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Determinants of scabies infection among school age children in Siraro district, west Arsi zone, Oromia region, Ethiopia 2021: Unmatched case control study

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Arsi zone, Oromia region, Ethiopia,2021: Unmatched case control study

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Abstract

Background: Scabies is a highly contagious skin disease common in low and middle income countries and resource limited settings. The disease has a debilitating effect in children affecting their health, productivity and growth. Even though there are effective treatments for the disease, it has been persistent in developing countries. The studies conducted in our country focus on outbreak situations. The endemic scabies cases among the population are not studied well. Also, there have been no studies conducted on the determinants of the disease among school age children in the area.

Objective: To assess the determinants of scabies infection among school age children in Siraro District, West Arsi Zone, Oromia Region, Ethiopia, 2021.

Method: Community based unmatched case control study was conducted among children of age 5-14 years from May 12 to June 22, 2021. A total of 340 participants (170 cases and 170) controls were planned for the study. Ten kebeles were selected and cases and controls were selected using multistage sampling method from the selected clusters. Data was collected by interviewer administered structured questionnaire. Data was entered by using Epidata and exported into SPSS software version 23 for further analyses .Bivariate and multivariable logistic regression was employed and AOR with 95% confidence interval and $p < 0.05$ was used to determine association. The results are presented using tables and graphs.

Results: The response rate was 94.1%. A total of 320 participants, 170 cases and 150 controls participated in the study. Mean age of the cases and controls was 9.57 with SD of ± 2.760 and 9.55 with SD of ± 2.780 years respectively. Majority of both the cases and controls lived in the rural area. Family size greater than 5 (AOR=2.04, 95%CI =1.1-3.6) and bathing frequency of more than one week (AOR=2.68, 95%CI= 1.56-4.59) were significant factors of scabies infection. Not sharing bed with a person with itching and pruritus (AOR=0.04, 95%CI=.29-.84), not sharing clothes with their siblings (AOR=.31 95%CI=.186-.532) and not having previous history of scabies infection (AOR=.58 95% CI=.34-.99) were protective factors against scabies infection.

Conclusion: Scabies infection is an important health problem in Siraro district among school age children. Crowded living, lack of personal hygiene and lack of access to water were associated to high scabies infection among school age children in Siraro district.

Key words: scabies, determinants, children, Siraro district, Oromia region

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Acronyms and abbreviations

ARF Acute Rheumatic Fever

DALY DisabilityAdjusted Life Years

GAS Group-AStreptococcus

GBD Global burden of disease

IACSIInternational Alliance for control of Scabies

LMIC Low and Middle Income Countries

MDA Mass Drug Administration

NTD Neglected Tropical Diseases

OCHAOffice for the Coordination of Humanitarian Affairs

OPDOut Patient Department

PHEM Public Health Emergency Management

PPS Probability proportional to size

SPSS Statistical Package for Social Sciences

WHO World Health organization

1. Introduction

1.1 Back ground

Scabies is a highly communicable skin infection caused by the mite *Sarcoptes Scabiei* Var hominies. It is an ancient disease that has been around for about 2500 years(1). The mite *Sarcoptes scabiei* was discovered as a causative agent of the disease scabies by Dr. Giovanni Cosimo Bonomo in 1687(2).

The adult female mite, about 0.3-0.5 mm in size, burrows into the stratum corneum, the outer most layer of the skin, and lays 2-3 eggs. The eggs will be hatched within 50-72 hours. The larvae then emerges and comes up to the surface of the skin and burrows into the layer of the skin repeating the previous 10-17 days cycle(3,4). It is transmitted from a person to the other through prolonged skin to skin contact, sharing of clothes and bedding and sexual contact. Mites can survive for up to three days outside of human host making sharing of clothes and fomites a way of transmission especially in the case of crusted scabies where an infected person can harbor as much as thousands to millions of mites(5).

The typical manifestations are erythematous skin rash and pruritis. Pruritis or sever itching which worsens during the night time, is the result of the hosts immunologic response to the mites' saliva, excreta and eggs(6). The rash can appear on any part of the body but the sites usually affected are the inter-digital spaces, wrist, extensor area of elbow and knee, Penis, nipple, waist, buttock, abdomen feet and thigh. In children and infants head, feet neck, palms and sole could be involved(7).

Apart from the sever discomfort to the patient, the subsequent scratching that follows causes the skin to break serving as entry point for microorganisms causing bacterial infections. Therefore, scabies rash could be a ground for further bacterial infection by microbes such as Group A streptococcus (GAS), and staphylococcus aureus. This could result in post streptococcal acute glomerulonephritis and possibly rheumatic fever(8).

A more severe form of scabies called crusted or Norwegian scabies can occur in individuals who are immune suppressed, including those with diabetes or HIV infection, and people who are

malnourished, elderly people, or those living in institutions(9).It manifests with plaques and skin crusting. person with crusted scabies may have from thousand to millions of mites as compared to the classical scabies where as much as 10-15 mites are usually present on the infected person rendering crusted scabies a highly contagious type(10).

Different studies have also established association between scabies infestation and Rheumatoid Arthritis, Rheumatic heart disease, Myasthenia gravis, Bipolar Disorder, stroke and Renal disease. The relation was attributed to the effect of Scabies on the immune system of the host(8,9)13,14).Studies have shown the relationship between scabies and Bacterial infections to be a significant factor for Acute rheumatic fever (ARF)(8).There also were evidences of acute glomerulonephritis outbreaks following Scabies outbreaks(15).

Globally, an estimated 200 million people are affected by the disease. Most of these cases are in the countries with tropical climate since scabies mite prefers a hot and humid climatic condition(3).

The prevalence of Scabies varies from region to region. According to the WHO report, in 2018, the estimated prevalence of scabies ranged from 0.2% to 71% globally(16).The disease is more prevalent in resource poor settings. Scabies accounts for 0.21% of the DALY according to the 2015 Global burden of disease report. However, the DALY accounts the direct effect of scabies in the calculation therefore not considering the complication of scabies into consideration. Also, the mortality of scabies was considered to be null, when crusted scabies was believed to have considerable mortality(17).Scabies has been emerging as an important disease in crowded environment like elderly homes in some developed countries too(18).

The disease is common among children, adolescents and elderly. These age groups are more vulnerable to immune compromised states making progress to bacterial super infection of scabies rash high. Globally, households spend millions on the treatment of scabies. It can cause a substantial economic burden especially on patients with severe systemic sequel(19).

Recent outbreaks of scabies in high income countries have also emphasized the significance of the disease(19).The world health organization (WHO) has recently added Scabies to the list of Neglected tropical disease.(NTDs) on October 2013(20).

Scabies treatment requires a combination of medical treatment and serious hygiene measures. The first line drug for treatment of scabies in our country is BBL (Benzyl Benzoate lotion)(21). Systemic drugs like Ivermectin have also proved effective in the treatment of Scabies(22). Recently, extraction of scabies treatment from different medicinal plants has been in progress in order to minimize to adverse effect of previously existing scabies medication(23). Scabies treatment should be repeated after a week to kill the mites that develop from the eggs. Antimicrobial drugs are required for the treatment of the super infection and anti-allergic medication for the pruritis(24). The treatment should be repeated 7-14 days later to prevent re- infection by newly hatched eggs(3). In addition, the treatment of scabies requires treatment of close contact(10).

1.2 Statement of the problem

Scabies is a highly contagious disease and is a major public health problem in low and middle income countries. Scabies is reported to have average prevalence of 5-10% among children globally. The prevalence is higher than 10% in Asian, Pacific Island and Central and South American countries(8).

The disease is more common among children under the age of 15 years. Studies have shown that the effects of the disease and its complications due to relapse and re-infection are also more pronounced in this age group(25).In addition, school age children are exposed to the significant risk factors of scabies such as overcrowding and contact history with infected person(26).

The effects of scabies can be debilitating in children.The itching causes severe irritation and loss of sleep in children(5).Scabies infection causes isolation and restriction from social activities, anxiety, depression and absenteeism from school on young patients(20,21).Moreover, the stigmatizations of scabies patient by health care providers which is manifested by excessive use of personal protective equipment cause psychological impact on patients(29).A study conducted in Northern Ethiopia found that 11% of children affected with scabies discontinued their education due to the disease(30).In addition, scabies infection could lead to sever medical complications like bacterial super infection, acute glomerulonephritis and rheumatic fever(8).Evidences show that in India 50% of children admitted to hospital due to post streptococcal glomerulonephritis (PSGN) were found to have scabies. Around 40% of impetigo occurring in children in developing countries is attributable to Scabies infection(10).In Ethiopia, 30% of school age children with scabies infection developed bacterial super infections(30).In addition, the fact that scabies can mimic wide variety skin condition makes clinical diagnosis and timely treatment difficult(31).Households spend up to 50% of their cash income on treatment of skin condition in Ethiopia due to repeated visits to health facilities as a result of ineffective treatment(31).

The main risk factors for scabies among children were found to be overcrowding, poverty, flooding, drought conditions and low access to water(31,32).The absence of washing facilities and shortage of water in school environment is also another risk factor for scabies infection among school children(33).Also the high contact behavior of school age children makes them

more exposed to scabies infection(34).Recently climatic changes and drought conditions are also emerging as risk factors for scabies infection(35).

Studies conducted in resource poor settings found higher prevalence of scabies in the community and wider range of prevalence from an area to other than that of the global burden of disease findings. These evidences show that the prevalence of scabies in the community is far higher than the GBD data or the cases reported from health facilities. In addition, the studies present have data on very few African countries. In a systematic review on the prevalence of scabies from 1985 to 2015 only 5 African countries were represented among 48 countries(8).

Studies show that despite all of the efforts being made, the burden of scabies is still not studied well globally, especially in the developing countries and among children(36).

