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BAHIRDAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH DEPARTMENT OF HEALTH SYSTEM AND HEALTH ECONOMICS

PREVALENCE AND ASSOCIATED FACTORS OF SCABIES IN NORTH MECHA DISTRICT, WEST GOJJAM ZONE, NORTH WEST ETHIOPIA

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ATHESIS REPORT SUBMITTED TO DEPARTMENT OF HEALTH SYSTEM AND HEALTH ECONOMICS SCHOOL OF PUBLIC HEALTH, COLLEGE OF MEDICINE AND HEALTH SCIENCES; BAHIR DAR UNIVESITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF MASTERS IN PUBLIC HEALTH.

JUANUARY, 2020

BAHIR DAR, ETHIOPIA

BAHIRDAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH

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FULL TITLE OF THE PROJECT	PREVALENCE AND ASSOCIATED FACTORS OF SCABIES IN NORTH MECHA DISTRICT , WEST GOJJAM ZONE, NORTH WEST ETHIOPIA
DURATION OF THE STUDY	FROM SEPTEMBER 09/01/2019 TO OCTOBER 10/30/2019
STUDY AREA	NORTH MECHA DISTRICT,WEST GOJJAM ZONE , NORTH WEST ETHIOPIA
TOTAL COST OF THE STUDY	26,510

Declaration

I, under signed, declared that this is my original work, has never been presented in this/any other university, and that all the resources and materials used for the research, have been fully acknowledged.

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Signature

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Acronyms and/or/ Abbreviations

AKF	Acute kidney failure
AOR	Adjusted odds ratio
CHF	Congestive heart failure
CI	Confidence interval
DALY	Disability adjusted life year
EPSD	Epidermal Parasitic Skin Disease
GAS	Group a Beta Haemolytic Streptococci
HH	Household
NTD	Neglected tropical Disease
OD	Odds ratio
SPSS	Statistical package of social science
SSA	Sub-Saharan Africa
STI	Sexually transmitted infection
WHO	World Health Organization
ARF	Acute Rheumatoid Fever
CRHD	Chronic Rheumatoid Fever

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Abstract

Background

Scabies is a contagious skin infestation caused by a mite known as Sarcoptes scabiei variety hominis.It affects all age groups. There is limited epidemiological data on scabies. This phenomena makes scabies neglected disease. It's difficult to request supplies in every level due to little epidemiological data about scabies.

Objective: the aim of this study was to determine prevalence and associated factors of scabies in North Mecha District, West Gojjam Zone, North West Ethiopia 2019.

Method: Community based cross-sectional study design was conducted from September 01/09/2019 to October 30/10/2019. A total of 551 samples was selected and included by using multistage sampling techniques. Skin examination was done by trained health personnel to rule out clinical features of scabies. Primary data was collected by trained data collectors using pre tested semi structured questionnaires by face to face interview. Data was coded and entered into Epi data version 3.1then exported to statistical package for social sciences version 23 software for analysis. Descriptive statistics describes the population in relation to determinant variables. Bivariate and multivariate analysis was used to identify factors associated with scabies. Statistical significance was determined at p-value < 0.05.

Result

A total of 551 study participants were participated in the current study. The prevalence of scabies was 14.9 %(82/551)[95%CI, (12%-18%)]. Participants with age < 15 years more prone to scabies (AOR=3.666, 95%CI: 1.970-6.824) Family size≥5(3.383, 95%CI: 1.583-7.228),travelling history to scabies epidemic area (AOR=5.58895%CI: 2.213-14.112), sharing clothes with scabies cases (AOR=3.321, 95%CI: 1.452-7.595), frequency of bathing (AOR=2.715, 95%CI: 1.034-7.125), frequency of washing clothes (AOR=2.180, 1.147-4.144) and frequency of changing clothes (AOR=5.709(1.882, 17.321) were independent significant factors associated with scabies infestation.

Conclusion

Scabies was a public health problem in north mecha community. age less than fifteen, family size five and above, travelling history to scabies epidemic area in the last two months, sharing clothes with scabies cases, frequency of bathing, frequency of washing clothes and frequency of changing clothes were independent significant factors.

Key Word: Scabies, prevalence and associated factors.

1. Introduction

1.1. Background

Scabies is one of neglected parasitic diseases caused by a mite known as Sarcoptes scabiei variety hominis which is a major public health problem globally and in resource poor communities in particular. Globally the exact prevalence of scabies is unknown ,but estimated as 300 million cases with 0.21% of total disability adjusted life years(TDALY) lost, and in resource poor tropical settings, the sheer burden of scabies infestation and its complications leads to a major cost in health care settings(1, 2).scabies leads to 1.5 million years lived with disability, while it affects the body vital organs like kidney and heart. Scabies poses major cause of morbidity(3, 4)and exacerbate the severity of chronic obstructive pulmonary disease(COPD).The burden is high in third world country(5).

In Ethiopia, scabies is beyond sporadic health problem, especially during manmade and natural disasters such as flooding, drought, civil war and conflict, poor water supply ,poor sanitation and overcrowding living condition(6). scabies is becoming beyond sporadic clinical cases but is turn to be a public health concern and affecting wider geographic areas and population groups especially in drought affected nutrition hotspot districts(7, 8). Ethiopia experience scabies outbreak in drought affected areas where there is shortage of safe water for drinking and poor personal hygiene as a result of direct impact of the drought caused by EL-NINO(7, 9). Ethiopia stands out for having the largest number of NTD cases following Nigeria and the Democratic Republic of Congo(9).

Scabies affects both sexes and all age groups but the most susceptible age groups are marginal age groups and resource poor communities are prone to scabies as well as for the development of complication as secondary infection. The highest burden occurs in hot tropical countries, where infestation is endemic in communities with poverty and overcrowding coexists(10). For example, the prevalence of scabies infestation was 18.5% in Fiji, while the prevalence of scabies in Cameron Boarding school is 17.8%(11, 12). The prevalence of Scabies also in Solomon Islands was 19.2%, while the prevalence is high in younger and older age groups(13)

Scabies is highly contagious and usually spread by prolonged direct skin-to-skin contact. It can also spread easily to sexual partners. Sometimes scabies can spread indirectly by sharing clothes, towels, or bedding used by infested individuals. A tiny scabies mite burrows into the epidermis of the skin where it lives and lays its eggs. symptoms of scabies are severe itching especially at night and popular skin rash that may affect much of the body parts, but mostly affected common sites like interdigital space, flexor of the wrist, elbow, armpit penis, nipple, pubic area and buttocks which usually begin 4–8 weeks after primary infestation(6).

Scabies registered as in 21 neglected tropical diseases in 2017 by World health organization (WHO)(1).this implies that the problem was under estimated in the past several years.so there is a limited study due to poor recognition of the problem. Therefore this study provides updated information about the prevalence and factors associated with scabies and gives clear evidence on the prevalence and risk factors in the study area.

1.2. Statement of the problem

Scabies is a disease in tropical, subtropical and in the pacific such as in Africa especially in sub-Saharan Africa, Latin America, India and Asia. It affects 5% of the world's population every year(14). Highest burden of scabies infestation is recorded in resource poor communities and marginal age groups. Younger children under the age of 15 years and those the elderly, chronically sick, immune-compromised and disabled individuals are at higher risk of developing sever form of scabies infestation(15).

