



**COLLEGE OF HEALTH SCIENCES**

**DEPARTMENT OF PUBLIC HEALTH**

**DETERMINANTS OF SCABIES AMONG PRIMARY SCHOOL CHILDREN IN HABRU DISTRICT, NORTH WOLLO ZONE, AMHARA REGIONAL STATE, ETHIOPIA.**

**BY**

**MELAT WODAJE (BSc)**

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<b>1.</b>	<b>Name of Investigator</b>	<b>Melat Wodaje</b>
<b>2.</b>	<b>Name of Advisor</b>	<b>Behailu Tariku (Assistant Professor)</b>
<b>3.</b>	<b>Study Area</b>	<b>Primary Schools in Habru District, North Wollo</b>
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<b>7.</b>	<b>Address of Principal Investigator</b>	<b>Email: <a href="mailto:Meluw2008@Gmail.Com">Meluw2008@Gmail.Com</a>  <b>Mobile : +251945973625</b></b>

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**DEBRE BERHAN, ETHIOPIA**

## **Approval of the thesis**

As members of Board examiners of the final thesis open defense examination, we certify that we have read and evaluated the thesis done by Melat Wodaje entitled “determinants of scabies among primary school children in Habru District, North Wollo Zone, Amhara Regional State, Ethiopia” and examined the candidate. We recommend that the thesis has been accepted as fulfilling the thesis requirement for the degree of masters of public health in Epidemiology.

### **Examiners**

Principal Advisor Name	Signature	Date
<u>Mr. Behailu Tariku, (Assistance Professor)</u>	_____	_____
External Examiner Name	Signature	Date
<u>Dr Takele</u>	_____	_____
Internal Examiner Name	Signature	Date
<u>Abay Birlew</u>	_____	_____
<b>Chairperson, Examining Board</b>	Signature	Date
<u>Wondessen Asegidew</u>	_____	_____

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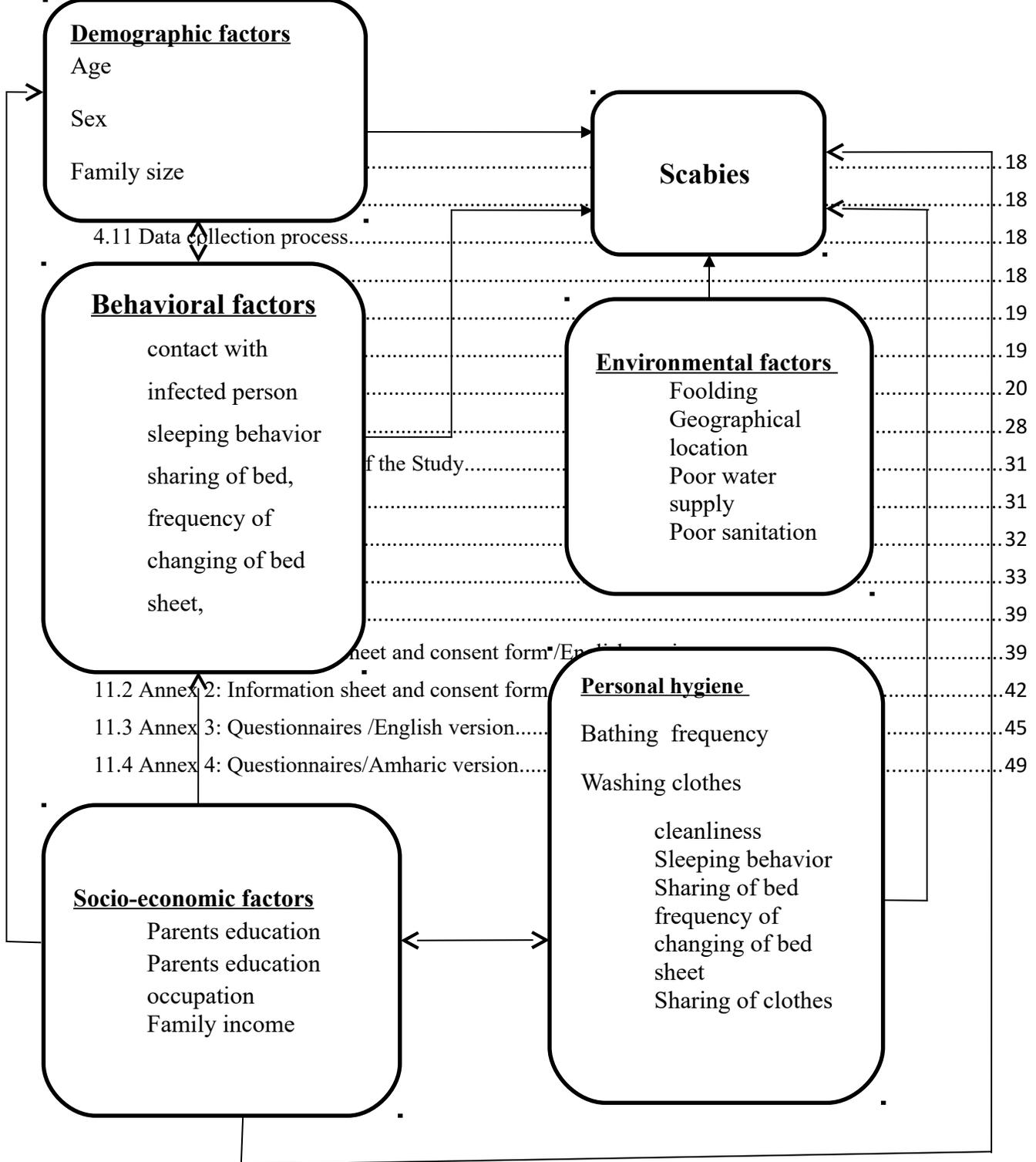
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## **Acronyms and Abbreviation**

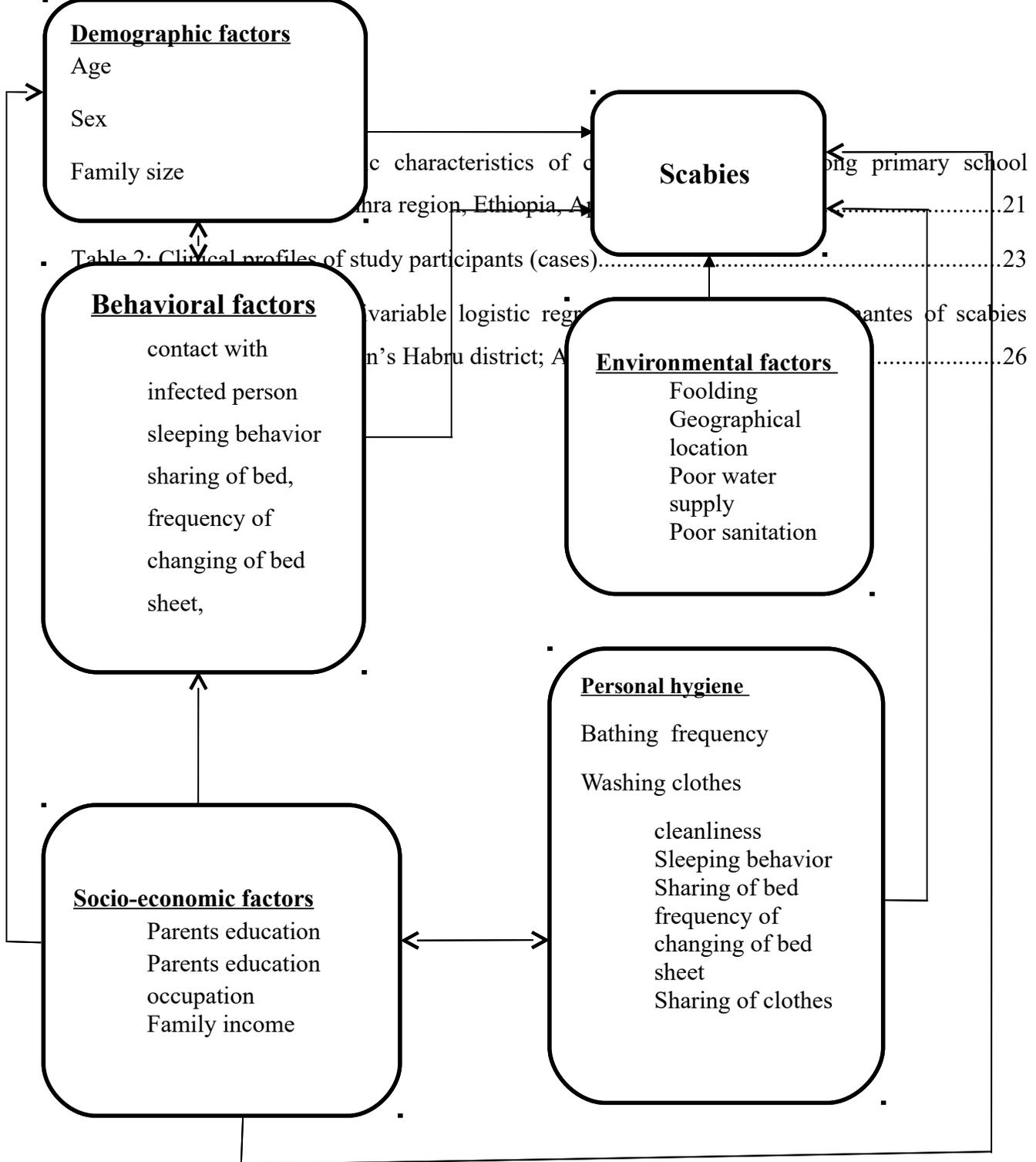
CSA	Central Statistical Agency
DBU	Debre Birhan University
FDRE	Federal Democratic Republic of Ethiopia
GBD	Global Burden of Disease
MDA	Mass Drug Administration
MPH	Master of Public Health
NTDs	Neglected Tropical Diseases
WHO	World Health Organization

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## **Abstract**

**Background:** Human scabies is a parasitic infection caused by *Sarcoptes scabiei var hominis*. It affects all age groups; however, children are more vulnerable. Specially in primary schools, scabies affects children's school regularity and performance. There is a gap of information on the determinantes of scabies among primary school children's in Ethiopia. The aim the study was to

identify factors that determine scabies among primary school children in Habru district, North Wollo Zone, Amhara Region, Ethiopia.

**Methods:** Institution-based unmatched case-control study was conducted among primary school children in Habru district from March to May, 2019. Three hundred, 100 cases and 200 controls, study participants were enrolled. A multi-stage sampling technique was used to get representative cases and controls. Skin examination of scabies was done by trained health professionals to select cases and controls. Data was collected using a structured questionnaire and analyzed using SPSS version 20 statistical software. Descriptive statistics was used to describe the study participants in relation to relevant variables. Bivariate and multivariable analyses were used to identify factors that determine the dependent variable. Statistical significance was declared at P.value less than 0.05.

**Results:** A total of 100 cases and 200 controls were participated in the current study. Sex, age, family size, family history of scabies, sharing of cloths with infected person, previous history of scabies and number of sleeping rooms were found to be independent determinants of scabies. Male were more likely to have scabies (AOR= 7.5; 95% CI: 3.293, 24.462). Younger children were more prone to scabies. Children between 10-12 years of age (AOR= 8; 95%CI: 2.786, 24.244) were found to be the most affected age group followed by 13-15 years of age (AOR= 7.7; 95%CI: 2.612, 23.194). Other factors like family size  $\geq 5$  (AOR= 3.4; 95% CI: 1.536, 7.748), family history of scabies (AOR= 9.8; 95% CI: 3.913, 24.462), were also independent factors of having scabies. **Conclusion:** Determinants such as sex; age, family history of scabies, family size, number of rooms, previous history of scabies and sharing clothes with a person with scabies had significant role for the transmission of scabies and thus the district health and education offices, NGOs and the school community should work together to prevent scabies.

