic infection. The highest rate of infection was *Giardia lamblia* followed by *Trichuris trichura*, *Ascaris lumbricoides*, *Entamoeba histolytica*, hook worm, *Entamoeba coli* and co-infection with roundworm and *E. histolytica*.

Out of 110 respondents, most of the students (98.2 %) had heard about the parasites. About 76 percent of the respondents had heard about Malaria parasites followed by Hookworms (about 57%), Tape worms (around 56%), Liver flukes (about 40%), Round worm (about 39%), Whip worm (around 8%) and Others (around 2%). The total percentage was greater than 100 due to multiple responses.

Majority of the respondents had obtained knowledge on parasites from text books, followed by internet, teacher, radio and television. News papers and other sources have no role to disseminate knowledge on parasites.

Most of the respondents (45.4%) said that parasites were very harmful followed by harmful (43.5%), neither harmful nor useful (6.5%) and don't know (4.6%).

25 percent respondents said that drinking contaminated water was the most potential source of parasite transmission followed by walking bare foot (around 22%), eating contaminated food (around 19%), close companion with domestic animals (around 19%),

swimming/washing or fishing in polluted water (around 11%) and don't know (around 4%).

Around 22 percent of the respondents said that wash hand before eating and after toilet is the most important preventive method of parasitic transmission followed by proper use of latrine (around 19%), avoid walking bare food (around 14%), protect food from house flies or other insects (around 12%), do not eat contaminated food (around 11%), do not drink contaminated water (around 9%), washing fruits and vegetables before eating (around 8%) and don't know (around 4%).

Children were the most vulnerable age group and farmers were the most risk occupational group of parasitic infection. All of the respondents have latrines at their home and all of them use it properly. 79 percent of the respondents claimed that their family members have no parasitic infection in the past six months.

6.2 Conclusions

This study is done to determine the secondary level students' knowledge on cultural influences on intestinal parasitism. Of the total 110 stool samples tested, 39.1 percent were found to be positive for parasitic infection. The *Giardia lamblia* was most frequently observed parasites and the female respondents have higher prevalence rate. In this study most of the respondents (98.2 %) had heard about the parasites and the percentage of respondents (76%) who heard about the Malaria parasites is higher in comparison to others that is anticipated as it has severe symptoms and must be treated at time rather than other parasitic diseases.

Majority of the respondents had obtained knowledge on parasites from text books followed by internet, teacher, radio and television respectively whereas news papers and other sources have no role to disseminate knowledge on parasites although 84.5 percent of the respondents read news paper. In this case, the concern authority should be aware to use different means of communication to disseminate knowledge on parasites. Most of the respondents (88.9%) said that parasites were not useful for us that depicts their awareness about the parasitic worms. 25 percent respondents said that drinking

contaminated water was the most potential source of parasite transmission that is true in most of the cases so the people most be made aware to use the safe drinking water. Around 22 percent of the respondents said that wash hand before eating and after toilet is the most important preventive method of parasitic transmission followed by proper use of latrine (19%) whereas around 4 percent of the respondents don't know about the potential source of parasitic transmission. Children were the most vulnerable age group and farmers were the most risk occupational group of parasitic infection. So, proper inspection in these groups is needed to find out the actual data on parasitic infection. It is also necessary to change the behavior of these groups that favors parasitic transmission. All of the respondents have latrines at their home and all of them use it properly. Similarly majority (79%) of the respondents' family members have no parasitic infection in the past six months which is a good indication of good health.

The major findings of this study are

- Female have higher parasitic load compare to male respondents
- Female respondents have higher knowledge on parasites than male respondents.
- The respondents with higher age have higher knowledge in this regards.
- Whereas religion, caste/ethnicity and parents education and occupation have no relation with the knowledge on parasitic infection.

REFERENCES

Azim, S. et al. 2008. Role of Human Behaviour and Parasitic Diseases. *Infectious Diseases Journal of Pakistan* 17(4): 128-134

Bundy, D.A.P. and Guyatt, H.L. 1995. The health of school-age children: Report of a workshop. *Parasitology Today* 11: 166-167

Casemore, D.P. 1990. Foodborne protozoal infection. *Lancet* 336: 1427– 1432

Chan, M.S. 1997. The global burden of intestinal nematode infections-Fifty years on. *Parasitology Today* 13: 438-443

Chatterjee, K.D. 1998. Parasitology (Protozoology and Helminthology) in relation to clinical Clinical Medicine. Printed in India; p. 238.

Cockburn, A.T. 1971. Infectious diseases in ancient populations. *Current Anthropology* 12: 45-62

Coimbra, C.E.A. Jr. 1988. Human factors in the epidemiology of malaria in the Brazilian Amazon. *Hum Org* 47: 254–260

Curtale, F. et al. 1998. Knowledge, perceptions and behaviour of mothers toward intestinal helminths in Upper Egypt: implications for control. *Health Policy and Planning* 13(4): 423-432

Dunn, F.L. 1968. Epidemiological factors: health and disease in hunter-gatherers. RB L and I DeVore, editors. *Man the Hunter* 221-228. Chicago: Aldine.