Therefore, health squeal related to secondary infection following scabies is one of the major problems especially under developed nations. Scabies infestation has severe form of Itching which creates a chance to bring bacteria enter into the body following scratched skin tissue(5). Following scabies infestation 10% of individuals develop sever form of kidney diseases among scabies developing individuals and those individuals were 23 times more likely develops Acute Rheumatoid fever or Chronic Rheumatoid heart disease(ARF/CRHD/) compared with those who had no scabies infestation(3, 16). The most common secondary bacterial infection is caused by especially Beta haemolytic group a streptococci (GAS) which play an important role for the development of heart and kidney diseases.it affects 517,000 individuals among scabies infected in the world every year(17).

Possible risk factors for scabies are overcrowding living conditions, low level of education. sleeping with others, sharing of clothes, lack of quality health service, sexual contact with infected individuals, sharing of towels, poor hygiene practices, low income and travel to scabies outbreak areas are some of among the risk factors(11).

The transmission of human scabies with in the community setting is a major public health problem in the world especially in Africa. Scabies is more dominant problem with in the community due to the spirit of living within the community is shared between communities or between individuals(18, 19). The transmission of scabies with in the community is rapid and difficult to control if once the disease is occurred due to different driving forces such as overcrowding, inadequate knowledge about the infestation, share clothes, share many thing in between the community, poor socio-economic status and poor level of personal hygiene. Scabies is a major public health problem in Ethiopia in the recent years. Epidemiological data about scabies infestation in the community provides important information about risk factors and a clue for method of prevention and control(19).

Ethiopia experiencing scabies outbreak in drought affected areas when there is shortage of water and in natural and manmade disasters.in this regard the ministry of health(FMOH),with non-governmental organizations and supportive partners, has been working to control transmission with in the community using multi-sectoral approach. The focus of the ministry of health is on affected and high risk districts based on nutritional status and the occurrence of drought in that area based on scabies risk criteria(20). There are some studies about scabies and stated as the major risk factors for scabies is influenced by manmade and natural disasters, age, geography, seasonal influence and personal hygiene. In addition the occurrence of climate change plays a significant role to change scabies from cyclical to epidemic fashion(21). But, on the best of my knowledge, there are a limited community based study conducted in Ethiopia about the prevalence and associated factors of scabies. Most studies were institutional based studies. my study area was out of scabies risk area based on scabies risk identification criteria, but there were more than 21,000 cases was line listed in North mecha district in 2010E.C(22).in addition there is no epidemiological information about scabies occurrence in North mecha district. Based on 2010 annual report of North Mecha district health office, those community health workers do active surveillance to know disease burden and to request drugs to the suppliers(22). This creates

an opportunity for an individual patient to develop secondary infection and long term complication. Currently there is no formal scabies prevention and control strategy in the world(23) Daily active case surveillance was no longer effective to determine the disease burden, because of it needs high man power, budget and willingness and co-operation of health workers. But this way was failed to identify scabies cases. Therefore it is important to determine the disease prevalence and associated factors in the study area to mitigate the disease burden and further transmission with in the community.

1.3. Significance of the study

The results of this study have implications for participants, to get treatment and to have awareness about how to prevent scabies. Consequently, the findings might help to enhance scabies infection prevention and health promotion programs in the community. The finding of this study is also important for health care providers to give intervention on scabies. Local managers will use this study result to mobilize resources. The study has also importance to develop clinical guidelines after reviewing the results of the study. This study also generate hypothesis, so it will initiate researchers for further investigation.

1.4. Justification of the study

Epidemiological data about scabies is important to prevent and control scabies infestation .in the last of 2010 E.C the Amhara health bureau orders the North Mecha District health office to order every health workers to do active case surveillance and register it in a line list(22). This approach is no longer effective due to it needs efforts to walk for a long distance for consecutive days and community health workers no more cooperative for active case surveillance. Therefore, this takes in to account the intention of regional health bureau to estimate the prevalence and to identify associated factors.

2010 E.C annual report of north mecha district indicates that there is difficulty of estimating disease prevalence in the woreda(22), this in turn causes difficulty to request appropriate drug. Currently there is no national clinical guideline for the treatment of scabies including secondary bacterial infection. This study measures the burden of disease and influence the health system.

Recent body of knowledge confirmed that scabies occurs in drought affected and nutritionally unwell conditions. Most studies examine those expected areas .This type of assumption creates barrier on disease prevention and controlling activities in area where there is no drought, but the infection occurs endemically in the recent years. Therefore this study generates hypothesis why scabies occurs as endemic infection in areas where no more favourable environment scabies like in my study area.

2. Literature review

2.1. Prevalence of scabies

A study done in Paris among homeless people who sleep in public places showed that the prevalence of scabies was 6.5%(24).

A study conducted in Solomon Islands showed that the prevalence of scabies in the community was 19.2% (95% confidence interval [CI] 17.5–21.0),while a school survey in Solomon islands showed that the prevalence of scabies 54.3%(95%CI,48.7-59.8)(13, 25). The overall estimated national prevalence of scabies in Fiji was 18.5%. The prevalence was highest in children aged five to nine years (43.7%), followed by children aged less than five (36.5%), and there was also an indication of prevalence increasing again in older age(11).Another study done in Solomon Islands among school children showed that the prevalence of scabies was 54.3% (95% confidence interval [CI] 48.7-59.8). The prevalence was higher in males which is 63.5% and in those aged 10-12 years (25).

A study done in sub-Saharan prisons showed that the prevalence of scabies was 32%.men was more affected than women. The prevalence was high in the most crowded prisons, but no difference in different age groups (26).

A cross-sectional study conducted in Camron boarding school indicates that the prevalence of scabies was 17.8% among school children in which females and younger children are more affected than male and older children(12). Another study in the west regions of Cameron among prisoners showed that the prevalence of scabies was 32%.the prevalence is higher in men than women(27).

A study in Egypt among school children showed that the prevalence of scabies was 4.4%.the prevalence was higher in females than males which, is 3.9% and 4.8% respectively. The prevalence of scabies infestation in male students was 3.9%, while it was 4.8% in females, with no statistical significance(28).

A study conducted in Kechabira district, Southern Ethiopia among line listed cases showed that the overall prevalence of scabies is 2.5%(29).Another study conducted in Gondar town among “yekolo temari” showed that the prevalence of scabies is 22.5%(30).Another institutional based

study done in North Gondar zone, Dabat district showed that the prevalence of scabies was 9.3%(31).

2.2. Associated factors of scabies

2.2.1. Socio-demographic factors

A study in Fiji showed that age was independently associated with scabies infestation. Those whose age less than fifteen was independently significantly associated with scabies. This study also showed that Households with five or more people sharing the same room were more likely to have scabies (odds ratios [OR] 1.6, 95% CI 1.2-2.2 compared to households with rooms occupied by less than five individuals(11).

A study done in Nigeria indicated that Poverty-related variables, such as illiteracy (OR: 7.15; 95% CI: 3.71–13.95), low household income (7.25; 1.19–88.59), absence of a solid floor inside house (12.17; 2.83–52.34), and overcrowding (1.98; 1.08–2.81) were significantly associated with infestation(32).