**Keywords:** Scabies, determinat factors, Ethiopia

# 1. Introduction

## 1.1 Background

Scabies is a neglected parasitic disease that is a public health problem worldwide, and particularly in resource poor regions. It affects people of all age groups, races, and socioeconomic levels. Approximately 300 million cases are reported worldwide each year (1). Scabies is caused by an infestation of the skin by the human itch mite (*Sarcoptes scabiei var.hominis*). The adult female scabies mites burrow into the upper layer of the skin where they live, lay and deposit their eggs (2). The incubation period is 3–6 weeks for primary infestation, however, it may be as short as 1–3 days in cases of re-infestation (3) (4)(5). The characteristic clinical feature is intense nocturnal pruritus. Diagnosis is made clinically, based on patient history and physical examination. It is confirmed by the demonstration of mites, eggs on microscopic examination (1). The most commonly affected areas are the hands, feet, the inner part of the wrists and the folds under arms. It could also affects other areas of the body, such as elbows and the areas around the breasts, genitals, umbilicus and buttocks(6).

Scabies infestations are generally categorized as typical or atypical. Patients with typical scabies usually have only 10 to 15 live adult female mites on the body. When diagnosis and treatment are delayed, scabies can develop an unusual or atypical presentation, indicating infestation of hundreds to thousands of mites (7). Infestation is frequently complicated by bacterial skin infection, including impetigo, cellulites, and abscess due to streptococcus and staphylococcus infections. Such bacterial skin infections predispose to serious form of scabies (8).

Although different transmission ways are reported, the predominant route of transmission is by direct, prolonged skin-to-skin contact with an infected person. However, a person with scabies can also spread the infestation by exposure to bedding, clothing as well as furniture that has been used. Transmission among family members and in institutional settings is common. Asymptomatic person with mites can also spread scabies (9)(10). Treatment of scabies infection includes topical or oral administration of a scabicide agents and an appropriate antimicrobial agent if secondarily infected (11).

Although scabies is considered as one of the most prevalent skin infections in third world countries, most incidence are in developing countries in poor peoples who live in rural and crowded areas characterized with tropical climate (12). It is particularly a problem where there is social disruption, overcrowding and where personal hygiene is poor (13). Sometimes scabies is known as a water shortage disease because of its association with inadequate water supply, which leads to poor personal hygiene and thus increased risk of transmission. Therefore, poor personal hygiene is play a scrucisl role for the transmission of scabies (14).

Globally, it affects more than 130 million people at any time. However, the prevalence is vary in the recent literatures and ranging from 0.3% to 46% (15). In the developed world, outbreaks in health institutions and vulnerable communities contribute to significant economic cost in national health services. However, in resource-poor tropical settings, the sheer burden of scabies infestation, as well as their complications, imposes a major cost on health-care systems (16). Young children and the elderly in resource-poor communities are more susceptible to scabies as well as to the secondary complications of infestation (15).

In Ethiopia, scabies is common problem, especially during natural or man-made disasters, such as flooding, drought and conflict, poor water supply and sanitation, and overcrowded living conditions. According to the public health emergency measures surveillance report, scabies is becoming a public health concern, affecting wider geographic areas and population groups, especially in drought affected areas (14)(17).

## 1.2 Statement of the problem

Scabies is common in many tropical and subtropical countries, such as Africa, Central and South America, Australia, Caribbean Islands, India, and Asia. The highest prevalence of scabies occurs in poor populations and among children and the elderly. (18). Some group of the population are more affected by serious form of scabies. School children, some Immunocompromised, elderly, disabled, or debilitated persons are at risk of a severe form of scabies (19). Therefore, the health consequences related to complications of scabies is one of the major problems especially in developing countries. In many countries, the main disabilities associated with scabies are caused by itching which results secondary infection brings a series of additional complications due to bacterial infection of the skin, abscesses and cellulitis (20)(21). Multiple factors such as poverty, poor hygiene, low socioeconomic conditions, illiteracy, overcrowding, lack of access to health care, frequent population movements, malnutrition, inadequate treatment, poor public health education, sleeping habits, and overcrowded sleeping space, sharing of clothes and sharing of towels have frequently reported as risk factors for scabies throughout the world (6).

The transmission of human scabies infestations in school settings is a major public health problem worldwide. The problem is more aggravated among school children in rural area due to poor living conditions and low level of parent's education (22). The infection spreads rapidly in school children due to different driving forces such as close contact and overcrowding within the class. The infection affects the academic performance of students (23). Scabies is a major problem among Ethiopian school children (24). Epidemiological data about scabies infestation in schoolchildren provide valuable information about its risk factors and suggest a basis for methods of prevention and therapy (6).

Ethiopia is experiencing scabies outbreak in drought affected areas where there is shortage of safe water caused by El Nino(14). In this regard, the Federal Ministry of Health (FMoH), in collaboration with partners, has been working to stop community level transmission of scabies outbreak using multi-spectral intervention approach. Key focus is on affected and high risk districts, based on nutrition and scabies outbreak risk criteria (24). There are some studies in Ethiopia and the major risk factors of scabies are influenced by gender, age, overcrowding, geography, season, and personal hygiene. In addition, climatic change contributed to change in

scabies prevalence from cyclical to epidemic pattern (25)(26). However, to our knowledge, the determinants of scabies among schoolchildren is not well studied in Ethiopia. In addition, there is no epidemiological information about scabies available in the current study area, Habru district (27). Scabies outbreak has been reporting in Habru district frequently (28). Therefore, it is important to determine the possible risk factors of scabies to mitigate the disease burden and its transmission among schoolchildren.

### **1.3 Justification of the study**

This study has tried to identify the determinants of scabies, and to take possible intervention measures to control the scabies and prevent occurrence of further cases among primary school children in Habru district, North Wollo Zone. To take preventive and control measures against scabies, availability of epidemiological information on a given locality is crucial. Therefore, this study has a significant impact to take preventive and control measure of scabies in the district.

Schoolchildren constitutes a fifth of a given population in developing countries including Ethiopia. Therefore, saving lives of this group of population is saving the lives of tomorrow's leaders. The aim of this study was to bring better understanding on transmission dynamics of scabies among school children for prevention intervention. In addition, the study also hoped to give reliable information for policy makers at local, regional & federal level and for nongovernmental organizations to take measures to enhance the health of school children in the district. Furthermore, knowing the possible determinants at school is very important to the school management to take measure and mitigate the transmission of the infection. Finally, the result of this study may provide important information for other researchers as a base line data.

## **2. Literature Review**

### **2.1 Global epidemiology of scabies**

Scabies is endemic in tropical and subtropical areas. It is a global public health problem and the highest prevalence of scabies occurs in tropical area, especially among children and elderly people (29). Scabies is among the top 50 most prevalent diseases worldwide, with a global prevalence of 1.5% of the world population in 2010 (19). The highest incidence is reported in tropical climates, with rates of up to 25% overall and up to 50% in some countries and communities (30). Scabies has been added to WHO's list of Neglected Tropical Diseases (NTDs), in recognition of the very large burden of disease. However, unlike many other NTDs, scabies can also occur in temperate regions where it similarly has a predilection for vulnerable communities in which overcrowding and poverty coexist (31). It is one of the commonest dermatological conditions which accounting for a considerable proportion of skin disease in developing countries (15)(32). The complication is also associated with disabilities. According to the Global Burden of Disease (GBD) report, scabies directly accounts for 0.21% of global disability-adjusted life years (32).

Scabies is a significant public health problem in the developing world, with high burden among children living in poor and overcrowded conditions (21)(33). The highest rates of infestation occur in countries with hot, tropical climates, especially in communities where overcrowding and poverty coexist (17)(34). The prevalence is much higher in most vulnerable groups such as young children and the elderly. In addition, in resource poor communities scabies also associated with secondary complications (19). The greatest scabies burden, is highest in children aged 1–4 years and gradually decreasing from age 5 to 24 years (34)(35).

### **2.2 Scabies in Africa**

Scabies affects almost all African countries. In sub-Saharan Africa the prevalence of scabies was ranged from 1-2 %(32). Due to the El-Nino event which affects many countries globally including Ethiopia, drought and extreme water shortage is one of the driving forces of scabies outbreaks (36). The primary contributing factors in contracting scabies seem to be poverty and

overcrowded living conditions (15). The study conducted in Mali, Malawi, Tanzania and Sierra Leone revealed scabies as one of the common skin problems in Africa. This report explores Scabies is one of the highly contagious skin infections commonly seen in African countries (32) (15).

### **2.3 Scabies in Ethiopia**

Scabies outbreaks are widely reported in Ethiopia and like many of other tropical developing nations, poor socio economic status plays a significant role (37). Since July 2015, Ethiopia has witnessed outbreaks in scabies (38). Studies evidenced the prevalence of scabies varies among different geographical areas. The study done at referral hospital in Addis Ababa found that, scabies was present in 0.9% of cases. In drought affected areas, the prevalence of scabies ranging from 2% to 67% (14). Moreover, in a recent systematic review, the prevalence of scabies ranged from 0.2% to 71.4% (17). School aged Ethiopian children are commonly affected by scabies (4). The study conducted in Southern part of Ethiopia show that most of affected populations were children in the primary schools and most of them had shown complication due to secondary infection attributable to scabies (39). Similarly, the study conducted in Northern Ethiopia among religious students “Yekolo temeri” show that the overall prevalence rate was found to be 22.5% (40).

### **2.4 High risk groups for scabies infestation**

Scabies affects people of all age groups; however, children in developing countries are most susceptible. Scabies is commonly observed in very young children followed by older children and young adults (41). In addition, elders, immune compromised people are more vulnerable to scabies. In particular, school children are the most affected groups who carry the most debilitating effect caused by scabies (42).

### **2.5 Public health impacts of scabies**

Scabies infestation is frequently complicated by secondary bacterial skin infection such as impetigo, cellulitis, and abscess due to *S. pyogenes* and *S. aureus* infections which predispose to serious supportive and nonsuppurative sequelae. In addition, it causes disabilities especially in

resource poor communities (43). Scabies also causes considerable economic burden on individuals, families, communities, and the health systems in general. Families in endemic areas spend a substantial portion of income for treatments and restricting available funds for food and essential commodities (15).

## **2.6 Risk factors contribute to scabies infestation**

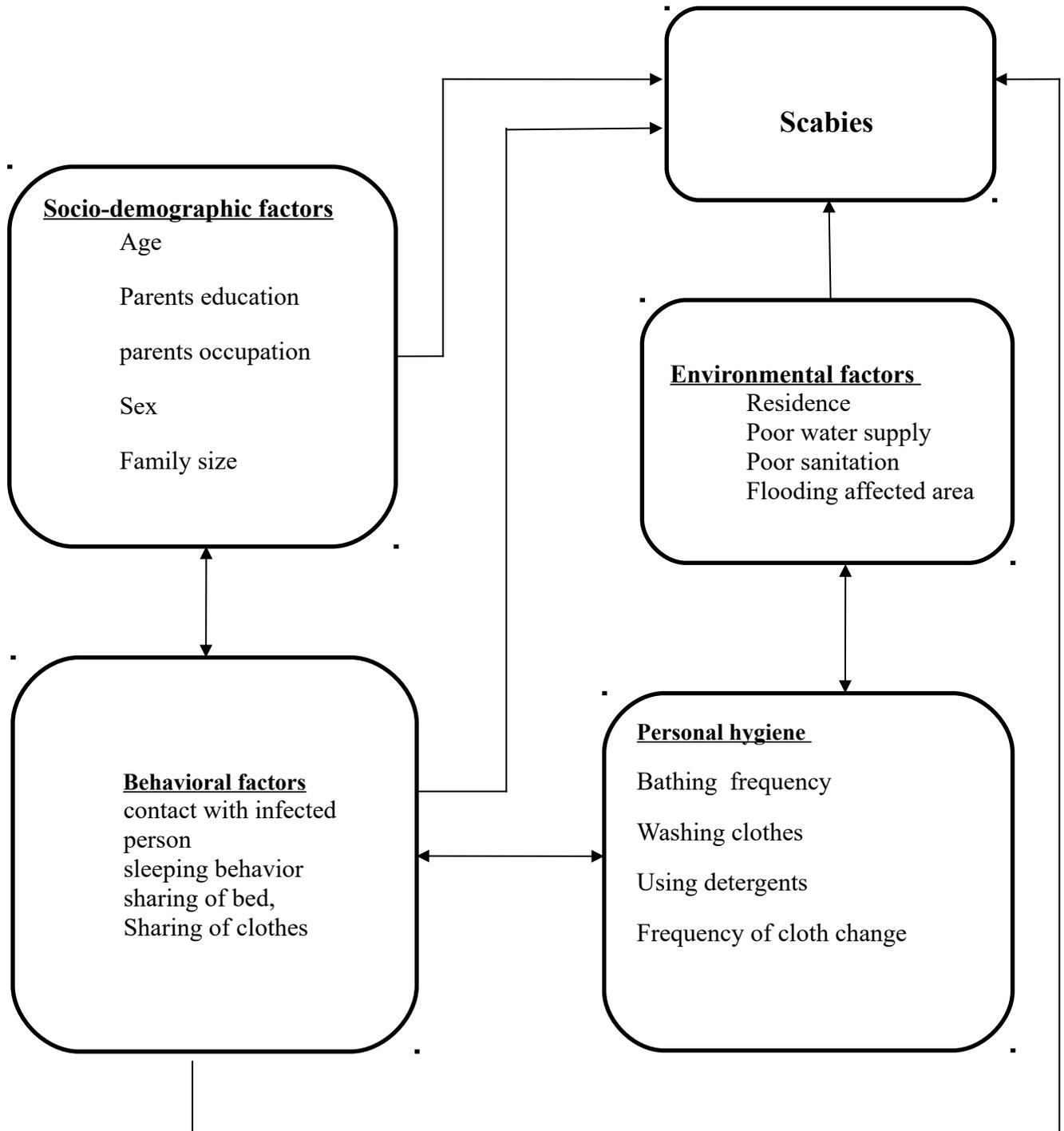
Different scholars reported that the risk factors for scabies are not common throughout the world. They differ from one locality to another. Therefore, identifying risk factors in a particular locality means to move forward to implement effective prevention and control measures against scabies in that community(44).