In Ethiopia, 9.9% of children under the age of 15 years,13.6% in under five years children, and 5.6 % of the orphan school children are affected by scabies(30,37).However this could be the tip of the iceberg since most of skin disorders in our country are not reported since the affected individuals do not complain or seek medical help(19,38,39).Several epidemics of scabies have been witnessed over the past years. Scabies has been included as one of the reportable diseases in the drought affected areas of our country since 2015. As a result, the weekly PHEM surveillance reported increasing scabies cases especially in the districts most severely affected by drought and malnutrition. In northern Ethiopia, an ongoing case of Scabies infestation was in progress since 2015 that affected nearly 1 million people in the region by 2018(30).Factors for progress to endemic scabies are overcrowding, poverty, poor compliance to treatment, and delayed treatment of index cases(39).

Scabies is one of the weekly reportable diseases by the PHEM in West Arsi zone. Siraro district is one of the 13 districts of West Arsi zone. It is also one of the 83 Malnutrition hot spot districts of Oromia region and one of the 5 ‘priority 1’ Malnutrition hot spot districts of west arsi zone(40).

The area has semi-arid climatic condition with frequent inadequacy of rain fall leading to drought condition. According to the weekly PHEM report, there is a persistent OPD cases of Scabies reported to the zone from Siraro district. In 2019 GC, 1600 new cases of scabies were reported by health facilities to the zonal health bureau. These cases are only the cases that came

to the health facilities seeking treatment. The school age children (5-14) are chosen for the study due to the fact that this age group is more susceptible to scabies infection. Even though scabies is highly prevalent in the area, the reason for the endemicity of the disease in the Area has not been studied. Therefore, the aim of this study is to determine the factors for scabies infection among school age children in Siraro district, West Arsi zone, Ethiopia.

1.3 Significance of the study

The report will be distributed to all the responsible sectors as well as the District and zonal health bureaus. Therefore, it can serve as a spring board for intervention on the problem area and further investigation into the problem by the responsible bodies. It can also serve as an input for policy makers on the issue of NTDs in areas of concern like the Siraro district. Moreover, it will help other researches interested in working on the specific title or study area. The study will also benefit the community, health professionals working in the area.

2.Literature review

2.1 Over view of scabies

Scabies is a highly communicable skin infection caused by the mite *Sarcoptes scabiei var hominis*. It is transmitted through prolonged skin to skin contact and sharing of clothing with person infected with the mite. It is a debilitating disease affecting the quality of life and productivity of affected individuals. Its burden is more pronounced in Low income countries and resource limited settings. It affects all age groups but is more common among children, adolescents and the elderly.

2.2 Determinants of scabies

2.2.1 Socio demographic related determinant factors of Scabies

Different studies show that male sex is a significant factor for scabies infection. A cross sectional study conducted among school children in Solomon Islands showed that male sex is a risk factor for scabies infestation (AOR=1.4)(41). Also a study conducted in Vanuatu found male sex to be a determinant for scabies infection(42). Another study conducted in Ghana among school age children also showed that the attack rate was higher in male students (11.5% for males, and 10.8% for females). However, the study showed that the risk of attack did not differ with sex(43).

The case control study conducted in Kembata Tembaro zone also found similar findings AOR=2.69 (95% CI: 1.82, 3.96)(43). A case control study conducted in Harbu district Northern Ethiopia also found that males were more exposed to Scabies infection than females (AOR 7.5(3.293-24.462)(44). Study conducted among boarding school children in Cameroon also found male sex to be a significant risk factor (AOR 2.18 (1.70–2.78)(45). Similarly, a cross sectional study conducted on the prevalence of determinants of scabies in the Pacific island of Samoa showed similar results (AOR=1.3 CI, 1.02–1.8)(42). However in a case control study conducted in Hadiya zone, male sex was not found to be a significant risk factor for scabies infection(7). There was also no significant association found between male sex and scabies infection in the study conducted in drought affected areas in Northern Ethiopia(30).

Different studies found different age ranges as significant factors for scabies infection with almost all the ranges including children. Study from Solomon Islands showed that children of

age between 10- 12 years were more at risk of being infected by scabies (AOR=1.4, 95% CI 1.1–2.9)(41). A case control study conducted in Hadiya zone southern Ethiopia also found age less than fifteen years to be a risk factor (AOR = 2.62, 95% CI: 1.31–5.22)(7).

A case control study from East Badewacho district also showed age range between 5 to 14 was significantly associated with scabies infestation(7). According to a study conducted in Fiji the prevalence of scabies was high in the children in the age group between 5 and 9(16).

A case control study conducted in Harbu district found that children 10-12 years of age were more exposed to scabies (AOR=8 CI 2.78-24.24)(44). The study from Vanuatu also showed that majority of cases were under the age of 15 years with age between 11-15 being more likely to be affected with scabies (OR=2.4 (1.6–3.6)(42). A study from drought affected areas in Northern Ethiopia showed age from 2-18 years to be exposed to scabies(30). Another study conducted among boarding schools children in Cameroon showed that age under 15 years was a significant risk factor 1.90 (1.43–2.5)(45).

According to the study conducted in Kembata Tembaro zone sharing of bed and clothing was one of the significant risk factors for scabies infestation, AOR=3.12 (95% CI: 2.12, 4.59)(46). A case control study from Dabat, Northern Ethiopia, also showed that contact with a person with itching was a significant risk factor (AOR = 2.66). The study also showed that participants with higher contact and sharing of bed with scabies infected person had higher chance of being infected (AOR =2.66 (CI=1.21, 5.83)(47). The case control study conducted in Kembata Tembaro zone also showed sharing of cloths was a significant risk factor (AOR= 3.12 (2.12,-4.59). The study also found that low household annual income, was a significant risk factor for scabies infection AOR=2.13 (95% CI: 1.32-3.44) along with family size greater than five (AOR=1.77 CI=(1.04, 3.01)(48). A study conducted among prisoners in Cameroon also showed that sharing of clothes/bedding is a significant risk factor (AOR= 2.71 (1.81–4.06) (49).

According to a case control study conducted in south Ethiopia family size greater than 5 was found to be a significant risk factor for scabies (AOR = 2.63, 95% CI: 1.10–6.27)(7). In a case control study conducted in Kachabira district, south Ethiopia similar findings were found with the odds of having scabies in households with more than 6 members was 38 times more than those with equal or less than 6 members(46). The study conducted among Siri lankan children also found that family size more than six members was a significant risk factor for scabies

infection(38).In a study conducted in northwestern Ethiopia, living in a one room house was a significant risk factor (AOR=32.84, 95% CI=14.48-67.44)(39).Another study from Australia also showed that children living in households with more than 5 people were 4 times more likely to have scabies(8).A study conducted in West Iran also agrees with this finding. Family size more than 5 was a significant risk factor (AOR18.50;CI14.41–20.68)(50).

In a rather different finding,a cross sectional study conducted in Dabat, north Ethiopia found that not living with both parents was also a risk factor for scabies infestation (AOR = 2.49)(47).

Having a disabled or dead father was found to be a significant risk factor(51).The study also found using water only for hand washing to be a risk factor(AOR = 4.38, 95% CI 1.78, 10.76)(47,51).A longitudinal study conducted in north western France on treatment failure in Scabies showed that absence of decontamination of furnishings was significant risk factor (AOR=8.72; 95% CI: 3.50-21.75)(52).The study also showed that duration of symptoms longer than 1 month before diagnosis has a significant relationship with failure of scabies treatment (AOR=3.97; 95% CI: 2.10-7.51) as well as presence of a relative with the disease in the household(AOR=1.82; 95% CI: 1.05-3.16).study conducted in Pakistan showed that scabies was prevalent in households with persons living in uncemented house and having domestic animals(53).A study conducted in Iran on the prevalence and determinants of scabies among school children also found living with animals indoors was a risk (AOR 2.765(1.672–4.573))and living in a hard brick house was protective of scabies infection(AOR 0.090 (0.016–0.496))(50).

Another significant factor according to the study was father's unemployment and place of residence with urban residence being a protective factor. (AOR 2.304 (1.459–3.640) and(AOR =0.618, 95% CI =0.393–0.972 respectively)(54).

Infrequent use of soap AOR =(4.777, 95% CI 1.440, 15.841) was also a significant factor according to the study conducted in Kachabira district (46).

Low parental educational level was found to be determinant factor for scabies according to the study conducted in Dabat (AOR = 5.11, 95% CI 2.25, 11.58)(47).A study conducted in among prison inmates in Cameroon foundthat the odds of acquiring scabies among inmates with lower level of education was twice as higher than those with higher educational level(49).A case

control study conducted in Damboya district also showed that parental illiteracy was a significant risk factor AOR =3.49 (95% CI: 2.06, 5.94)(48)The study from Iran also showed parental illiteracy as a significant factor for scabies infection.(AOR 1.885(1.237–2.870))(55).

Also the study from northwestern Ethiopia showed similar findings with parental illiteracy and Low incomes (AOR=13.109, 95% CI=2.864-60.012, P=0.001)(56).

2.2.2 Environmental factors

A study conducted in Iran on the prevalence and determinants of scabies infection showed that seasonal variation was one of the risk factors for scabies infection. According to the study, majority (60.5%) of cases was detected during the months of September to November (50).Change in environmental or sociopolitical conditions can be associated with scabies epidemics.A study showed that scabies caused 19% of the morbidity in areas affected by flooding(57). A study conducted on the prevalence and determinants of scabies infection in drought affected areas of Ethiopia pointed out that scabies infection could have relationship with climatic change and drought conditions(40).