A study done in sub-Saharan prisons showed that scabies infestation was significantly associated with level of education, when the level of education increases the prevalence of scabies decreases and vice versa (26).

A cross-sectional study conducted in the west regions of Cameron among prisoner showed that overcrowded prison was independent significant factors associated with scabies infestation ($P< 0.0001$). Men were significantly more affected than women ($P = 0.004$) and the prevalence of scabies significantly decreased when the level of education increased ($P< 0.0001$). In addition to low level of education is significantly associated with scabies with (adjusted odds ratio (AOR) 1.90; $P< 0.0001$)(27).a study done in center regions of Cameron(33).

A study in Egypt among school children showed that scabies was significantly associated with place of residence, level of education which is illiteracy, students whose fathers occupation was farmers were more affected and family size greater than four was risk factors(28).

A study conducted in east Badewacho district in southern Ethiopia showed that Independent risk factors found to be statistically associated with scabies infestation were age less than 15 years (AOR = 2.62, 95% CI: 1.31–5.22), family size greater than 5 members (AOR = 2.63, 95% CI: 1.10–6.27)(21).another study in southern Ethiopia showed that male sex with (AOR=2.69,95% CI:1.82-3.96),family size greater than or equals to five (AOR=1.77,95% CI:1.04-3.01),illiteracy, low household annual income were factors independently associated with scabies(34).

A study done in southern Ethiopia among school children showed that low household annual income, AOR=2.13 (95% CI: 1.32, 3.44); and family size greater than five, AOR=1.77 (95% CI: 1.04, 3.01) were significantly associated with scabies infestation(34).

A study done in Habiru district among school children showed that Age being young, Family size $\geq$ 5 and number of sleeping rooms were independent significant factors to develop scabies(35)

2.2.2. Environmental factors

A study conducted in east Badewacho Southern Ethiopia showed that home being affected by flooding is significantly associated with scabies(AOR = 22.32, 95% CI: 8.46–58.90)(21).

A study done in southern Ethiopia showed that inaccessibility and poor utilization of water, AOR=1.64 (95% CI: 1.12, 2.40) was significantly associated with scabies infestation(34).

A study conducted in Gondar among "yekolo temari"indicated that , those participants who travel to scabies epidemic area were 4.7 times more likely to develop the disease than who did not visited epidemic area in the past two months (AOR=4.7, 95% CI=1.64-14)(30)

2.2.3. Behavioral factors

A study done in Pakistan showed that Sharing of clothes and towels with scabies cases were statistically significant with p-value (p=0.01)to develop scabies compared with those who didn't share towels, clothes and any material contacted with scabies cases(36).

A study conducted in Cameron boarding school indicates that sleeping with others, sharing beddings, sharing clothes with scabies cases, pruritus in the close entourage and complaining of pruritus were significantly associated with the presence of mites(12).

A study conducted in Nigeria showed that Individual behavior, such as sharing of beds/pillows (2.11; 1.42–3.14) and sharing of clothes with scabies cases (2.51; 1.57–3.99), was also highly significantly associated with scabies. While regular bathing habits (0.37; 0.24–0.56) and regular use of bathing soap (0.36; 0.21–0.53) were protective factors(32).

A study conducted in Kechabira district, Southern Ethiopia showed that sharing clothes with scabies cases[AOR = 6.083, 95% CI (1.546–23.927)] poor hand washing, [AOR = 5.155, 95% CI (1.286–20.666)] and not using soap for bathing AOR = [4.777, 95% CI 1.440, 15.841)] were independent risk factors associated with scabies outbreak(29).

Another study conducted in southern Ethiopia among school community showed that sharing clothes with scabies cases were independent significant factor with (AOR=1.64, 95%CI:1.12-2.40) compared with those who didn't share clothes with infected persons(34).

A study conducted in Gondar among "yekolo temari" indicated that sharing cloth from infected person were 2.76 times more likely to develop scabies (COR=2.76, 95% CI= 1.04-7.41) and had close contact with infected individuals have significant association with scabies cases(30)

A study conducted in Habiru district showed that sharing of clothes with infected were independent significant factors associated with scabies infestation(35).

2.3.4. Personal hygiene

A study conducted in Pakistan showed that irregular and infrequent bathing practice were statistically significant with p-value (p=0.01). Irregular washing of clothes was observed in 78% and statistically significant association was observed between non availability of water and scabies. Poor source of water was significantly associated with scabies cases with p-value (p=0.001)(36).

A study conducted in Cameron among prisoners showed that number of baths less than once daily (adjusted OR 11.23, 95% CI: 2.10-60.06; p=0.005) and a number of laundries less than

once weekly (adjusted OR 16.27, 95% CI: 4.21-62.84; p<0.0001) were the two independent factors driving scabies infection among prisoners. Another study in Cameroon boarding school showed that at least two baths per day, usage of soap for baths and finger nails always cut short appeared as protective factors(12, 27, 33).

A study conducted in kechabira district southern Ethiopia on scabies outbreak investigation showed that showering after a week (AOR=11.2, 95%CI, 2.972-45.418), Infrequent use of soap during bathing (AOR=4.777, 95%CI: 1.440-15.841) were independent significant factors associated with scabies. in this study changing clothes after a week was not significantly associated with scabies(29).

3. Conceptual framework

Several factors play a role in determining scabies. These are socio-demographic variables like that of sex, age, family size, place of residence and religion.

Socio-economic variables which determine scabies are education and occupation. Housing condition which is important for scabies to be happen is absence of solid floor in the house.

Hygienic factors which is important for scabies to be occurred is taking shower ,finger nail conditions either short or long, personal hygiene practice and bathing of body either regularly or not. Environmental factors, like occurrence of public emergency conditions area of settlement, source of water and travelling history. Behavioural factors like sharing clothes, sleeping habits, sharing beds/pillows was seen as factors associated with scabies cases