Estevez E.G. et al.1983. Intestinal Parasites in a Remote Village in Nepal. *Journal of Clinical Microbiology* 17(9): 160-161

Gillett, J.D. 1985. The behaviour of *Homo sapiens*, the forgotten factor in the transmission of tropical disease. *Trans. Roy. Soc. Trop. Med. Hyg.* 79: 12–20

Macpherson, C.N.L. 2005. Human behavior and the epidemiology of parasitic zoonoses. *International Journal for Parasitology* 35: 1319-1331

Nelson, G.S. 1990. Human behaviour and the epidemiology of helminth infections: cultural practices and microepidemiology, Parasitism and host behaviour. In: Barnard, C.J., Behnke, J.M. (Eds.), Parasitism and Host Behaviour. Uni Nottingham, UK 234–263

Olsen, A. et al. 2001. A study of risk factors for intestinal helminth infections using epidemiological and anthropological approaches. *Journal of Biosocial Science* 33: 569-584

Parajuli, R.P. et al. 2009. Behavioral and nutritional factors and geohelminth infection among two ethnic groups in the Terai region, Nepal. *American Journal of Human Biology* 21(1): 98–104

Patz, J.A. et al. 2000. Effects of environmental change on emerging parasitic diseases. *Int. J. Parasitol* 30: 1395–1405

Reddy, V.S. et al. 1998. Intestinal parasites among children at Bharatpur, Nepal. *Indian Pediatrics* 35: 76-77

Rijal, B. et al. 2001. Gender variations in the prevalence of parasitic infections and the level of awareness in adolescent in rural Nepal. *Southeast Asian Journal of Tropical Medicine and Public Health* 32(3): 575-580

Savioli, L. et al. 1992. Intestinal parasitic infections: a soluble public health problem. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 86: 353-354

Sherchand, J.B. et al. 2003. Mapping of lymphatic filariasis in Nepal. *Filaria Journal* 2: 1-9 Accessed from http://www.filariajournal.com/ content/2/1/7

Stephenson, L.S. 1987. Impact of intestinal helminths on human nutrition. New York: Taylor and Francis Ltd, 1-20

Tanner, S.N. 2005. A population in transition: health, culture change and intestinal parasitism among the Tsimane' of lowland Bolivia. A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Anthropology) in The University of Michigan, USA

Thornhill, R. 2010. Zoonotic and non-zoonotic diseases in relation to human personality and societal values: support for the parasite-stress model. *Evolutionary Psychology* 8(2): 151-169

Uga, S. et al. 2004. Parasites detected from diarrheal stool samples collected in Nepal. *Southeast Asian Journal of Tropical Medicine and Public Health* 35(1): 19-23

UNFPA. 2004. Population growth is still an issue. State of World Population. The Cairo Consensus at Ten: Population, Reproductive Health and the Global Effort to End Poverty

WHO Expert Committee. 1987. Public health significance of intestinal parasitic infections. Bulletin of the World Health Organization 65(5): 575-588

WHO. 2004. The global burden of disease, Printed in Switzerland. Accessed from http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004 on May-20, 2011

WHO. 2005. Parasitic diseases. State of the art of vaccine research and development. Initiative for Vaccine Research. World Health Organization, WHO Document Production Services, Geneva, Switzerland

Williams-Blangero, S. et al. 1998. Attitudes towards helminthic infection in the Jirel population of eastern Nepal. *Soc. Sci. Med.* 47: 371–379

Wilson, M.E. 1995. Travel and the emergence of infectious diseases. *Emerg. Infect. Dis.* 1: 39–46

Wirsing, R.L. 1985. The Health of Traditional Societies and the Effects of Acculturation. *Current Anthropology* 26(3): 303-322

Zakai, H.A. 2007. Level of awareness about parasitic diseases among students, Jeddah, Saudi Arabia. *Med. Sci.* 14(2): 37-47

QUESTIONNAIRE

Knowledge on cultural influences on intestinal parasitism among secondary level students (a case study of Ratnanagar municipality, Chitwan, Nepal)

Name:…….

Demographic Data

1	School:	
2	Class:	
3	Age:	
4	Sex	Male ☐ Female ☐
5	Caste/Ethnicity	Newar ☐ Brahmin ☐ Chhetri ☐ Tamang ☐ Gurung ☐ Others (specific)……..
6	Religion	Hindu ☐ Buddhist ☐ Christian ☐ Muslim ☐ Others (specific) ……...
7	Place of residence	Urban ☐ Rural ☐
8	Where do you live/stay at present?	At home ☐ At hostel ☐ At rented room ☐ At relative's home ☐ Others (specific) …….