2.2.3 Treatment related factors

A longitudinal study conducted in France found that most of patients who had treatment failure (53%) were treated by general practitioner rather than by dermatologists. The study also found that not treating the contacts of the index case was a significant factor for repeated infection of scabies (AOR=2.52; 95% CI 1.28-4.99)(52).A study conducted in Iran also showed that resistance to the anti-scabies drugs due to un-prescribed use was on the risk factors for scabies infection(33).A study from Gambia showed that previous history of skin infection was also a significant risk factor (AOR 4.51 CI 2.63- 7.73)(58).

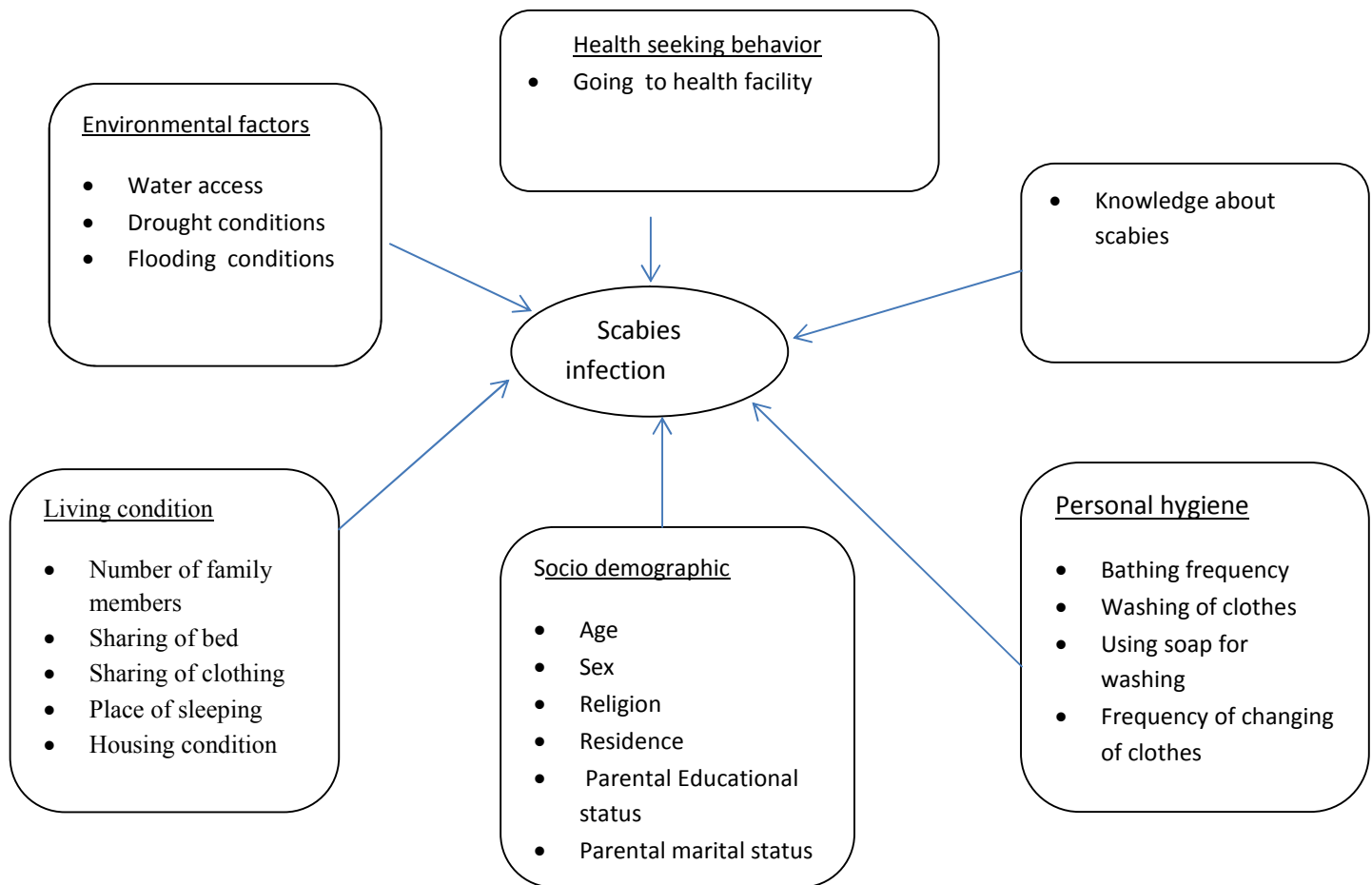
The study from boarding school in Cameron showed that children who did not have access to infirmary or health care were more exposed to scabies infection than children who did (AOR =1.30CI=1.03–1.65)(45).

2.2.4 Knowledge about scabies

Poor knowledge about scabies was a significant factor for scabies infection (AOR)=4.32 (95% CI: 2.93, 6.36) according to a case control study conducted in Damboya district, south Ethiopia(48).

The studies conducted on the determinants of scabies reflect that sociodemographic characters, as well as economic status of the community have a significant influence on scabies infection. The ever changing climatic condition and consequent drought and flooding condition also happened to be significant risk factors. Several of the risk factors for scabies among children were due to living conditions, sharing of rooms, beds, clothing, living spaces, and related to personal hygiene.

2.3 Conceptual framework



The conceptual frame work was developed from literature review by identifying the significant risk factors for scabies infestation among school age children.

(10),(30),(37),(51),(49),(53),(33),(54),(8),(46),(58).

Figure 1: **conceptual frame work of the determinant factors of scabies infection**

3.Objective

3.1 Objective of the study

- To assess the determinant factors of scabies infection among school age children in Siraro district.

Materials and Methods

4.1 Study area and period

The study was conducted in Siraro district, west Arsi zone, Oromia region from May 12 to June 22, 2021. West Arsi zone has 13 districts and 2 town administrations. Siraro district is one of the thirteen districts. It is found 310 kms away from the capital city of Ethiopia, Addis Ababa. The district is bounded by Alaba Special woreda in the north, LokaAbaya district in the south, Kachabira district in the west and Shalla district in the east.

The climatic condition is Semi-Arid. The district has a total population of 202,735 out of which 67,308 (33.1%) of them is between the age of 5 and 14 years. There are a total of 42,236 households and 32 kebeles in the district. There are 7 health centers in the district.

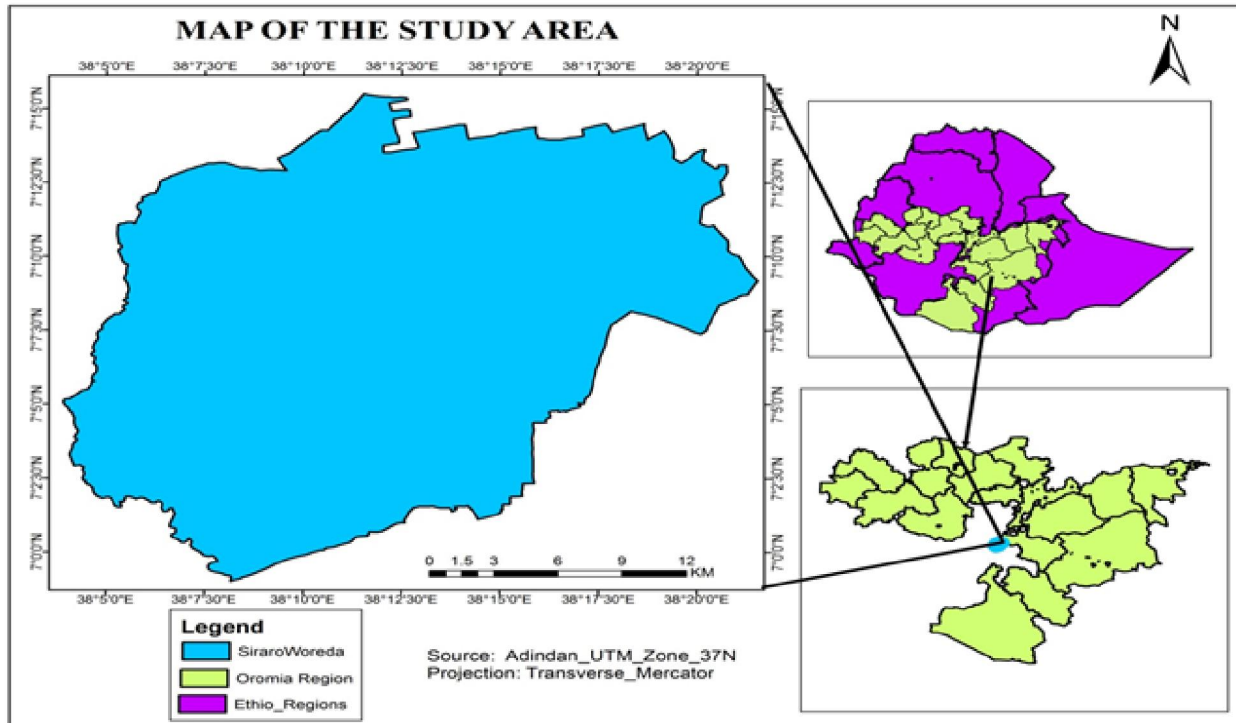


Figure 2: Map of the study area; Siraro district (ArcGIS map)

4.2 Study design

A community based unmatched case control study was conducted.

4.3 Population

4.3.1 Source population

All children between the ages of 5-14 residing in Siraro District

4.3.2 Study population

Cases: All children of age 5-14 living in Siraro district who had scabies

Controls: All children of age 5-14 living in Siraro district that do not have scabies infection and is a neighbor of the case.

4.3.3. Study unit

Case: is an individual child of age 5-14 living in the selected kebeles of Siraro district who was screened positive for scabies infection and randomly selected to be part of the study.

Control: is a child of age 5-14 living in selected kebeles of Siraro district who has no signs and symptoms of scabies infection and who is neighbor to the cases who is selected randomly to be part of the study.

