I

INTRODUCTION

Scabies is a common parasitic infection caused by the mite *Sarcoptes scabiei var. hominis*. It was described as early as the sixteenth century and the cause of the disease was definitely established by 1835. The etiological agent of Sarcoptic mange in man was first definitely proven to cause human mange by Raspail and his Corsican student Renucci in 1934. In the past, itch swept over armies and population in great epidemics, but it has decreased with civilization and cleanliness. Infestations occur when the "itch" mite, *S. scabiei*, burrows into the skin and consumes host epidermis and sera. The predominant disease manifestations are mediated through inflammatory and allergy-like reactions to mite products, leading to intensely pruritic lesions.

Scabies is a major global health problem in many indigenous, Third World communities and is endemic in many tropical and subtropical areas, such as Africa (Odueko et al., 2001), Egypt (Hegazy A A et al., 1999), Central and South America (Heukelbach et al., 2003), Northern and Central Australia (Walton et al., 2004), the Caribbean Islands (Walton et al., 1990), India (Mallik et al., 2004) and Southeast Asia (Pruksachatkunakorn et al., 2003). Person-to-person body contact is generally necessary for transmission of scabies (Mellanby, 1941). Thus, it is a disease of overcrowding and poverty rather than a reflection of poor hygiene (Heukelbach et al., 2005). It has been estimated that 300 million people suffer from scabies infestation at any one time (Taplin et al., 1990), although this number has been disputed. Scabies is an important disease of children, but it occurs in both sexes, at all ages, in all ethnic groups and at all socioeconomic levels (Currie et al., 2000). Scabies is also a major problem among important livestock and companion animals, with, for example, approximately 25% of pigs in some areas of the United States experiencing scabietic mange, leading to major economic losses (Cargill et al., 1997). Moreover, many millions of wild animals worldwide suffer from sarcoptic mange (Walton et al., 1997). In humans, the symptoms of scabies infestations can mimic other dermatological skin diseases, and traditional tests to diagnose scabies are less than 50% accurate.

The cohort study done using interview and clinical examination by a single physician showed 3% scabial infestation among members of trekking groups in the Central Nepal Himalaya (Basnyat and Litch, 1997). A base line health survey among students of Paropkar Orphanage Centre, Paropkar Adarsh High- School and wards no. 19 and 20 peoples of Kathamandu Metropolitan City found 27.3%, 22.4% and 22.2% respectively, people were infested with scabies (Subedi, 2000). The Workplace Occupational Health Assessment was done in ten industries of Kathamandu valley then higher proportion of child workers (97%) was found and were illiterate suffering from scabies, otitis externa, otitis media anaemia etc. (Joshi and Dahal,2008).

Sarcoptes scabiei var. *hominis* is small, oval, dorsally convex, dirty white, eyeless mite. Male is smaller than female showing strong positive- thermotaxis and life span completes within 12-28 days. Its dioceous, monogenetic and incubation period last for 3-5 days. Sarcoptic itch of man is commonly acquired from contact with infested person, their clothing, bed linen or towel contaminated with the adult female mites, its eggs, larvae or nymphs. The outstanding clinical diagnostic symptom is intense itching causing weeping and bleeding of the lesion, provides an opportunity for pyogenic infections to spread infestation to other sites

The aim of treatment for scabies is to suppress the discomfort due to the disease, to limit the risk for super infection and related complications such as PSG, and to limit the dissemination of the disease in the family and more widely in the community. The main topical drugs recommended today (Walker et al., 2000) for the treatment of scabies are 0.3- 1% lindane, 10-25% benzyl benzoate lotion, 5% permethrin cream, esdepallethrine (aerosol), 2-10% sulfur (Pruksachatkunakorn et al., 2002), 25% sulfiram, and 10% crotamiton; DDT is no longer recommended. S*cabies* is most common in those families, where personal hygiene is neglected.

Significance of the study

Although the availability of effective chemotherapy, scabies is still a major problem in many rural and urban communities in Nepal, relating primarily levels of poverty, overcrowding and poor hygienic status. Scabies is increasingly recognized as a major driving force of secondary bacterial infection and so many infectious diseases. Up to this date no any survey work is done on scabies in Mahottari district so scientifically

it is interesting to know the local reality regarding patient's perception of scabies, due to highly prevalent skin diseases associated to epidemiological risk of greater spread resulting from lack of diagnosis. The people of rural area selected under study are illiterate, lying underline of poverty; residing in overcrowding and poor hygienic status so prevalence of scabies may be high in these communities. It is important to know the product profile used for self medicating scabies in order to assess the individuals' risk of using substances-such as corticoids-which can hide the clinical status of diseases or, even cause some skin condition, such as contact dermatitis by antibiotics and topical use of plants.

This investigation is aimed to seek relation between community and infestation rate of *Sarcoptes* specimen and to bring awareness regarding prevention and cure of this infestation.

II

OBJECTIVES

General

To determine the infestation rate of *Sarcoptes scabiei* causing scabies in Loharpatty VDC, of Mahottari district of Nepal.

Specific

- To determine the hygienic status of the study area.
- To determine age and sex-wise prevalence of scabies.
- To collect *Sarcoptes* specimen from infested persons and identification of mites.
- To find out the knowledge, attitude and practices towards scabies.
- To aware people regarding preventive measures of *scabies* in the study area. Convincing people for treatment, if they are attacked by these mites.

III

LITERATURE REVIEW

Scabies in global context

Kambara et al., (1999) examined a 64 year old man with crusted scabies (Norwegian scabies) with blisters on his trunk and limbs. He was diagnosed as bullous pemphigoid, then began treatment with prednisolon 105 mg/day and was gradually tapered to 80mg/day then blisters disappeared except for several erosions after four months and developed crusted eruptions on his trunk and limbs. The scabies was treated with 0.5% Y-BHC ointment for 3 days and a week. Two weeks after treatment, all crusted eruptions were scrapped off and no scabies mites were seen from skin scrapping.

Glorio et al., (1999) detected a case at hospital out break of scabies, which provoked the infestation of physicians, nurses and relatives; then started a revision of the disease, particularly analyzing its epidemiology aspects, in order to describe the distribution and magnitude of the problem. They pointed out that scabies were of worldwide nature, with a real unknown prevalence, and a substantial increase of the number of cases in the last few years, particularly in closed communities.

Downs et al., (1999) studied about the prevalence of both scabies and head lice by the help of information obtained from the office of National Statistics, Royal College of General Practitioners, Weekly Return Service, Department of Health and local survey of school children from Bristol and drugs sales of insecticides. From the study it was suggested that the prevalence of scabies and head lice was increasing and both conditions were becoming refractory to pesticides treatment and head lice were significantly more prevalent in urbanized areas ($p<0.00001$), north of country in children ($p<0.000001$) and women ($p<0.000001$). Both conditions were seen in all age groups and common in the winter compared to summer.

Walton et al., (1999) studied genetic markers in sequential population of *S. scabiei* mites from treated patients with multiple episodes of crusted scabies. Individual mites were genotyped at hyper variable microsatelite locci by a fluorescence based

polymerase chain reaction. Results indicated that sequential populations of mites were genetically more similar to each other than to mites from other patients.

Lonc and Okulewicz (2000) studied direct relationship between the high incidence of scabies and low standard ecological indices, as well as social economic setting among inhabitants of Walbrzych, Legnica and Wroclaw districts in Silesia region of Poland. In the year 1990-1997, the highest means incidence of scabies per 100,000 people (80 and 46) were noted from Legnica and Walbrzych districts respectively, compared to only 7.9 in the Wroclaw district. Infestation was co-related with percentages of the population with higher education (4.8, 4.2, and 1.01, Walbrzych, Legnica and Wroclaw respectively) and the number of patients per physician (795, 632, and 288 respectively). Scabies infestation was highest in children and teenagers (0-19) and was gender associated in all age groups, (Women were more often infested than men).

Alberici et al., (2000) worked on safe and reliable treatment for (HIV) – associated scabies, they had treated 60 episodes of scabies in that setting, occurring in 39 patients, with one of the following regimens: (i) topical treatment with benzyl benzoate solution; (ii) single- dose oral treatment with ivermectin alone; and (iii) combination therapy with benzyl benzoate solution and oral ivermectin, employing the same regimens as single agent therapy. In contrast, combined treatment produced an optical rate of success, without significant treatment related side effects. They concluded that combination treatment with benzyl benzoate solution and oral ivermectin is preferable to single agent therapy in crusted scabies occurring in HIV/AIDS patients.

Abou Zinada and Najwa (2000) diagnosed microscopically 18 cases of scabies over four months in Jeddah. The most common infested site was the abdomen, followed by the lower and upper limbs but in other parts of the body was not common.

Birrell and Birrell (2000) data on polypharmacy and appropriateness of the treatment of upper respiratory infection, anemia and scabies from the 17 primary health care units in northern Zanzibar were analyzed before and after one year teaching programme. That analysis showed a significant and sustained reduction in polypharmacy and an improvement in the treatment of scabies, upper respiratory infection, and anemia in less developed country.

Wisuthsarewong, Wanee and Suchitra Viruan (2000) performed retrospective study of the skin diseases in children less than 13 years old at the Referral Pediatric Dermatology Clinic, Syria Hospital, Thailand. It included 4,265 visits made by 2361 patients. In children, eczematous dermatitis was the most common (41.2%) followed by skin infection (21.9%), pigmentary disorder (7.0%), hypersensitivity skin disease (4.1%) and others. The entity of contact dermatitis, scabies, vitiligo tunea capitis, alopecia, areata, popular urticaria, impetigo and urticaria represented 4.9, 4.1, 4.1, 3.3, 2.4, 2.3, 2.3 and 2.2 percentages respectively.

Paasch and Uwe-Frithjof (2000) examined clinically and microscopically of identified mites from all individuals of the population (IOP: patients, staff, and family members) by dividing into two groups: (a) healthy and infested IOP; and (b) cases with crusted scabies. The first group was treated simultaneously once with external scabicides (allethrin or permethrin). All others were hospitalized and treated either with systemic ivermectin or with the latter in combination with permethrin living in three residences. The clinical signs of scabies were reported in 91.5%, 78.5%, and 15.4% of the patients (age 55-97 years; mean, 80.5 years), 54.1%, 32.9%, and 16.6% of staff members, and in 7%, 3% and 0% of family members. The infested IOP showed crusted scabies (index cases) in 5.3%, 5.0% and 1.7% common scabies in 43.1%, 36.7%, and 7.1%, and postscabiotic dermatitis in 10.3%, 7.6%, and 3.5%.

Bezoldet et al., (2001) described the use of polymerase chain reaction (PCR) to amplify *Sarcoptes scabiei* DNA in a patient presenting with clinically a typical eczema. Cutaneous scales were PCR positive for *S. scabiei* DNA before therapy and negative 2-weeks after therapy. That method was facilitated fast and very sensitive diagnosis to identify previously unrecognized scabies.

Mazyad et al., (2001) recovered *Sarcoptes scabiei* and *psoropts ovis* from EL Hassanah and All Arish. In sheep 197 out of 939 (20.98%) were infested with *S. scabiei* (4.05%) and *P. ovis* (16.93%). The highly infested sheep were recorded in EL Hassanah (28.22%) and the least infested one were in All Arish (15.85). In man 69 out of 790 (8.7%) were infested with *Sarcoptes scabiei* (8.1%) and *P. ovis* (0.63%). The highly infested patients were recorded in E.L. Hassanah (16.2%) and the least infested ones were recorded in All-Arish (4.3%). In man infestation was seen on one site in 15 patients (21.7%), on two sites in 32 patients (46.4%) and on more than two sites in 22

patients (31.9%). Infestation on the two sites was predominant on the upper and lower limbs followed by the lower limbs and genital organs. Those results indicated that transmission of scab mites, *S. scabiei* and *P. ovis* from Sheep to man occurred. Infestation with scab mites was high in shepherds (79.7%) than in non-shepherded patients (20.3%).

Takahashi et al., (2001) performed parasitological and histopathological examinations on two raccoon dogs, *Nyctereutes procyonoides*, with severe dermatitis. These raccoon dogs were infected with a great number of *Sacroptes scabiei* but not with *Demodex.* Histopathologically, marked parakeratosis, hyperkeratosis and acanthosis were observed then cross sections were observed in the stratum corneum and hair follicles contained keratinous plugs instead of hair.

Marigny et al., (2001) studied about the efficacy of ivermectin in the patients suffering from scabies and treated with ivermectin for onchocercosis. The result showed that ivermectin was very efficient particularly in treating crusted scabies- a growing infection in immunodefficient patients associated with a simple use (one or, two oral doses within a week) compared with constraining topical scabicide treatment.

Brook Itzhak (2002) summarized a series on studies on the microbiology of several secondary bacterial infections: scabies, psoriasis, poison ivy, atopic dertmatitis, exzema herpecticum and kerion. *Staphylococcus aurous* and group A ß-*hemolytic streptococci* were the most prevalent aerobes and were isolated from all body sites. The enteric gram - negative *bacilli* and *bacterioides spp.* were found most often in buttock and leg lesions. Group A ß- hemolytic *streptococci*, pigmented *prevotella* and *porphyromonas spp.* and *fusobacterium spp*. were most commonly found in lesions of the head, face, neck and fingers. That review highlighted the polymicrobial aerobic-anaerobic microbiology of secondarily infected skin lesions.

Takeda Fumiko et al., (2002) carried out a survey of mites from four –hospitals in May, August and November 1996 and February 1997 in Central Mainland Okinawa. All together one hundred and twenty-seven dust samples were collected from the floor and bedding and examined. The average numbers of mites were 30.9/m^2 for the floor and 180/m^2 for bedding 5/m *Sacroptes scabiei* were found from a mattress and blanket in a patient room.

Smith et al., (2002) worked on skin disease problems in the staffs of large Korean nursing homes over the past 12 months. From the study, it was found that the contact dermatitis was the most common skin disease detected, with 4.8% of staff currently suffering from it and 6% reporting it in the previous 12 months period. Scabies was diagnosed among 24% of staff and reported as a previous infection by 6.0%. Over all, the prevalence of dermatitis and scabies were quite low when compared to previous studies.

Buczek et al., (2002) performed an epidemiological analysis of scabies incidents focusing on the age and sex patterns of the population, seasonal incidence, and environmental conditions in Central Europe from 1990-1998. Total 2064 cases of scabies were reported and found that the incidence of scabies was typically higher in rural areas than in cities. The most cases of scabies were noted in children and teenagers between 6 and 15 years of age. The research indicated that prevalence of the disease within a family was an important factor in scabies epidemiology in the Swietokrzyskie Voivodeship (Central Europe). The incidence of scabies was seasonal in its nature, as the majority of cases occurred in the autumn and winter months.

Holt et al., (2003) studied on *Sarcoptes scabiei* and identified a multigene family of at least 24 homology of a serine protease allergen. One of these genes was predicted catalytically inactive due to mutations at a critical triad of monoacids at the active site. The possibility of these genes for inactivated proteases have been conserved because they mediate a novel host defense evasion stages that the mite had evolved as an adaptation to parasitism of the epidermis.

Mimouni et al., (2003) determined the seasonality of scabies in a large military population for the last two decades. That database was used in the present study to analyze the incidence of scabies by seasons. Scabies was defined according to the report by a military physician based on the typical clinical presentation, relevant epidemiological data and in most cases, microscopic visualization of the mites. Then it was found that the person–time incidence of scabies was higher in winter than summer ($P < 0.001$) and the young adult population was more frequent in the cooler months of the year.

Katsumata and Katsumata (2003) applied Y-BHC (60 mg) over the entire body except the head of a 91-year-old female suffering from scabies. That chemical was used in a smaller dose than previously reported, and it proved to be effective except for its effect on the head. Six days after the initial application, they applied Y-BHC (49 mg) to the patient's head, but she died 5 day latter concluding that the application of Y-BHC to the head of such patient should be done with great caution.