The risk factors of scabies have been reported from different part of the world by different scholars. For instance, an epidemiological study conducted in Iraq; shows that residence is one of the major risk factor for scabies. The prevalence of scabies was higher in rural areas than urban areas, 62.3% and 37.7%, respectively and it is more prevalent in cold and warmth seasons in males as well as females (28).

In similar manner, the study in Cameroon the prevalence of scabies among schools children was 17.8 % and they reported the spread of scabies is linked with poor personal hygiene. In addition, younger childrens are more prone to scabies infection (45). The study done in Nigeria revealed that scabies is associated with poverty, overcrowding, and water scarcity and highly prevalent among school-aged children in rural communities (46). According to Sherbiny El *et al.* report, the types of school play a significant role on the transmission of scabies prevalence and transmission. The prevalence was higher in public schools than private schools. Family size also a driving factor for scabies transmission. It is more common in school children with a large family ( $\geq 7$  members) (10.6%) as opposed to a family of 5-6 members (4.9%) and 3-4 members (3.8%) (47)(1). A population based survey conducted at Solomon Island, show that family size was the main risk factors of scabies prevalence. The study also revealed that scabies most commonly affects lower legs, ankles, feet, wrists and hands. In majority of participants with scabies (80.9%) more than one body parts are involved (48).

Although parents education play a significant role to prevent infectious disease associated with poor personal hygiene, the study done in Quetta show that parent's education is not play a significant role in children education, the hygiene of their children. It is also reported, parents education is not found to be a determinants of scabies among school children's (49)(1).

As stated above referring different scholars report, the risk factors and how individuals with scabies affected are varying in different geographical locations, type of communities and environmental factors. Therefore, knowing the epidemiology and determinates of scabies among schoolchildren in different communities and geographical locations is crucial to prevent the transmission dynamics of the disease. However, there is scarcity of data in Ethiopia on scabies risk factors among schoolchildren.



**Figure 1: Conceptual Frame work for scabies determinants adapted from different literature (9,32,36,40,42,43,44,45).**

### 3. Objectives

#### 3.2 General Objective

- To assess the determinants of scabies among primary school children in Habru District, North Wollo, Amhara Regional State, Ethiopia, 2019.

#### 3.3 Specific Objectives

- To determine socio-demographic and behavioral factors of scabies among primary school children in Habiru District, North Wollo, Amhara Regional State, Ethiopia, 2019.
- To determine environmental factors of scabies among primary school children in Habiru District, North Wollo, Amhara Regional State, Ethiopia, 2019.

#### 3.3 Research Hypothesis

1. **Ho:** Pr (scabies/ socio-demographic factors exposed) = Pr (scabies/not exposed socio-demographic factors)

**Ha:** Pr (scabies/ socio-demographic factors exposed)  $\neq$  Pr (scabies/not exposed socio-demographic factors)

2. **Ho:** Pr (scabies/environmental factors exposed) = Pr (scabies/not exposed environmental factors)

**Ha:** Pr (scabies/environmental factors exposed)  $\neq$  Pr (scabies/not exposed environmental factors)

3. **Ho:** Pr (scabies/ behavioral factors exposed) = Pr (scabies/not exposed behavioral factors)

**Ha:** Pr (scabies/ behavioral factors exposed)  $\neq$  Pr (scabies/not exposed behavioral factors)

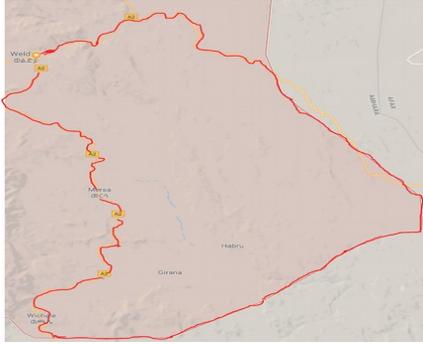
## 4. Methodology

### 4.1 Study area

The study was conducted in primary schools at Habru district, North Wollo, Amhara regional state. Habru district is located at 384km from Bahir Dar and 490km to Northeast of Addis Ababa. The district is administratively organized into 43 kebeles; 7 urban kebeles and 36 rural kebeles. According to the Central Statistical Authority (CSA) 2018 population projection, the

total population of the district is estimated to be 228,583. Among this 198,867 live in rural areas and 29,716 in urban areas. Out of this 113,149 are male and 115,434 female. The district has a total of 96 primary schools (1-8 grade) of which 67 schools are found in the rural kebeles and 29 schools are found in the urban kebeles with a total of 30,925 students , 15,775 male and 15,150 females students. Currently, the district has 7 health centers, 43 health posts, and 3 private clinics, which accounts for 95.5% of potential health services coverage.





**Figure 2:** Map of study catchment area Ethiopia (A), Amhara Region (B), North Wollo Zone (C) Habiru District (D) , Source: Google Map-Ethiopia, North Wollo Zone, Amhara Region

## 4.2 Study design and period

Institution based unmatched case-control study design was employed to assess the determinants of scabies among primary school children in Habru district North Wollo zone, Amhara regional state from March– May, 2019.

## 4.3 Population

### 4.3.1 Source population

All primary school children in Habru district, North Wollo Zone of Amhara Region.

### 4.3.2 Study population

The study populations for cases were all selected primary schools children of Habru district, North Wollo Zone of Amhara Region, 2018/19 academic year who were between grade 4- 8 and who have scabies case ; and for controls, all selected primary schools children of Habru district North Wollo Zone of Amhara Region who had no scabies case, 2018/19 academic year.

### 4.3.3 Study Unit

The study unit were those cases which had signs and symptoms of Scabies based on WHO case definition and who were selected by simple random sampling technique from selected primary schools and, studied two controls per each case who had no signs and symptoms of scabies based

on the case definition; selected from the same primary schools in Habru district, North Wollo Zone of Amhara Region.

#### **4.4 Sample size determination and sampling technique**

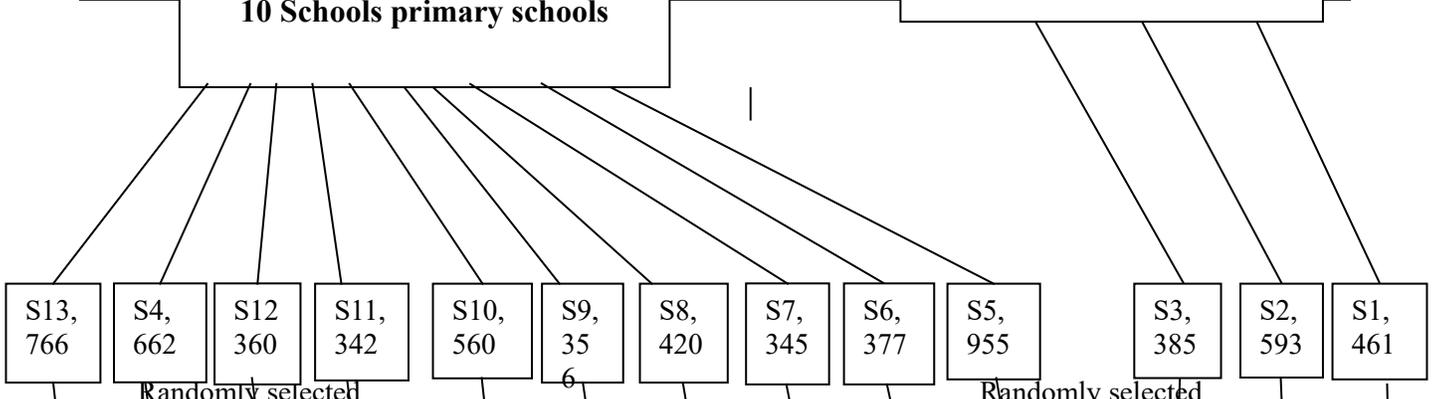
The sample size was calculated by Epi Info™ version 7 statistical program using unmatched case control formula by taking one of the determinates of scabies, family size greater than five ( $\geq 5$ ), percent of cases exposed (85%) and percent of controls exposed (65%) with OR of 3.05(39). The probability of obtaining the population proportion of children among cases and controls was fall within 5% margin of error, two sided confidence level 95% and 80% power of the test, 5% non-response rate, use design effect 1.5 and control ratio of 1:2, the final sample size is 300 (100 cases and 200 controls).

##### **4.4.1 Sampling technique and procedure**

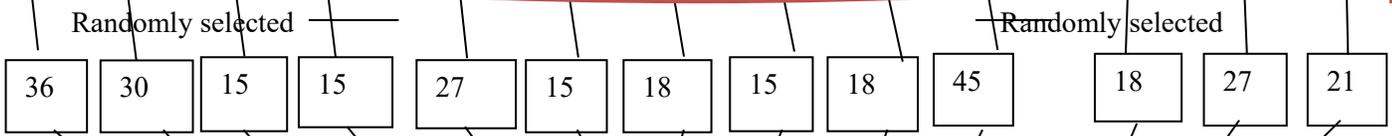
A multi-stage sampling technique was employed to select representative sample of students from urban and rural primary schools. In the first stage, the district contains 96 primary schools that were divided in to urban and rural primary schools. In the second stage, considering homogeneity assumption 13 schools were selected by simple random sampling method from the list of schools, 3 urban schools and 10 rural schools. In the third stage, study participants were selected by simple random sampling technique. All the schoolchildren chosen were from grade 4 to 8 because younger children (grades 1–3) were not able to understand and answer the questionnaire well. The number of children allocated for each school was determined based on the school's total number of students. Three hundred students were chosen randomly from three urban and ten rural schools.

**Table: 1 Allocated sample size in each of the thirteen ranomly selected schools according to sample size and number of students in each school**

No	School Name	Total number of students	Sample allocated
<b>Habiru district</b>			
1	Mehal amiba	461	21
2	Libiso	502	27
<b>96 primary schools</b>			
3	Gunie	345	15
4	Kulelie	662	30
5	Kulie	955	45
<b>67 Primary Schools</b>		<b>29 Primary Schools</b>	
6	Jard	345	15
7	Haro	420	18
<b>10 Primary Schools</b>		<b>3 Primary Schools</b>	
8	Qjimiha	420	18
9	Q	356	15
10	G	955	45
11	Menetela	342	15
12	Burka	360	15
13	Chafee meda	766	36
<b>Total</b>		<b>6582</b>	



**Based on proportional allocation from total children participants selected randomly (lottery method)**



**Total Sample of = 300 Children selected randomly (1:2ratio)**

### **Figure 3: Schematic presentation of sampling procedure for selection of children**

#### **4.5 Selection of cases and controls**

Presence or absence of scabies was identified by conducting preliminary school survey among students who were between grades 4 to 8 for 13 selected schools. During skin examination, each student was registered on the registration form with a specific identification code. Cases were identified in the examination and lists of students who had scabies and those who did not have the case were separately established from the registration form on the basis of the specific identification codes. Simple random sampling technique was used for selection of both cases and controls.