Inclusion criteria

All children in the age of 5-14 and their caretakers (adult) living in the selected clusters of Siraro district during the study period

Exclusion criteria

- Severely ill children or caretakers of child
- Children or caretakers of child who have not lived in Siraro district for more than 6 months

4.4 Sample size determination and sampling technique

4.4.1 Sample size determination

Sample size was calculated using Epi info software by using the unmatched case control formula. Given that there are different determinant variables; sample size was calculated for

three significant variables namely sharing of bed and clothing, parental illiteracy and family members greater than five from three different studies. Parental illiteracy from study conducted in Hadiya zone(7) yielded the largest sample size of 103 cases and 103 controls taking 95% two sided confidence level, 80% power, and case to control ratio of 1:1. Proportion of outcome in controls 24% and AOR of 2.42 were taken.

By taking 10% non-response rate and considering design effect of 1.5 the final sample size is 340(170 case and 170 controls).

Table 1: sample size determination for determinants of scabies infection among school age children at siraro district

Variable	AOR	Power	Confidence level	Case/control ratio	% of exposure in controls	Sample size obtained	
						cases	Controls
Family members >=5	38.21	80	95	1:1	24	9	9
Sharing of bed and clothing	6.08	80	95	1:1	15.8	32	32
Parental illiteracy	2.42	80	95	1:1	24	103	103

4.4.2 Sampling procedure

Multi stage sampling technique was employed. The first stage was selection of kebeles. Siraro district has 32 kebeles. Thirty percent 30% of the total kebeles were selected by using Simple random sampling. Then, screening of all children in the selected kebeles within the age range of 5-14 was conducted prior to sampling cases and controls to identify the cases and controls in the population. Cases were determined based on the IACS criteria of clinically diagnosed scabies. Children that are screened positive and negative for scabies were registered and coded with their household address to build a sampling frame. The households were numbered and coded separately from all the screened kebeles. After screening was conducted, the number of case to

be sampled from each kebele was allocated by proportional allocation according to the population size of each selected kebele. Cases were selected by simple random sampling from all the scabies cases. Controls were selected randomly from the neighbors of the cases. When there was more than one child eligible to be control in the neighborhood household, one child was selected by lottery method to be the control. The households where respondents were not present during screening and data collection were revisited to reduce the non-response.

Table 2: Number of scabies case identified during screening in selected kebeles of Siraro district,2021

Kebele	Total population	Number of screened cases	Proportion (from the total 4309 cases)
Torbaan Hansawee	6189	904	21%
Qixee Teesiisaa	9301	861	20%
Shirkano Kata	8800	560	13%
Demine Lamaan	9282	474	11%
Bilaancha lamaan	5923	344	8%
SheellooAbooree	7916	302	7%
Sheelloo balela	5923	344	8%
Sanbatee Leno	4081	259	6%
Lookee Hadaa	7712	172	4%
Roophii 01	5793	86	2%

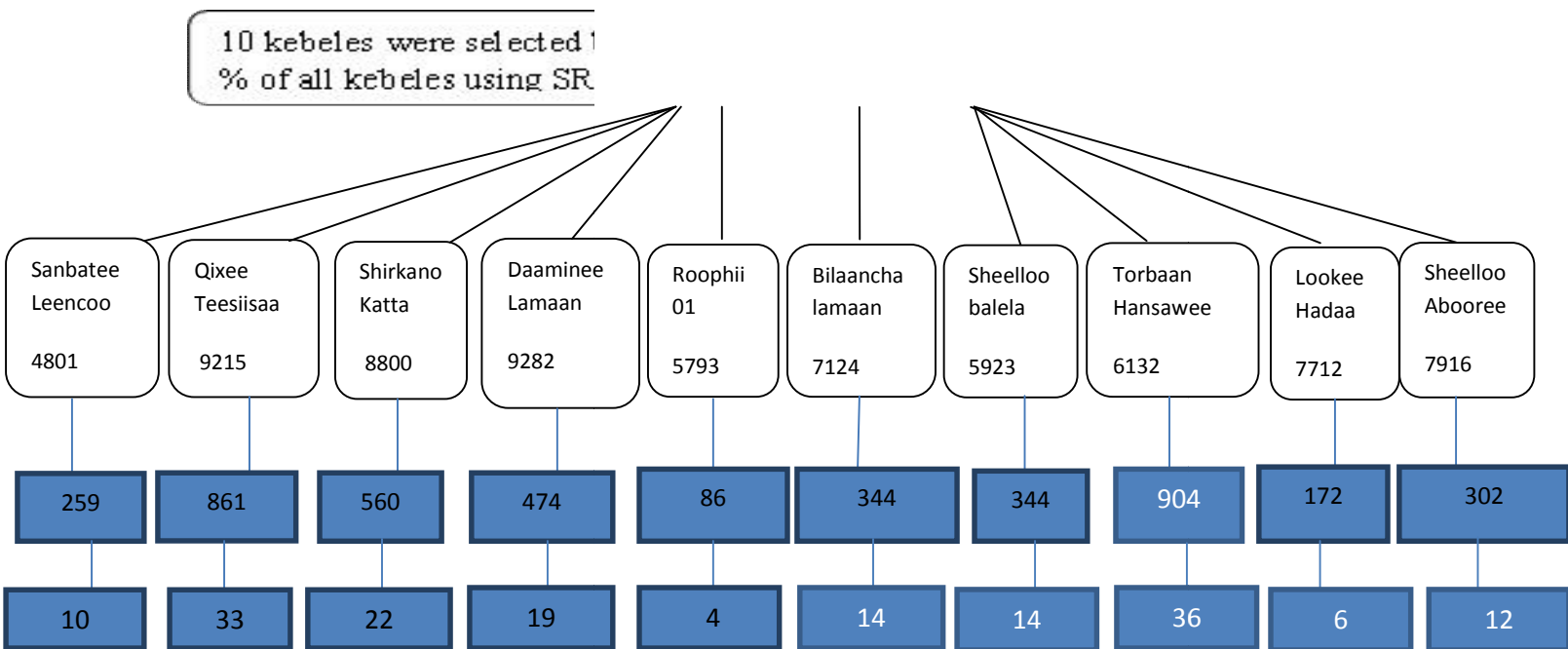


Figure 3: Diagram illustrating sampling Procedure

Proportional allocation of cases to each kebele was done to determine the number of cases to take from each kebele.

$$n_i = \frac{N_i}{N} * n$$

N

Where n_i =the required sample size from a kebele

N_i =number of scabies cases in a kebele

N=Total scabies cases in the screened kebeles

n=required sample size

4.5 Study variables

Dependent variable

Scabies infection

Independent variable

Socio demographic factors: Age, Sex, Religion, Residence, Parental Educational status, Parental marital status

Living condition: Number of family members, sharing of bed, sharing of clothing, Place of sleeping, Housing condition

Environmental factors: Water access, drought condition, Flooding

Personal hygiene: Bathing frequency, washing of clothes, Using soap for washing, Frequency of changing of clothes

Knowledge about scabies

Health seeking behavior: Going to health facility

4.6 Data collection

The data collection was conducted in two phases. The first phase was identifying the scabies cases among the children between ages of 5-14 in the 10 selected kebeles of the districts. This phase was started on May 12 /2021 GC. The task was done in collaboration with the district health extension workers and volunteers. community mobilization was done in all the 10 kebeles for two days from May 12-14 /2021.(Wednesday –Friday).For ease of performance we performed the surveys in five days' time by working on 2 kebeles in a day.

Screening was conducted by 5 teams of health professionals each containing 2 health officers and a nursewho are fluent in Afan Oromo, the local language. The teams screened each case together. A decision on a positive scabies infection was based on the agreement of two or more of the professionals.A scabies case was defined based on the IACS case definition, a person with erythematous, pruritic rash with or without burrows or history of contact with a person with

typical signs of scabies. Examination of the private parts was done after explanation to the participant and consent, performed by an examiner of the same sex and in private.

Due to the COVID-19 outbreak data collection has been difficult for the first couple of months. Since our study population were school age children between the age of 5-14 years and schools were closed and social gathering were difficult due to the infection.

The total population of the 10 kebeles is 72,698 of which 15,335(21%) are children of age 5-14 years. During the screening, a total of 4,309 cases were identified which is 28.1 % of school age children population. We randomly selected 170 of the case children for the study. Controls were selected from the neighbors of the cases. Data was collected from the parents and care takers of the children at their living area (homes).

Data on the determinant factors for scabies infection was collected by using an interviewer administered, structured questionnaire. The questionnaire was translated to the local language of Afan Oromo by a language expert and was retranslated to English to check for consistency. The questionnaire contained questions of socio demographic, determinants of scabies, clinical signs and symptoms of scabies (for cases), knowledge about scabies and health seeking behavior. Data was collected by 6 health extension workers after being provided with training. Data was collected from the caretakers of the child at the homes of the study participants.

4.7 Operational definitions

Scabies case: for the purpose of this study, Scabies case was a person in the age of 5-14 who present with erythematous, pruritic rash with or without burrows or contact history with an individual who has got itch or typical lesion living in Siraro district during the time of the study

Controls: were children living in Siraro district in the age range of 5-14 who have no scabies signs and symptoms during the time of the study

Contact: is defined as a person without signs and symptoms who had direct contact (particularly prolonged, direct, skin to skin contact) with suspected or confirmed case in two months prior to the study(17).

Crusted scabies: Clinical symptoms suggestive of scabies, hyperkeratotic skin crusts and skin fissuring as a result of hyper infestation(18).

Knowledge of scabies: is measured by a collective of questions on causes, transmission, treatment and prevention of scabies. Participants were said to have Good knowledge of scabies if they scored equal to or above average value while those who scored less than average have poor knowledge(26).