Gonzalez et al., (2003) carried out an epidemiological study from 1998 – 2002 on children treated at the hospital de Ninos in La Plata. 22% out of 4900 children between 0 and 11 years 22% were infested, of these children between 0 and 3 years were the most affected. Girls exhibited a higher prevalence (23%) than boys (9%). Incidence in both girls and boys was higher in winter (38% and 24% respectively) than in autumn (33% and 20%), spring (23% and 15%) and summer (6% and 3%). A higher prevalence was recorded of lower strata of society (62%) due to stacking, poor hygienic conditions and insufficient means.

Perna, Bell and Rosen (2004) presented a 45 year old AIDS patient with red popular pruritis rash on his abdomen and anterior thighs and a single, thick, crusted, non-practice lesion on the penis, treated with lindane topically prior to the development of the penile lesion. Then a mineral oil preparation was obtained from the hyperkeratosis penile lesion and revealed the numerous mite eggs and faces. Again the patient was treated with ivermectin 200 mg/kg dose taken as two doses, 14 days apart, with complete resolution of both pruritus and skin lesions. This patient is the first known report of Norwegian scabies localized as a single lesion on the penis.

Fajardo-Velazquez et al., (2004) admitted an AIDS patient with severe water and electrolyte imbalance to the hospital de infectologia of the Centro Medico Nacional La Raza in Mexico City from July 19 to August 20, 1999. After 28 days, identified 48 secondary cases with clinical scabies: 71% health workers, mainly nurses (79%), 23% health worker's relatives and 6% inpatients. The skin rashes commonly involved the upper extremities (60%) but not the hands. That high lighted the difficulties in diagnosing Norwegian scabies in an immunosuppressed host as well as the importance of ensuring that health workers follow standard precautions at all times.

Otero et al., (2004) conducted a prospective 15-year (1988-2002) study in 9751 attenders, investigating scabies and other in Spanish STIs unit. One hundred forty seven patients (1.5%) had scabies, which was more frequent in males (2.1% 73 of 3623) than in females (1.2%, 72 of 6128) ($P < 0.001$). Infestation peaked in autumn/winter (70.1%) versus spring's summer (29.9%) ($P<0.05$). And oral contraceptic users ($P < 0.01$), high alcohol users ($P<0.05$). In both sexes, scabies was commoners in smokers ($P < 0.05$) and parenteral drugs abusers ($P < 0.001$). The scabies incidence had been stable, with autumn and winter peaks.

Mc Carthy et al., (2004) carried out a community based research in the biology of scabies and infection. The infections were resulted in the application of molecular tools. Those tools were established that canine and human scabies populations were genetically distinct, a finding with major implications for the formulation of public health control policies.

Unver and Nevin Turgay (2006) reported that the clinical types of scabies can be highly variable. There might be a problem in diagnosis due to difficulty in detecting the parasite and delayed diagnosis caused outbreaks for people living in overcrowded places such as poorhouses, orphanages and barracks.

Pasay et al., (2006) cloned 3711 and 6151 bp. respectively of CDNA and genomic fragments of the VSSC gene from scabies mite *Sarcoptes scabiei* to develop tools to study resistance to pyrethroid acaricides. A polymerase chain reaction based strategy had been developed that enabled genotyping individuals' scabies mites. That facilitated early detection and monitoring of pyrethroid resistance in scabies mite population under drug selection pressure.

Tzanetou (2006) reviewed the features of the arthropods, its life cycle, and the mode of transmission, the clinical form of infestation, therapeutic approaches and new anti-ectoparasitic drugs. The disease control measures were reported, in order to achieve a high suspicion index for the infection, accurate diagnosis, appropriate therapeutic management and prevention in Greece.

Maria de, Fátima de and Medeiros Brito (2006) conducted a prospective study among 65 patients seen at the Dermatology Outpatients Clinic in Recife, Brazil, with clinical diagnosis of scabies. Only 47.7% believed that their symptoms were due to

scabies, and 86% thought that they could be related to other diseases, such as infections, insect bites and allergy to contactants. Self medication was observed in 55.4% of patients, and the products mostly used were soaps and herbs. The diagnosis of scabies led to negative feelings in 56.7% of cases indicated the need of integral care of patients.

Ihsan Hakki CIFTCI et al., (2006) performed a school-based, cross-sectional study in 1,134 children. The infestation was found in 14 (1.2%) of 1,134 children; 9 (0.8%) with *pediculosis capitis* and 5 (0.4%) with scabies. They found that infestations were more frequent in children with mothers whose education levels were low. That indicated the necessity of an improvement in the economic and socio-cultural status of the community and the promotion of hygiene concepts and practices in order to improve health of preschool age children.

Vorou, Remoundaki and Maltezou (2007) admitted elderly institutionalized patients with unrecognized crusted scabies as the main source of nosocomial transmission and found factors that facilitated the development of hospital acquired scabies and nosocomial epidemics were- poor knowledge of scabies epidemiology, unfamiliarity of health care workers with a typical presentations, long incubation period, diagnostic delay and incomplete monitoring.

Ejidokun, Aruna and O'Neil (2007) described control of scabies in future education and reported four conformed cases of scabies among a subset of 108 students and 41 staff members in England hospitals and found that the Staff had considerable physical contact with the students who were housed in five groups of homes, individual homes and support centers. Mass prophylaxis was offered to all staff and students, through 39 general practice surgeries. The challenges overcome were: ensuring complete case ascertainment accessing of up-to-date information about students and staff, achieving a coordinated approach to treatment, securing informed consent and media management.

Sudakin (2007) FDA (food and drugs association) issued a public health advisory for lindane products (approved by US) for the treatment of scabies and lice emphasizing the importance of compliance with labeling instructions. The product was not applied according to the labeling instructions and the 66-year-old man rapidly developed

hypoxemia, seizures, respiratory acidosis and hypotension. The factors suggested a need for the FDA to reassess whether the risks of lindane have been effectively communicated to health care providers.

Abedin et al., (2007) conducted a comparative trial of tropical permethrin and oral ivermectin in a closed population of 84 children living in an urban hostel of Delhi found treatment of scabies with ivermectin in an endemic population was more efficacious as compared to tropical permethrin application and reduced the base line prevalence, decreasing the chain of transmission and chances of reinfection.

Feanneret et al., (2007) detected the 24 cases of crusted scabies from three health care institutions in Switzerland. 12 among inpatients after exposure within the health care institution and the 12 among household or other close contact. The 116 health care providers exposed within the health care institutions were investigated with negative results for scabies. That was the 1st reported observation of large scabies outbreaks involving health care institutions in Switzerland. Those outbreaks demonstrated that it was not an absolute disease and a high index of suspicion must be maintained into promptly detect difficult cases.

Kuhn et al., (2008) developed a few serological tests due to difficult in the diagnosis of *Sarcoptes* infestation using whole mite antigen in animals' mange. They described the isolation and characterization of cines of several immunoreactive clones and their recombinant expression in *Escherichia coli*. Three proteins contained repetitive sequences which suggested that they might be involved in immune evasion.

Rahdar, Vazirianzadeh and Maraghi (2008) conformed scabies by clinical examination and microscopically identification of mites from scrapping of scabies lesions in a four months old child. It was found that the prevalence of scabies was high in children in rural regions, due to certain environmental conditions such as overcrowding, poor personal hygiene, poverty, and ignorance, which were conductive to the spread of scabies.

Scabies in Nepal

Basnyat and Litch (1997) assessed the incidence of medical illness among members of trekking groups in the Central Nepal Himalaya along a 22-day trekking route with elevations ranging from 487 m to 5100 m. The cohort study design was applied using interview and clinical examination by a single physician. Subjects were 155 members of commercial trekking groups: 102 Nepali porters, 31 Nepali trek staffs, and 22 Western trekkers. It was found that the high-altitude pharyngitis/bronchitis was the most common illness in the party (12%) followed by scabies (3%), acute mountain sickness (8%) and gastroenteritis (6%). Other conditions included anxiety (3%), cellulitis (3%), snow blindness (3%), acute alcohol intoxication (2%), conjunctivitis (2%), fever (2%), lacerations (2%), and hemorrhoids (1%).

Walker and Johnstone (2000) assessed the effects and toxicity of topical and systemic drug treatment for scabies by searching different Cochrane Infectious Diseases Group trials registers and international specialist centres. Two reviewers assessed eleven trials, were included (7 compared drug treatments, 2 compared treatment regimes, 1 compared the drug vehicle and 1 was a community intervention). The evidence found that permethrin was more effective than gamma benzene hexachloride and appeared to have less potential serious drugs reactions than gamma benzene hexachloride.

Subedi (2000) has done epidemiological surveillance study of human mites infestation based on baseline health survey among students of Paropkar Orphanage Centre, Paropkar Adarsh High-school and wards 19 and 20 of Kathmandu Metropolitan City and found 27.3%, 22.4% and 22.2% respectively infected with *Sarcoptes scabiei* var. *hominis.*

Joshi and Dahal (2008) conducted **"**Workplace Occupational Health Assessment" in ten industries of Kathmandu valley using a structured questionnaire to find out the health effects due to occupational hazards of child workers. It was found that out of the total 545 workers present in the industries under study, 135 (24.8%) were child workers. Higher proportion of child workers (97%) was illiterate compared to 3% of children with primary level education. Among the child workers, 23 (17%) were girls. The majority of the child labors were suffering from conditions like scabies, otitis externa, otitis media, anaemia, upper respiratory diseases, nasal problems, abdominal pain etc.

IV

MATERIALS AND METHODS

Study Area

Nepal is an underdeveloped country surrounded by China at the North and India at the East, West and South. It is located from 80° 4’ in the East to 88° 12’ in the West longitude and from 22° 22’ in North to 30° 27’ in South latitude. It is administratively divided into five developmental regions, 14 zones and 75 districts. There are 20 districts in the Terai regions, 38 districts in the Hill regions and remaining 17 in the mountainous regions. The Mahottary district where the present study was carried out is a Terai region located in Janakpur zone and include in the Central Developmental Region.

Mahotttari is situated west to the Janakpur zone, at the height of 61 to 808 m from sea level. This district is surrounded by Dhanusha in the East, Sarlahi in the West, Sindhuli in the North and Sitamadhi district of Bihar State of India in the South. It has the total area of 1002 sq. km (Central Bureau of Statistics, HMG 2001) with 76 VDCs and 5 constituencies, and Jaleshwor is the district headquarters. The total population of this district is 552,481 (Male=286,905 and Female=265,576) i.e. 2.39 % of total country’s population with the sex ratio 0.925 and annual growth rate 1.97 % (1991-2001). The literacy rate is 34.6% (Male=45.9% and Female=22.4%). The ethnic groups include Brahmin, Chhetri, Yadav, Muslim, Tharu, Dhanuk, Shahu, Kyastha, Koiri, Sonar, Chamar, Dussadh, Mager, Tamang, Newar and others. 84.85 % of the people living there accept agriculture as their main occupation while rest 15.15% depends on other works rather than agriculture. The poverty index is 29.1%.

The single VDC, Loharpatty situated in the mid of the district was selected for study purpose. It has total population of 7822 (Male=4060 and Female=3762) with 1,372 numbers of households. The VDC is dominated by Muslim, Brahmin, Chhetri, Dhanuk, Chamar, Dushadh, Mushhar, and others.

People are mostly farmers and human habitation is surrounded by poor sanitation. They use common canal to throw wastage of house and never clean the canal which causes environmental pollution of this poor community.

Study Population

During the study period, survey was carried out for mite infestation among 450 people (260 from ward no. 7 and 190 from ward no. 9) of Loharpatty VDC of Mahottari district, Nepal.

Study design

Study was carried out by using random sample technique

Study period

The study was conducted from Dec 2007 to June 2008 at Loharpatty VDC, Mahottari District, Nepal

Methods

- **Questionnaire survey**

A set of structured questionnaire containing name, age, sex, occupation, education, marital status, surrounding environment and their probable effects against disease, current health status, clinical symptoms of scabies, awareness etc. was prepared and administered in the field.

- **Clinical examination**

With the help of medical officer, the infestation of mites was conformed by visual inspection**.**

- **Microscopical examination of the collected samples**

During the study period samples of the mites from infested persons were collected in vials containing 5% formalin solution as preservative by superficial scrapping of skin epidermis with the help of scalpel. The collected samples were brought to the laboratory of Central Department of Zoology for Microscopical examination.

Later the collected scrapping in vial containing 5% formalin solution were mounted on glass slides and covered with cover slips. The slides were examined under low (10x), high (40x) magnification and oil emersion for observation of *S. scabiei.*

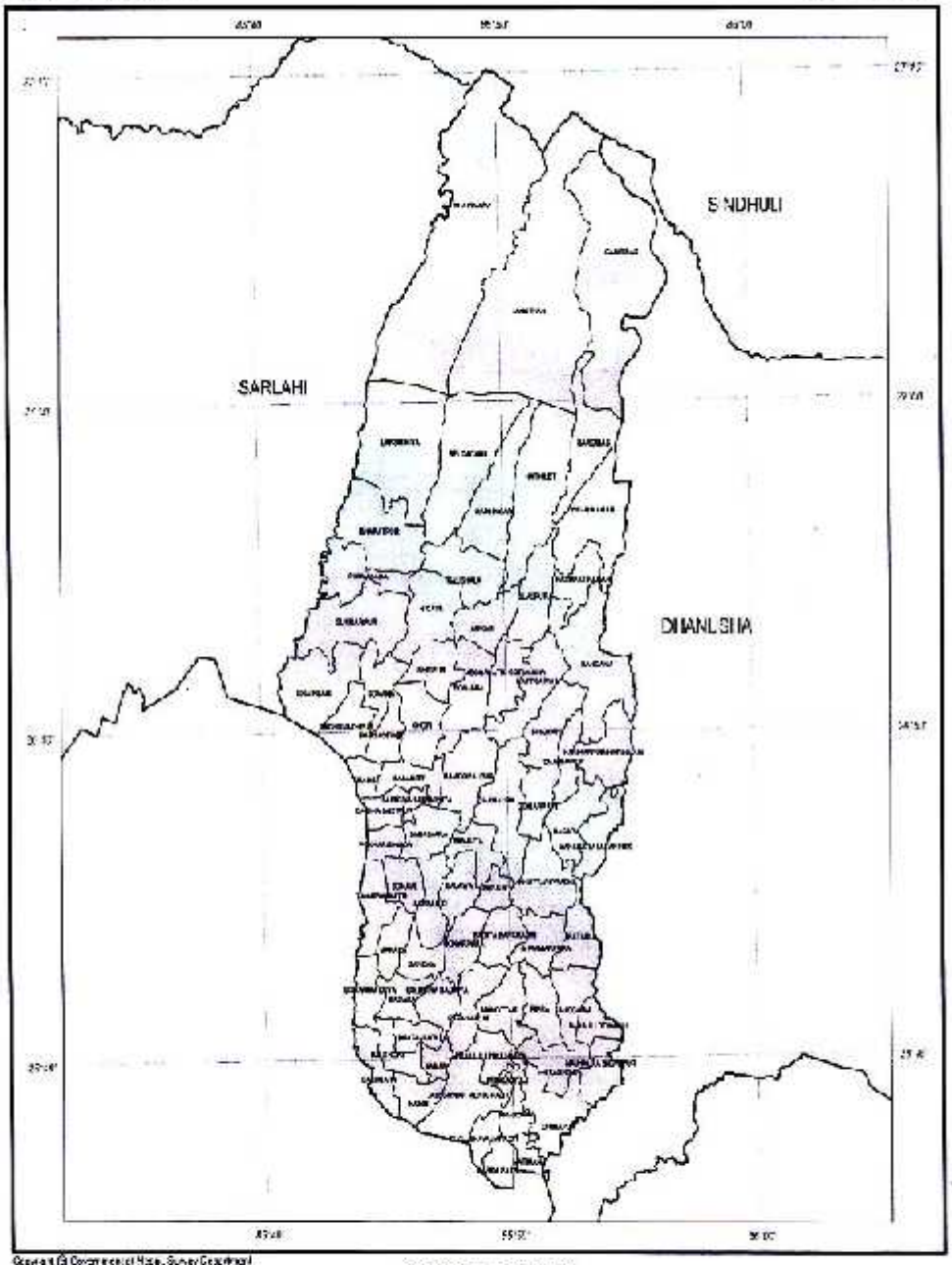
Data Processing and Analysis

The collected raw data were firstly edited to detect errors to make them accurate, uniform and well arranged, and then were coded for easy classification and tabulation. Thus, the classified and tabulated data were analyzed by means of table, bar diagrams and pie-graph under data base method

MAHOTTARI DISTRICT

ZONE : JANAKPUR

District Code : 16



SCALE 1 : 350000

7000 0 7000 14000 Meters

LEGEND

———	District Boundary
———	VDC Boundary
MORANG	District Name
[illegible]	VDC Name

DISTRICT : MAHOTTARI

Area :1002 Sq.Km.(Approx.)