**Cases selection:** A student that had clinical sign symptom of scabies based on WHO case definition that (Presence of itching with typical lesions on hands, inter-digital, and/or genitalia and/or itching and close contact with an individual who had itching or typical lesions in a typical

distribution). Diagnosis of a scabies infestation usually is clinical, made based upon presence of the typical rash and symptoms of unrelenting and worsening itch, particularly at night (51). Cases were selected by trained health professionals.

**Controls selection:** A student of the school who had no clinical sign symptom of scabies based on WHO case definition that are selected from the same school. Two controls to each cases were selected by trained health professionals.

## **4.6 Inclusion and Exclusion criterias**

### **Inclusion and exclusion criterias for cases**

Children grade 4-8 who had signs and symptoms of scabies infection were included and those who were absent from school for two consecutive days during data collection period were excluded.

### **Inclusion and exclusion criterias for controls**

Children grade 4-8 who had no any signs and symptom of scabies were included and those who were absent from school for two consecutive days during data collection period were excluded.

## **4.7 Standard case definition**

**Suspected Case:** A person with signs and symptoms consistent with scabies was suspected. The characteristic symptoms of a scabies infection include superficial burrows, intense pruritus (itching) especially at night, a generalized rash, and secondary infection on the head, face, neck, armpit, elbow, wrist, palms, buttocks and soles (53)(14).

**Confirmed Case:** A person who has a skin scraping in which mites, mite eggs, or mite feces have been identified by a trained healthcare professional was considered a confirmed case (53) (14).

**Contact:** a person without signs and symptoms consistent with scabies who has had direct contact (particularly prolonged, direct skin-to-skin contact) with a suspected or confirmed case in the two months preceding the onset of scabies signs and symptoms in the case(53)(14).

## 4.8 Study Variable

### Dependent variable

Scabies infestation

### Independent variables:

**Demographic factors:** age, sex, family size

**Socio-economic factors:** - Parents education, parents occupation, Family income

**Behavioral factors:** - contact with infected person, sleeping behavior, sharing of bed, frequency of changing of bed sheet

**Environmental factors:** - Geographical location, poor water supply, poor sanitation, flooding affected area

**Personal hygiene:** - Bathing frequency, washing clothes, sharing of bed, frequency of changing of bed sheet, sharing of clothes

**Clinical factors:** - taking treatment, sever itching, visible body parts mostly affected, onset of rash and duration

## 4.9 Operational Definition

**Overcrowding:** consider as high risk of diseases transmission if more than four people living in one room.

**Personal hygiene:** Maintaining the body's cleanliness; a child with no visible dirt on the hair, face, palms, fingers, fingernails, foot, and clothing.

**Contact history:** Previous contact with patient with scabies within the last two weeks

**Restriction:** A Problem experienced by an individual in involvement in life situations

**Family size:** The number of people who are living together under one roof

**School Children:** Children regardless of whether they attend school or not, but this study

considers those children who attend class from grade 4 to 8 only.

#### **4.10 Data Collection methods and tools**

The data was collected using pre-tested interview guided structured questionnaire, which contained:

- Socio-demographic and environmental data: the level of education and the occupations of their parents, number of members of their families, number of rooms in their houses, number of persons who sleep with them in the same bed, presence of animals in their houses, flooding affected their houses.
- Family history of itchy rash, and sharing clothes with others, washing frequency, sources of water
- Clinical data used for diagnosis: students were asked about the presence of rash in their bodies, its site, and time of appearance.

The questionnaire was first prepared in English and translated to local language (Amharic) and then back to English by both language experts. The instrument was adopted from different literatures developed for similar purpose by different authors and tools designed by various organizations.

##### **4.10.1 Data collectors**

Data were collected by six BSc nurses. In addition, two BSc holder nurse holder supervisors were recruited to supervise the day-to-day data collection activities together with the principal investigator. Two days training was given to data collectors and supervisors on the objectives of the study, how to interview, how to fill the questionnaire and handle questions raised by clients during interviewing.

##### **4.10.2 Pre- test**

Before the actual data collection, the questionnaire was tested for 5% of sample size among children in two primary schools which were not included in the actual study.

#### **4.11 Data collection process**

After identifying the targeted schools, two trained data collectors were assigned to each school and clinical examination was carried out in a private room. The diagnosis of scabies was made on clinical basis by the presence of rash with itching increasing at night, and skin lesions in the form of characteristic burrows, vesicles, and itchy papules or nodules in characteristic sites of the disease (on the wrist, sides and web spaces of the fingers, the axillae, periareolar, periumbilical, abdomen, and buttock areas). Data were collected through face-to face interview with children. The school teachers were asked to help in organizing the interview sessions. Two unmatched controls were selected per each case. The students were interviewed during break time, and just before the students left the respective schools.

#### **4.12 Data analysis**

The collected data were coded and entered to Epi Info™ version 7. It was checked for its completeness, cleaned, and analyzed accordingly and exported to SPSS version 20 for further statistical analysis. Descriptive statistics was used to describe the study population in relation to relevant variables. Both bivariate and multivariate logistic regression models were used to identify associated risk factors. Those variables which had a P values of  $<0.25$  in bivariate analysis were enter and re-analyzed in multivariable logistic regression model to control confounding factors. Odd ratios and their 95% confidence intervals were computed and variables with P value less than 0.05 were considered as statistically significant. Logistic regression assumption test was tested and fit to the final model check by Hosmer Lemeshow goodness of fit ( $p = 0.87$ ).

#### **4.13 Data quality assurance**

To keep the quality of data, the English version questionnaire was translated in to Amharic and then back to English to maintain its consistence for actual data collection with great emphasis given to local vocabularies. The questionnaire was also pre-tested on pilot area. The principal investigator had given detailed training for data collectors and supervisor and, a guiding document was given to them. Furthermore, the principal investigator and supervisor were giving feedbacks and corrections on daily basis for the data collectors before they deployed to the field

and completeness, accuracy, and clarity of the collected data. Any error, ambiguity, incompleteness encountered were addressed on the following day before starting the next day activities.

#### **4.14 Ethical consideration**

The proposal was ethically approved by DBU College of Health Sciences Research Ethics Committee. Permission was obtained from the Habru district education and health offices. In addition, permission was obtained from each of the selected schools. Informed consent was obtained from student's teacher. In addition verbal assent was obtained from all children. Student's privacy was maintained throughout the data collection process such as during the interview and the skin examination. For this sake, names of participants were not taken and the data obtained from them kept confidential. In collaboration with the district health office confirmed cases were referred and some of them got the treatments, Sulfur ointment.

### **5. Results**

#### **5.1 Socio-demographic characteristics of the study participants**

In the current study, 300 study participants were included of which 100 were cases and 200 were controls. The response rate was 100%. Among the total 100 interviewed cases, 73(73%) were male and 27(24%) were female. The mean age was found to be  $14 \pm 2.4$  years for both cases and controls. Majority of study participants were from rural area in both groups, 79% and 75% for controls and cases respectively. Sixty percent of cases and 64.5% of controls were Muslims and the rest were Orthodox Christian followers. One-third (72%) of cases born to mothers who can't read and write, while 18% of controls born to mothers with primary educational level. Majority, 84(42%) of controls and 43(43%) of cases born to fathers who can read and write and few children born to father who have accomplished university or college education; 11(5.5%) and 7(7%) for controls and cases respectively. As to parent's occupational status, 69% of cases and

66% of controls born to housewives; whereas 71% of cases and 66.5% of controls born to farmer with regard to father's occupational status (Table 1).

**Table 1: Socio-demographic characteristics of cases and controls among primary School children in Habru district May 2019.**

Variable	Control		Cases n (%)		Total, n = (%)
	Number	Percent	Number	Percent	
<b>Age</b>					
10-12	46	23%	54	54%	100(33.3%)
13-15	64	32%	36	36%	100(33.3%)
16-18	90	45%	10	10%	100(33.3%)
<b>Family size</b>					
<5	132	66%	44	44%	176(58.7%)
≥5	68	34%	56	56%	124(41.3%)
<b>Sex</b>					
Female	128	64%	27	27%	155(51.7%)
Male	72	36%	73	73%	145(48.3%)
<b>Current residence</b>					
Urban	42	21%	25	25%	67(22.3%) %
Rural	158	79%	75	75%	233(77.7%)
<b>Religion</b>					
Orthodox	71	35.5%	34	34%	105(35%)
Muslim	129	64.5%	66	66%	195(65%)
<b>Marital status of the mother</b>					
Married	158	79%	84	84%	242(80.7%)
Divorced	42	21%	16	16%	58(19.3%)
<b>Marital status of the father</b>					
Married	158	79%	84	84%	240(80%)
Divorced	42	21%	16	16%	60(20%)
<b>Mother's educational level</b>					
Can't read and write	60	30%	72	72%	132(44%)
Reading and writing	80	40%	23	23%	103(34.3%)
Primary school	36	18%	3	3%	39(13%)
Secondary school	16	8%	1	1%	17(5.7%)
University/college	8	4%	1	1%	9(3%)
<b>Father's educational level</b>					
Can't read and write	79	39.5%	46	46%	125(41.7%)
Reading and writing	84	42%	43	43%	127(42.3%)
Primary school	14	7%	3	3%	17(5.7%)
Secondary school	12	6%	1	1%	13(4.3%)
University/college	11	5.5%	7	7%	18(6%)
<b>Mother's occupational status</b>					
Housewife	132	66%	69	69%	201(67%)
Government employee	8	4%	3	3%	11(3.7%)
Daily laborer	4	2%	4	4%	8(2.7%)
Merchant	36	18%	10	10%	46(15.3%)
Others	20	10%	14	14%	34(11.3%)
<b>Father's occupational status</b>					
Farmer	133	66.5%	71	71%	204(68%)
Daily laborer	5	2.5%	4	4%	9(3%)
Government employee	10	5%	6	6%	16(5.3%)
Merchant	32	16%	8	8%	40(13.3%)
Others	20	10%	11	11%	31(10.3%)

## 5.2 Presence of clinical features of Scabies

Among the case study participants, 96 (96%) had scabies related skin rash and 99(99%) had itching followed by secondary bacterial infection 33(33%). Of the total cases, 89 (89%) of them did not visit health facility to get treatment for the infestation. Few cases have gotten medication. Almost all cases included in the study complained persistent itching and they had itching during night time. Regarding site of the rash on the body, 16(16%) of cases had it on inter gluteal area, 70 (70%) on ulnar border of the hand space, 7 (7%) on inner aspects of thighs and 5(5%) in elbow surface. The rash was dispread within one week in half of the cases (Table 2)

Table 2: Clinical profiles of study participants (cases)

Variable	Category	Number of Cases percentage (%) (N=100)	
<b>Skin rash</b>	Yes	96	96
	No	4	4
<b>Tiny red burrows</b>	Yes	73	73
	No	23	23
<b>Secondary infections</b>	Yes	33	33
	No	67	67
<b>Persistant itching</b>	Yes	99	99
	No	1	1
<b>Itching time</b>	Day	12	12
	Night	88	88
<b>Duration of rash</b>	< 8 days	53	53
	≥8 days	47	47
<b>Nearby clinic/health center</b>	Yes	54	54
	No	46	46
<b>Have you visited health facility because of the scabies</b>	Yes	11	11
	No	89	89
<b>Did you get medication</b>	Yes	10	10
	No	90	90
<b>Site of lesion</b>	Ulnar border of the hand	70	70
	Elbow	5	5
	Inter gluteal area	16	16

Inner aspects of thighs	7	7
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### 5.3 Factors Associated with Scabies

In the bivariate analysis, age, family size  $\geq 5$  members, family history of scabies, mothers educational status, sleeping with person infested with scabies, previously scabies history, number of sleeping rooms, sharing of clothes with infected person, source of water for daily basis, and animal living inside the house were significantly associated with having scabies.