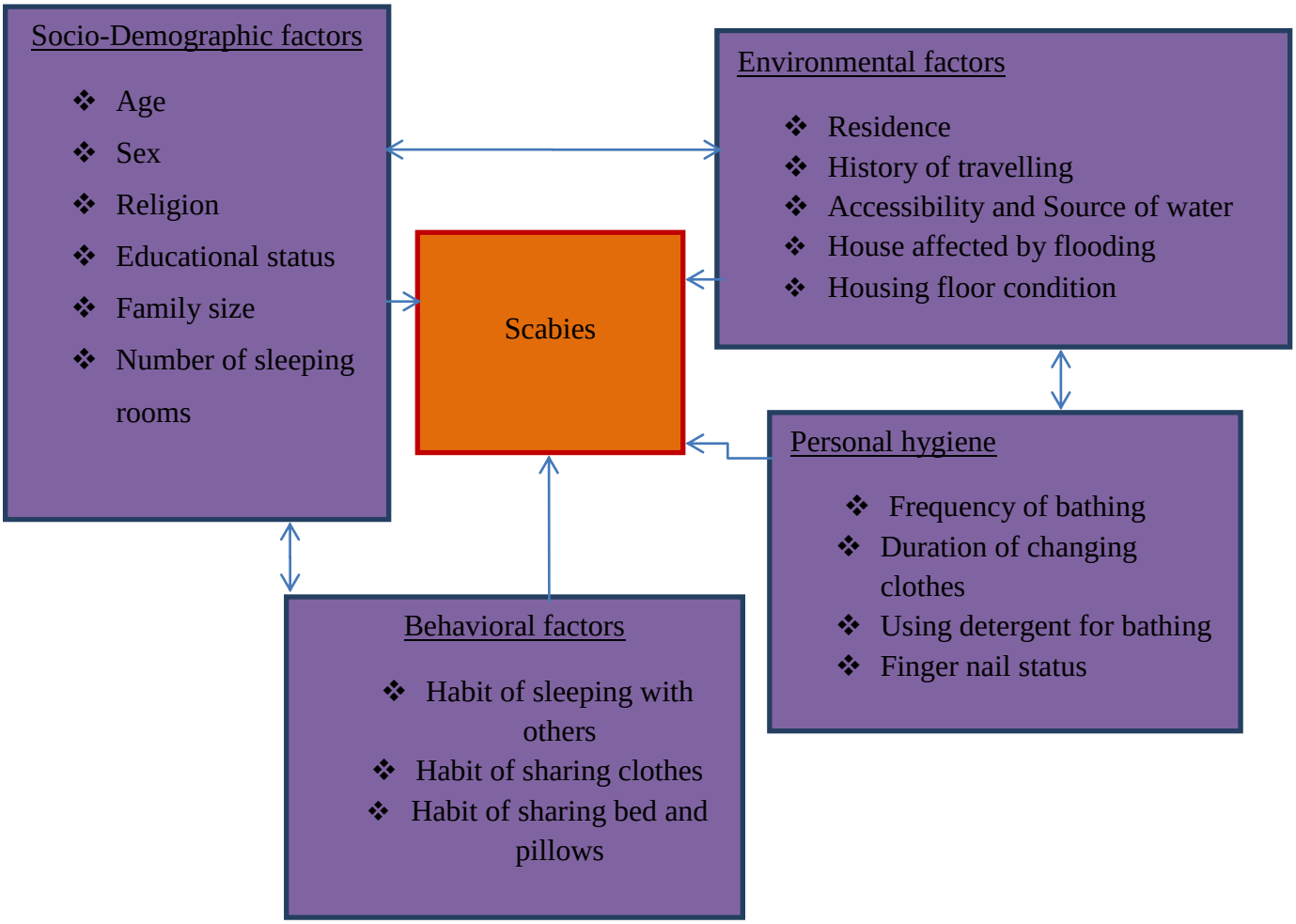

Figure 1: Conceptual frame work adapted from reviewing different literatures about prevalence and associated factors of scabies in north mecha District, North West Ethiopia 2019.

4. Objective

4.1. General objective

Assessment of the prevalence and associated factors of scabies in North Mecha District, North West, Ethiopia 2019

4.2. Specific objective

1. To determine the prevalence of scabies in North Mecha District 2019
2. To identify Associated Factors of scabies in North Mecha District 2019

5. Method and Materials

5.1. Study Design

Community based cross-sectional study design methods was conducted in North Mecha, North West, Ethiopia 2019.

5.2. Study area and period

The study was conducted in 2019 in North Mecha district, North Mecha is one of the wordas in the Amhara Region province of gojjam part of west gojjam zone. North Mecha is bordered on the southwest South Mecha, on the west by lesser Abay river which separates it from Awi zone and South , on the north by lesser Abay river separates it from North Achefer Woreda, on the South east by n and, on the east by Bahir Dar zuria woreda.Water bodies of this woreda include tingity, which is located in a volcanic crater near the lesser Abay,R.Echeesman believed he was the first European to see this body of water in 1932. The administrative centre of North Mecha is Merawi which is located 508 km far from Addis Ababa, capital city of Ethiopia and 34 km from Bahir Dar which is the capital city of Amhara region. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), this woreda has a total population of 303,208, of whom 153,120(50.5%) of them is male and 150,088(49.5%) of them is female while 37,871 or 12.5% are urban inhabitants(37)

With an area of 1481.64 square kilometres, North Mecha has a population density of 197.13, which is greater than the Zone average of 158.25 persons per square kilometre. A total Expected households is 70,513 with expected persons per household is 4.3 to a household, and 68,612 housing unit. The majority of the inhabitants practiced Christianity, with 98.91% as their religion. The largest ethnic group in the woreda is Amhara which is 99.91% which speaks Amharic as first language by 99.96%. It is food secured woreda which has a cycle of farming three times a year.7000 hectare of farming area is covered by “koga mesino project “is a dam of koga river(38) and all households around the dam produce a crop three times a year. In North

Mecha there is one government hospital,10 health centers,36 health posts and 2 medium private clinics and 4 drug vendors(39).

5.3. Population

5.3.1 Source population

All population of North Mecha District, West Gojjam Zone of Amhara Region in 2019G.C.

5.3.2. Study population

All peoples North Mecha District who fulfil the inclusion criteria

5.3.3. Study unit

Individuals in every household

5.4. Eligibility criteria

5.4.1 Inclusion criteria

Participants who were resident in North Mecha more than two months during the study period and voluntary to participate in the study were included.

5.4.2. Exclusion Criteria

Participants who live in North Mecha District less than two months during the study period and those who refuse to participate and severely ill patients who left against medical advice will be excluded from the study.

5.5. Study Variable

5.5.1. Dependent Variable

Scabies Infestation

5.5.2. Independent Variable

- Socio-Demographic factors age, sex , family size, religion, residence, occupation, number of sleeping rooms and educational status
- Behavioural factors contact history with scabies cases, sharing clothes with other family members, sharing clothes with scabies cases, habit of sleeping, sharing clothes with scabies cases and sharing beds/pillows with others
- Factors associated with personal hygiene like frequency of bathing, using soap during bathing, hand washing practices, frequency of washing clothes, frequency of changing clothes and finger nail status
- Environmental factors like history of travelling to scabies epidemic area, place of residence , poor water supply, home affected by flooding and housing floor condition and presence of animals inside the house.

5.6. Operational Definition

1. Scabies Infestation**:** - an individual having intense and persistent itching, which worsens at night, rash, lesions in between finger webs, genitalia, axillary area, elbow area and reproductive organs.

2. Infestation: -the presence of scabies mites in the body.

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

4. Over-crowding: -consider as high risk of disease transmission if more than four people living in a single household.

5**.** Household:-those who dwell under the same roof and compose a family.

6. Family size:-the number of people who are living together under one roof.

7. Contact history:-Previous contact with patient with scabies within the last two month.

5.7. Sample Size Determination and Procedure

5.7.1. Sample Size Determination

To determine the sample size we have two options. Estimating sample size for the prevalence and estimating sample size for the factor and take the larger among the two options. So the sample size is determined using single population proportion formula and the following assumption is made. I take the prevalence of scabies a study conducted in Gondar which is 22.5%(30),which is p =0.225 ,at α=0.05(5%),95% confidence level(Zα/2 =1.96),10% non-response rate and absolute precision or margin of error to be 5%(d=0.05). The minimum sample is calculated using single population proportion estimate that is: -

$$n = \frac{(Z\alpha/2)^2 p\,(1-p)}{d^2}$$

n = Minimum sample size

Zα/2 = Z value at 95% CI (1.96)

p = the previous prevalence rate in 22.5 %(0.225)

d = Margin of error 5% (0.05)

$$n = \frac{Z\alpha/2)^2 p\,(1-p)}{d^2}$$

$=1.96^2 x\ (0.225(1-0.225))/\ (0.05*0.05) =268$

Since I use multi stage sampling I used a design effect 1.5 and non-response rate 10% from the initial sample size .so the final sample size was 442.