HORIZONTAL DATUM

Spheroid Everest 1830

Projection MUTM

Origin Longitude 84° E, Latitude 0° N

False coord nates of origin 500 000 m. Easting, 0 m. Northing

Scale Factor at Central Meridian 0.9999

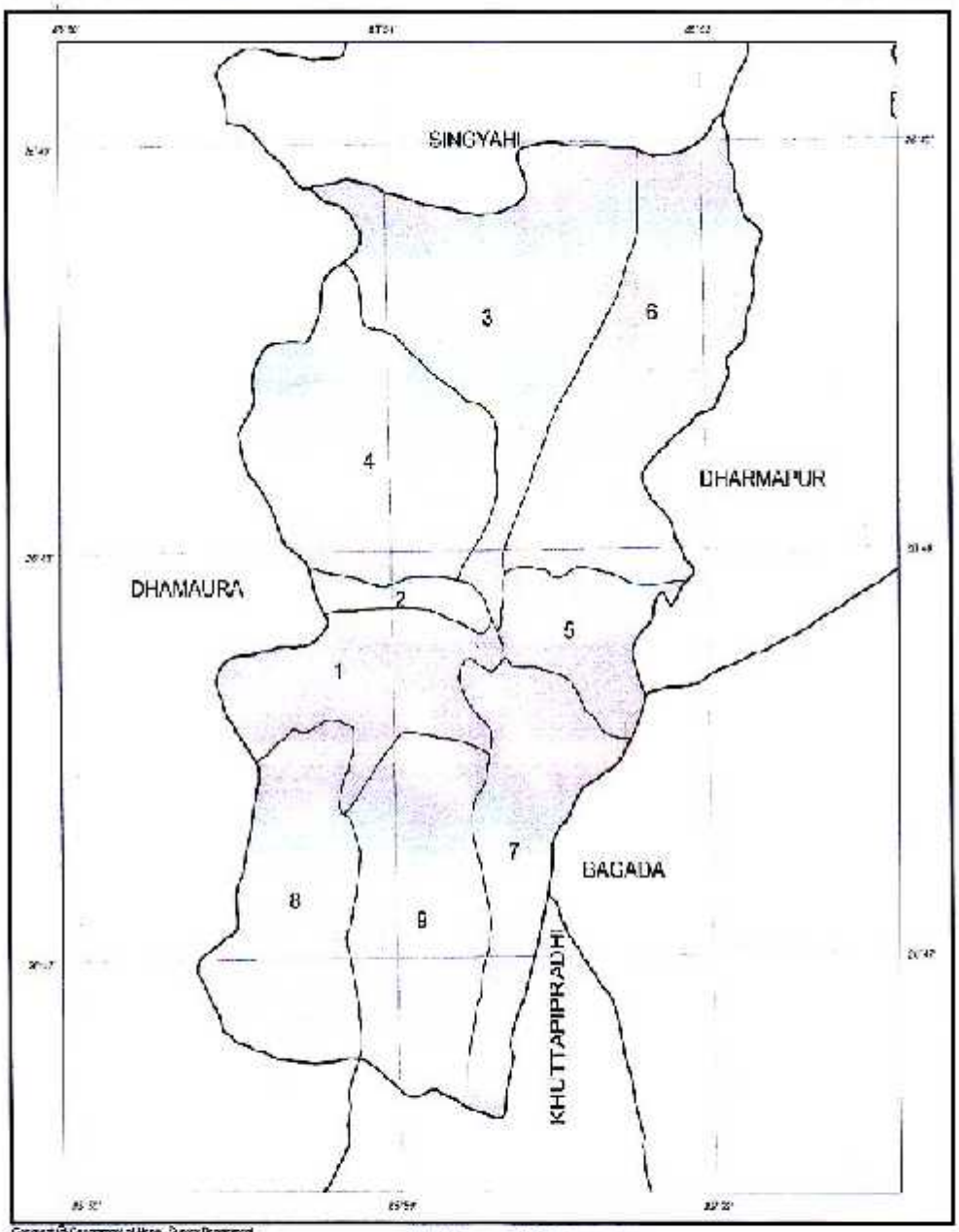
Map compiled from National Topographic Database at scales 1:25 000 and 1:50 000, 2002. Thema administrative boundaries and district names on the picture. Map produced by the Survey Department, National Geographic Information Infrastructure Programme (NGIIP), Kathmandu.

LOCATION MAP

LOHARPATTI VDC

DISTRICT : MAHOTTARI

VDC Code : 18042



SCALE 1 : 27500

LEGEND

———	VDC Boundary
- - - -	Ward Boundary
BUKHIEL	VDC Name
5	Ward Number

350 0 350 700 Meters

HORIZONTAL DATUM

Spheroid Everest 1830
Projection VDTM
Origin Longitude 84° E, Latitude 0° N
False coordinates of origin 500 000 m. Easting, 0 m. Northing
Scale Factor at Central Meridian 0.9999

Map compiled from National Topographic Database at scales 1:25 000 and 1:50 000, 2002. Internal administrative boundaries are not demarcated on the ground. Map produced by the Survey Department, National Geographic Information Infrastructure Programme, (NGIIP), Kathmandu.

LOHARPATTI VDC

Area : 6 Sq.Km.(Approx.)

MAHOTTARI DISTRICT

VDC Location Map

PLATE – I

A. Interviewing the respondents

B. Visual inspection of scabies

C. Penis and Glans Penis infestation

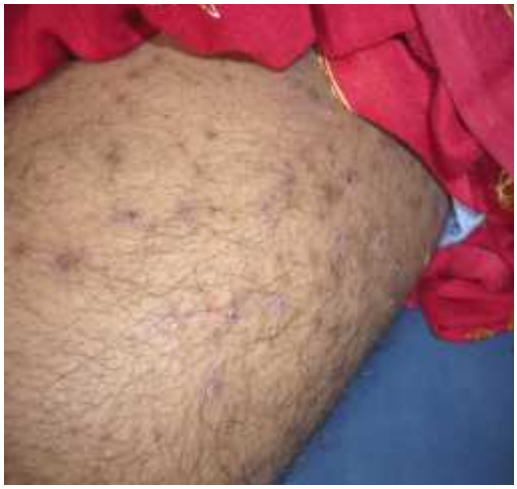
D. Swelling of Penis due to Scabies

E. Infestation on Penis and Pubic region

F. Infestation on Finger web

PLATE: - II

G. Infestation on Pelvic region



H. Infestation on Thigh

I. Infestation on Pubic, Pelvic and Genital

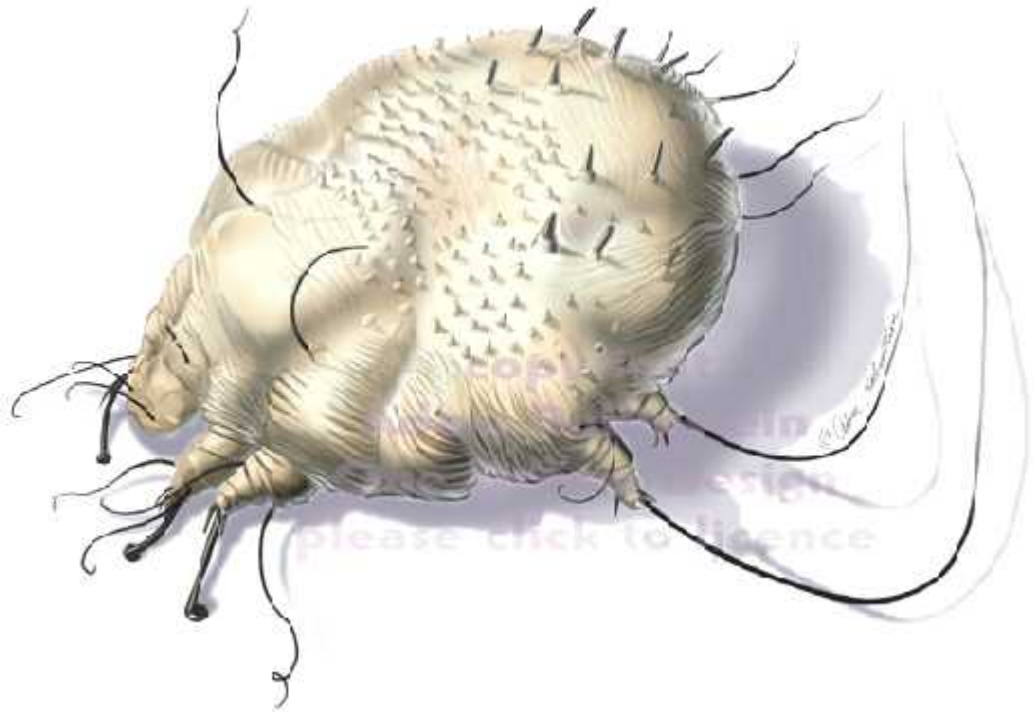
J. Scrotal sac, Penis and Thigh region

K. Penis, Scrotal sac and Pubic region

L. Microscopical examination

PLATE: - III

Male: - *Sarcoptes scabiei* var. *hominis*



Female: - *Sarcoptes scabiei* var. *hominis*

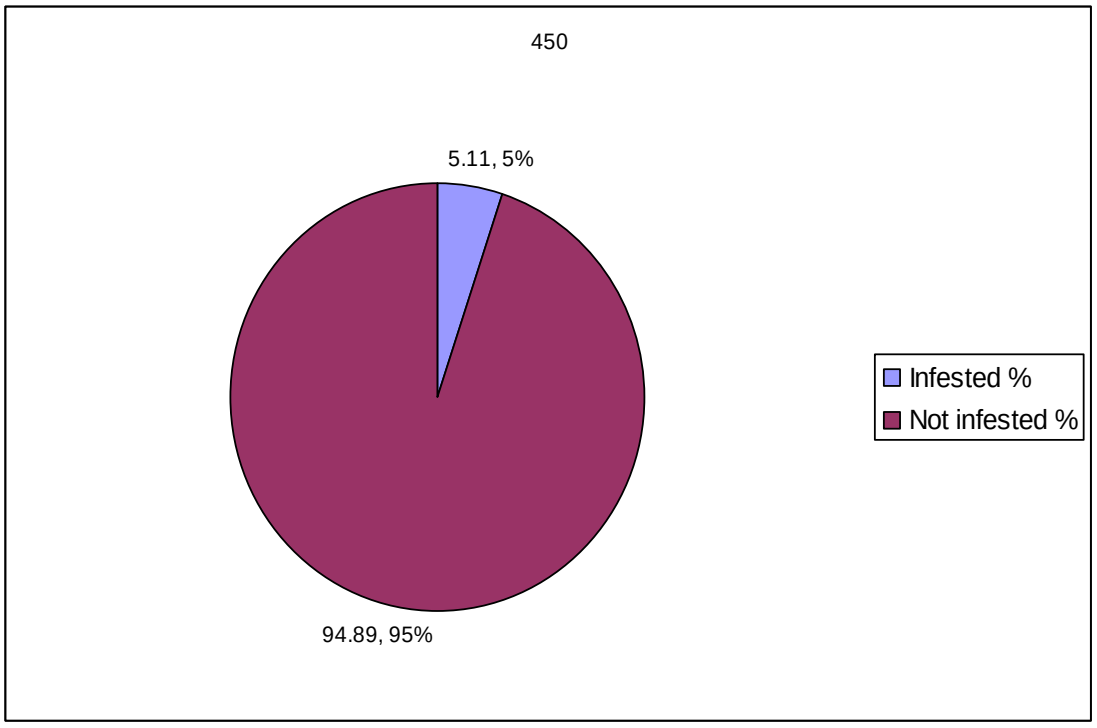
V

RESULTS

The study was carried out among the people of Loharpatty VDC of Mahottari district. Altogether 450 respondents from 64 households were taken as the sample size. The information regarding the prevalence of Scabies infestation from the participants was collected with the help of questionnaire survey and also by observation.

General infestation with scabies

Out of 450 respondents, 5.11% (23/450) were found to be infested with human scab mites causing scabies.



.

Fig. 1: General infestation with scabies

Sex- wise scabies in the studied population

Out of 450 respondents, 5.11% (23/450) were found infested with scab mites, *Sarcoptes scabiei.* Out of which 3.81% (17/450) were males and 1.34% (6/450) were females. Comparatively males were more infested with scabies than that of females. Statistically, the chi-square test indicated that there was significant difference in scabies infestation between the sexes (χ^2 =4.569, p<0.05, 1 d. f.).

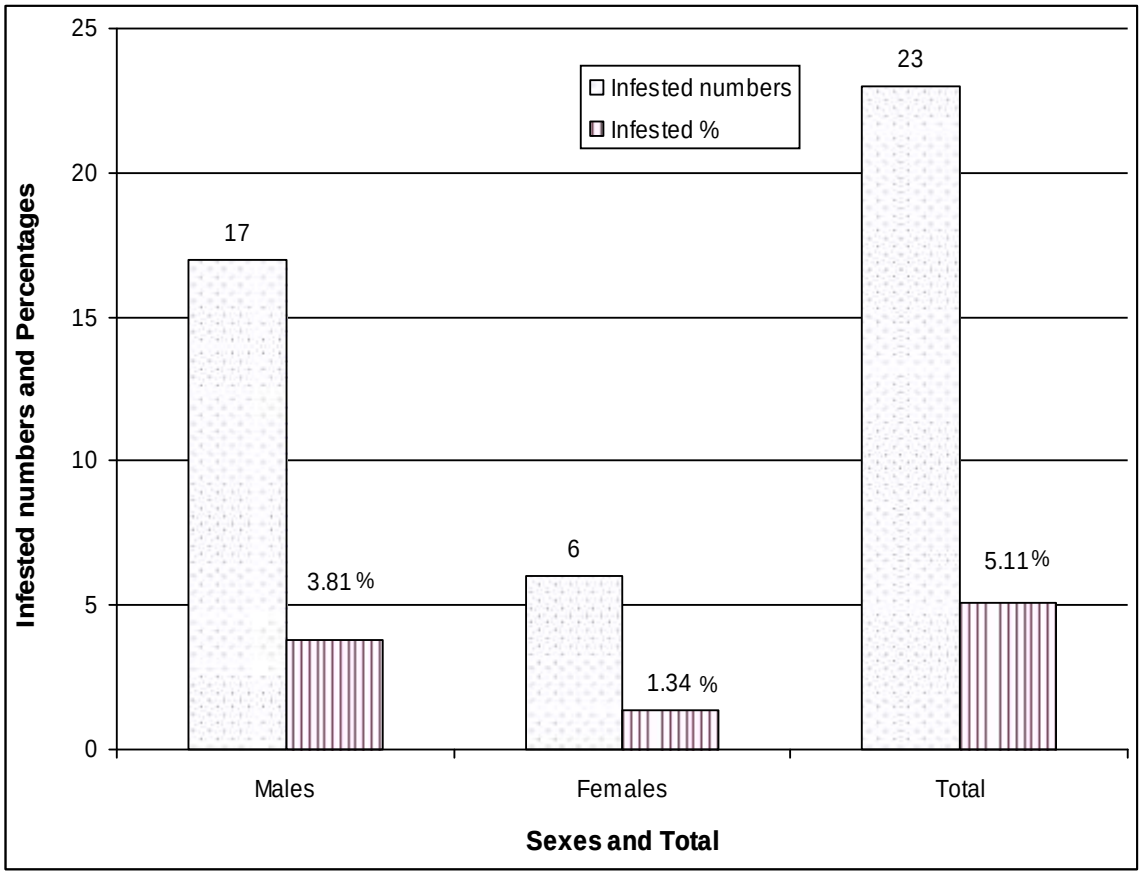


Fig.2: Sex- wise infestation with human mites

Age-wise infestation of human mites

The maximum number of respondents included in the survey were from the age group of ≤10 year(s) i.e. 21.77% (98/450) and minimum number of respondents included in the survey were from the age group of >70 years i.e. 0.088% (4/450). The highest infestation was recorded in the ≤10 year(s) age groups i.e. 2.66% (12/450). The lowest infestations were recorded in the 41-50 and 51-60 year(s) age groups i.e. 0.22% (1/450) and 0.22% (1/450) respectively. Similarly infestations of 1.11% (5/450), 0.44% (2/450) and 0.44% (2/450) were found in 11-20, 21-30 and 31-40 year(s) age groups respectively. Statistically, the chi-square test indicated that the difference in age wise infestation of scabies was found to be significant (χ^2 =14.754, $p<0.05$, 7 d. f.).