4.8 Data analysis procedures

Data was entered into Epi data software and exported to SPSS software version 23. Data cleaning and coding was conducted using SPSS software. Descriptive analysis was performed and results were presented using graphs, charts and tables. Logistic regression was used for data analysis. Bivariate analysis was used to choose candidate variables with a p- value of < 0.25%. Then multivariable analysis was used to fit the final model for candidate variables. A $p < 0.05$ was used to determine the predictor variables for the final model. AOR with 95% confidence intervals were calculated to determine the association between scabies infection and determinant factors. The logistic regression assumption test was tested and model fitness was checked by Hosmer Lemeshow goodness of fit.

4.9 Data quality management

Prior to screening, health professionals who conducted the screening were given training on the diagnosis of scabies cases and application of the case and control definitions to avoid misdiagnosis of cases and controls.

Data collectors on the determinants of scabies infection were also trained for two days prior to data collection.

Pretest was conducted on 17 children and their care takers in Shalla district at Fendi Ejersa health center to check for the consistency of the questionnaire. A close supervision was carried out by the principal investigator during data collection procedures. The data from each respondent was checked for its completeness, consistency and accuracy by the data collectors and principal investigator.

4.10 Ethical consideration

All the documentations and strategies used to maintain the Ethical principles were provided to the Health research Ethics review committee of Jimma University institute of health, faculty of public health, and clearance was secured after evaluation of the study protocol. Consent was obtained from the caretakers and those who are not willing to provide consent were treated as non-response. Verbal assent was obtained from children aged 12-14 years. All participant data was kept confidential and secure. Data collection involving private body parts was conducted after explanation to the subject and acquiring consent and in private. All information collected from participant was kept strictly confidential. Children with untreated scabies were linked to health facility for further management.

4.12 Dissemination Plan

The research will be submitted to Jimma University, institute of health, Faculty of public health, department of Epidemiology and disseminated to Ministry of health, Oromia regional health office, West Arsi zone health office and Siraro district health office. Efforts will also be made to publish the finding.

5. Results

The response rate was 94.1%. Out of the total 340 sample sizes, 320 participants participated in the study.

Socio demographic characteristics

The mean age of study participants was 9.59 with standard deviation ± 2.760 . The mean age of the cases was 9.57 years with Standard deviation of ± 2.780 while the mean age of the controls was 9.55 with a standard deviation of ± 2.808 . Majority, 161 (94.7%) of the cases and 137 (91.3%) of the controls were Muslim in religion. About 98 (57.6%) of cases and 81 (54%) of controls were female children. About 77% of cases and 78% of controls live with both their parents.

Forty (23.5%) of cases and 32 (21.3%) controls lived with only with one parent. Majority of both the cases and controls lived in the rural area of the district; 139 (81.8%) and 105 (70%) respectively. Nearly 80% (134) of the cases and 42 % (87) of the controls had a family size of more than or equal to 5 people in their household. (Table 1)

Table 3: Socio demographic characteristics of the participants of the study in Siraro district, West Arsi zone, 2021

Variable		Frequency	
		Cases(n=170)	Controls(n=150)
Age group	5-10	103(60.6%)	90(60%)
	11-14	67(39.4%)	60(40%)
Sex	Male	72(42.4%)	69(46%)
	Female	98(57.6%)	81(54%)
Religion	Muslim	161(94.7%)	137(91.3%)
	Protestant	9(5.3%)	13(8.7%)
Parental marital status	Living together	130(76.5%)	118(78.7%)
	Not living together	40(23.5%)	32(21.3%)
Residence of the respondent	Urban	31(18.2%)	45(30%)
	Rural	139(81.8%)	105(70%)
Father's occupation	Farmer	100(58.8%)	84(56%)
	Gov't employee	12(7.1)	15(10%)
	Merchant	40(23.5%)	35(23.3%)
	Private job	1(0.6%)	1(0.7%)

	NA	15(8.8%)	14(9.3%)
Fathers education	Illiterate/read and write	33(19.4%)	25(16.6%)
	Primary	72(42%)	56(37.3%)
	Secondary and above	50(29.4%)	55(36.6%)
	NA	15(8.8%)	14(9.3%)
Mother's Occupation	Farmer	57(33.5%)	46(30.7%)
	Housewife	90(52.9%)	81(54%)
	Merchant	2(1.2%)	2(1.3%)
	Gov't employee	12(7.1%)	14(9.3%)
	Private job	3(1.8%)	2(1.3%)
Mothers education	Illiterate/Read and write	72(42.4%)	61(40.7%)
	Primary	60(35.5%)	54(36%)
	Secondary and above	6(3.5%)	30(20%)
	NA	6(3.5%)	5(3.3%)
Number of family members	<5	36(21.1%)	63(42%)
	≥ 5	134(78.8%)	87(58%)

Living condition

One hundred and forty three (80%)cases and about 87(42%) of the controls live in households with more than 5 members About 164(96.4%) of the cases and 143(95.3%) of controls sleep with another member of the family.Out of this, 100 (60.9%) of the cases and 68(47.5%) of the controls slept with a person with itching and pruritis.

About 120(70.6%) of the cases and 60(40%) of controls shared clothes with their siblings or family members.Majority of the cases, 139 (81.8%) and majority of controls, 117(78%) slept on a floor mat on the ground.

Personal hygiene

Majority of the cases, 167 (98.2%) and 149 (99.3%) of the controls washed their clothes. However, only 69 (40.6%) of the cases and 86 (57.3%) of controls used soap to wash their clothes. A majority of both the cases and controls, which is 114 (67.1%) and 106 (70.7%) respectively, changed their clothes frequently. (Fig 4)



Figure 4: Personal hygiene of school age children in Siraro district, 2021

Knowledge about scabies

Regarding knowledge of scabies, 126 (74%) of the cases and 59 (39.6%) of controls had poor knowledge of scabies according to the study. (Table 4)

Health seeking behavior

From the total participants, 78 (45.9%) of the cases and 77 (51.3%) claimed to go to health facilities whenever they have itching and skin rash. From the participants who seek treatment, 30 (38.4%) of the cases and 28 (36.6%) of the controls used traditional medicines such as warm water, salt solution, and different herbs. (Fig 5)

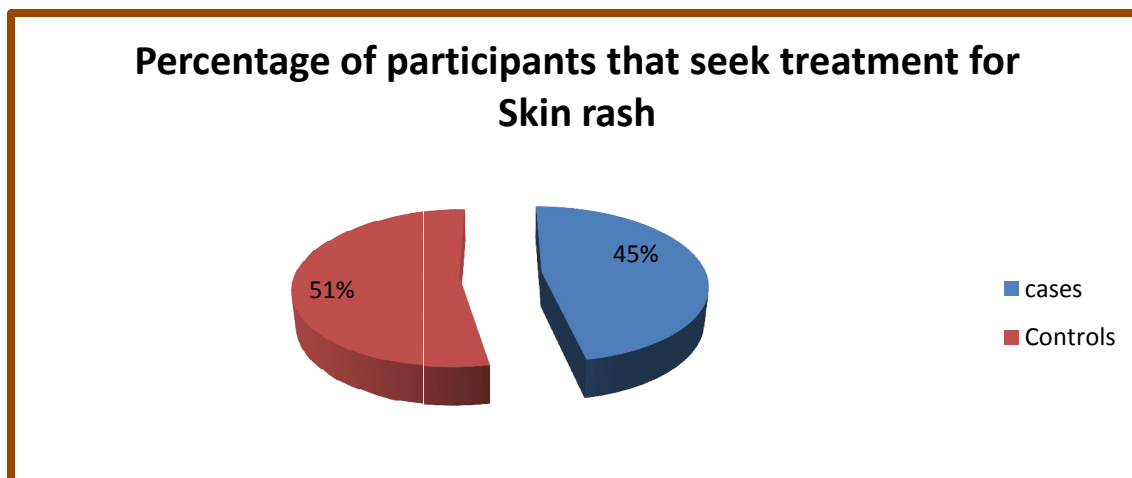


Figure 5 : Proportion of participant’s treatment seeking behavior Siraro district 2021

Housing condition

About 60(35.5%) Of the cases and 52(34.7%) of the controls live in households with more than or equal to two rooms. One hundred fifty (88.3%) of cases and 130(86.6%) of controls lived in households made of mud or wooden walls. About 168(98.8%) of cases and 148(98.7%) of the controls lived in houses with thatched or grass roofs.

During bivariate analysis, the determinates factors that had p-values<0.25 and were candidates for the multivariable analysis were family size of more than 5 people (OR=2.695 p=0.001), Poor knowledge of scabies (OR=4.409p=0.001),Sleeping with a person with itching and pruritis (OR=1.723 p=0.019),Sharing clothes with other person (OR=3.600 p=0.000),and Previous history of scabies infection (OR=.502 p=0.002),Wash clothes with soap(OR=1.967 p=0.003),Distance more than half kilometers away from water source (OR=2.352 p=(0.000) ,andbathing frequency of more than a week (OR=3.661p=0.00)(Table 4).

Parents’ educational status and Parental Occupation, Sex of the child, flooring material of household and Parental marital status didn’t qualify for the multivariable analysis.