Alternatively, the sample size can be calculated by using Epi-info-7 and taking three significant determinant variables with weak odds ratio from previous studies as follows then the largest sample size will be taken as a final sample size. (Table)

Table 1: Shows sample size calculation for the factor calculated by Epi-info ver.7.

Selected Variables	CI	Power	% Outcome of unexposed group	% Out come of exposed group	OR	Ratio (unexposed : Exposed)	Sample size	After adding design effect And non-response rate (1.5 and10%)
Family size ≥5(21)	95 %	80%	72.12%	87.2%	2.63	1	248	409
Source of water(pond) (21)	95 %	**80%**	12.12%	24.6%	2.36	1	334	551
Age < 15(21)	95 %	80%	52.12%	74.1%	2.624	1	168	277

Since the sample size for each of these variables calculated is greater than the size calculated for the single proportion formula, **551** was the appropriate Final sample size for my study.

5.7.2. Sampling procedure

The study included 551 residents (who lived in the area at least two months during the study period) using a multi stage random sampling technique. In the first stage, ten out of 36 Keble (27.8% of the total area) was selected by lottery method. In the second stage, a total of 551 households were selected using a systematic random sampling method. In this process samples were proportionally allocated to each selected Keble.

Total number of households were obtained from the respective administrative areas and used to calculate sampling fraction. Only one eligible individual was interviewed in the selected households. Occasionally, two or more individuals were eligible in the household, but only one individual was selected by lottery method. The sample size was distributed to each selected kebele in proportional allocation by using the formula ni=n/N*Ni. Where n=total sample size to be selected=551.N=total population 78875.Ni=total population of each keble ni(sample size from

each keble),so the total sample size was 551.to select each study unit systematic sampling technique was used. Finally from those study unit or individual, we select a family member who meets the eligibility criteria by lottery method. Proportional allocation to each keble was seen below on table. (Table 2)

Table 2: Proportional allocations of samples in each of the selected ten kebles in North Mecha District, North West Ethiopia according to the total sample size.

Name of selected kebele	Total population of the kebele	Proportionally selected households	K-value
Agamina	5039	35	33
Kurti-Bahir	8981	63	33
Woteti-Ber	8808	62	33
Goragoti	8378	59	33
Merawi 01	6563	46	33
A/Fana	5854	41	33
Berta-Geberie	5879	41	33
Dili-Betigil	10554	73	33
Ambo-Mesik	10842	75	33
Ediget	7977	56	33
Total	78875	551	33

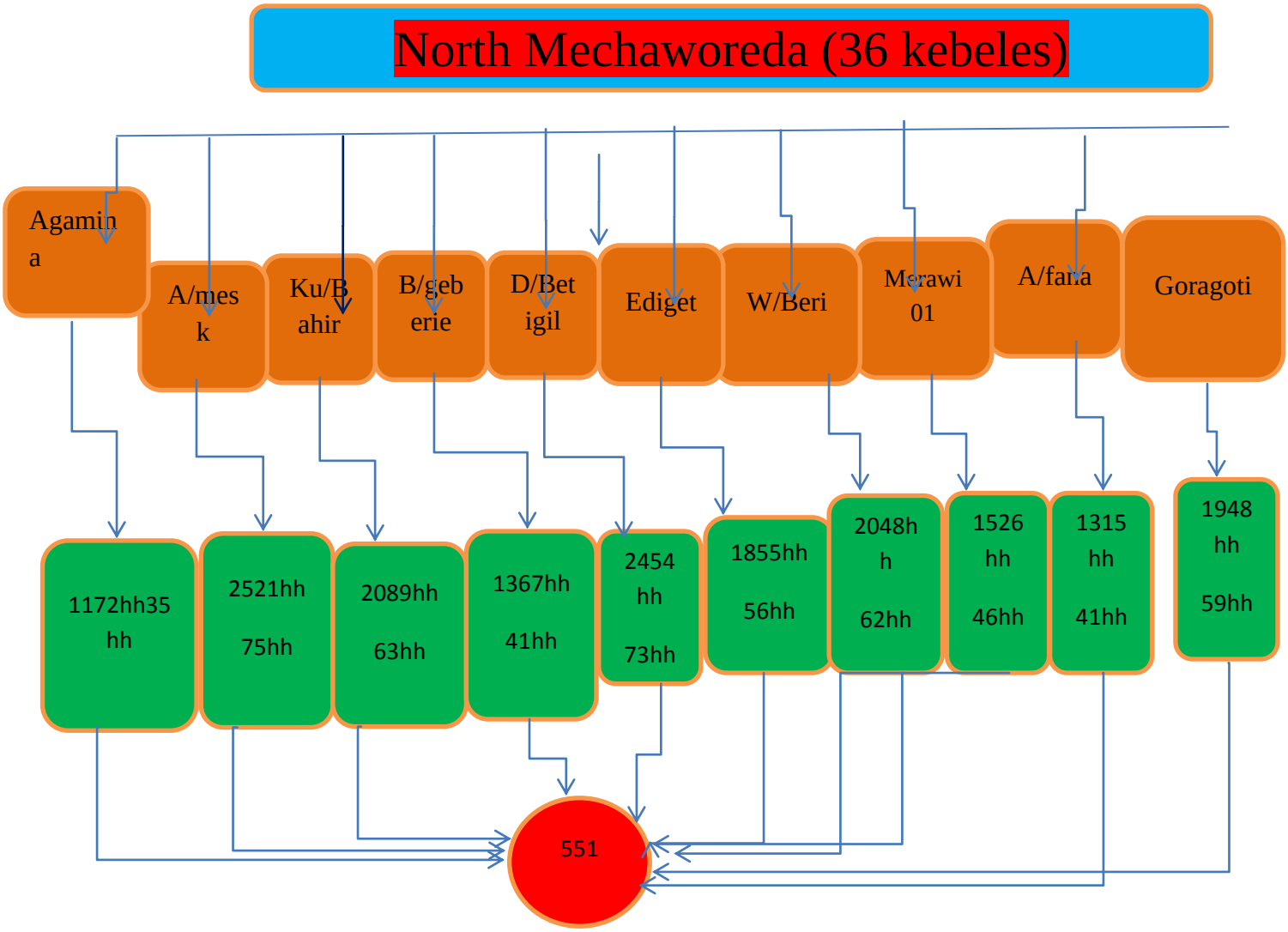

Figure 2: Schematic presentation of sampling procedures.