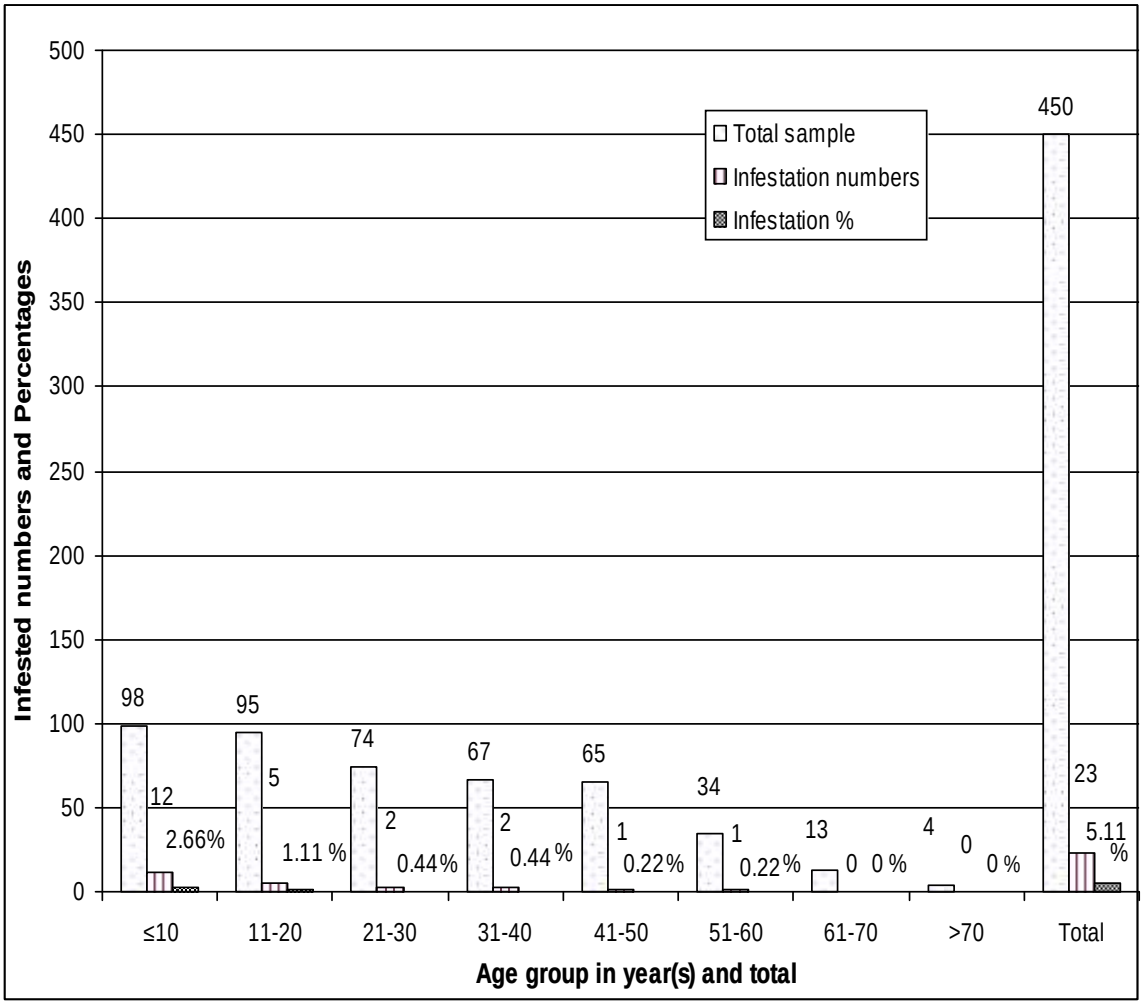


Fig. 3:Age-wise infestation of human mites.

Age and sex wise infestation of human mites

From the study it was revealed that among the males the maximum infestation was found in age group ≤10 years i.e. 2 % (9/450) followed by the 11-20 years i.e. 0.88% (4/450), 21-30 years i.e. 0.44% (2/450) and 31-40 years i.e. 0.44% (2/450) while no infestation was found in other age groups. Similarly in female, the maximum infestation was found in the age group ≤10 years i.e. 0.66% (3/450), followed by 41-50 years i.e. 0.22% (1/450) and 51-60 years i.e. 0.22% (1/450) while no infestation was found in remaining age groups. Statistically, chi-square test indicated that there was no significance difference in scabies infestation between the age and sexes (χ^2=23.769, p<0.05, 21 d. f.).

Age groups in year(s)	Total samples	Total infestation		Males infestation		Females infestation	
		numbers	%	numbers	%	numbers	%
≤10	98	12	2.66	9	2.00	3	0.66
11-20	95	5	1.11	4	0.88	1	0.22
21-30	74	2	0.44	2	0.44	0	0
31-40	67	2	0.44	2	0.44	0	0
41-50	65	1	0.22	0	0	1	0.22
51-60	34	1	0.22	0	0	1	0.22
61-70	13	0	0	0	0	0	0
>70	4	0	0	0	0	0	0
Total	**450**	**23**	**5.11**	**17**	**3.77**	**6**	**1.33**

Table 1: Age- sex wise infestations of human mites

Education-wise infestation of human mites

The maximum infestation of human mites was found in the primary and under SLC respondents i.e. 2.22 % (10/450) and the minimum in the nonformally educated i.e. education with planned objectives not bounded as formal education respondents i.e. 0.45 %. Similarly 1.56% and 0.91% were found in uneducated and lower secondary school respondents respectively. But there was no infestation in secondary and higher secondary school respondents. Statistically, the difference between education wise scabies infestation was found to be significant (χ^2=30.673, p<0.05, 5 d. f.).

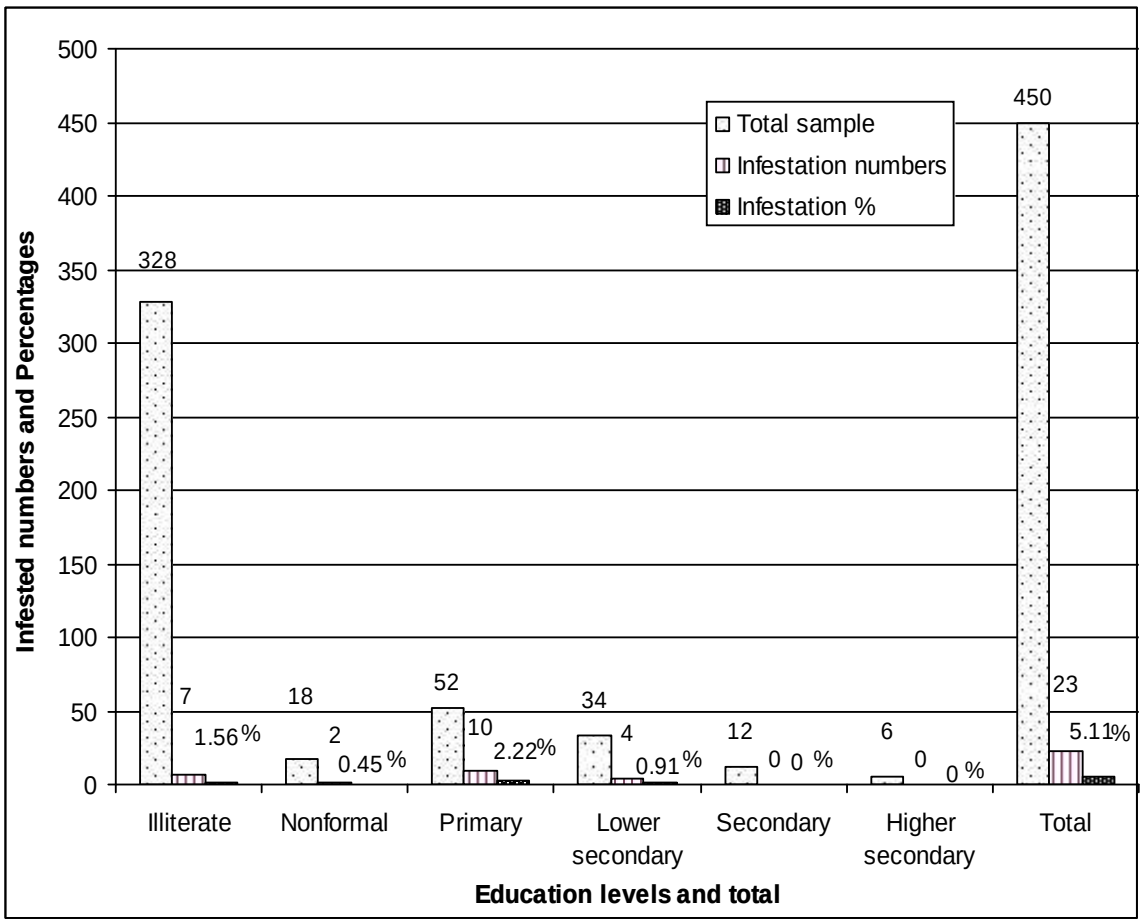


Fig. 4: Education-wise infestation of human mites

Occupation-wise infestation of human mites

Out of 450 respondents, the maximum infestation of human mites was found in the students i.e. 3.11% (14/450) followed by labors 0.88% (4/450), farmers 0.66% (3/450) and house wives 0.44% (2/450) while no infestation was found in the business men and job holders. Statistically, the difference among occupation-wise scabies infestation was found to be significant (χ^2=32.986, p<0.05, 5 d. f.).

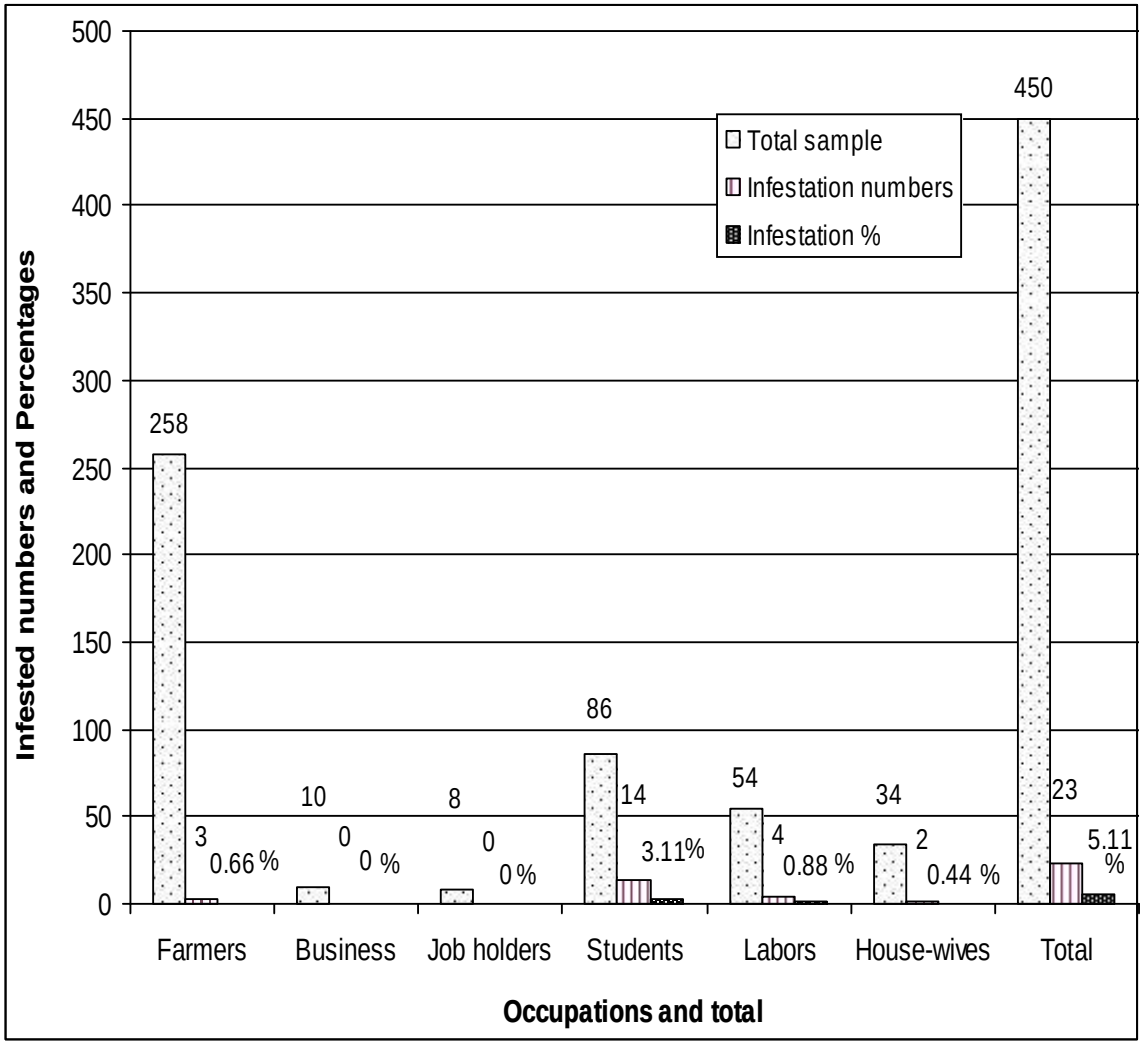


Fig.5: Occupation-wise infestation of human mites

Infestation of human mites in relation to marital status

The maximum infestation was found in those respondents who were unmarried i.e. 4.22% (19/450) and minimum in those respondents who were married i.e. 0.89% (4/450). However there was no infestation of human mites in widow respondents. Statistically, the chi-square test indicated that the difference in scabies infestation in relation to marital status was found to be significant (χ^2=8.722, p<0.05, 2 d. f.).