Household Characteristics

9	Can your father read and write?	Yes ☐ No ☐
10	If yes, what is your father's educational level?	No Schooling ☐ Primary ☐ Lower Secondary ☐ Secondary/SLC ☐ Intermediate ☐ Bachelor and above ☐
11	Can your mother read or write?	Yes ☐ No ☐
12	If yes, what is your mother's educational level?	No Schooling ☐ Primary ☐ Lower Secondary ☐ Secondary/ SLC ☐ Intermediate ☐ Bachelor and above ☐
13	What is your father's occupation?	Agriculture ☐ Government employee ☐ Private employee ☐ Business ☐ Daily wages ☐ Others (specify) …….....
14	What is your mother's occupation?	Agriculture ☐ Government employee ☐ Private employee ☐ Business ☐ Daily wages ☐ Others (specify) …….....
15	How many members are there in your family?	Male …….. Female …… Total ……..

16	What is the monthly income of your family?	< 5000 □ 5001-10000 □ 10001-15000 □ >15000 □
17	Among the followings which facilities are at in your home?	Electricity □ Radio □ Television □ Telephone □ Computer □ Internet □
18	Do you/your family members read news paper?	Yes □ No □
19	If yes how often do you read news papers?	Daily □ Sometimes □ Rarely □

Knowledge on health, culture and intestinal parasitism

20	Have you heard about parasites?	Yes □ No □
21	If yes, which parasites have you heard?	*Ascaris lumbricoides* (round worm) □ *Trichuris trichiura* (whip worm) □ Hookworms □ Liver flukes □ Tape worms □ Malaria parasites □ Others (specify) ……..
22	If yes, from which source did you know?	Internet □ Radio □ Television □ News papers □ Text books □ Teachers □ Other (specify) …….

23	Do you eat meat?	Yes ☐ No ☐
24	If yes, which animal(s) meat do you eat?	Goat ☐ Buffalo ☐ Pig ☐ Boar ☐ Duck ☐ Chicken ☐ Others (specify)……..
25	If no, why do you not eat meat?	Religious region ☐ Family region ☐ Adverse effects in health ☐ Don't like ☐ Others (specify)……
26	Can you name the parasites transmitted by infected meat?	Tape worms ☐ *Trichinella spiralis* ☐ Ascaris ☐ Hook worms ☐ Don't know ☐ Others (specify)…….
27	Which of the following are water-borne parasites?	Giardia ☐ Cryptosporidium ☐ Tape worms ☐ Filariasis ☐ Don't know ☐ Others (specify)……
28	Which of the following parasites are transmitted by companion with animals like dog and cat?	*Toxocara canis* (dog round worm) ☐ *Ancyclostoma caninum* (a dog hook worm) ☐ *Echinococcus* spp. ☐ Toxoplasm (a protozoan parasite) ☐ Don't know ☐ Others (specify)……..

29	In your opinion which parasites are transmitted by eating invertebrates like crabs, crayfish and snails?	*Paragonimus* spp. (a fluke) □ Angiostrongylus (a round worm) □ Ascaris □ Giardia □ Don't know □ Others (specify)…….
30	Hindus are generally away from these parasites?	*Taenia saginata* (a cow tap worm) □ Trichinella spp. □ Malaria parasites □ Giardia □ Don't know □ Others (specify)……..
31	Muslims are generally away from these parasites?	*Taenia saginata* (a cow tap worm) □ Trichinella spp. □ Malaria parasites □ Ascaris □ Don't know □ Others (specify)……..
32	Which of the following parasite(s) is/are transmitted by contaminated soil?	Malaria □ Ascaris □ Hook worms □ Filarial worms □ Don't know □ Others (specify)……
33	What is your opinion about parasites?	Very harmful □ Harmful □ Neither harmful nor useful □ Beneficial □ Very beneficial □ Don't know □
34	Which is the most potential source of parasitic transmission (please select only one)?	Walking bare foot □ Swimming/washing or fishing in polluted water □ Eating contaminated foods □ Drinking contaminated water □ Close companion with domestic animals □ Don't know □ Others (specify)……

35	Which is the most important preventive method of parasitic transmission (please select only one)?	Wash hand before eating and after toilet □ Washing fruits and vegetables before eating □ Avoid walking bare foot □ Protect food from house flies or other insects□ Do not eat contaminated food □ Do not drink contaminated water □ Proper use of latrine □ Don't know □ Others (specify)…….
36	Which is the most vulnerable group of parasitic infection (please select only one)?	Children □ Adolescents □ Youth □ Old □ Don't know □
37	Which is the most vulnerable occupational group of parasitic infection (please select only one)?	Farmers □ Employee □ Business men □ Don't know □ Others (specify)……..
38	What's about latrine in your home?	Inside house □ Outside house □ No latrine □
39	How often your family members use latrine?	Daily □ Some times □ Rarely □ Don't know □
40	Do you have noticed any parasitic infections in you or your family members within past six months?	Yes □ No □ Don't know □
41	If yes, list it/them?	a)…… b)…… c)……

Thank You!