Table 4: Bivariate analysis for determinant factors of scabies infection among school age children in Siraro district

Exposure		n(%)		COR(95% CI)	P-value
		Case (n=170)	Control (n=150)		
sex	Male	103(60.6%)	90(60%)	1.159(745-1.804)	.512
	Female	67(39.4%)	60(40%)	Reference	
Parental marital status	Living together	130 (76.5%)	118(78.7%)	Reference	.639
	Separated	40(23.5%)	32(21.3%)	1.135(.670-1.923)	
Family Size	<5	18(24.6%)	63(42%)	Reference	
	≥ 5	134(78.8%)	87(58%)	2.695(1.651-4.402)	.000
knowledge of scabies	poor	126 (74%)	59(39.6%)	4.409(2.819-6.78)	.001
	good	44(26%)	91(61.4%)/	Reference	
Sleep with a person with itching and pruritis	Yes	100(60.9%)	68(47.5%)	1.723(1.094-2.714)	.019
	No	64(39.1%)	75(52.4%)	Reference	
Share clothes with other person	Yes	120(70.6%)	60(40%)	3.600(2.263-5.727)	0.00
	No	50(29.4%)	90(60%)	Reference	
Previous history of scabies infection	Yes	107(62%)	69(46%)	.502(.321-.784)	.002
	No	63(37%)	81(54%)	Reference	
Wash clothes with soap	Yes	69(40.6%)	86(62.9%)	1.967(1.260-3.071)	.003
	No	101(59.4%)	64(37.1%)	Reference	
Distance from water source	Less than 500 meters	47(27.6%)	71(47.3%)	Reference	
	Greater than 500 meters	123(72.4%)	79(52.7%)	2.352(1.478-3.742)	.000

Floor material	Cement	27 (15.9%)	28 (18.7%)	Reference	
	Earth/Rudimentary	143 (84.1%)	122(81.3%)	1.216(.680-2.174)	.510
Bathing frequency	Less than or equal to a week	82(48.2%)	116(77.3%)	Reference	
	More than a week	88(51.8%)	34(22.7%)	3.661(2.251-5.955)	.000

During multivariable analysis, Family size of greater than 5 person was found to be significant factor for scabies infection among school age children. (AOR=2.040 95%CI =1.143-3.643). Children who lived in households with more than 5 members were twice as much exposed for scabies infection than children who lived in households with less than 5 members. Bathing frequency of more than one week interval was also significant factor for scabies infection. (AOR=2.684 95%CI= 1.569-4.593). Children who took bath in more than a week interval were twice more at risk of scabies infection than those children who took bath in less than a week interval.

Children who do not share bed with a person with itching and pruritus were 50% more protected from scabies than those children who sleep with a person with Itching and pruritus (AOR=.0496 95%CI= .291-.846).

Similarly not sharing clothes with their sibling was protective factor from scabies infection (AOR=.315 95%CI=.186-.532). Children who do not share clothes with their siblings were protected from scabies infection by 70% than those children sharing clothes with their siblings.

Children who don't have previous history of scabies infection were 50% more protected of scabies infection than those children who had previous scabies infection (AOR=.589 95% CI=.349-.996). (Table 5)

Table 5:Multivariate table of determinant factors of scabies infection among school age children in Siraro district

Exposure		N(%)		COR(95% CI)	AOR(95% CI)	P-value
		Cases =(170)	Controls =(150)			
Family Size	<5	18(24.6%)	63(42%)	Reference		
	≥ 5	134(78.8%)	87(58%)	2.695(1.651-4.402)	2.040(1.143-3.643)	.016
knowledge of scabies	Poor	126 (74%)	59(39.6%)	4.409(2.819-6.78)	3.219(1.678-5.875)	0.01
	Good	44(26%)	91(61.4%)/	Reference		
Sleep with a person with itching and pruritis	Yes	100(60.9%)	68(47.5%)	1.723(1.094-2.714)	.496(.291-.846)	.010
	No	64(39.1%)	75(52.4%)	Reference		
Share clothes with other person	Yes	120(70.6%)	64(87.6%)	3.600(2.263-5.727)	.315(.186-.532)	0.00
	No	50(29.4%)	60(40%)	Reference		
Previous history of scabies infection	Yes	107(62%)	69(46%)	.502(.321-.784)	.589(.349-.996)	.048
	No	63(37%)	81(54%)	Reference		
Bathing frequency	Less than or equal to a week	82(48.2%)	116(77.3%)	Reference		
	More than a week	88(51.8%)	34(22.7%)	3.661(2.251-5.955)	2.684(1.569-4.593)	.000

6. Discussion

Data on determinates of scabies infection among school age could provide valuable information to serve as a basis for methods of prevention and control of the disease and therapeutic services.

Family size greater than 5 people was a significant factor according to this study. The findings from the studies conducted in Kachabira district and East Badewacho district of Southern Ethiopia and Harbu district in northern Ethiopia also agree with this study(7,44,46). Other studies from Srilanka and Australia also support this finding(38,39). This could be due to the fact that overcrowding among larger families could increase close contact, sharing of clothes and sleeping space. This is supported by different studies that stated overcrowding and poverty were interrelated and aresignificant factors for scabies infection (28,36). Study done among yekolo tamaris in northern Ethiopia supports that overcrowding was a risk for scabies infections(59). Also, larger family size could lead to poor personal hygiene due to giving care for large family could challenging due to shortage of resources for personal hygiene. In General, communicable diseases are more frequent and the transmission is easy when the population density is high(60).

Sharing bed and clothing were significant factors for scabies infection among children. Since Scabies mites could stay alive on cloth and fomites for prolonged time, children who are sharing clothes could get the disease easily even after medication(5). The finding was consistent with the reports from Southern Ethiopia wheresharing of bed and clothing was one of the significant risk factors for scabies infection(7,46). This finding also agrees with the finding of the studies in Pakistan and Egypt(53,54). The similarities in these findings could be attributed to similarities in the socioeconomic characters of the areas under the studies since the areas under study had a characteristic low socioeconomic status.

Sleeping with a person with itching and pruritis was also an important factor for scabies infection. different studies conducted in other parts of the country also support this finding. (59,61). A study from Pakistan also had similar findings(53). A Ghanaian study also found sharing of sleeping mats to be important factor(43). This is due the prolonged and close body contact among individual during sleeping and staying together and the contamination of the

sleeping area by mites leading the transfer of mites from one person's skin to the other. However it was insignificant risk factor in the study from Harbu district, northern Ethiopia(44).

Previous history of scabies infection was a significant factor in this study. This finding was similar to the finding of the case control study conducted among school age children in Harbu district where children with previous history of infection were 7 times more likely to get infected again(44). Re-infection with scabies mite more occur due to non-treatment, inappropriate use of medication, treatment failure or inadequate treatment of fomites or close contacts of the patient(62). This similarity could be due to the similarities in the health seeking behavior and hygiene condition of the population. The persistence of the determinant factors of the disease such as unchanging habits of poor personal hygiene of the affected individuals could contribute to the repeated infection in the cases.

Poor knowledge of scabies was also a significant factor for scabies infection among children in our finding. A Study from Damboya, southern Ethiopia supported this finding(48). Another study reported from Ghana, that found good knowledge of scabies was important factor in preventing scabies infection showing link between literacy level and scabies infection(63). Studies showed that good knowledge towards hygiene and infectious disease was important factor in reducing scabies infection in low income countries(64). The similarities among these findings could be due to the fact that the study areas were low income countries with similar lack in health education and poor knowledge of scabies infection. A study stated that providing the community and the health care providers with adequate knowledge about scabies infection was important to reduce scabies infections(62).

Bathing frequency was also a significant factor for scabies infection in the current study. A study from rural communities in Iran and Iraq also had similar findings. This was because people usually change their under garments and clothes during bath times and prolonged bathing episodes expose to prolonged use infected clothes and longer time of communication for the mites (33).

Distance from water source was a significant factor for scabies infection according to this study. This finding is supported by a studies conducted in Egypt that found out poor access to water source was a significant risk factor for scabies infection and study conducted in primary schools

in Ethiopia which also found that inaccessibility or lack of access to water was factors independently associated with scabies(48,54).

Siraro district is a semi-arid area with a significant shortage of water. This leads to shortage of water and drought conditions in several occasions in the area. Changes in environmental or sociopolitical conditions can be associated with scabies epidemics. A study conducted on the prevalence and determinants of scabies infection in drought affected areas of Ethiopia pointed out that scabies infection could have relationship with climatic change and drought conditions (30).

Some independent variables such as Parents' educational status and Parental Occupation, Sex of the child, flooring material of household and Parental marital status didn't qualify for the multivariable analysis.

Parental educational status was significant variable in different studies(47,51). However, in the current study it was not a significant factor. This could be due to the fact that both case and control groups in the current study have comparable education status which is low parental literacy level rendering the variable insignificant in this particular study.

Sex of a child was also found to have no significant association with scabies infection in children. Similar findings were seen in studies from Egypt and different parts of northern Ethiopia (30,54). These similarities could be because the studies were made among communities with similar socioeconomic background. However, male sex was a significant factor in for scabies infection a number of other studies (44,45). This difference could be due to the socio-cultural differences or number of study participants included in the studies.

Parental marital status was not a significant factor in the current study. This finding was justified by the fact that children who live with both of their parents could necessary level of support easily than those who live with single parents(47). However, this finding is not similar with the finding of our research.

7. Limitation of the study

- There could be recall bias especially from the control side.

8. Conclusion

In Siraro district, scabies is still an important health problem, with a significant effect among school age children. The disease is associated with poor living conditions, overcrowding, and poor personal hygiene. Moreover, it is aggravated by the shortage of water in the area since the area has shortage of water both from natural source and pipe water.

Modifiable risk factors such as personal hygiene and crowded living conditions were found to be independent determinants of scabies infection. Strategies for poverty alleviation and awareness creation on personal hygiene and efficient use of water are recommended for effective prevention of scabies Infection in the area.

9.Recommendation

We recommend

- To the Health extension program to address the lack of knowledge towards scabies by incorporating health education on scabies to their community health programs
- For the zonal health office to organize campaigns at schools and community for scabies screening and treatment .
- For further studies to be conducted in the area involving the age groups that were not included in this study

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Annex 1. Information sheet and Informed consent

INFORMED CONSENT

My name is _____ I come from Jimma University to study the determinants of scabies infection among school age children in Siraro district. This study is believed to contribute on the effort to prevent scabies infection in children. For the successful implementation this study, we are collecting data from children and their care takers. I assure you that there will be no harm, discomfort or possible ill effects on your health or well-being arising from participating in the study. You have the opportunity to ask questions on all aspects of the study and have to understand the advice and information given. You are free to withdraw from the study at any time without having to justify your decision and without prejudice. The information that you will provide will be kept confidential.