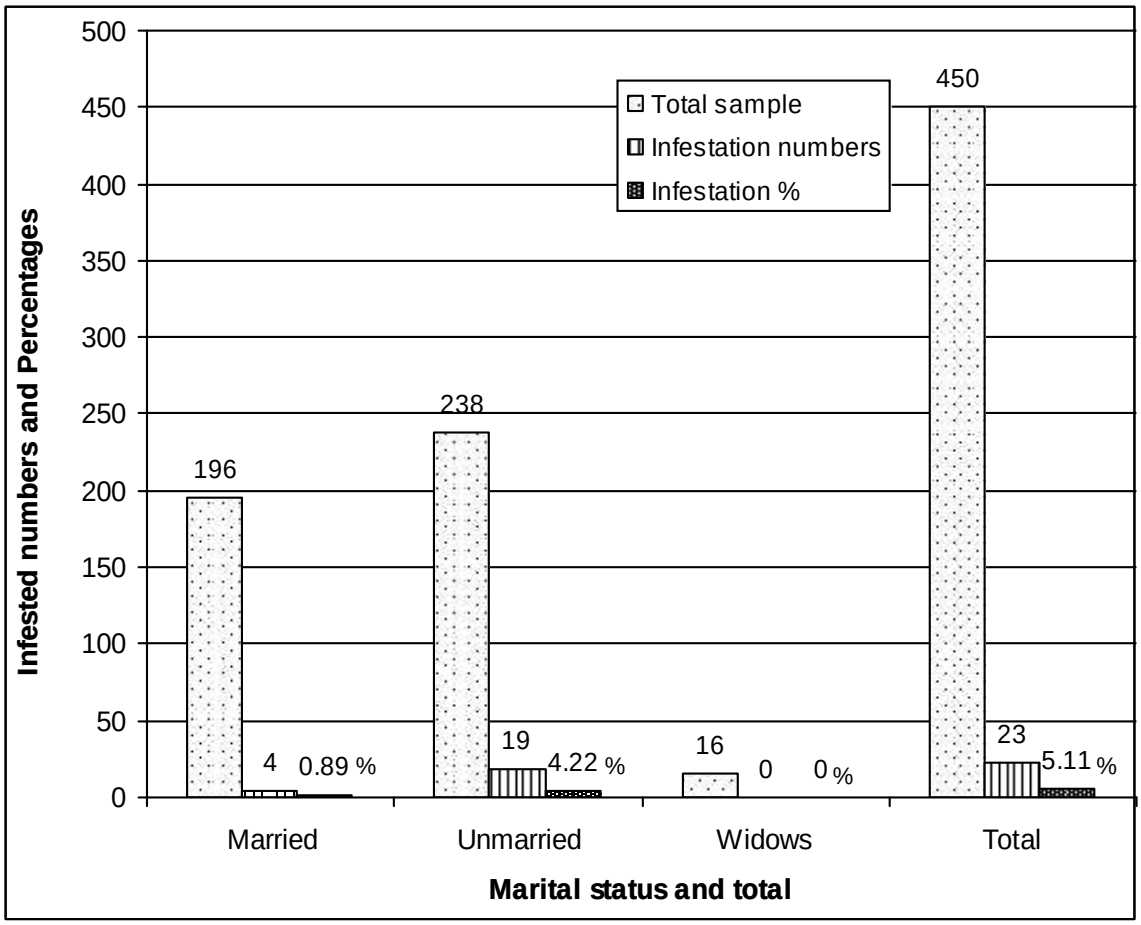


Fig. 6: Infestation of human mites in relation to marital status

Infestation of human mites with frequency of taking bath

Out of 450 respondents, the maximum infestation were found in those people who were not taking bath regularly i.e. 2.44% (11/450) and minimum was found in those who were taking bath regularly i.e. 0.44% (2/450). Similarly 0.72% (3/450) and 1.61% (7/450) infestation were found in those people who took bath twice in a week and once in a week respectively. Statistically, the chi-square test indicated that the scabies infestation was significantly depending upon the frequency of taking bath (χ^2=14.796, p<0.05, 3 d. f.).

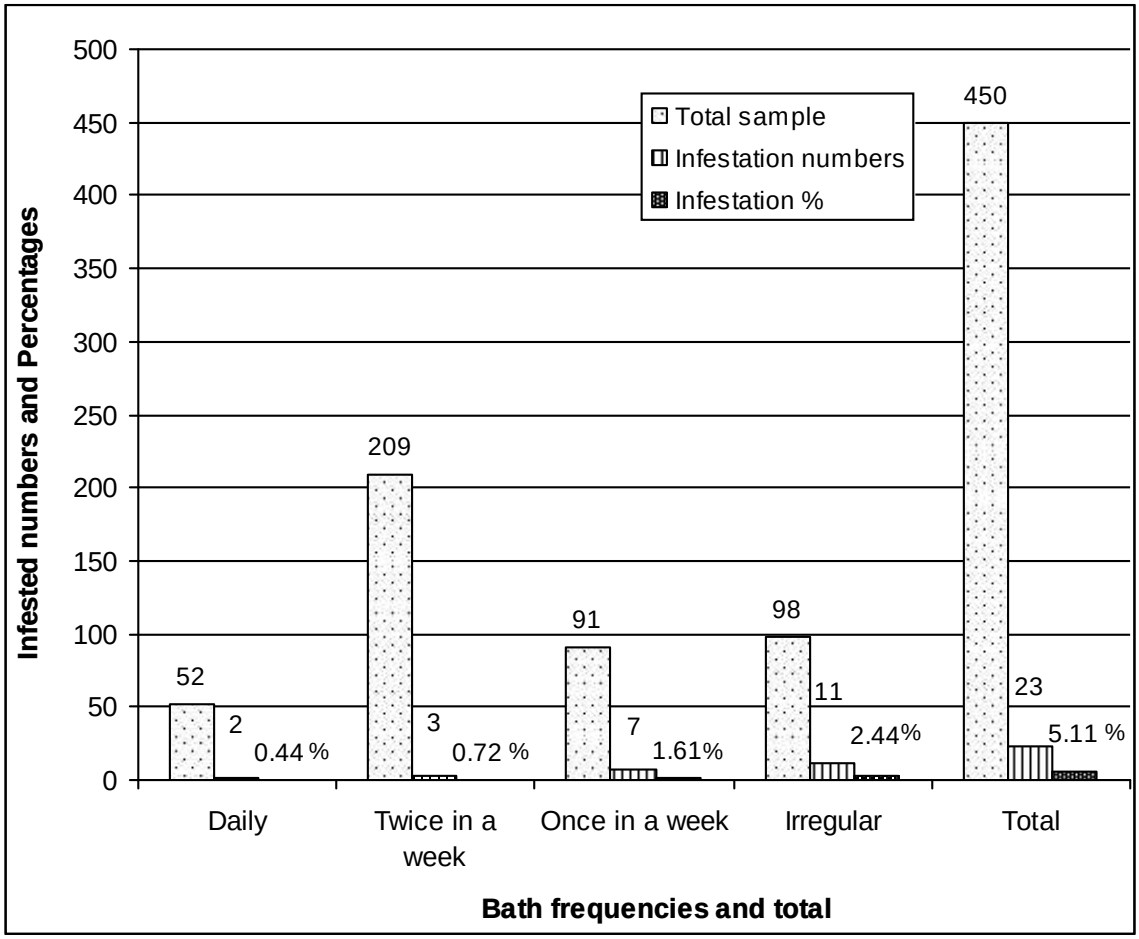


Fig.7: Infestation of human mites with frequencies of taking bath

Infestation of human mites with relation to sleeping habits

Out of 450 respondents, 86.22% (388/450) used to sleep together and 13.78% (62/450) people used to sleep alone. The maximum scabies infestation was found in those people who used to sleep accompanied by another person i.e. 4.23% (19/450) and found minimum in those people who used to sleep alone i.e. 0.88% (4/450). Statistically, the chi-square test indicated that the scabies infestation was significantly depending upon the sleeping habits (χ^2=3.841, p<0.05, 1 d. f.).

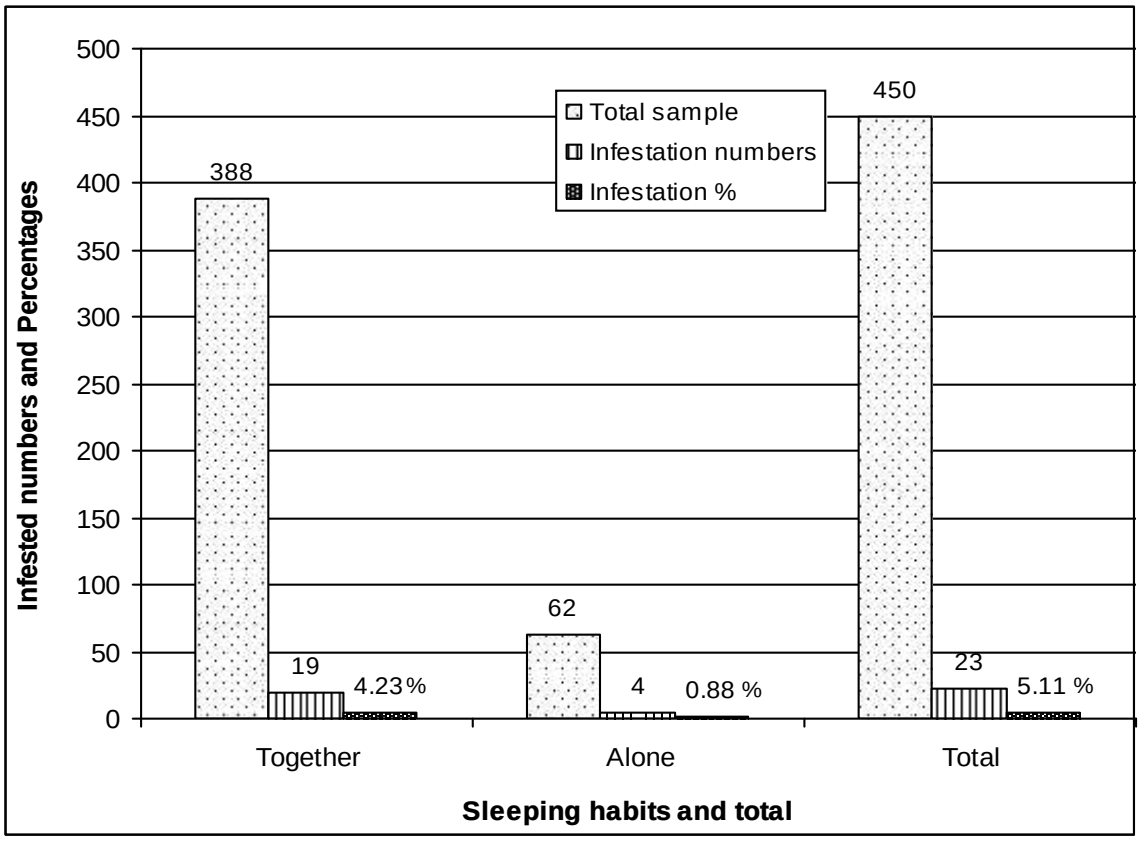


Fig. 8: Infestation of human mites with relation to sleeping habits

Infestation of human mites in relation to environment

Out of 450 respondents, the maximum infestation of human mites were found in the environmental conditions, 2.88% (13/450) dirty followed by 0.90% (4/450) ditches, 0.88% (4/450) vegetations and 0.44% (2/450) clean. Statistically, the chi-square test indicated that the scabies infestation was not significantly depending up on the environmental conditions (χ^2=2.689, p<0.05, 3 d. f.).

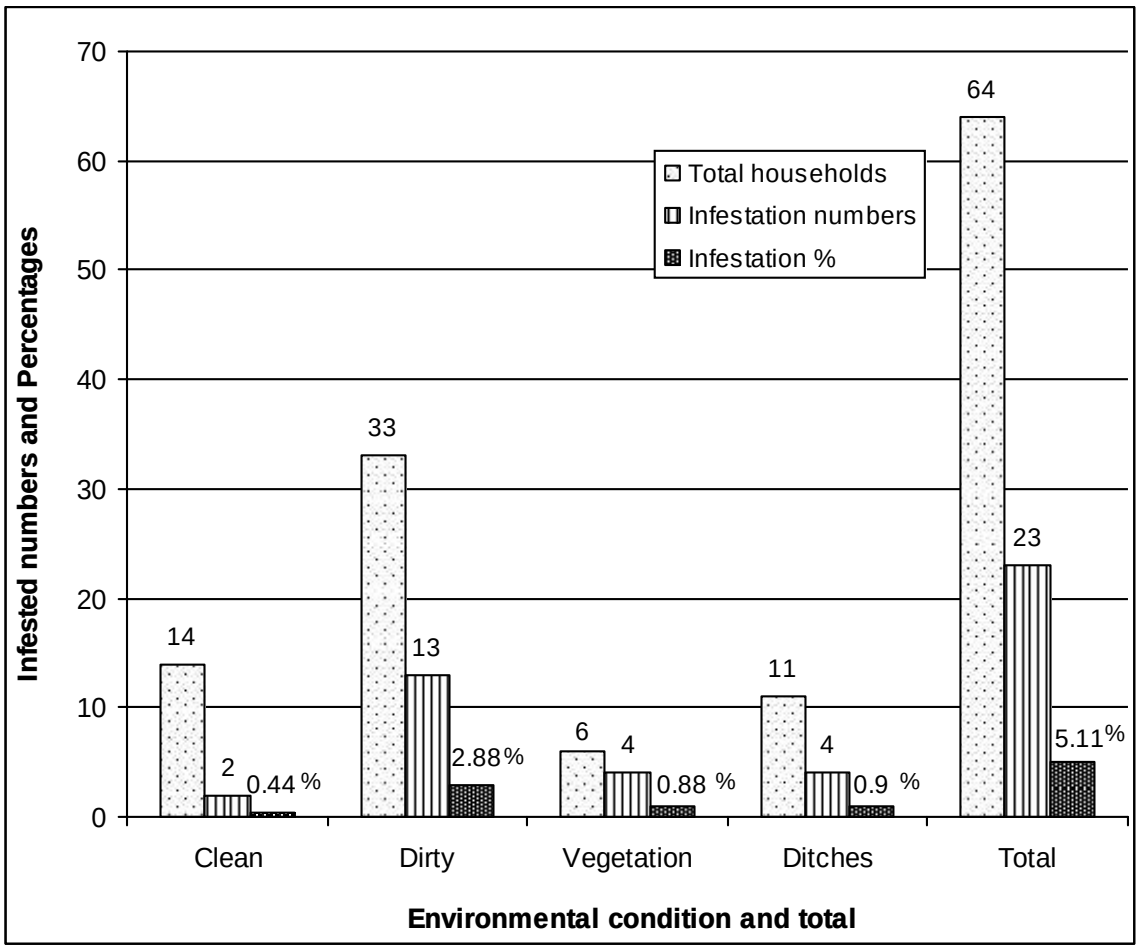


Fig. 9: Infestation of human mites in relation to environmental conditions

Family wise infestation of human mites

From the study it was revealed that the maximum infestation was found in 5-10 family members group i.e. 2 % (9/450), followed by 0-5 family members group i.e. 1.33 % (6/450) and ≥11 family members group i.e. 1.76 % (8/450).