As shown on the diagram above ten kebles was selected out of 36 kebles in North Mecha woreda administration randomly selected by lottery method. The list of households prior to data collection was taken from each of the selected kebles health post CHIS. The registration procedures and completeness of the records was checked. Those households who did not update from CHIS were included before sampling frame preparation. Households in CHIS was updated and prepared for sampling frame preparation. Generally updating list of households was completed one day before data collection. House number of the households was identified and sampling frame was prepared for each of the selected kebles. During sampling frame preparation those health extension workers who works at health posts of selected keble was co-operative while preparing all list of keble households. Finally, the required number of sample was selected from each kebles using systematic random sampling technique.

According to North Mecha woreda plan commission office the total population of the selected kebele was 78875.Therefore18343 households(N)in the selected kebele and dividing it by sample size (n) the selected study participants (K) was interviewed by using systematic random sampling method (K=N/n=18343/551=33.

nh=n*Nh/N

N=total house holds
Nh=total households from each kebele
n=total sample size
nh=selected households from the total house hold

Therefore, eligible study participants were interviewed by going in every 33 households. For households with more than one eligible study participants, interview was done by selecting a participant using lottery method although in the event of a household with no eligible participants the immediate next household was interviewed. Health extension workers were co-operative for data collectors while collecting data in every 33 households.

5.8. Data Collection

5.8.1 Data Collection Technique

A semi structured and pretested questionnaire which was customized from different literatures developed for similar purpose by different authors (21, 30, 35)was used and face to face interview was carried out. Physical examination was done to rule out scabies by protecting privacy.in addition to semi-structured questionnaire data collectors were used photo of characteristic skin lesion of scabies for comparison of normal skin and scabies lesion or scabies lesion and other differential diagnosis. The pre -test was run in kebles which was not included in the actual study area on 5 % of the total sample size was considered. The questionnaire included questions on socio-demographic characteristics, environmental, behavioural and personal hygiene related factors. The questionnaire was originally developed in English and then translated into Amharic. It was translated back to English to ensure its consistency. Most of the items were adapted from existing literatures. The Amharic language questionnaire was used to collect data at all kebles during the study period. Supervision of data collectors was made two

times at each keble during the study period by the principal investigator and by two supervisors. The collected data was carefully checked for completeness as well as consistency. Any confusion on the data collection procedure and responses was handled immediately (on spot).

5.8.2. Data Collectors

The data was collected by interviewing the study participants after getting informed consent. Three clinical nurses and two BSC public health officers were participated in data collection after being given an intensive one days training on the data collection tools and collection procedures by the principal investigator for data collectors and supervisors. Those health professionals who participated in data collection were Public health emergency management (PHEM) focal who had exposure of scabies screening before assigning as data collectors. Training was given by principal investigator for data collectors act as refresher training for them. Health extension workers support data collection process by rounding house to house with data collectors.

5.8.3. Data collection process

After identifying the targeted Keble, trained data collectors were assigned to each keble and clinical examination was carried out by keeping personal privacy. While doing physical examination they compare actual skin finding with previously readymade visual photo of scabies cases, with The diagnosis of scabies was made on clinical basis by the presence of rash with itching worsening 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, per areolar, periumbilical, abdomen, and buttock areas). Data was collected through face-to face interview with participants.

5.8.4. Data Quality Control

In order to keep data quality, the questionnaire was developed first in English version and then was translated to local language Amharic and then after data collection back to English to keep data consistence of actual data. The questionnaire was also pre-tested on areas not included in actual data.one day training was given for data collectors and supervisors. Furthermore, feedback was given for data collectors in daily bases by principal investigator or supervisors before they

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

5.8.4. Data Processing and Analysis

Data was coded manually, cleaned and entered by Epi data version 3.1, and transports to the SPSS version 23 statistical software for 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 <0.2 in bivariate analysis was entered and re-analyzed in multivariable logistic regression model to control confounding factors. Odd ratios and 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 ($p>0.05$).

5.9. Ethical Consideration

Ethical clearance was obtained from the Ethical review board of Bahir Dar University. Communication with the head of health department was made through formal letter obtained from Bahir Dar University. After the purpose and the objective of the study were informed, formal letter was bringing from West Gojjam Zone Health department for North Mecha health office. North Mecha Health office also wrote a formal letter for all kebles. Verbal consent was obtained from each study participant after taking formal letter in each selected Keble administration. Participants were informed about they have the right to withdraw from the study at any time if they were not comfortable about the questionnaire. In addition to this in order to keep confidentiality of any information provided by the study subjects, the data collection procedure was maintained. Scabies cases was linked to health facilities and treated with their contacts during data collection.

6. Result

6.1. Socio- demographic characteristics of participants

A total of 551 participants were interviewed giving 100% response rate. The mean age of the respondents was 25 (± 15.073 SD). Of the study participants 288(52.3%) of them were females. Females were more affected by scabies than male's .among scabies developing cases 58.5% of them were females while the rest 41.5% of cases were males. More than half of the respondents 61.3% of the respondents were single, the rest 38.7% of the respondents were married. Among the study participants 226(41%) of them was students and 198(35.9%) of them were farmers.

Majority of the participants 541(98.2%), were follower of Orthodox Christian and 1.8 of them were Muslim followers. Of the study participants, 243(44.1%) were unable to read and write.68.4% of the respondents had family member greater than five the rest 31.6% of participants had family member less than four. Most of study participants 473(85.8%) had sleeping rooms less than and equal to three. Most of the study participants were rural inhabitants (Table 2)

Table 3: Distribution of the study population by socio-demographic characteristics, North Mecha District, Northwest Ethiopia, November 2019 (n=551).

		Presence of scabies infestation			
		No Scabies		Had scabies	
		Frequency	Percent	Frequency	Percent
Age	>= 15 years	310	66.1	39	47.6
	< 15 years	159	33.9	43	52.4
Sex	Male	229	48.8	34	41.5
	Female	240	51.2	48	58.5
Marital status	Single	286	61.0	52	63.4
	Married	183	39.0	30	36.6
Educational status	College and above	18	3.8	0	0.0
	Secondary education	58	12.4	5	6.1
	Primary education	140	29.9	9	11.0
	Read and write	73	15.6	5	6.1
	Unable to read and Write	180	38.4	63	73.8
Occupational status	Government employer	10	2.1	0	0.0
	Merchant	8	1.7	0	0.0
	Housewife	90	19.2	9	11.0
	Daily laborer	7	1.5	3	3.7
	Student	189	40.3	37	45.1
	Farmer	165	35.5	33	40.2
Religion	Muslim	10	2.1	0	0.0
	Orthodox	459	97.9	82	100
Family size	<= 4	160	34.1	14	17.1
	>=5	309	65.9	68	82.9

Number of sleeping rooms in your house	> 3	73	15.6	5	6.1
	<= 3	396	84.4	77	93.9
Place of residence	Urban	42	9.0	5	6.1
	Rural	427	91.0	77	93.9

6.2. Presence of clinical feature of scabies

Skin rash and itching, which worsen at night were major clinical symptoms of scabies. among the study participants 84(15.2%) of them had skin rash and 84.8% of them had no skin rash.86 (15.6%) of participants had itching and the rest of 465(84.4%) them had no itching. 82(95.3%) of study participants had characteristic persistent itching among who had complain of Itching (4.7%) of the study participants had no persistent itching even if they had itching. Eightytwo (95.3%) of the respondents had itching at night among those who complain itching. Seventy five (87.2%) of had itching more than eight days among those who had complain of itching. Majority of 542(98.4%) of the respondents confirms presence of health facility in their locality and 40 (46.5%) of them visit health facility due to their illness among those who complaining of Itching. Thirteen cases (15.1%) get treatment for their complain. the rest had no treatment. Based on scabies case definition and diagnosis algorithm 82(14.9%) scabies cases was identified. (Table 3)

Table 4: Presence of clinical features of scabies among study participants in North Mecha District, Northwest Ethiopia, November 2019(n=551).