Are you willing to participate in this study?

I confirm that I have understood the above and freely consent to participate in this study. I have been given adequate time to consider my participation.

Participant code _____

Name and Signature of participant _____ Date _____

Name and signature of data collector _____ Date _____

Annex 2. Questionnaire for data collection on determinant factors for scabies infection

Data collection tool for case control study on scabies:

Status: Case _____ Control _____ Code _____ Date of data collection _____
 Zone ----- Woreda _____ kebele _____ Gote _____

S.No	Question	Alternatives
1.Socio demographic variables		
1.1	Sex	1. Male 2. Female
1.2	Age	years___ Months_____
1.3	Residence	1. Urban 2. Rural
1.4	Religion	1. Muslim 2. Orthodox 3. Protestant 4. Others specify-----
1.5	Father's Occupation	1. Farmer 2.Merchant 3. Govn't employee 4. Other specify
1.6	Father' educational status	1.Illiterate 2.can read andwrites3. Primary education 4.secondary education 5. Higher education
1.7	Maternal Educational status	1. Illiterate2.can read and writes3. Primary education 4.secondary education 5. Higher education
1.8	Parents Marital status	1.Married 2.Divorced 3.Widowed
2 Living condition		
2.1	Have you ever been infected with scabies before?	1. Yes 2. No
2.2	With whom do you sleep?	1.Along 2.father /mother 3.brother/sister 4.Friend 5. Other specify

2.3	Does the person you sleep with have scabies?	1.Yes 2.No
2.4	Is there any one with scabies infection in your school/class room?	1.Yes 2.No
2.5	Do any of your friends have scabies before?	1.Yes 2.No
2.6	Do you share clothes with other family members?	1. Yes 2. No
2.7	Where do you sleep	1. On a bed 2. On the floor 3. On a bed made of mud
3. Personal hygiene related		
3.1	How often do you take shower?	1.2-3 days 2.weakly 3.More than a weak
3.2	What do you use to take shower?	1.Water only 2.Water with soap
3.3	Do you wash your clothes?	1.Yes 2.No
3.4	If yes how often do you wash your clothes?	1. Weakly 2. More than a weak
3.5	What do you use to wash your clothes?	1. Water only2. Water and soap
3.6	How often do you change your clothes?	1. Everyday 2. Twice a week 3.weakly 4.More than a weak
4 Environmental factors		
4.1	What is the source of water for your household?	1. River 2. Spring 3.well 5. Tap 4.other specify
4.2	How far is your home from the water source?	In minutes-----
4.3	How much water do you use for house hold in a day?(in 20 liter jerry cans)	-----in liters
4.4	Has your house been affected by flooding?	1.Yes 2.No
5.Housing condition		

5.1	Roof	1. Thatched (dry grass) 2. Corrugated iron 3. Plastic
5.2	Walls	1. Brick 2. wooden 3. Mud
5.3	Floor	1. Cement 2. Earth
5.4	Number of rooms in the house	1. One 2. two 3. Three 4. More than three
5.5	Number of windows	1. One 2. Two 3. Three 4. More than three
6. Household character		
6.1	Does your household have electricity?	1. Yes 2. No
6.2	Does your household have radio?	1. Yes 2. No
6.3	Does your household have television?	1. Yes 2. No
6.4	Does your household have refrigerator?	1. Yes 2. No
6.5	Does your household have electric mitad?	1. Yes 2. No
6.6	Does your household have table?	1. Yes 2. No
6.7	Does your household have a chair?	1. Yes 2. No
6.8	Does your household have a bed with cotton/sponge/spring mattress	1. Yes 2. No
6.9	Does any member of this household have a bank account	1. Yes 2. No
6.10	What is the main source of drinking water for members of your household?	1. Piped water 2. well or bore hole 2. Dug well 3. Spring 4. Rain water 5. Surface water 6. Bottled water
6.11	What kind of toilet facility do members of your household usually use?	1. flush/power flush latrine 2. pit latrine 3. Composting toilet 4. Bucket toilet 5. .No facility/bush/field

6.12	What type of fuel does your household mainly use for cooking?	1 Electricity 2.wood 3. Charcoal 4. Biogas 5.Kerosine/Natural gas 6.Animal dung 7.Straw/shrub/grass 8.No food cooking at home
6.13	What is the main material of the floor in your household?	1 .Natural floor 2.Rudimentary floor (wood plank, bamboo) 3.Finished floor (carpet, cement ,vinyl) 4. Other _____
6.14	What is the main material of the exterior walls in your household?	1. Natural walls(cane/palm/dirt/no wall) 2. Rudimentary(mud/ply wood/stone with mud/reused wood) 3. Finished wall(cement/stone/bricks/planks) 4. Others_____
6.15	What is the main material of the roof in the household?	1.Natural roofing(no roofing/tactch/mud/sod) 2.Rudimentary roofing(rustic mat /bamboo/planks/ plastic) 3.Finished roofing (metal iron/wood/cement/asbestos/shingles) 4. others
7.Clinical history of scabies(only for cases)		
7.1	Do you have rash?	1. Yes 2. No
7.2	If yes which one do you have?	1. Itch 2. Rash 3. both
7.3	When is the rash worse?	1 At day 2. At night 3. No difference
7.4	Have you ever been told by your friends to play alone because of your illness?	1. Yes 2. No
7.5	Have you ever been sent home from school because of your illness?	1.yes 2.No
8 .Knowledge questions regarding scabies		
8.1	Have you ever heard about scabies?	1.yes 2.no

8.2	From whom did you hear about scabies?	1.Friends 2.Family member 3.HEW 4. Teachers 5. School 6.others specify_____
8.3	What are the Signs and symptoms of scabies?	1. Itching 2. Rash 3 skin lesion 4.I don't know 5.others specify -----
8.4	How do you think the disease transmit from person to persons?	1.Contact with infected patient 2. sleeping with infected person 3. Not washing hands and body 4. Don't know 5.Other(specify)-----
8.5	Do you think scabies has treatment?	1. Yes 2. No
8.6	Do you think scabies is preventable?	1. Yes 2. No
8.7	If yes, how can you prevent scabies?	1. Keeping personal hygiene 2. Reducing contact with a person with scabies 3. Getting family members treatment 4. I don't know 5. Others (specify)_____
9.Health seeking behavior		
9.1	Did you get treatment for the disease currently?	1. Yes 2. No
9.2	If yes, where were you treated?	1. Health facility 2. Traditional healer
9.3	If no, why didn't you get treatment	1. I have no money 2. I was treated before and it didn't work 3. I don't think it is a serious problem 4. The medication is expensive

9.4	Do you think treatment for scabies costs you a lot of money?	1 .yes it does 2. No it doesn't
9.5	Where do you buy the drug?	1 It was subscribed by a health professional 2. I bought it from Pharmacy my self 3. I took it from another person who had left over
9.6	How long do you apply it?	1. As directed by the physician 2. Until I see that the rash has subsided 3. Until the itching has subsided
9.7	What did you do with the left over drug?	1. I discarded it 2. I keep it to use whenever similar problems occur
9.8	Were you instructed to repeat the medication by a physician?	1. yes 2. No
9.9	If yes, when?	1 .A week after the first treatment 2 .Two weeks after the treatment 3. If the itching stars again
9.10	Have you ever been given drugs at school for scabies?	1.yes2.No
9.11	Do you think using the treatment is difficult?	1 .Not at all 2. Somewhat 3. It is difficult
9.12	Was any other member of your family treated the same time you were treated?	1. Yes 2. No

Annex 3. Scabies screening tool

Variable	Yes/present	No /Absent	Remark
Signs and symptoms/History			
Itching/pruritis			
Rash			
History of contact with a person infested with scabies			
Clinical examination			
Erythematous rash			
Burrows			
Infected wound on the typical sites			
Crust			
Sites of scabies rash			
Flexor surface of knee			
Wrist			
Finger web			
Extensor surface of elbows			
Buttocks			
Waist			

Guca Odeffanoo fi HayyamaaHirmaannaaQorannoo

Ani.....jedhamaa.Qorannoo Sababoota dhibee citto
ijoolleeumriinisaaniibarumsaafgahananaasiraarookessajiranirrattigeggeesuufunivbersitiiJimmairr
atiidhufee.Kayoonqorannaakanaaaittisadhibee citto
ijoolleeirratiigaheeakkataphatuufi.Galmagaiinsa qorannookanaafijoolleefiiMaatiiwwanirraraanga
ragaraanifunaannamaa.

Qoranichakeessattihirmaachuukeessaniifrakkoonisinirragahuutokkollekanhinjirreta' uuisiniifirmk
aneessa.Garabiraatiingaafiwwanqoranichairrattiqabdankamiyyuugaafachuunidandeessuu,mirgad
eebiiisiniifkennamuhubachuusniqabdu. Hirmaannakeessan Yeroo
barbaaddanheyamatokkomaleeaddaankutuunkandanddeessata' uuisiniifibsaa .
Odeffanoonisiinnuufkennitaanhundigutuunguututtiiccitiicimaannuufisinjidduuttikanhafuudha.

Qorannicha keessatti nihirmaatuu ?Eyyee..... lakki.....

Qorannaa kana keessattihirmachuuffedhiikooguutuudhanheyamuukiyyanimirkaneessa.

Koodii Hirmaataa.....

Maqaa fi MallattooHirmaataa.....Guyyaa.....

Maqaa fi Mallattooabbaodefannoofunaanuu.....Guyyaa.....