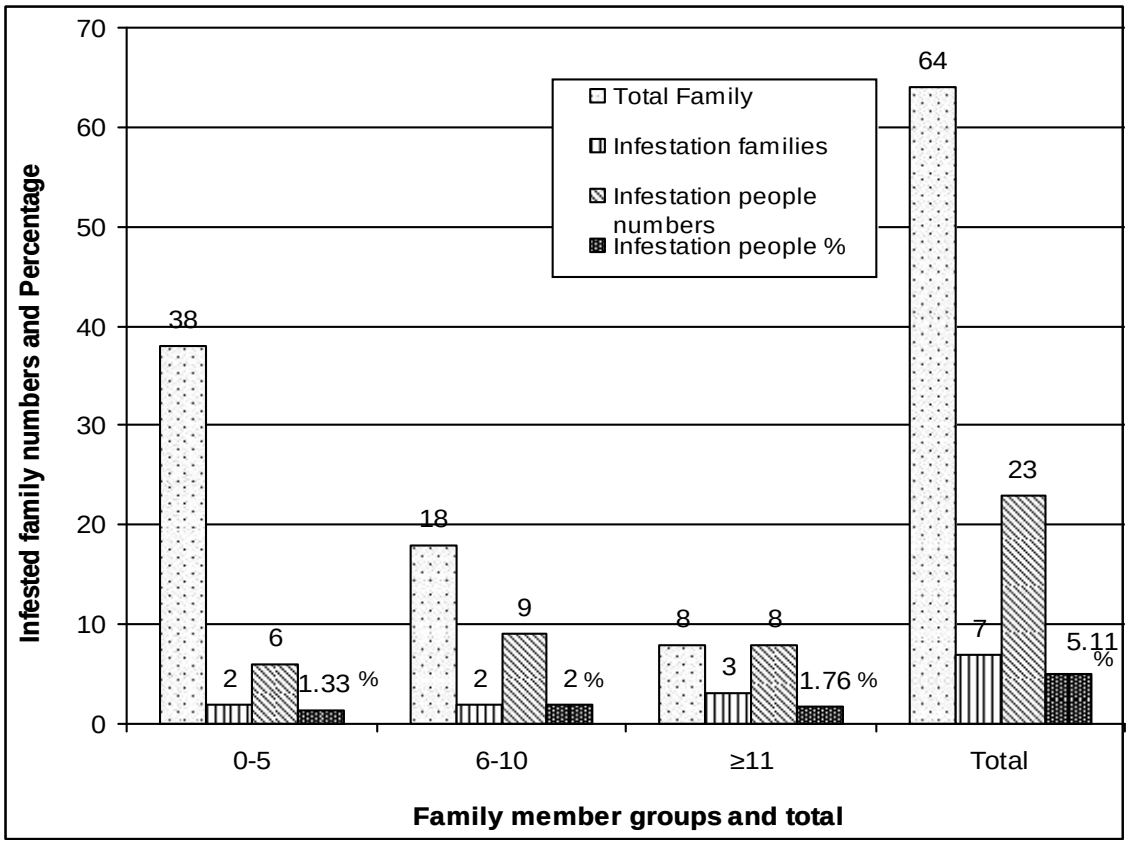
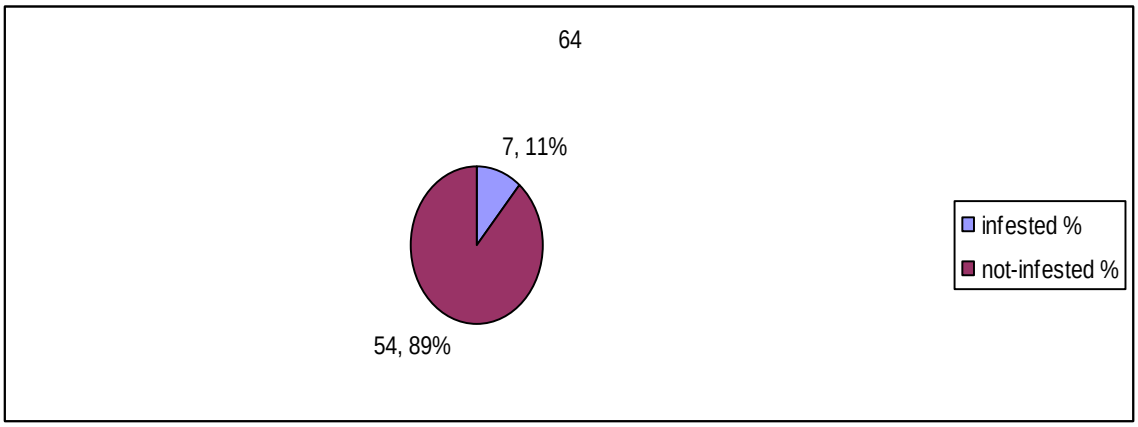


Fig.10: Family wise infestation of human mites

Out of 64 households, 7 (10.95 %) were infested with Scabies, as shown in pie-graph.



Infestation of human mites in relation to soap used during bath

Out of 450 respondents, 22.66% (102/450), 10.66% (48/450), 21.77% (98/450), 5.33% (24/450), 3.77% (17/450) and 35.77% (161/450) were found to use Lifebuoy, Liril, Lux, Dettol, Tulsi and washing soaps during bath respectively. The maximum infestation of human mites were found to 2% (9/450) followed by 1.60% (7/450), 0.63% (3/450), 0.44% (2/450), 0.22% (1/450) and 0.22% (1/450) in those people who used washing soap, Lux, Tulsi, Liril, Dettol and Life buoy soaps during bath respectively. Statistically, the chi-square test indicated that the scabies infestation was significantly depending upon the soap used during bathing (χ^2= 76.606, p<0.05, 5 d. f.).

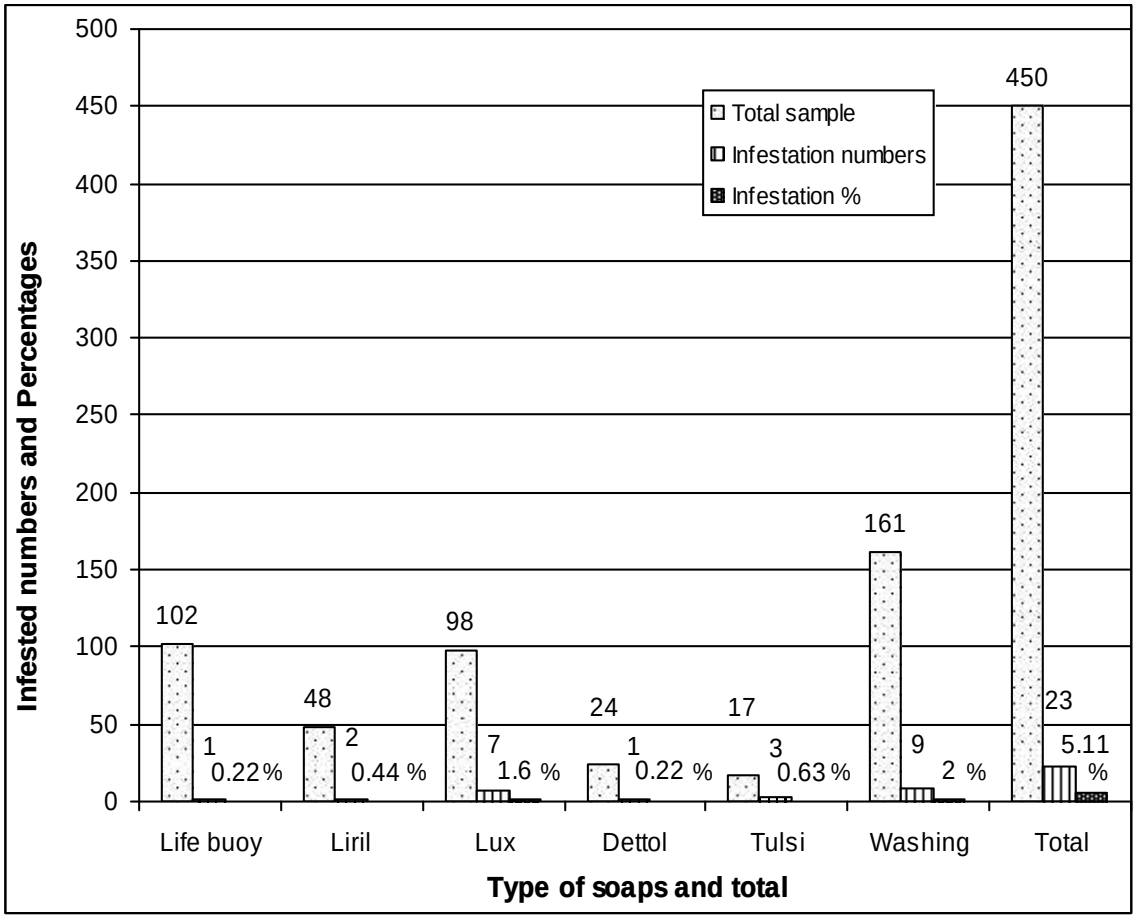


Fig.11: Infestation of human mites in relation to soaps used during bath

Respondents' knowledge towards mode of transmission of human mite's infestation

Out of 450 respondents, 81.33% (366/450) had knowledge about the transmission of human mites from which 2% (9/450) were infested while the rest 18.67% (84/450) respondents had no knowledge about the transmission of mites from which 3.11% (14/450) were infested. Statistically, the chi-square test indicated that the scabies transmission was significantly depending up on the knowledge of respondents (χ^2=28.435, p<0.05, 1 d. f.).

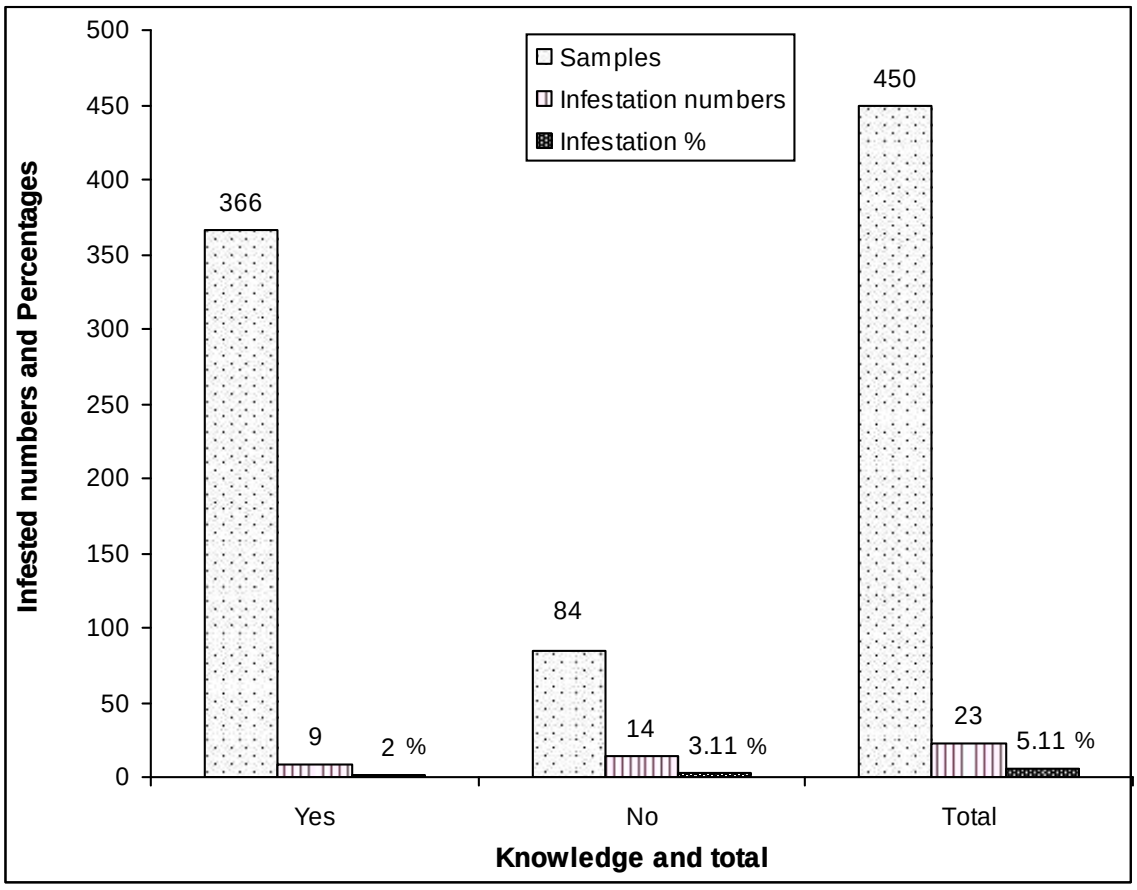


Fig.12: Respondents' knowledge towards mode of transmission of human mite's infestations

Respondents in relation to types of medicines being used during infestation

Out of 450 respondents, 23 respondents were found human mites' infestation. Among them 13.10% (3/23), 8.70% (2/23), 13.10 % (3/23), 21.73% (5/23) and 17.39% (4/23) used Scabial lotions, Scarb lotion, Scabex lotion, Coconut oil and Herbal juice respectively as medicine for cure of the mites' infestation. But out of 23 infested people, 26.10% (6/23) were unknown about the mite's medicines.

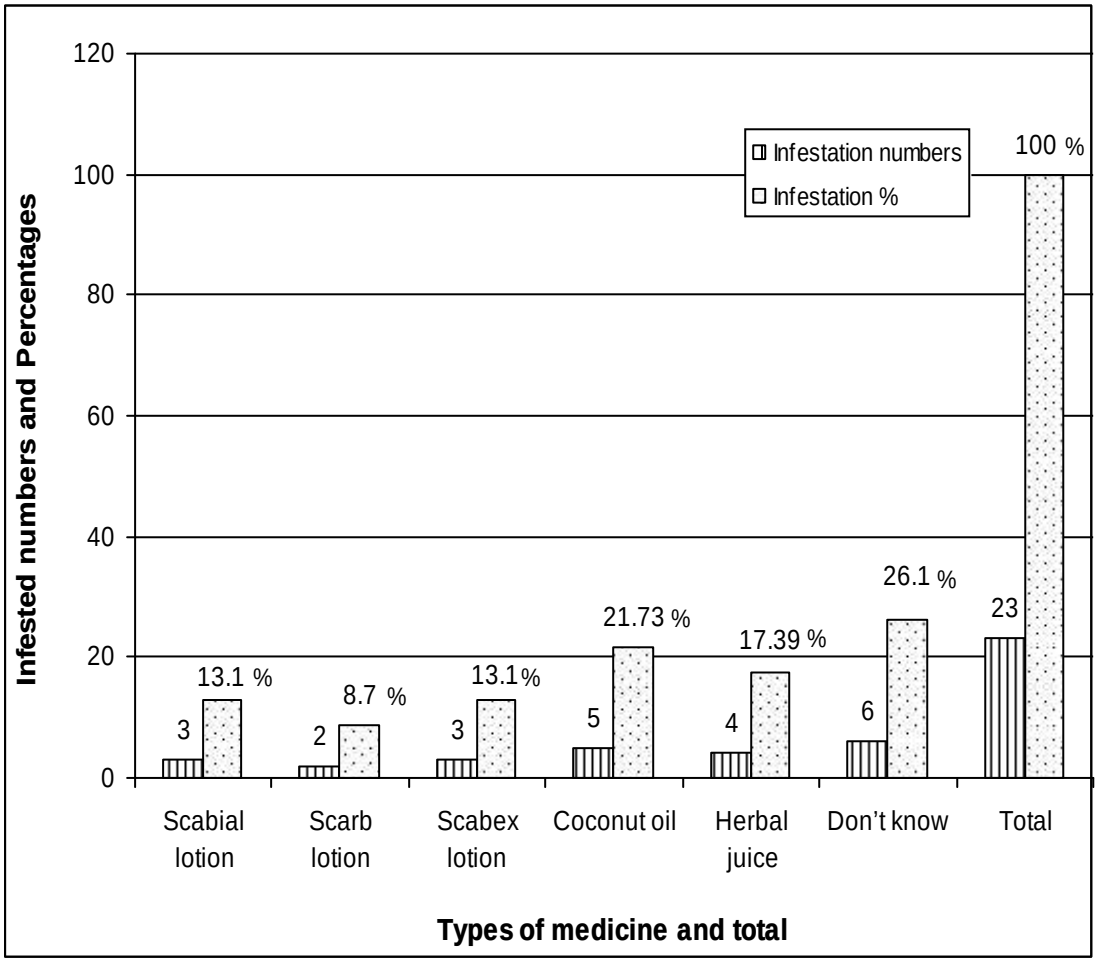


Fig.13: Respondents in relation to types of medicine being used during infestation

VI

DISCUSSION AND CONCLUSION

In fact all communities have their own concept of health, as a part of their culture. No doubt, if we have better health we live longer with better life. Only getting enough food is not sufficient to maintain better health, personal hygiene and sanitation also play an important role for maintaining better health. If condition of personal hygiene, sanitation and balance diet is not maintained properly then the chances of infection of different kinds of parasitic diseases would be common such as lice, mites, worms, flukes, bacteria, viruses' etc. The chances of infestation with mites (Scabies) are more on the person who do not take regular bath and change their garments frequently, contact with infected people, lack personal hygiene and sanitation.