Those individuals within 10-12 and 13-15 years of age were more likely developed scabies compared those older age groups. The OR of participants who were in 10-12 age group was 10.5 95%CI (4.9, 22.6) whereas children within 13-15 age groups were 5 times more likely to have scabies infestation compared to the older age groups.

Male participants were more likely to infected by scabies with the OR of 4.8. In the bivariate analysis, family size was found to be a significant determinant of scabies. The larger the family size, the higher the risk to get scabies. Family size greater than or equal to 5 was 2.4 times more likely to develop scabies compared to the lesser the family size. Educational status of the mother had a significant dterminants of scabies. Those children born from mothers who can't read and write were more likely having scabies. However, father's educational status was not significantly associated with scabies in the bivariant analysis. Previous history of scabies was found to be a significant determinant of scabies in bivariant analysis. Those individual who have been infected previously were 3.9 times more likely to be re-infected compared to the control. Source of water for daily bases was also found to be an important determinant of scabies in bivariant analysis. Of the water sources, pond water was significantly independent risk factor. Those study participants who have been using pond water were 3.8 times more likely to get scabies infestation than those who used pipe water (Table 3).

After adjusting for possible confounding factors the result of multiple logistic regression analysis showed that age, sex, family size  $\geq 5$  members, family history of scabies, number of sleeping rooms, previous infection and sharing of clothes with infected person were found to be the final independent variables significantly associated with scabies infestation.

Children between 10–12 years of age were 8 times more likely to get scabies (AOR= 8, 95% CI: 2.7, 24.2) and age between 14-15 years of age, 7.7 times more likely to develop scabies (AOR=

7.7, 95% CI: 2.6, 23.2) compared with age between 16-18 years of age. Male were more likely to get scabies infestation. In the multivariate analysis, males were 7.5 times more likely to develop scabies than female (AOR= 7.5; 95% CI: 3.3, 24.4). The larger the family size was found to be independent determinants of scabies. Children with family size  $\geq 5$  were more likely to develop scabies infestation (AOR= 3.4, 95% CI: 1.5, 7.7). Similarly, the number of sleeping rooms was also found to be independent determinants of scabies. The smaller the number of sleeping rooms, the greater risk to get scabies. As shown in the table below, children from family having less  $\leq 3$  sleeping rooms were more likely to be infected by scabies (AOR= 8.2, 95% CI : 2.9, 23).

In the multivariate analysis, previous history of scabies was found to be a significant determinant of scabies. Children who have been infected previously were 7.4 times more likely to be re-infected compared to those who have no previous scabies history (AOR= 7.4, 95% CI: 1.4, 39.1). In addition, family history of scabies was also an independent determinant of scabies, (AOR= 9.8, 95% CI: 3.9, 24.4). The odd of developing scabies infestation was 7.4 among children's shared any clothes with someone with scabies cases compared to those had not shared any clothes with someone with scabies case (AOR =7.4, 95% CI: 2.7, 24).

Mothers educational status, sleeping with scabies patients, frequency of body wash, sharing cloths with other family members, pound water were not significantly associated with scabies in multivariate analysis.

**Table 3: Bivariate and multivariable logistic regression analysis of determinants of scabies among primary school children's Habru district; Amhara region, Ethiopia**

Variable	Cases(%)	Control(%)	COR(95% CI)	AOR(95% CI)
<b>Age</b>				
10-12	54(54)	46(23)	10.5(4.928 – 22.649)	8(2.786 – 24.244)**
13-15	36(36)	64(32)	5(2.343- 10.938)	7.7(2.612– 23.194)**
16-18	10(10)	90(45)	1	1

<b>Sex</b>				
Female	27(27)	128(64)	1	1
Male	73(73)	72(36)	4.8(2.836 – 8.146)	7.5(3.293– 24.462)**
<b>Family size</b>				
<5	44(44)	132(66)	1	1
≥5	56(44)	68(34)	2.47(1.511 – 4.039)	3.4(1.536 – 7.748)**
<b>Number of room</b>				
≤3	105 (52.5)	85 (85)	5.127 (2.772 – 9.484)	8.2(2.914– 23.145)**
>3	95 (47.5)	15 (15)	1	1
<b>Mothers educational status</b>				
Can't read & write	60 (30)	72 (72)	9.6 ( 1.168- 78.938)	2(0.205 – 21.142)
Read and write	80 (40)	23 (23)	0.5(0.028-9.076)	0.01(.000-0.447)**
Primary school	36 (18)	3 (3)	2.3(0.273-19.353)	0.7 (0.064-8.491)
Secondary school	16 (8)	1 (1)	0.7(0.061-7.271)	0.1 (0.005-2.402)
College/ university	8 (4)	1 (1)	1	1
<b>Previously infected</b>				
Yes	11 (11)	6 (3)	3.996(1.433– 11.148)	7.4(1.420– 39.196)**
No	89 (89)	194 (97)	1	1
<b>Family history</b>				
Yes	70 (70)	44( 22)	8.27 (4.806 – 14.239)	9.78(3.913-24.462)**
No	30 (30)	156 (78)	1	1
<b>Sleeping with scabies patient</b>				
Yes	28 (28)	18(9)	3.9 (2.049 -7.547)	1(0.318 – 3.713)
No	72 (72)	182 (91)	1	1
<b>Taking shower frequencies</b>				
Oncetimepertwo weeks	29 (29)	48 (24)	3.2 (1.202 – 8.640)	1.8(0.450 – 7.291)
Once per week	65 (65)	120 (60)	2.88 (1.148 – 7.269)	2.6(0.770 – 9.217)
Every day	6 (6)	32 (16)	1	1
<b>How frequent you wash your cloth</b>				
Weekly	55(55)	121(60.5)	1	

More than a weak	45(45)	79(39.5)	0.79(0.491-1.297)	
<b>Sharing of clothes with other family members</b>				
Yes	60 (60)	87 (43.5)	1.948 (1.196 – 3.174)	0.7(0.333 – 1.679)
No	40 (40)	113 (56.5)	1	1
<b>Shared any clothes with someone with Scabies case</b>				
Yes	34 (34)	15 (7.5)	6.354(3.253– 12.408)	7.4(2.786 -24.049)**
No	66 (66)	185 (92.5)	1	1
<b>Home affected by flooding</b>				
Yes	26(26)	38(19)	1.5(0.847-2.648)	0.8(0.291-2.452)
No	74 (74)	162 (81)	1	1
<b>Travel history</b>				
Yes	15(15)	36(18)	0.8(0.417-1.550)	
No	85(85)	164(82)	1	
<b>Number of student per class room</b>				
<50	17 (17)	28 (14)	0.79(0.412-1.533)	
≥50	83 (83)	172 (86)	1	
<b>Sources of water for daily basic use</b>				
Pipe	35 (35)	122 (61)	1	1
Spring	23 (23)	29 (14.5 )	2.765 (1.423 – 5.370)	1(.0338 – 3.225)
Pond	10 (10)	9 (4.5)	3.873(1.460– 10.276)	3(0.625 – 18.294)
River	32 (32)	40 (20)	2.789 (1.534 – 5.070)	2.3(0.921-5.982)

\*\*Shows variables that are statistically significant after adjusted with  $p < 0.05$ .

## 6. Discussion

The clinical characteristics of study participants were determined and the result showed that major symptom that identified was itching that worsens during the night. Generally, itching is the main symptom of scabies. This is often severe and tends to be in one place at first, and then spreads to other areas. The main sites where the rashes appear were on ulnar border of the hand (70%), elbow (5%), and inter gluteal area (16%) and inner aspects of thighs (7%) in the current study. This is in contrast with the study conducted at Kacha Bira district of Kembata Tembaro

Zone, SNNP Region in which the wrist accounts 64%, inter digital spaces 71% and inter gluteal area 75% (24). The finding is similar to the study conducted at boarding schools in Cameroon with the interdigital spaces and flexor wrists (ulnar border of the hand) were the common sites affected by scabies (54). This could be true as these parts of the body might be easily exposed to the mite and create favorable conditions for the scabies mite.

In the present study, it was found that being male, age group 10-12 years and 13-15 years, sharing of clothes with scabies patients, previous scabies history, having a family history of scabies, family size  $\geq 5$  members and numbers of sleeping rooms were significant risk factors for scabies infestation. Males were more likely to be infected compared to female. This result was in line with a study done in northwestern Ethiopia and Cameroonian children, which reported scabies was more prevalent among male students (45) (39). The possible assumption could be that females had more access to water every day than males and are able to relatively maintain their personal hygiene than male. The other possibility could be also males, particularly in the rural area, spend more time outside and can be potentially infected easily since other environmental factors facilitate the transmission. Male also have a habit to sleep with others which could contribute to acquiring the infestation (45). However, this result was in contrast with other studies in which no significance difference was observed between being male or female with scabies infestation (47)(55). The difference could be due to the sociocultural differences or the number of study participants included. For instance, the study done by Hegab DS *et al*, 2015 included large number study participants compared to the current study.

Age was found to be an important determinant of scabies in the current study. Younger children were more likely having scabies infestation. Children between 10-12 years of age were found to be the most affected age group (AOR: 8, 95%CI: 2.786, 24.244) followed by 13-15 years of age (AOR= 7.7, 95%CI: 2.612, 23.194). The finding was in line with a similar study conducted in Cameroonian boarding schools (45). However, the result was in contrast with other studies conducted in South West Ethiopia, Quetta and Pakistan (39)(50)(56). The reason why younger children's were more prone to scabies could be due to the fact that younger children, particularly those at school are at high risk of scabies infestations as the school environments may increase the susceptibility of cross-infestation and increase contacts(23). The other possibilities could be younger children could not have awareness how to prevent scabies and keep personal hygiene. In

addition younger children, are most commonly shared cloths with others potential having scabies.

Concerning the risk factors for scabies, there was statistically significant association between family size and scabies infestation that the odds of acquiring scabies was 3.4 in those having more than five family members (AOR= 3.4; 95%CI: 1.536, 7.748). Majority of cases in the current study were living in a family having five or more family members. This finding was consistent with the study done in Pakistan indicating households with six to ten persons per household were more likely to acquire scabies compared to those households having less than five family members (50). In addition, this result is also supported by other similar study conducted in west of Iran which revealed that scabies had been directly associated with family size (57). It is well known that scabies can spread easily under crowded conditions where close body and skin contact is common (24)(55). In general, communicable disease are more frequent and the transmission is easy when the population density is high (34). Crowded living conditions, in particular overcrowding for sleeping space and sleeping habits could have been important contributing risk factor for scabies in the current study. This crowdedness could create favorable conditions for the causative agent and facilitate the transmission dynamics among family members. Other scholar also reported a similar finding on the epidemiological study of scabies in primary schools, Fayoum Governorate- Egypt(58). The study conducted on scabies outbreak investigation among religious students “Yekolo temari” in Gonder town also revealed living in crowded condition was risk for having scabies (59). The increased risk of scabies as the family size is increasing could be due to overcrowding among larger families which increases sharing of cloths, beds and other utensils potentially abiotic hosts for the mite. It is well known that Scabies can spread easily under crowded conditions where close body and skin contact is common. The other justification could be that family size conditions were less conscious of the importance of personal hygiene and the role of poor hygiene in the spread of communicable diseases due to giving care for all family members or shortage of materials for personal hygiene.

The current study also revealed that number of sleeping rooms  $\leq 3$  was significantly associated with developing scabies (AOR= 8.2; 95%CI: 2.914, 23.145). Fewer rooms and many people sharing the same bed delicate the predisposition to scabies infestation, mainly due to contact transmission of the disease. An increased number of family members with small houses typically led to poor living conditions and unhealthy practices (60). Our finding was in line with the study

conducted in Fayoum Egypt (58). It was found that family history of scabies was 9.8 times more prone to having scabies (AOR= 9.8; 95%CI: 3.913, 24.462). This result is supported by other similar study conducted in Egypt (55). The reason could be probably that awareness of family members about the spread of the disease between family members is less and led to lack of prevention measure to be taken (45). It is known that the chance of getting the disease if one family member having the case is high unless critical cares are taken.