		Presence of Scabies infestation			
		No Scabies		Had scabies	
		Frequency	Percent	Frequency	percent
Do you have skin rash?	No	467	99.6	0	0
	Yes	2	0.4	82	100
Do you have Itching?	No	465	99.1	0	0
	Yes	4	0.9	82	100
Is your itching persistent?	No	469	100	0	0
	Yes	0	0	82	100
At what time you're itching worsened (n=86)?	Day time	4	4.6	0	0
	Night	0	0	82	100

Presence of health facility in your locality(n=551)	No	9	1.9	0	0
	Yes	460	98.1	82	100
Do you visit health facility due to your illness(n=86)	No	2	50	44	53.7
	Yes	2	50	38	46.3
Do you get medication for your illness?	No	469	100	69	84.1
	Yes	0	0	13	15.9
Is your Itching persistent more than eight days?	No	465	99.1	11	13.4
	Yes	4	0.9	71	86.6

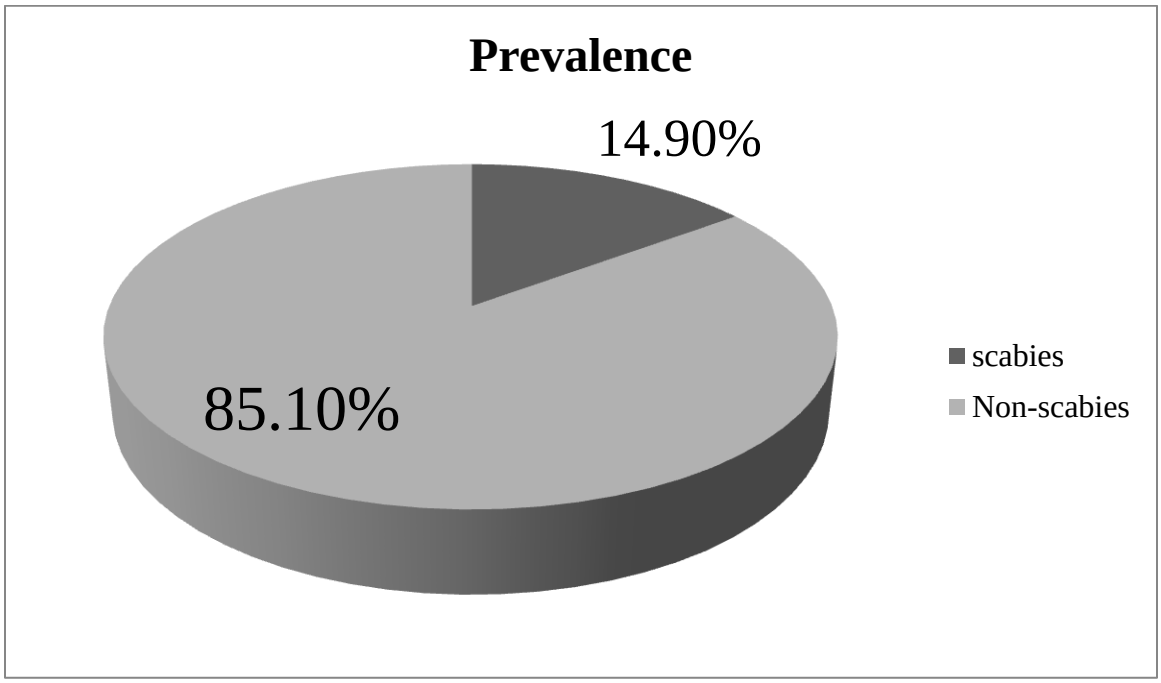

Figure 3: Prevalence of scabies among study participants in North Mecha District, Northwest Ethiopia, and November 2019(n=551).

6.3. Factors associated with scabies

In simple bivariate analysis age < 15years, Family size ≥ 5, number of sleeping rooms in the house, travelling history to scabies epidemic area, contact history with scabies cases, habit of

sleeping, sharing clothes with other family members, sharing clothes with scabies cases, sharing beds/pillows with others, frequency of bathing, consistent use of soap during bathing, frequency of washing clothes, frequency of changing wearing clothes and cutting finger nail always short were candidate variables at p-value ≤0.2.

After adjusting possible confounding factor the result of multivariate logistic regression analysis indicated that age, family size ≥ 5, travelling history to scabies epidemic area in the last two months, sharing clothes with scabies cases, frequency of bathing (taking shower), frequency of washing clothes and frequency of changing clothes were found to be the final independent factors associated with scabies.

In multi-variate analysis with age <15 years were 4 times more likely to get scabies (AOR=3.666, 95% CI: 1.970, 6.824) compared with those age fifteen and above.in multivariate analysis family size was independent factor associated with scabies. Family size ≥5 was 3 times more likely developed scabies than family size <5 (AOR=3.383, 95% CI: 1.583, 7.228).travelling history to scabies epidemic area in the last two months was 6 times more likely got scabies (AOR=5.588, 95% CI: 2.213, 14.112) compared with those individual study participants did not travel to scabies epidemic area in the last two monthes.in multivariate analysis sharing clothes with scabies cases were independent factor to develop scabies. Study participants who shared clothes with scabies cases were 3 times more likely (AOR=3.321, 95%CI: 1.452, 7.595) to develop scabies than those who did not shared clothes with scabies cases. Similarly frequency of bathing was found to be independent significant factor to develop scabies. Bathing irregularly in a week were 3 times more likely (AOR=2.715, 95% CI, 1.034, 7.125) to develop scabies infestation compared with those who takes bathing one and more per day. In multi-variate analysis frequency of washing clothes were independent significant factor to develop scabies. Washing frequently clothes decreases the chance of getting scabies, but delayed habit of washing clothes increases the chance of getting scabies. Individual study participants who did not wash their cloths at least once a week 2 times more likely to develop scabies (AOR=2.180, 95% CI: 1.147, 4.144) than those who washed their clothes at least once a week. Frequency of changing clothes was independent significant factors associated with scabies. Changing clothes after a week was 6 times more likely (AOR= 5.602, 95% CI: 1.882, 17.321) developed scabies infestation than those who changes their cloths every other day.

Number of sleeping rooms in the house, history of contact with scabies cases, habit of sleeping, sharing clothes with other family members, sharing beds/pillows, using soap during bathing and finger nail status were not significantly associated with scabies infestation in multivariate analysis. (Table4)

Table 5: Bivariate and Multivariate analysis of factors associated with scabies infestation in North Mecha District, Northwest Ethiopia, November 2019(n=551).