Since the discovery in 1687 AD of the itch mites marks scabies as the first disease of human with known cause and the cause of disease was definitely establish by 1835 AD. Since that time numerous additional knowledge of the causative parasite *Sarcoptes scabiei* have been made. The etiologic agent of *sarcoptic* mange in man was first definitely proven to cause human mange by Raspail and his corcican student Renucci in 1834 AD. Fain in 1968 AD made a detailed study of *Sarcoptic* mites from a wide range of hosts of mammals. Of the several genera of mites of the Sarcoptidae infesting the skin of mammals, only one species *Sarcoptes scabiei* Linnaeus in 1758 AD and Latreille in 1802 AD commonly cause disease in man. The infection with *S. scabiei* acquired from infected dogs, horses, pigs, cattles etc. are considered to produce mild infestations.

The present study has been carried out among the people of Loharpatty VDC of Mahottari district, Nepal. The main aim of the present study is to investigate the infestation of mites (scabies) as well as personal hygiene and sanitary condition of the people. The survey was conducted among 450 people and infestation rate of scabies was found to be 5.11% (23/450). Wisuthsarewong W. and Suchitra V. (2000) reported overall 2361 patients out of whom 4.1% (2361/97) were found infested with scabies. Mazyad et al., (2001) reported over all 8.7% (69/790) people infested with scabies. Smith et al., (2002) reported 6% scabies infestation in the staffs of large Korean nursing homes. Gonzalez et al., (2003) reported 22 % (1078/4900) children infested

with scabies at the de Ninos Hospital, La Plata in Argentina. Otero et al., (2004) found 1.5% (147/9751) scabies infestation in Spain. Ihsan Hakki et al., (2006) found 1.2% (14/1134) children infested with scabies. Basnyat and Litch (1997) investigated 3% (5/155) trekking members were infested with scabies. Subedi (2002) investigated 22.2% (61/275) people of Kathmandu Metropolitan City were infected with scabies. The present result is very much similar with Wisuthsarewong, Wanee and Suchitra Viruan (2002) and Smith et al., (2002).

Among 23 infested cases, 3.81 % (17/450) were of males and 1.34 % (6/450) of females. The higher degree of infestation was found in males than females. Statistically the difference between the sex-wise infestation of scabies was found to be significant (χ^2=4.56, P<0.05, 1 d. f.). This result resembles with Otero et al., (2004) where they showed a higher infestation in male 2.1 % (73/3623) than in female 1.2 % (72/6128) (p<0.001). The higher degree of infestation in males may be because of not taking bath regularly because of busy in labor work.

All the age groups are susceptible to scabies infestation. The present study reveals higher infestation in age group of ≤10 years and 11-20 years i.e. 2.66% 12/450) and 1.11% (5/450) respectively while less in the age groups of 41-50 years and 51-60 years i.e. 0.22% (1/450) and 0.22% (1/450) respectively and no infestation was found in the age groups of 61-70 years and >70 years. The chi-square test indicated that the difference in age-wise infestation of scabies was found to be significant (χ^2=14.75, P<0.05, 7 d. f.). This result resembles with Lonc and Okulewicz (2000) where they showed highest scabies infestation in children and teenagers (0-20) years and was not associated with any genders and in any age groups. This is also supported by Wisuthsarewong W. and Suchitra V. (2000) where dermatitis was most common followed by scabies infestation 4.1% (97/2361), Buczek et al., (2002) found that the most cases of scabies were noted in children and teenagers between 6-15 years of age, Mimouni et al., (2003) found that the young adult population was more frequently infected with scabies in the cooler months of the years. Joshi and Dahal (2008) found 97% child workers in ten industries of Kathmandu valley and most of them were suffering from scabies infestation. This may be due to their contact with others during playing and sitting together. The least infestation

Was in the age groups of 41-50 and 51-60 years due to their awareness about scabies. While no infestation in the age group over 70 years may be due to good care of the old-aged people by their family members.

The maximum scabies infestation was found in primary school students' i.e. 2.22 % (10/450) and minimum in nonformal education. i e .45 % (2/450), while no infestation no infestation in the people whose education level was high i.e. secondary and higher secondary level. Statistically, the difference between education-wise scabies infestation was found to be significant (χ^2=30.673, P<0.05, 5 d. f.). This is supported by Lonc and Okulewicz (2000) and found that higher the education, lower is the infestation in Poland. Ihsan Hakki CIFTCI et al., (2006) found that scabies infestation was more frequent in children with mothers whose education level was low. This may be due to low level of knowledge; most of the people i.e. 81.33 % (366/450) were still unaware about scabies infestation.

The male students of the age groups of ≤10 and 11-20 years were found to be relatively higher where as no infestation in the age groups of 41-50, 51-60, 61-70 and >70 years in males and age groups of 21-30, 31-40, 61-70 and >70 years in females.

Infestation of mites was found higher in those people who were unmarried i.e. 4.22 % (19/450) and lower in those who were married i.e. 0.89 % (4/450). The chi-square test indicated that the difference between married and unmarried was found to be significant (χ^2=8.722, P<0.05, 2 d. f.). The married people probably use medicine. Regarding the sleeping habit, infestation rate were found higher i.e. 4.23 % (19/450) in those who used to sleep accompanied by another person and lower i.e. 0.88 % (4/450) who used to sleep alone. The chi-square indicated that mites infestation was not significantly depending upon sleeping habit (χ^2=0.266, P<0.05, 1 d. f.). Many people sleep along with another person and hence mites transmit during night sleep.

Infestation of mites was found higher 2.44% (11/450) in those who used to take bath irregular and lower 0.44% (2/450) in those who take bath daily. The chi-square test indicated that infestation was significantly depending on frequency of taking bath (χ^2=14.796, P<0.05, 3 d. f.). "Prevention is better than cure" so prevention and control of mites infestation can be done by taking regular bath and changing cloths regularly in adequate way.

The households containing dirty environment (i.e. garbage containing cooked rice, vegetables, cattle dung, faecal matters and very bad smell due to no management of disposal system etc.) found higher infestation of mites i.e. 2.88% (13/450) and lowest in those whose environmental condition is clean i.e. 0.44% (2/450). Statistically, the chi-square test indicated that the mites infestation was not significantly depending upon environment (χ^2=2.689, P<0.05, 3 d. f.). The present result is very much similar with Rahdar, Vazirianzadeh and Maraghi (2008). Out of 64 households, 28.12% (18/64) were found to be infested with human scab mites causing scabies may be due to lack in management of residential environment.

Regarding the soap, mites infestation was found higher in those who used washing soap i.e. 2% (9/450) and lower in those who used to Life buoy and Dettol soap during bath. The chi-square test indicated that mites infestation was significantly depending up on soap used during bathing (χ^2=76.606, P<0.05, 5 d. f.). The Life buoy and Dettol soaps may be anti-septic.

Awareness of use of medicines against scabies was also studied among all infested people and revealed that most of them were found ignorance regarding the use of medicines against mites' infestation, while a few of them were found using medicines for it. Public ignorance is also one of the major causes of increasing mites' infestation in this study area.

Scabies infestation in human population of Loharpatty VDC, Mahottari district, is a neglected disease. This study gives the first data which will help to conduct further research on prevention and control of scabies infestation.

By performing the survey it can be concluded that illiteracy is responsible for lack of awareness towards the scabies infestation, poor sanitary conditions around houses, carelessness towards health and hygiene are major contributing factors for the epidemic of scabies. Hence extensive study should be undertaken to determine the epidemiological and etiological factors that cause high prevalence of scabies infestation.

Concluding points:

- Out of 450 respondents, 5.11 % (23/450) were found to be infested with human scab mites causing scabies.
- Out of 5.11% (23/450) infestation, 3.81% (17/450) were males and 1.34% (6/450) was of females.
- The highest infestation was recorded in ≤10 year(s) age group i.e. 2.66% (12/450) and lowest in the age groups 41-50 years and 51-60 years i.e. 0.22% (1/450) and 0.22% (1/450) respectively.
- Among the males, the maximum infestation was found in the age groups ≤10 year(s) i.e. 2% (9/450) and minimum in the age groups 21-30 years i.e. 0.44% (2/450) and 31-40 years i.e. 0.44% (2/450) while no infestation in remaining age groups. Similarly in the females the maximum infestation was found in the age groups ≤10 year(s) i.e. 0.66% (3/450) and minimum in the age groups 41-50 years i.e. 0.22% (1/450) and 51-60 years i.e. 0.22% (1/450) and no infestation in remaining age groups.
- The highest infestation was found in the primary and under S. L. C. respondents i.e. 2.22% (10/450) and no infestation in respondents with secondary and higher secondary education level.
- The maximum infestation was found in under S.L.C. students i.e. 3.11% (14/450) followed by labors 0.88% (4/450), farmers 0.66% (3/450) and house wives 0.44% (2/450) while no infestation in businessmen and job holders.
- Among the marital status, unmarried were more infected i.e. 4.24% (19/450) than the married i.e. 0.88% (4/450) however no infestation in widows groups.
- Out of 64 households, 10.95 % (7/64) families were found to be infested with human scab mites causing scabies.
- The respondents were taking bath regularly were less infested i.e. 0.44% (2/450) and who were taking bath irregularly were more infested i.e. 4.67% (21/450).
- The respondents who used to sleep accompanied by another were more infected i.e. 4.23% (19/450) and less in those who used to sleep alone i.e. 0.88% (4/450).

- Out of 450 respondents, the maximum infestation were found in the environmental conditions, 2.88% (13/450) dirty followed by 0.88% (4/450) ditches, 0.88% (4/450) vegetations and 0.44% (2/450) clean.
- The maximum infestation of human mites were found 2% (9/450) followed by 1.60% (7/450), 0.63% (3/450), 0.44% (2/450), 0.22% (1/450) and 0.22% (1/450) in those people who used Washing soap, Lux, Tulsi, Liril, Dettol and Life buoy soaps during bath respectively.
- Out of 450 respondents, 81.33 (366/450) had knowledge about the transmission of human mites from which 2% (9/450) were infested while the rest 18.67% (84/450) respondents had no knowledge about the transmission of mites from which 3.11% (14/450) were infested.
- Out of 23 respondents infested with mites, 13.11% (3/23), 8.70% (2/23), 13.11% (3/23), 21.73% (5/23) and 17.39% (4/23) used Scabial lotion, Scarb lotion, Scabex lotion, Coconut oil and Herbal juice as medicine respectively for cure of the mites' infestation and 26% (6/23) were unknown about the mites' medicines.

VII

RECOMMENDATIONS

Based on the results from the baseline health survey from Loharpatti VDC, Mahottari district of Nepal, following recommendations is forwarded to minimize the scabies infestation.

- Many people are still unknown about the disease caused by *S. scabiei* so make them familiar about it and awareness program should be launched at such communities.
- Personal hygiene and sanitary condition should be maintained properly.
- Regular bathing should be practiced.
- Garments should be changed regularly.
- Using common garments and beds should be avoided.
- Unnecessary and without precaution contact with domestic animals such as dog, sheep, goat cattle etc. should be avoided.
- Treatment against mites (scabies) is recommended at the early stage of infestation.
- The research work on prevalence of mites (scabies) should be encouraged.

VIII

REFERENCES

Abedin, Sarfrajul, Manish Narang, Vijay Gandhi and Shiva Narang (2007). Efficacy of permethrin cream and oral ivermectin in treatment of *Scabies*. Indian Journal of Pediatrics. 74(10) Oct: 915-16.

Abou Zinada and Najwa Y. (2000). Scabies in some workers living in crowded area Jeddah, Saudi Arabia. Journal of the Egyptian Society of Parasitology. 30(1) April: 325-28.

Alberici F, Pagonil L, Ratti G, and Viale P. (2000). Ivermectin alone or, in combination with benzyl benzoate in the treatment of human immunodeffiency virus associated Scabies. British Journal of Dermatology. 142(5) May: 269-72.

Basnyat B and, Litch J A (1997). Medical problems of porters and trekkers in the Nepal Himalaya. Wilderness Environ Med. 1997 May; 8(2):73-4.

Bezold G, Lange M, Schiener R, Palmedo G, Sander C A, Kercher M and Peter R U (2000). Hidden Scabies. Diagnosis by polymerase chain reaction. British Journal of Dermatology. 144(3) March: 614-18.

Birrel G and Birrel K G. (2000). Assement of one year teaching programme in Zanzibar, Tanzania. 356(9235) 23 Sep: 1084.

Brook and Itzhak (2002). Secondary bacterial infection complicating skin lesion. Journal of Medical Microbiology. 5(10) Oct: 808-12.

Buczek A, Pabis B, Bartosik K, Stanislowek I, Salata M, Pavis A (2002). Epidemiological study of *scabies* in different environmental conditions in central Poland. Annals of Epidemiology. 16(6): 423-28. **WWW.linkinghub.elsevier.com**

Cargill C F, Pointon A M, Davies P R and R Garcia (1997). Using slaughter inspections to evaluate sarcoptic mange infestation of finishing swine. Vet. Parasitol. 70**:**191-200**. [CrossRef][Medline]**

Chmela J (2004). Problem related to control of epidemic and persistent outbreaks of scabies. Epidemiology Mikarobiologie Immunologie. 53(3):126-30.

Currie B J and Carapetis J (2000). Skin infections and infestations in Aboriginal communities in northern Australia. Australas. J. Dermatol. 41**:**139-143. **[CrossRef][Medline]**

Downs A M R, Harvey I and Kennedy C T C (1999). Epidemiology of Head lice and Scabies in UK. 122(3) June: 471-77.

Ejidokun O O, Aruna O S and Neil B O (2007). A *scabies* outbreak in a further education college in Gloucestershire. Epidemiology and Infections 135(3) April: 455-57.

Fajardo-Velazquez, Roman, Elena Urdez-Hernandez and Antonio y-Sita Morales (2004). Nosocomial outbreak of *Scabies* from a Norwegian scabies case. Salud Publica de Mexico. 46(3) May: 251-54.

Feanneret, Leila A, Philippe E, Felix G and Raffale M (2007). An out break of scabies: a forgotten parasitic disease still present in Switzerland. Swiss Medical Weekly. 137(49-50) Dec: 695-99.

Glorio R, Roxana H and Alberto W (1999). Nosocomial Scabies. 86(1) March: 54-57.

Gonzalez, Alda, Cristina de Vilialobos, Alicia R and Sandra G (2003). *Scabies* a reemergent disease. Entomologia 4-vectors. 10(4) Octo: 621-33.

Hegazy A A, Darwish N M, Abdel-Hamid I A and Hammad S M (1999). Epidemiology and control of scabies in an Egyptian village. Int. J. Dermatol. 38**:**291-295. **[CrossRef][Medline]**

Heukelbach J, van Haeff E, Rump B, Wilcke T, Moura R C and Feldmeier H (2003). Parasitic skin diseases: health care-seeking in a slum in north-east Brazil. Trop. Med. Int. Health **8:**368-373**. [CrossRef][Medline]**

Heukelbach J, Walton S F, and H Feldmeier (2005). Ectoparasitic infestations. Curr. Infect. Dis. Rep. 7:373-380.**[Medline]**

Holt, Deborah C, Katja F, Shelley F, Walton and David Kemp J (2003). A multigene family of inactivated serine proteases in *Sarcoptes scabiei*. Journal of Investigate Dermatology. 121(6) Dec: 1449-54.

Ihsan Hakki CIFTCI, Semsettin KARACA, Omer DOGRU Zafer CETINKAYA and Mustafa KULAC (2006). Prevalence of pediculosis and *Scabies* in preschool nursery children of Afyon, Turkey**.** Korean Journal of Parasitology. 44 (1) March: 95-98.

Joshi S K and Dahal P (2008). Occupational health in small scale and household industries in Nepal. Kathmandu Univ Med J (KUMJ). Apr-Jun 6(2): 152-60

Kambara T, Maize T, Ikuyo T, Megumi T, Yasuyuki S, and Hiroshi N ((1999). A case of crusted Scabies associated with bullous pemphigoid. Hifu. 41(2) April: 209-13.