The current study demonstrated that children who have been sharing clothes with scabies infected person were more likely prone to having scabies (AOR= 7.4; 95%CI: 2.786, 24.049) and became infected in greater proportions. The result is in line with the study conducted in Pakistan and Egypt (61)(50). Sharing of clothes with someone with scabies facilitates the transmission and therefore the spread of scabies mites from infested person to healthy children and children sharing clothes with infected person were more susceptible to severe and repeated infection due to the fundamental role of contact in disease transmission. Since the mites could stay alive on cloth for prolonged time unless complete removal have been made such as bedding and clothing laundered properly, children who are sharing cloths could get the disease easily although medication has been made.

Previous scabies infestation was found to be independent factors of scabies reinfestation (AOR= 7.4,95%CI: 1.420,39.196). Reinfestation of the infestation indicates that these subsequent infections are more likely could be due to incorrectly applied treatment, treatment failure or inadequate treatment of the environment or close contacts that is ineffective eradication of mites on physical bodies (62). Inappropriate medication could be contributing for reinfection as we noted only few children have gotten medication for the infestation in the current study. This might allow the scabies mites to persist in the environment including cloths and other potential sources.

Sleeping with scabies infected person, taking shower frequencies, sharing clothes with other family members, parent's education, resident, number of student per class room, animal living inside the housed ,sources of water for domestic purpose, home affected by flooding, animals living inside the house and frequency of cloth washing were not significantly associated with scabies in the current study. It is in contrast with other previous studies in Bedwecho district, Hadiya Zone and Pakistan and Egypt (39)(50)(55).

## **7. Strengths and Limitations of the Study**

### **7.1 Strength of the study**

- Being a case control study which have been more effective to assess the determinant factors
- As to the data quality, the use of a standardized questionnaire, pretests done before the data collection and intensive training for data collectors

### **7.2 Limitation of the study**

Diagnosis was carried out only on the clinical basis; not confirmed by burrow scraping and microscopic examination.

## **8. Conclusion**

In conclusion, scabies remains a significant problem among primary schools children's in Habru district primary schools. Determinants like sex; age, family history of scabies, family size, number of rooms, previous history of scabies and sharing clothes with a person with scabies were significantly associated with the occurrence of scabies and are important risk factors for transmission of the disease in the district primary schools.

## **9. Recommendations**

Based on the findings, the following recommendations have made to mitigate the impact and to reduce scabies in the district at various levels comprising of schools, parents, and students.

- District health office should work closely with school community to implement control mechanisms and to distribute treatments.
- Woreda health office and health centers have to promote on hygiene and sanitation of the school community .
- Student's parents and teachers should have work together on how children keep their personal hygiene and prevent scabies.

## 10. References

1. Raza N, Agha H. Risk factors for scabies among male soldiers in Pakistan : case control study. *East Mediterr Heal.* 2009;15(5):1105–10.
2. Zeba N, Shaikh DM, Memon KN, Khoharo HK. Scabies in Relation to Hygiene and Other Factors in Patients Visiting Liaquat University Hospital , Sindh ,. *Int J Sci Res.* 2014;3(8):2012–5.
3. Górkiewicz-Petkow A. Scabies. *Eur Handb Dermatological Treat Third Ed.* 2015;25:859–65.
4. Health MOF. Guideline for management of scabies in adults and children. MALAYSIA; 2015.
5. Management of Scabies in Long- Term Care Facilities, Schools And Other Institutions. 2014.
6. Khatoon N, Khan A, Azmi MA, Khan A, Shaukat SS. Most common body parts infected with scabies in children and its control. *Pak J Pharm Sci.* 2016;29(5):1715–7.
7. Planning H. Planning H. Nevada State Health Scabies Prevention and Control Guidelines

- Residential Group/ Group Home Facilities. 2011 ;( September).
8. Hay RJ, Johns NE, Williams HC, Bolliger IW, Dellavalle RP, Margolis DJ, et al. The Global Burden of Skin Disease in 2010 : An Analysis of the Prevalence and Impact of Skin Conditions. *J Invest Dermatol.* 2014;134(6):1527–34.
  9. Liu J, Wang H, Chang F, Liu Y, Chiu F. The effects of climate factors on scabies . A 14-year population-based study in Taiwan. *Parasite.* 2016;23(54):1–7.
  10. Mashqoor M, Mbbs M, Mbbs G, Mateen A. Prevalence of Scabies Among Rural Children in Kashmir. 2019;2(1):8–10.
  11. Salavastru CM, Chosidow O, Boffa MJ, Janier M, Tiplica GS. European guideline for the management of scabies. *Eur Acad Dermatology Venereol.* 2017;1–6.
  12. Governorate A, Mohy AA, Al-hadraawy SK, Abduljabbar A, Aljanaby J. Epidemiological study of patients infected with scabies caused by *Sarcoptes*. *Biomed Res.* 2018;29(12):2650–4.
  13. T M. Guidelines for the Management of Scabies. NHS Highland Assynt House Beechwood Park: Information produced by: Health Protection Team Directorate of Public Health & Health Policy NHS; 2017. p. 1–13.
  14. Enbiale W, Ayalew A. Investigation of a Scabies Outbreak in Drought-Affected Areas in Ethiopia. *Trop Med Infect Dis.* 2018;114(3):1–9.
  15. Hay1 RJ, Steer2 AC, And DE, Walton3 S. Scabies in the developing world its prevalence, complications, and management ,2012. *Wiley Online Libr , Clin Microbiol Infect.* 2012;18(4):313–23.
  16. Veranda. Sehgal SM and VR. Nodular Scabies of the Genitals. *Int J Dermatology.* 2015.
  17. CDC.Prevention&Control.2015;(888):30329.Availablefrom:h ttp://www.cdc.gov/parasite.
  18. Interim-Guideline for Multi Sectorial Scabies Outbreak Emergency Response; FMOH: Addis Ababa, Ethiopia, 2015.
  19. Kline K, Mccarthy JS, Pearson M, Loukas A, Hotez PJ. Neglected Tropical Diseases of Oceania : Review of Their Prevalence , Distribution , and Opportunities for Control  
Neglected Tropical Diseases of Oceania : Review of Their Prevalence , Distribution , and

- Opportunities for Control. PLoS Negl Trop Dis. 2013;(January).
20. Federal ministry of Health. Final Interm Guideline for Multi-Sectorial Scabies Outbreak Emergency Response. Ethiopia; 2015.
  21. Hay RJ, Steer AC, Engelman D, Walton S. Scabies in the developing world its prevalence , complications , and management. Eur Soc Clin Microbiol Infect Dis. 2012;18(4):313–23.
  22. Liu J, Hsu R, Chang F, Yeh C, Huang C, Chang S, et al. Increase the risk of intellectual disability in children with scabies. Vol. 23, Medicine. 2017. 1-7 p.
  23. CDC.Epidemiology&RiskFactors of Scabies. 2015.
  24. Markos girmamo, scabies out break investigation, Kacha Birra District, Kembata Tembaro Zone, SSNPR, Ethiopia, November 11-20, 2016.
  25. Alsamarai AM, Hamed A, Alobaidi A. Scabies in displaced families : Health care problem that need urgent action. Our Dermatol Online. 2017;8(3):250–4.
  26. Zeba N, Shaikh DM MK and KH. Scabies in relation to Hygiene and other factors in patients visiting Liaquat University Hospital, Sindh, Pakistan. Sons. JW and, editor. Int J Sci Res. 2nd ed. 2012;3(8):241–4.
  27. Federal Democratic Republic of Ethiopia Ministry of Health. National Master Plan for Neglected Tropical Diseases (NTDs) (2015/16-2019/20). 2nd ed. Addis Ababa; 2016.
  28. North Wollo Health Department, Zonal public health emergency management case team annual report, 2015.
  29. CDC. Prevention &Control, 2015; (888):30329.Availablefrom:<http://www.cdc.gov/parasites/scabies/prevent.htm>.
  30. Engelman D, Kiang K, Chosidow O, Mccarthy J, Fuller C, Lammie P. Toward the Global Control of Human Scabies : Introducing the International Alliance for the Control of Scabies. PLoS Negl Trop Dis. 2013;7(8):5–8.
  31. [http: globalhealth.thelancet.com/2014/07/07/scabiesjoins-list-who-neglected-tropical-diseases](http://globalhealth.thelancet.com/2014/07/07/scabiesjoins-list-who-neglected-tropical-diseases).

32. Karimkhani C, Colombara D V., Drucker AM, Norton SA, Hay R, Engelman D, et al. The global burden of scabies: a cross-sectional analysis from the Global Burden of Disease Study 2015. *Lancet Infect Dis.* 2017;17(12):1247–54.
33. Thomas J, Peterson GM, Walton SF, Carson CF, Naunton M, Baby KE. Scabies: An ancient global disease with a need for new therapies. *BMC Infect Dis.* 2015;15(1):1–6.
34. WHO | Scabies [Internet]. Who. 2015. Available from: [http://www.who.int/lymphatic\\_filariasis/epidemiology/scabies/en/](http://www.who.int/lymphatic_filariasis/epidemiology/scabies/en/).
35. Boushab BM, Zahra Fall-Malick F, Mamoudou S, Boushab MB. Epidemiological, Clinical and Evolutionary Human Scabies in the Aioun Hospital Center (Hodh El Gharbi Region), Mauritania. *Ann Clin Lab Res.* 2015;3:31.
36. WHO. Epidemiology and Management of Common Skin Diseases in Children in Developing Countries. 2015.
37. Weekly E, Bulletin E. Ethiopian Public Health Institute Center for Public Health Emergency Management. Vol. 4. 2018.
38. Drought and Disease Outbreaks in Ethiopia ,Humanitarian Requirement Document. 2016.
39. Sara J, Haji Y, Gebretsadik A. Scabies Outbreak Investigation and Risk Factors in East Badewacho District , Southern Ethiopia : Unmatched Case Control Study. *Hindawi, Dermatology Res Pract.* 2018;10.
40. Town G, Yassin ZJ, Dadi AF, Nega HY, Derseh BT, Asegidew W. Scabies Outbreak Investigation among “ Yekolo Temaris ” in. *Electron J Biol.* 2017;13(November 2015):203–9.
41. Lay C, Wang C, Chuang H, Chen Y. Risk Factors for Delayed Diagnosis of Scabies in Hospitalized Patients From Long-Term Care Facilities. *Clin Med Res Elmer Press.* 2011;3(2):72–7.
42. Karimkhani C, Colombara D V, Drucker AM, Norton SA, Hay R, Engelman D, et al. Article The global burden of scabies : a cross-sectional analysis from the Global Burden of Disease Study 2015. *Lancet Infect Dis.* 2015;17(12):1247–54.
43. Mika A, Reynolds SL, Pickering D, McMillan D, Sriprakash KS, et al. Complement

Inhibitors from Scabies Mites Promote Streptococcal Growth A Novel Mechanism in Infected Epidermis. *PLoS Negl Trop Dis* 2012; 6(7): e1563.  
doi:10.1371/journal.pntd.0001563.