GUCA GAAFILEE SABABOOTA DHIBEE CITTO (HOYXOO) IJOLLEE BARUMSAAF
GAHAN IRRATI, AANAA SIRAARO, GODINAARSI LIXAA

Guca odeffanno qorannaa dhibee citto warraqabanii fi hinqabneef: citto/hoyxoo kanqabu
_____ kanhinqabne _____ Koodii ___ Guyyaa odeffanoon funaname _____
Godina ----- Aanaa _____ Ganda _____ Garee _____

Lakk.	Gaafiile	Filannoowwan
1. Haalajirenya Hawaasummaa		
1.1	saala	1. Dhiira 2. Dubara
1.2	Umrii	wagga ___ Baatii/ji'a _____
1.3	Bakkajirenyaa	1. magaalaa 2. Baadiyya
1.4	Amantii	1. Muslima 2. Ortodoksii 3. Pirootestaantii 4. Kanbiraa -----
1.5	HojiiAbbaa	1. Qonnanbulaa 2. Daldalaa 3. Hojjataamootummaa 4. Kanbiraa.....
1.6	SadarkaabarnootaAbbaa	1. Kanhinbaratin 2. BarreesuufDubbisuu 3. Sadarka 1ffa 4. sadarkaa 2 ffa 5. Barnootaolaanoo
1.7	Sadarkaabarnootahaadhaa	1. Kanhinbaratin 2. BarreesuufDubbisuu 3. Sadarka 1ffa 4. sadarkaa 2 ffa 5. Barnootaolaanoo
1.8	Haalawalfuudhinsamaatii	1. kan fuudhe 2. kan Hiike 3. .Abbanworrakanboqate
1.9	Galiimaatii	Qarshiidhan-----
2. Haalajireenyaa		
2.1	Dhibeen citto siqabee beekaa?	1. Eyyen 2. Lakki
2.2	EenywajjiinBulta/rafta?	1. Kopha 2. Abbaa /Haadha 3. Obboleessa/Oboleetti 4. Hiriyyota 5. Kanbiraa.....

2.3	Namniatiwajjiinbultudhibeecittoqaba ?	1. Eyyen 2. Lakki
2.4	Namnidhibeecittoqabumanabarumsaakeessa/Dareekeekesaj ira?	1. Eyyen 2. Lakki
2.5	Hiriyyoonikeedhibeecittooiinqabamaniibeekukanaandura?	1. Eyyen 2. Lakki
2.6	Obbolewwankeewaliinuffatawaljijirtuu	1. Eyyen 2. Lakki
2.7	Maalirraafta?	1.siree 2. lafarra 3. Siraadhoqqee
3 Qulqulinadhuunfa		
3.1		1.guyyaa 2-3 2.Torbeedhaan 3.Torbee oliin
3.2		1.Bishaan qofa 2.Bishaniifi saamunaa
3.3	Uffata keen nimiiccitaa ?	Dhaqnakeeyeroomeeqadhiqatta?
3.4	Eyyenyoojetteyeroomeeqa?	Maalfayyadamteedhaqnakeedhiqatta?
3.5	Uffatakeemaaliinmiiccitaa?	1. Bishaanqofa 2.Bishaniifi saamunaa
3.6	Uffatakeemeeqajjiratta?	1. guyyaHundaa 2. Torbetti al lama 3.torbaniin 4.torbee oliin
4.Naannoo waliinwalqabatee		
4.1	Bishaaneessaafayyadamtu?	1. Laga 2. Burqaa 3.Biirri 4.Kanbiraa5. Boonbaa
4.2	BishaanhangamManakeessanirraafagaata?	Daqiiqaadhan -----
4.3	Manakeessattibishaanlitrii 20 meqaafayyadamtuu ?	----- litirii
4.4	Balaanlolaamanakessanmudateeturee ?	1. Eyyen 2. Lakki
5.Haala manajireenyaa		

5.1	Baaxii/xaaraa	1. Migira/ citaa 2. qorqoorroo 3. lastikii
5.2	Dagalee	1. Tuubii 2.Muka 3. Dhoqee
5.3	Lafti	1. liishoo 2.lafa duwaa
5.4	Lakk.golamanakeessajiruu	1. tokko 2.lama.3 sadii 4. Sadiiol
5.5	Lakk. Foddaawwanii	1. tokko 2.lama.3 sadii 4. Sadiiol
6 Akkaatamanajireenyaa		
6.1	Sara elektirikiiqabduu ?	1. Eyyen 2. Lakki
6.2	Radiyooniiqabduu?	1. Eyyen 2. Lakki
6.3	Teeleevizoonaaqabduu?	1. Eyyen 2. Lakki
6.4	Friijiiqabduu?	1. Eyyen 2. Lakki
6.5	Eeleeelektrikaaqabduu?	1. Eyyen 2. Lakki
6.6	Tarabeezaaqabduu?	1. Eyyen 2. Lakki
6.7	Tessooqabduu?	1. Eyyen 2. Lakki
6.8	Sireefirashaispoojjiiqabduu ?	1. Eyyen 2. Lakki
6.9	Akaawuntiibankiiqabduu ?	1. Eyyen 2. Lakki
6.10	Bishaan dhugaatiiessaawaraabattu ?	1.bishaanboonbaa 2. Bishaan boolla 3. bishaan maddaa 4.bishaanroobaa 5. Bishaan lagaa 6.bishaan haylaandii
6.11	Mana fincaaniiakkamiiqabdu ? Ilaaluun	1. kanbishaaniindeemuu 2. Boolla qotame 3. kankompoostii fayyadu 4. Meshaa akka baaldiittifayyadamna 5.hin qabnu

6.12	Nyaatabilcheessuufmaalfayyadamtu ?	1 elektirikii 2.qoraan 3. kasala 4. baayoogaasii 5.naafxaa 6.koboota 7.marga 8.nyaata hin bilcheesinu
6.13	Keessoonlafamanakeessaniimaal irra tolfame? Ilaaluun	1 .lafaduwvaa 2.xaawlaa irra 3.simintoo 4. Kanbiroo _____
6.14	Dagaleen/girgiddaanmanakeesaniialaanmaal irra tolfamee? Ilaaluun	5. Mukaafiiboobaa 6. Mukaafdhoqee 7. simintoo 8. kanbiraa _____
6.15	Baaxiinmanakeessaniimaal irra tolfame? Ilaaluun	1.baaxii uumamaa/ margaa /cittaa 2.kan laastikii/sharaa 3.qorqoorroo 4. kanbiraa
7.Haala Dhibee Citto		
7.1	Citto/ hooyxooqabdaa?	1. Eyyen 2. Lakki
7.2	YooEyyenjetteisakam ?	1. Hoyxoo 2. Citto 3. Lamaanuu
7.3	Yerookambayyesihooysisaa?	1.guyya 2. galgala 3. Garagarummahinqabu
7.4	Hirroyootakeirraaddabaatetaphatasabacittootiif?	1. Eyyen 2. Lakki
7.5	ManaBarumsaairraaria'amteebeeytaasabacittootiif?	1. Eyyen 2. Lakki
8.Beekumsawaa'eedhibee Citto		
8.1	Waa'eecittodhageesseebeeytaa?	1. Eyyen 2. Lakki
8.2	Eessaadhageesse ?	1.Hiriyyota 2.Maatii 3.Ekisteenshinii fayyaa 4. Barsiisaa 5. Manabarumsaa 6.Kan

		biraa.....
8.3	MallatooleendhibeeCittoomaalfá'aa?	1. Hooyisuu 2, gogaamadeessuu 3.Hinbeekuu 4.Kan biraa -----
8.4	Haala dhibee Cittoonamarranamattidarbu?	1.Nama cittoqabuunwaltuquu 2. NamacittoqabuunwaliinRafuu 3. Hinbeekuu 4.Kanbiraa.....
8.5	Dhibeen hoyxoo qorichaqabachuubeytaa	1.Eeyyen 2. Lakki
8.6	Ittifamuu dhibee hoyxoo beeyta	1.Eeyyen 2. Lakki
8.7	Akkamittiittistuundanda'ama	1. Qulqulinadhuunfaeeguu 2. Tuqatiinamacittoqabuudhiisuu 3. Yaaliimaatiingeggeessuu 4. Hinbeekuu Kanbiraa _____
9. Itti fayyadamayaalaa Fayyaa		
9.1	Yaaliidhibeehoyxooargataajirtuuamma	Eeyyen 2. Lakki
9.2	Eeyyenyoojetteessattiyaalamte	1. buufatafayya 2. Qorichaaadaa
9.3	Lakkiyoojetteemaalif	1qarchii hinqabuu 2. kanaandurayaalamefaayidaahinqabu 3. dhibeeguddaamiti 4. qorichiqaaliidha
9.4	Qorichidhibeehoyxoobaayyeqaaliidha ?	1 .Eeyyen 2. Lakki

GUCA ARGAMUU/DHABAMUU DHIBEE HOYXOO

JIJJIRAMAA	Eyyen/jira	Lakki/ hinjiru	Ibsa
MALATTOOLEE FI AMALOOTAA			
HOYSISUU			
SHIFTOO			
NAMA HOYXOO QABU WAJJIN WALTUQTEE BEEKTAA			
YAALII MANA YAALAA			
SHIFTOO			
GOGAA KAKA'E			
QAMA MADAAN MIIDHAMEE			
MADAA GOGEE			
BAKKA HOYTOON SHIF JEDHE			
TAFA			
GANAA HARKAA			
QUBBEENHARKAA JIDDUU			
KIYYOO LUKAA/MIILAA			
TEESSUMA IRRA			
MULDHII			

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application.

Name of the student: _____

Date. _____ Signature _____

APPROVAL OF THE FIRST ADVISOR

Name of the first advisor: _____

Date. _____ Signature _____

APPROVAL OF THE SECOND ADVISOR

Name of the second advisor: _____

Date. _____ Signature _____