Katsumata, Kajuo and Kajumi K (2003). Norwegian scabies in an elderly patient who died after treatment with y-BHC. Internal Medicine Tokyo. 42(4) April: 367-69.

KOVACS Fabiana Thais and BRITO Maria de Fátima de Medeiros (2006). Disease perception and self medication in patients with *Scabies*. A Bras Dermatol. 81(4), 335-40. **http:www.scielo.br**

Kuhn C, Lucius R, Matthens H F, Meusel G, Reich B and Kalinna B H (2008). Characterization of recombinant immunoreactive antigens of the scab mite *Sarcoptes scabiei.* Center for animal biotechnology, faculty of veterinary science, The University of Melbourne, Melbourne 3010, Vic: Australia. **WWW.sciencedirect.com**

Lonc E and Okulewicz A (2000). Scabies and Head lice infestation in different environmental conditions of Lower Silesia, Poland. Journal of Parasitology. 86(1) Feb: 170-71.

Mallik S, Chaudhuri R N, Biswas R and Biswas B (2004). A study on morbidity pattern of child labourers engaged in different occupations in a slum area of Calcutta. J. Indian Med. Assoc. 102**:**198-200, 226.**[Medline]**

Maria de Fátima de Medeiros Brito (2006). Clinical, epidemiological, laboratory and therapeutic Investigation. Disease perception and self medication in patients with *Scabies.* 81(4):335-40.

Marigny K, Lohezic F, Bertin S and Javaudin L (2001). Ivermectin in the treatment of human scabies. Journal de pharmacie clinique. 20(2) April-June: 97-101.

Mazyad Said A M, Eman Sanad M and Tosson Morsy A (2001). Two types of scab mites infesting man and sheep in North Sinai. Journal of the Egyptian Society of Parasitology. 31(1) April: 213-22.

Mc Carthy J S, Kemp D J, Walton S F and Currie B J (2004). *Scabies*: more than just an irritation. Postgraduate Medical Journal 80: 382-87. **WWW.pmj.bmj.com**

Mellanby K (1941). The transmission of scabies. Br. Med. J. **ii:** 405-406

Mimouni D, Ankol O E, Davidovitch N, Gdalevich M, Zangvil E and Grotto I (2003). Seasonally trends of scabies in a young adult population. 20 years follow up: Journal of Dermatology. 149(1) July: 157-59.

Odueko O M, Onayemi O, and Oyedeji G A (2001). A prevalence survey of skin diseases in Nigerian children. Niger. J. Med. 10**:**64-67.**[Medline]**

Otero Luis, Jose Varela A, Emma E, Carmen S, Maria L J et al. (2004). *Sarcoptes scabiei* in sexually transmitted infections unit –A 15 years study. Sexually Transmitted Diseases. 31(12) Dec: 761-65.

Pasay, Cielo, Shelley W, Katja F, Deborah H and James McCarthy (2006). Per based assay to survey for knockdown resistance to pyrethroid acaricides in human *scabies* mites' .American Journal of Tropical Medicine and Hygiene. 74(4) April: 649-57.

Paasch Uwe, Haustein MD, Uwe-Frithjof MD (2000). Management of endemic outbreaks of scabies with allethrin, permethrin and ivermectin**.** International Journal of Dermatology. 39(6) June: 463-470. **WWW.dermatology.adisonline.com**

Perna A G, Bell K and Rosen T (2004). Localized genital Norwegian *Scabies* in AIDS patients. Sexually transmitted infection. 80(1) Feb: 72-73.

Pruksachatkunakorn C, Wongthanee A and Kasiwat V (2003). Scabies in Thai orphanages. Pediatr. Int. 45**:**724-727. **[Medline]**

Pruksachatkunakorn C P, Damrongsak M, Sinthupuan S (2002). Sulfur for scabies outbreaks in orphanages. Pediatr Dermatol; 19:448-53.

Rahdar M, Vazirianzadeh B and Maraghi S (2008). Department of Mycoparasitology, Medical School, Ahwaz Joundi-Shapour University of Medical Sciences, Iran. A Case Report of *Sarcoptes scabiei* Infection in Ahwaz, Iran. **Journals.tums.ac.ir**

Sancin A, Ensabela M F, Pacilli L, Piraccini B, Raitano A, Vioti P L et al., (2005). *Scabies*, an emerging parasitosis. Igiene Moderna.. 124(1) July: 1-38.

Shelley F, Walton and Bart Currie J (2007)**.** Problems in Diagnosing *Scabies*, a Global Disease in Human and Animal Populations. Clinical Microbiology Reviews. 20(2) April: 268-79.

Smith, Derek R, Jam W C, Dongsoo Yu Myung Ki, Chun-Hwa Oh and Zentaro Y (2003). Skin disease among staff in a large Korean nursing home. Tohoku Journal of Experimental Medicine. 198(3) Nov: 175-80.

Subedi J R (2000). Epidemiological surveillance study of human mites (*Scabies)* infestation on baseline health survey in wards 19 and 20 of Kathmandu Metropolitan city in Nepal. M. Sc. Thesis submitted to Central Department of Zoology Tribhuvan University.

Sudakin, Daniel L (2007). Fatality after a single dermal application of lindane lotion. Archives of environmental and occupational health. 62(4): 201-203.

Takahasi M, Sadao N, Hitoko M, Soichi M, Takashi S, Yoshiro Y and Tokyo S (2001). Mange caused by *Sarcoptes scabiei* in wild raccoon dogs, *Nyctereutes procyonoides,* in Kanagawa prefecture, Japan. Journal of Veterinary Medical Science. 63(4) April: 457-60.

Takeda, Fumiko, Takako T, Naomi K, Ichiro M and Yoshiya S (2002). Mites from the floor and bedding of hospitals in Mainland Okinawa, Japan. Medical Entomology and Zoology. 53(3) Sep: 163-68.

Taplin D, Meinking T L, Chen J A and Sanchez R (1990). Comparison of crotamiton 10% cream (Eurax) and permethrin 5% cream (Elimite) for the treatment of scabies in children. Pediatr. Dermatol. **7:**67-73. **[Medline]**

Tielsch, James M and Arlyne B (2004). Impact of ivermectin on illness and disability associated with Onchocerciasis. Tropical Medicine and International health. 9(4) April: A 45-A 56.

Tzanetou K (2006). *Scabies*: reappearance of a forgotten parasitic disease. Deltion Ellenikes Mikrobiologikes Etaireias 51(5) Sep: 346-52.

Unver, Aysegul Y and Nevin T (2006). Approach to the patient with scabies. TURKIYE PARASITOLOJI DERGISI. 30(1). 77-82.

Vorou R H D, Remoudaki and Maltezou H C (2007). Nosocomial *Scabies.* Journal of Hospital Infection. 65(1) Jan: 9-14.

Walker G J, Johnstone P W (2000). Interventions for treating scabies. Country Support Team for Central and South Asia, UNFPA, Cochrane Data base Syst Rev: (3): CD000320. **gwalker@unfpa.wlink.com.np**

Walton S, Low Choy J, Bonson A, Valle A, McBroom J, Taplin D, L Arlian, Mathews J, Currie B, and Kemp D (1999). Genetically distinct dog-derived and human-derived *Sarcoptes scabiei* in scabies-endemic communities in northern Australia. Am. J. Trop. Med. Hyg. 61:542-547.**[Abstract]**

Wisuthsarewong, Wanee and Suchitra Viruon (2000). Analysis of skin diseases in a referral pediatric dermatology clinic in Thailand. A Journal of the Medical Association of Thailand. 83(9) Sep: 999-1004.

IX

ANNEX

ANNEX-I

Questionnaire for base line health survey at Loharpatty VDC, Mahottari district of Nepal

ID NO: ---------- Date: ----------

1. Name of household…… House number……Name of interviewee…….

Sex: male ☐ female ☐ Age…….

2. Education

A. Literate ☐ B. Illiterate ☐

If literate

a. Primary ☐ b. Lower sec. ☐ c. Secondary ☐

d. Higher ☐ e. Others ☐

3. Occupation

a. farmer ☐ b. business ☐ c. Job holder ☐

d. Student ☐ e. Labor ☐ f. house wife ☐

4. Marital status

a. Married ☐ b. Unmarried ☐ c. Widow ☐

5. Are you infested with Scabies?

Yes ☐ No ☐

A. If yes

a. Hands ☐ b. Finger web ☐ c. Pubic region ☐

d. Genital organ ☐ e. Thigh ☐ f. Others ☐

g. Over body

Since when

a. day(s) ☐ b. Week ☐ c. Month(s) ☐ d. Year(s) ☐

B. Sign and symptoms

a. Itching ☐ b. Allergy ☐ c. Bacterial infection ☐

C. Medicine used

a. Name (i) Medicine ☐ (ii) Company ☐ (iii) Others ☐

b. Since when

(i) Day ☐ (ii) Week ☐ (iii) Month(s) ☐ (iv) Year(s) ☐

c. Mode of administration

(i) Oral ☐ (ii) External ☐

d. Effects

(i) Improve ☐ (iii) Degrade ☐

6. Living standard

a. Poor ☐ b. Medium ☐ c. Rich ☐

7. Respondents current health status

a. Healthy ☐ b. Unhealthy ☐

8. Frequency of bath

a. Regular ☐ b. Irregular ☐

If irregular

(i) Once in a week ☐ (ii) Twice in a week ☐ (iii) Once in two week ☐

9. Soap / Shampoo used during bathing

a. Life buoy ☐ b. Liril ☐ c. Lux ☐ d. Dettol ☐

e. Tulsi ☐ f. washing ☐ g. Others ☐

10. Environmental condition

a. Clean ☐ b. Dirty ☐ c. Vegetation ☐

d. Ditches ☐ e. Canal ☐

11. Do you have disposal system?

a. Yes ☐ b. No ☐

If yes

(i) Safety tank ☐ b. Drainage ☐ c. Pond ☐ d. Others ☐

12. Pet / Domestic animals

a. Cow ☐ b. Buffalo ☐ c. Bull ☐ d. Goats ☐ E. Dog ☐

f. Others ☐

13. Sleeping habit

a. Alone ☐ b. Together ☐

14. Do you have knowledge about Scabies?

a. Yes ☐ b. No ☐

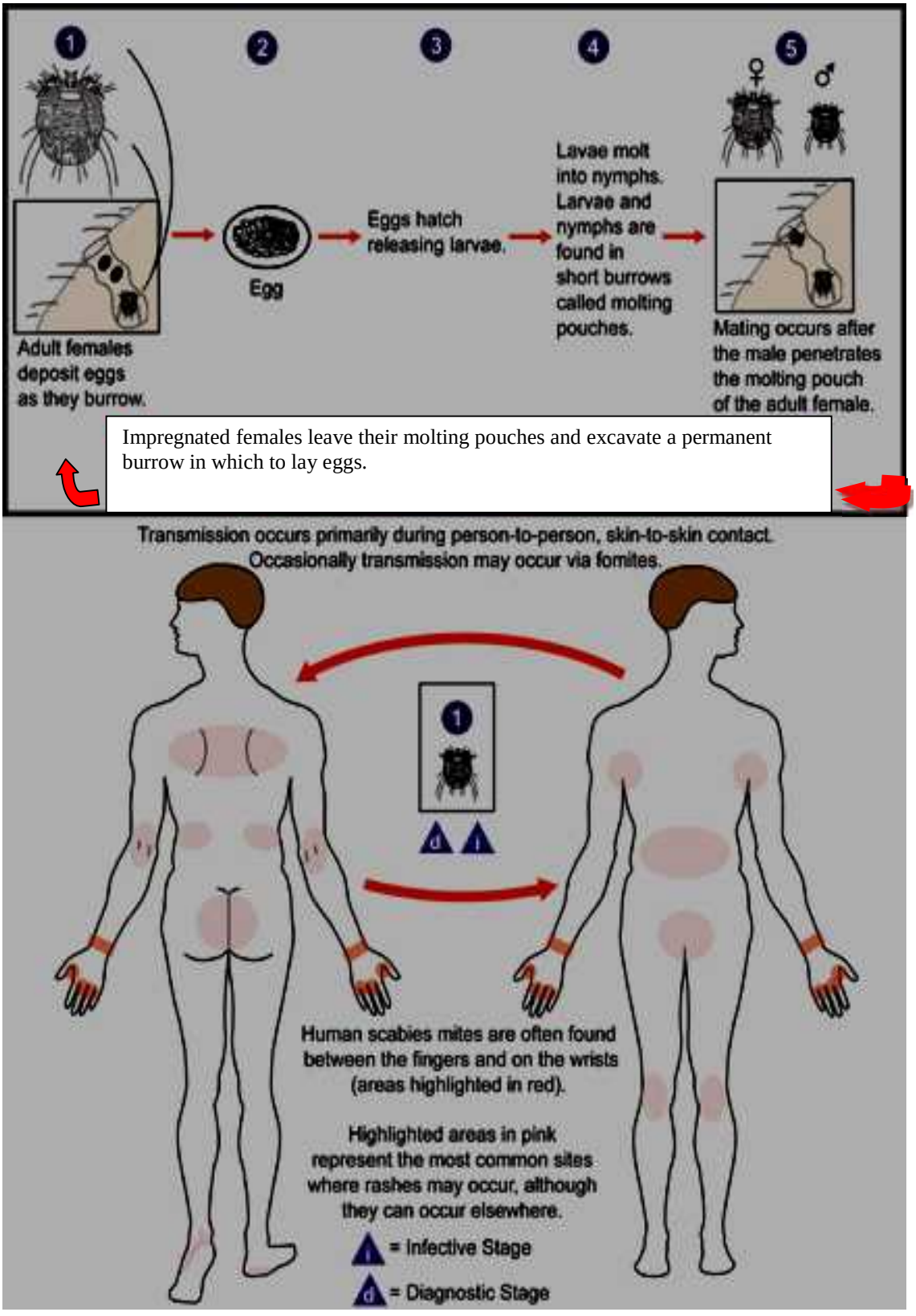
If yes, how is it transmitted? a. Sleeping together ☐ b. Others ☐

15. Suggestion ……

Signature of respondent's……

ANNEX-II

Diagrammatic representation of the life cycle of *Sarcoptes scabiei* var. *hominis*



Sarcoptes scabiei undergoes four stages in its life cycle: egg, larva, nymph and adult. Females deposit 2-3 eggs per day as they burrow under the skin❶. Eggs are oval and 0.10 to 0.15 mm in length ❷and hatch in 3 to 4 days. After the eggs hatch, the larvae migrate to the skin surface and burrow into the intact stratum corneum to construct almost invisible, short burrows called molting pouches. The larval stage, which emerges from the eggs, has only 3 pairs of legs ❸and lasts about 3 to 4 days. After the larvae molt, the resulting nymphs have 4 pairs of legs❹. This form molts into slightly larger nymphs before molting into adults. Larvae and nymphs may often be found in molting pouches or in hair follicles and look similar to adults, only smaller. Adults are round, sac-like eyeless mites. Females are 0.30 to 0.45 mm long and 0.25 to 0.35 mm wide, and males are slightly more than half that size. Mating occurs after the active male penetrates the molting pouch of the adult female❺. Mating takes place only once and leaves the female fertile for the rest of her life. Impregnated females leave their molting pouches and wander on the surface of the skin until they find a suitable site for a permanent burrow. While on the skin's surface, mites hold onto the skin using sucker-like *pulvilli* attached to the two most anterior pairs of legs. When the impregnated female mite finds a suitable location, it begins to make its characteristic serpentine burrow, laying eggs in the process. After the impregnated female burrows into the skin, she remains there and continues to lengthen her burrow and lay eggs for the rest of her life (1-2 months). Under the most favorable of conditions, about 10% of her eggs eventually give rise to adult mites. Males are rarely seen; they make temporary shallow pits in the skin to feed until they locate a female's burrow and mate.

Transmission occurs primarily by the transfer of the impregnated females during person-to-person, skin-to-skin contact. Occasionally transmission may occur via fomites (e.g., bedding or clothing). Human scabies mites often are found between the fingers and on the wrists.