44. White LCJ, Lanza S, Middleton J, Hewitt K. The management of scabies outbreaks in residential care facilities for the elderly in England : a review of current health protection guidelines. *Epidemiol Infect.* 2016;10:1–10.
45. Kouotou EA, Nansseu JRN, Kouawa MK, Bissek AZ. Prevalence and drivers of human scabies among children and adolescents living and studying in Cameroonian boarding schools. *Parasit Vectors.* 2016;4–9.
46. Sambo MN, Idris SH, Umar AA, Olorukooba AA. Prevalence of scabies among school-aged children in Katanga rural community in Kaduna. *Ann Niger Med.* 2012;6(1):11–4.
47. Sherbiny NA El, El TAA, Nasif GA, Hassan NS, Aliaa N. Epidemiological Study of Scabies in Primary Schools , Fayoum. *Prim Heal Care Gen Pract.* 2017;1(2):1–5.
48. Mason DS, Marks M, Sokana O, Solomon AW, Mabey DC, Romani L, et al. The Prevalence of Scabies and Impetigo in the Solomon Islands: A Population-Based Survey. *PLoS Negl Trop Dis.* 2016;10(6):1–10.
49. Qasim MM. Epidemiology of Scabies among Primary School Children in Quetta. *P J M H S.* 2015;9(13):1302–5.
50. Yasmin S, Ullah H, Inayat M, Khan U, Tabassum S. Epidemiological study of scabies among school going children in district Haripur , Pakistan. *Arthropods(IAEES).* 2017;6(2):59–66.
51. Fedral ministry of Health. Interm Guideline for Multi-Sectorial Scabies Outbreak Emergency Response. Ethiopia; 2015.
52. Walker SL, Lebas E, Sario V De, Deyasso Z, Doni N, Marks M, et al. The prevalence and association with health- related quality of life of tungiasis and scabies in schoolchildren in southern Ethiopia. *PLoS Negl Trop Dis.* 2017;11(8).
53. Engelman D, Steer A. Control Strategies for Scabies. *Trop Med Infect Dis [Internet].* 2018;3(3):98. Available from: <http://www.mdpi.com/2414-6366/3/3/98>

54. A.K.Emmanuel,R.N.Jobert,M.K.Kouawaetal.,“Prevalence and driversofhumanscabiesamongchildrenandadolescents living and studying in Cameroonian boarding schools,” *Parasites&Vectors*,2016.
55. Hegab Ds, Kato Am, Kabbash Ia, Dabish Gm. Scabies among primary schoolchildren in Egypt: sociomedical environmental study in Kafr El-Sheikh administrative area. *Clin Cosmet Investig Dermatol*. 2015;8:105–11.
56. Lulu Y, Tolesa G, Cris J. Prevalence and Associated Factors of Skin Diseases Among Primary School Children in Illuababor Zone, Oromia Regional State, South West Ethiopia . *Indo Am J Pharm*. 2017;7(01).
57. Nazari M, Azizi A. Epidemiological Pattern of Scabies and Its Social Determinant Factors in West of Iran. *Sci Res Publ Inc*., 2014;6(August):1972–7.
58. Sherbiny NA El, El TAA, Nasif GA, Hassan NS, Aliaa N. Journal of Primary Health Care and General Practice Epidemiological Study of Scabies in Primary Schools , Fayoum. 2017;1(2):1–5.
59. Yassin ZJ, Dadi AF, Nega HY, et al. Scabies Outbreak Investigation among “Yekolo Temaris” in Gondar Town, North Western Ethiopia, November 2015. *Electronic J Biol*, 13:3.
60. Hay RJ, Steer AC, Engelman D, Walton S. Scabies in the developing world-its prevalence, complications, and management. *Clin Microbiol Infect [Internet]*. European Society of Clinical Microbiology and Infectious Diseases; 2012;18(4):313–23.
61. Yasmin S, Ullah H, Inayat M, Khan U, Tabassum S. Epidemiological study of scabies among school going children in district Haripur , Pakistan. *Arthropods(IAEES)*. 2017;6(2):59–66.
62. Edison L, Beaudoin A, Goh L, Introcaso CE, Martin D, Dubray C, et al. Scabies and Bacterial Superinfection among American Samoan Children ., *PLoS One*. 2015;10(10):2011–2.

## **11. Annexes**

### ***11.1 Annex 1: Information sheet and consent form /English version***

Date \_\_\_\_\_ EC / \_\_\_\_\_ GC

#### **Introduction**

Dear participants!

My name is \_\_\_\_\_ and I am MPH student at Debre Berhan University, collage of health Sciences and department of public health. I am doing a research entitled with "Determinants of Scabies among primary school children at Habru District, North Wollo Zone, Amhara Regional Sate, a Ethiopia."

#### **Purpose of the study**

The objective of this study is to identify the determinants of scabies a among primary school children in Habru District, North Wollo, Amhara Regional State, Ethiopia

**Duration:**

The duration of this study, depend upon the availability of study subjects. It might take about two months or more.

**Risk associated with the skin examination:**

The risk associated with the skin examination is free of any risk

**Procedure of the study**

If you agree to participate in the study, over the data collection period, all participating individuals will have a complete skin examination by trained health staffs. Examinations will be conducted in a systematic way of the skin hair, nails, and oral cavity. Students will be bring to the waiting area class by class by their teacher and individually examine in a private setting by members of the study team. The students will be interviewed during break time, have no class and just before the students left the respective schools.

**Confidentiality**

All records will be kept strictly confidential. Participants identifications will not be collected for the study purpose instead code number will be used. Personal identifying information will not be shared outside of the study and it will not be used in any of the publications.

**Benefit of the study**

The benefit of this study is to create awareness on scabies infections, transmission, and possible privation this result will give hint to the school community to keep/improve their health. In addition, there is no any payment or direct benefit for participating.

**Withdrawal rights**

Your participation in this study is purely voluntary and you may stop the participation at any time or you may refuse to answer some of the questions if you feel uncomfortable. You are free to refuse to participate in the study or you can withdraw your consent at any time, without giving reasons and this will not involve any penalty or loss of benefits.

If you are not comfortable, please feel free to stop it at any level of the study. I appreciate your cooperation to a great extent.

If you have any question regarding to this study, you can contact the principal investigator through the following addresses.

**Principal Investigator: Melat Wodaje**

**Tel: +251-945973625**

**Email: meluw2008@gmail.com**

I would like to thank you for your time. Are you willing to participate in the study?

Yes, I am willing to participate in the study.

No, I do not wish to participate in the study.

Name \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

### **Informed consent**

I have been asked to give consent for my student to participate in this research study which will involve her/his completing the questionnaire. I have read/has been read to me the information and objectives of the study and I consent voluntarily for my student to participate as a participant in this study.

Participant code \_\_\_\_\_

Teacher signature: \_\_\_\_\_ date \_\_\_\_\_

Investigator signature \_\_\_\_\_ date \_\_\_\_\_

**11.2 Annex 2: Information sheet and consent form /Amharic version**

**አጠቃላይ መረጃ**

**በደብረ ብርሃ-ዩንቨርሲቲ የህብረተሰብ ጤና ሳይንስ ትምህርት ክፍል**

**በጥናቱ የሚሳተፉ የፈቃድ መጠየቂያ እና መቀበያ ፎርም/ሺት/**

**መግቢያ:**

**ሰላም እንደ ምን አለ?**

ስሜ \_\_\_\_\_ እባላለሁ። የደብረ ብርሃ-ዩንቨርሲቲ የህብረተሰብ ጤና ሳይንስ ትምህርት ክፍል የማስተርስ ዲግሪ ተማሪ ነኝ፤ በአሁኑ ሰዓት በሰሜን ወሎ ዞን ሐብሩ ወረዳ ትምህርት ጽ/ቤት ስር ባሉ አንደኛ ደረጃ ት/ቤት ተማሪዎች ላይ ለእክክ በሽታ ስለ ሚያጋልጡን ምክንያቶች፤ መተላለፊያ መንገዶች እና የስርጭቱ ሁኔታ ምን ያህል እንደሆነ ለማወቅ ጥናት እያካሄድኩ ነው።

የጥናቱ ዋና አላማ፡

ለእክክ በሽታ ስለ ሚያጋልጡን ምክንያቶች፤ መተላለፊያ መንገዶች እና የስርጭቱ ሁኔታ ምን ያህል እንደሆነ ለማወቅ ጥናት እያካሄድኩ ነው በሰሜን ወሎ ዞን በሐብሩ ወረዳ ትምህርት ጽ/ቤት ስር ባሉ አንደኛ ደረጃ ት/ቤት ተማሪዎች ስርጭቱ ምን ያህል እንደሆነ ለማወቅ ነው።

የጥናቱ ጊዜ፡

የጥናቱ ጊዜ በሚገኘው የናሙና መጠን የሚወሰን ሲሆን 2 ወር እና ከዛም በላይ ሊወስድ ይችላል።

ሊከሰቱ ስለሚችሉ ስጋቶችና የምችት መጓደሎች፡

ጥናቱ ለችግር የሚያስከትል ወይም የሚያሰጋ ነገር የለውም።

የጥናቱ ሂደት

እርስዎ በጥናቱ ላይ ለመሳተፍ ፍቃደኛ ከሆኑ ፣ሁሉም ተሳታፊ በህክምና ባለሞያ የቆዳ ላይ ምርመራ የቃል መጠይቅ ይደረግላችኋል። ምርመራው የሚካሄደው ክላስ በማይኖራቸው ክፍለ ጊዜና ወደ ቤት ከመሄዳችሁ በፊት ሲሆን ምርመራውን ወንድ ለብቻ ሴት ለብቻ ነው። ደግሞ በናንት ፍላጎት ላይ የተመሰረተ ነው።

የጥናቱ ሚስጢራዊነቱ፡

የሚሰጡት መረጃ ሚስጥራዊነቱ የተጠበቀ ነው። በስም አይጻፉም የዚህ ኮድ መፍቻ በፋይል ተቆልፎ የሚቀመጥ ሲሆን የተፈቀደለት ሰው ብቻ ፋይሉን ማየት ይችላል። ከዚህ ጥናት በሚወጡ ዘገባዎች ወይም የህትመት ውጤቶች ላይ ስምም ወይም ሌላ የእርስዎን ማንነት የሚገልጽ መረጃ አይኖርም። ኮምፒውተር ላይ ያሉ መርጃዎችም ምስጢራዊነታቸው የተጠበቀ ሲሆን በወረቀት ያሉ መረጃዎችም ደህንነቱ በሚጠበቅ ቦታ የሚቆለፉና የተፈቀደለት ሰው ብቻ ሊያያቸው እንዲችል ተደርጎ ይጠበቃል።

የሚያስገኘው ጥቅም፡

በጥናቱ በመሳተፊዎ ምንም አይነት ክፍያ አይጠየቁም ወይም የሚያገኙት ገንዘብ አይኖርም። ሆኖም ግን የእርስዎ በዚህ ጥናት መሳተፍ የእክክ በሽታን ለመከላከል ለሚደረገው ጥረት አወንታዊ ተቀሜታ አለው።

ከጥናቱ ስለማቋረጥ፡

በጥናቱ የሚሳተፉት ፈቃደኛ ከሆኑ ብቻ ነው። ስለዚህ መሳተፍ ከጀመሩ በኋላ ማቋረጥ ወይም መመለስ የማይፈልጉት ጥያቄ ከሆነ ይለፈኝ ማለት ሙሉ መብትዎ ነው። በጥናቱ መሳተፍ ወይም አለመሳተፍ አገልግልት ላይ ምንም አይነት ጥቅምም ሆነ ጉዳት አይኖረውም። ጊዜዎትን መስዕዋት አድርገው ስለተባበሩኝ ከልብ አመሰግናለሁ።

ስለ ጥናቱ ሕጋዊነት ለመጠየቅ ከፈለጉ፡

ይህንን ጥናት አስመልክቶ ጥያቄ ካለዎት ወይም የጥናቱ የመጨረሻ ውጤት ምን እንደሆነ ለማወቅ ከፈለጉ በሚከተለው አድራሻ ሊያገኙን ይችላሉ።

ጥናቱ አስከያጅ፡ ሜላት ወዳጅ

ስ.ቁ፡-09-45-97-36-25

ኢ.ሜል፡ [meluw2008@gmail.com](mailto:meluw2008@gmail.com)

**የስምምነት ቅፅ በአማርኛ**

ተማሪዎች በጥናቱ እንዲሳተፍና መጠይቅ እንዲጠየቅ የፍቃድኝነት ፎርም እንድሞላ ተጠይቄያለሁ።

ስለጥናቱ ሙሉ መረጃና አላማ አነብ/ተነበልኝ ተረድቶ ተማሪዎች በጥናቱ እንዲሳተፍ ፍቃድኝነቱን አረጋግጣለሁ።

የተሳታፊው የሚስጥር ኮድ \_\_\_\_\_

የመምህሩ ፊርማ \_\_\_\_\_ ቀን \_\_\_\_\_

የመረጃ ሰብሳቢው ፊርማ \_\_\_\_\_ .ቀን \_\_\_\_\_

### 11.3 Annex 3: Questionnaires /English version

Date \_\_\_ / \_\_\_ / \_\_\_ Kebele \_\_\_\_\_ School Code \_\_\_\_\_ Student Code \_\_\_\_\_

Grade \_\_\_\_\_ Section \_\_\_\_\_

No.	Questions	Response and Coding category	Skip to
	Respondent category	Case      2. Control	
<b>Part I: Socio-demographic and economic Characteristics</b>			
101	Residence of the student	1. Urban    2. Rural	
102	Age	_____?	
103	Sex	1. Male      2. Female	

<b>104</b>	<b>What is your religion</b>	<b>1. Muslim      2. Orthodox</b> <b>3. Protestants      4. Catholics</b> <b>Others(specify)_____</b>	
<b>105</b>	<b>Number of family in the household</b>	<b>_____?</b>	
<b>106</b>	<b>Marital status of the mother</b>	<b>1. Married   2. Single   3. Widowed</b> <b>4. Divorced</b>	
<b>107</b>	<b>Mother's Educational status</b>	<b>1. Illiterate   3. Secondary</b> <b>2. Primary   4. Tertiary</b>	
<b>108</b>	<b>Father's educational status</b>	<b>1. Illiterate   3. Secondary</b> <b>2. Primary   4. Tertiary</b>	
<b>109</b>	<b>Occupation of the mother</b>	<b>1. Housewife   3. Merchant</b> <b>2. Daily laborer                      4.</b> <b>Government employee</b> <b>5. Other (Specify)_____</b>	
<b>110</b>	<b>Occupation the father living with the mother</b>	<b>1. Farmer                                      3.</b> <b>Merchant/trader</b> <b>2. Government employee</b> <b>4. Daily laborer</b> <b>5. Other (Specify)_____</b>	
<b>11</b>	<b>Number of rooms in the house</b>	<b>_____?</b>	

**Part II: Clinical Presentations (for cases ONLY)**

<b>301</b>	<b>What are the symptoms?</b>	<b>1. skin rash</b> <b>2. Night itching</b>	
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302	During at what time the itching intense?	1. Day Time    2.Night Time	
303	Is rash seen?	1. Yes    2. No	
304	Date of onset/onset of rash	...../...../..... (DD/MM/YY)	
305	How long have you had a rash?	(Duration of rash occurrence ) _____ days	
306	Do you still have the rash?	1. Yes    2. No	
307	Is there nearby clinic/health center	1. Yes    2. No	
308	Did you visit health facility for this illness?	1. Yes(date went to facility____/____/____)  2. No	
309	Did you take treatment?	1.Yes    2.No	
310	Which body part is mostly affected?	1. The hand    2. Feet    3. Elbow  4. The inner part of the wrists 5. the folds under arms 6. Axillaries 7 .umbilicus 8.genital (male )	

**Part III:** Associated risk factors of Scabies

401	Did you have been infected Previously?	1.Yes    2.No	
402	How many family members living together	_____?	
403	How many sleeping rooms (beds) the family members have	_____?	
404	Has the person whom you are sleeping with scabies	1. Yes    2. No	
405	Is there family member history of scabies	1. Yes    2. No	
406	Do you wash your body?	1.Yes    2.No	
407	If yes, how frequent do you wash your body?	1. One time per two weeks	

		<p>2. Once per week</p> <p>3. Every day</p> <p>4. Every other day</p> <p>5. Other _____</p>	
408	What do you use detergent to take shower?	<p>1. Water only    2. water with soap</p> <p>3. other</p>	
409	Do you wash your clothes?	1. Yes    2. No	
410	If yes, when do you wash your clothes?	1. Weekly    2. more than a week	
411	Is there any shortage of water to wash your body and clothes?	1. Yes    2. No	
412	What is/are source/s of water for daily bases	<p>1. Pipe Water    3. Pond</p> <p>2. Spring    4. River</p>	
413	Is your home affected by flooding	1. Yes    2. No	
414	When do you change your clothes that you wear now?	<p>1. everyday    2. weakly</p> <p>3. more than a week</p>	
415	Have you shared any clothes with someone with Scabies case?	1. Yes    2. No	
416	Have you ever travel to a place with a scabies epidemic area (the last two week)	1. Yes    3. No	
417	Number of students per class room	_____ ?	
418	having animals inside house	1. Yes    2. No	

#### 11.4 Annex 4: Questionnaires/Amharic version

በደብረ ብርሃን-ዩንቨርሲቲ፣ ጤና ሳይንስ ኮሌጅ፣ የህብረተሰብ ጤና ት/ክፍል

መጠይቅ

ክፍል አንድ፡ ለተሳታፊዎች የሚሰጥ መለያ/ የትምህርት ቤትና የተማሪዎች መለያ

1. ትምህርት ቤቱ የሚገኝበት ቀበሌ \_\_\_\_\_
2. የትምህርት-ቤቱ ስም \_\_\_\_\_ የተማሪው መለያ ቁጥር \_\_\_\_\_
3. ክፍል \_\_\_\_\_ ሴክሽን \_\_\_\_\_
4. ቀን \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

ክፍል አንድ፤ የተጠያቂው አጠቃላይ የማህበራዊና ኢኮኖሚያዊ መረጃን የተመለከተ መጠይቅ

ተ.ቁ	ጥያቄ	አማራጭና መለያ ኮድ	ይዘል ል
101	ተጠያቂው	1. በእክክ በሽታ የተጠቃ 2. ጤነኛ	
102	እድሜ ሽ/ሀ ስንት ነው?	-----?	
103	ፆታ	1. ሴት 2. ወንድ	
104	ነዋሪነት ሽ/ሀ የት ነው?	1. ከተማ 2. ገጠር	
105	የእናትህ/ሽ የትምህርት ደረጃ ምን ያህል ነው?	1. ማንበብና መጻፍ የማትችል 3. ማንበብና መጻፍ ብቻ 2. አንደኛ ደረጃ 4. ሁለተኛ ደረጃ 3. ኮሌጅ/ዩኒቨርሲቲ ያጠናቀቀች	
106	የአባትህ/ሽ የትምህርት ደረጃ ምን ያህል ነው?	1. ማንበብና መጻፍ የማትችል 3. ማንበብና መጻፍ ብቻ	

		2.አንደኛ ደረጃ 4. ሁለተኛ ደረጃ 5. ኮሌጅ/ዩንቨርሲቲ ያጠናቀቀች	
107	የአባት/ሽ አሁን ያሉበት የጋብቻ ሁኔታ	1.በጋብቻ ላይ 2. ያላገባ 3. የተፋታ 4. ሚስቱ የሞተችበት	
108	የእናት/ሽ አሁን ያሉበት የጋብቻ ሁኔታ	1. በጋብቻ ላይ 2. ያላገባች 3. ከባሏ የተፋታች 4. ባሏ የሞተባት	
109	የእናት/ሽ ሰራ ምንድን ነው?	1. የቤት እመቤት 3. የቀን ሰራተኛ 2. የመንግስት ሰራተኛ 4. ነጋዴ 5. ሌላ (ይግለፁ)_____	
110	የአባት/ሽ ሰራ ምንድን ነው?	1. አርሶ አደር 2. የቀን ሰራተኛ 3. የመንግስት ሰራተኛ 4. ነጋዴ 5. ሌላ (ይግለፁ)_____	
111	መኖሪያ ቤታችሁ ስንት ክፍል አለው?	_____?	

ክፍል ሁለት፣ ስለ እክክ በሽታ ምልክቶችና ተያያዥነት ያላቸው ጥያቄዎች (ለታማሚው ብቻ) የተዘጋጀ መጠይቅ

301	የእክክ በሽታ ምልክቶች ምንድን ናቸው?	1. የቆዳ ሽፍታ 2. እረፍት አልባ ማሳከክ	
302	በብዛት የሚያሳክክህ/ሽ መቸነው?	1. ቀን ቀን 2. ማታ ማታ	
303	ከእክኩ በተጨማሪ ሌላ በሽታ ይዞሻል/ህ?	1. አዎ 2. አላውቅም	

304	መች ነበር መጀመሪያ የቆዳሽፍታ የወጣው?	1. ባለፈው ሳምንት 3. ከሁለት ሳምንት በፊት 2. በዚህ ሳምንት 4. አላስታውሰም
305	ሽፍታው ለምን ያህል ጊዜ ቆየ	-----
306	ሽፍታው እስካሁን አለ?	1. አዎ 2. የለም
307	በአካባቢያችሁ የጤና ተቋም አለ?	1. አዎ 2. የለም
308	ጤና ተቋም ሂደት ያወቃል?	1. አዎ (ቀን ___ / ___ / ___) 2. የለም
309	መድሃኒት ወስደው ነበር?	1. አዎ 2. የለም
310	የትኛው የሰውነት ክፍል ነው በብዛት የተጠቃው?	1. እጅን 2. እግርን 3. ክንዴን 4. ብብት አካባቢ 5. እምብርት አካባቢ 6. ከመቀመጫ አካባቢ 7. ብልት አካባቢ (ለወንዶች) 8. ወስጠኛው የጭናችን ክፍል

ክፍል ሶስት፣ ለእክክ በሽታ አጋላጭ ስለሆኑ ምክንያቶች የተዘጋጀ መጠይቅ

401	ከዚህ በፊት በእክክ በሽታ ተጠቅተው ያወቃል?	1. አዎ 2. አላወቅም
402	በቤት ውስጥ ምን ያህል የመኝታ ክፍሎች አሉ?	_____?
403	አብራችሁ የምትኖሩት የቤተሰብ አባላት	_____?

	ብዛት ስንት ነው?		
404	በቤተሰብ አባላት ውስጥ በበሽታው የተያዘ ሰው ነበር?	1. አዎ 2. የለም	
405	አብሮዎት የሚተኛው ሰው በእኩክ በሽታ የተያዘ ነው?	1.አዎ 2. የለም	
406	ገላዎን ይታጠባሉ?	1.አዎ 2. የለም	
407	አዎ ካሉ ገላዎን በምን ያህል ጊዜ ልዩነት ይታጠባሉ?	1. በሁለት ሳምንት አንድ ጊዜ 2. በሳምንት አንድ ጊዜ 3. በየቀኑ 4. ሌላ ካለ (ግለፁ)_____	
408	ገላዎን ሲታጠቡ የምትጠቀሙት ምንድን ነው?	1.በውሃ ብቻ 2. በሳሙና 3. ሌላ ካለ (ግለፁ)_____	
409	ልብሰዎን ያጥባሉ?	1.አዎ 2.የለም	
410	አዎ ካሉ በየስንት ጊዜ ነው የሚያጥቡት?	1. በሳምንት 2. ከሳምንት በላይ	
411	መኝ ነው ልብሰዎትን የሚቀይሩት?	1.በየ ቀኑ 2.በሳምንት 3.ከሳምንት በኋላ	
412	ከቤተሰብ አባላት ጋር ልብስ ትዋዋሳላችሁ?	1. አዎ 2. የለም	
413	በእኩክ በሽታ ከተያዘ ሰው ጋር ልብስ ተዋወላችሁ ታወቃላችሁ?	1. አዎ 2. የለም	
414	ልብሳችሁንና ገላችሁን ለመታጠብ የውሃ እጥረት አለባችሁ?	1.አዎ 2. የለም	

415	በየቀኑ የምትጠቀሙት ወሃ ምንጩ ከየት ነው?	1. የቧንቧ ወሃ 3. ኩሬ 2. የምንጭ ወሃ 4. ወንዝ	
416	ባለፉት ሁለት ሳምንታት ውስጥ የእከክ በሽታ ወዳለበት አካባቢ ሂደው ነበር?	1. አዎ 2. የለም	
417	ቤታችሁ በጎርፍ ተጠቅቶ ያወቃል?	1. አዎ 2. የለም	
418	የተማሪዎች ብዛት በክፍል ደረጃ ስንት ነው?	-----	
419	በመኖሪያ ቤታችሁ ውስጥ እንሰሳቶች አሉ	1. አዎ 2. የለም	