Variables	Scabies		COR(95%CI)	AOR(95%CI)
	Yes	No		
Age				
≥ 15 years	39(47.6)	310(66.1)	1	1
< 15 years	43(52.4)	159(33.9)	2.150(1.339,3.452)	3.666(1.970,6.824)***
Family size				
≤ 4	14(17.1)	160(34.1)	1	1
≥ 5	68(82.9)	309(65.9)	2.515(1.372,4.611)	3.383(1.583,7.228)***
Number of sleeping rooms in the house				
>3	5(6.1)	73(15.6)	1	1
≤ 3	77(93.9)	396(84.4)	2.839(1.111,7.256)	2.785(0.947,8.188)
Travelling history				
No	64(78)	442(94.2)	1	1
Yes	18(22)	27(5.8)	4.604(2.400,8.832)	5.588(2.213,14.112)***
History of contact with scabies cases				
No	74(90.2)	455(97.0)	1	1
Yes	8(9.8)	14(3.0)	3.514(1.425,8.665)	0.976(0.260,3.658)
Sleeping habit				
Alone	14(17.1)	198(42.2)	1	1
With others	68(82.9)	271(57.8)	3.549(1.940,6.490)	2.300(0.471,11.236)
Sharing clothes with other family members				
No	11(13.4)	219(49.7)	1	1
Yes	71(86.6)	250(53.3)	5.654(2.921,10.945)	2.124(0.741,6.094)
Sharing clothes with scabies cases				
No	16(19.5)	291(62)	1	1
Yes	66(80.5)	178(38)	6.744(3.787,12.010)	3.321(1.452,7.595)***
Sharing beds/pillows				
No	14(17.1)	192(40.9)	1	1
Yes	68(82.9)	277(59.1)	3.367(1.840,6.159)	0.647(0.134,3.125)
Frequency of bathing				
Washing one and more per day	8(9.8)	163(34.8)	1	1
At least once per week	19(23.2)	137(29.2)	2.826(1.200,6.656)	2.459(0.877,6.897)
Irregularly per	55(67.1)	169(36)	6.631(3.063,14.353)	2.715(1.034,7.125)***

week					
Using soap during bathing					
No	31(37.8)	90(19.2)	2.560(1.549,4.229)	1.788(0.932,3.432)	
Yes	51(62.2)	379(80.8)	1	1	
Frequency of washing clothes					
At least once per week	26(31.7)	329(70.1)	1	1	
More than a week(after a week)	56(68.3)	140(29.9)	5.062(3.053,8.391)	2.180(1.147,4.144)***	
Frequency of changing clothes					
Every other day	8(9.8)	179(38.2)	1	1	0.001
Every week	50(61.0)	254(54.2)	4.405(2.038,9.517)	1.172(0.466,2.948)	
after a week	24(29.3)	36(7.7)	14.917(6.028,35840)	5.709(1.882,17.321)***	
Cutting finger nails always short					
Yes	27(32.9)	300(64)	1	1	
No	55(67.1)	169(36)	3.616(2.198,5.948)	1.816(0.978,3.374)	

7. Discussion

Clinical features of study participants were characterized and the finding on clinical presentation of scabies was determined and the finding revealed that dominant symptoms that identified were rash and itching which worsen at night. Generally itching which worsen at night and rash were the major symptom of scabies.

This study showed that prevalence of scabies infestation with in North Mecha District community was 14.9 % (82/551) with [95%CI, (12%-18%)] among all age groups.

This finding is in line with a study conducted in Fiji and Solomon islands(11, 13). This similarity might be due to some socio- demographic characteristics. For instance, the proportion of study participants who was unable to read and write in this study was 44%, and in the Fiji studies it was 36% and 48% respectively. Moreover, the occupational status of the two participants was almost similar which was farmers and most of them were rural inhabitants.

The prevalence of scabies in this study was higher than other studies conducted in Paris6.5%(24). It was also higher than studies conducted in Egypt 4.4%(28).a study done in Ethiopia like east Kechabira district in southern Ethiopia2.5%(29) and a study done in North Gondar Dabateworeda9.3%(31). The difference could be due to time gap of studies, study participant, socio-demographic and socio-economic variation. This assessment was done after the occurrence of El-Nino in Ethiopia thus affects the epidemiological disease pattern either in sporadic or epidemic fashion.The difference could be due to sample size (123 in Kechabira district), presence of socio-economic differences, cultural variations and service accessibility.

The prevalence of scabies in this study was lower than a study done in Nigeria Nasarawa state community based cross-sectional study 65.0%(40).The prevalence of scabies in this study also lower than a school survey done in Solomon island 54.3%(25).the possible difference is in Nigeria Nasarawa state the illiteracy rate of the population was 90%,which is higher than the current study in North mecha district. Other possible difference is socio-economic, which was economically poor than the current study population.

According to this study age was significantly associated with scabies infestation. Those study participants whose age less than fifteen was 4 times (3.666, 95%CI: 1.970-6.824) more likely to develop scabies infestation than those whose age was fifteen and above**.** This finding is

supported with previous studies conducted in Habiru district, North wollo(35) zone andeast Badewacho district southern Ethiopia(21).however this study was in contrast with a study done in Pakistan(36).Young age groups were more likely to had scabies infestation.The possible explanation could be these age groups were school age group. Therefore this creates an opportunity for contact and overcrowding. The school environment creates a good atmosphere for cross- contamination and overcrowding.other possibility is that younger children had a high possibility of sharing clothes with infected individuals compared with older individuals. Inaddition this age group level of awareness about infection prevention and personal hygiene is less compared with fifteen and above.

Considering the risk factors for scabies family size was statistically significantly associated with scabies infestation.in this study those study participants whose family size $\geq$ 5 was 3 times (3.383, 95% CI: 1.583, 7.228) more likely to develop scabies compared with those who had family size less than five. Under this study most of study participants had family size five and above. This study was in line with a study done in Habiru district, North wollo zone(35) and Egypt(28)showing family size five and above more likely to had scabies than family size less than five family members.in addition this study was consistent with a study done in east Badewacho district southern Ethiopia which, showed that scabies had association with family size(21).It is obviously well understood that overcrowding atmosphere supports scabies infestation, in which families with five and above creates cloth body contact in between family members and have behavior of sharing clothes. Family member five and above faces shortage of clothes, this condition obligates those family members to share clothes. Additionally family members five and above not well nutritionally secured compared with families have less than five family members. This condition drops the immune system and exposes them to scabies. Generally crowding condition creates best atmospheric environment for the parasite and speed up cross-contamination dynamics in between family members. Overcrowding living condition creates crowded sleeping space and favors cloth contact. A study on scabies outbreak investigation among religious students ”YekoloTemari” in Gondar showed that overcrowding environment speed up the transmission dynamics(30).another justification is family members five and above is less concerning about personal hygiene and the effect of poor personal hygiene on communicable disease ,because of busy time on caring those family members or due to scarce resources to meet their needs.

This study also showed that travelling history to scabies epidemic area in the last 2 months was significantly associated with scabies infestation. Travelling history in the last two months to scabies epidemic area was6 times(5.588,95%CI:2.213,14.112) more likely to develop scabies infestation than those who had no history of travelling in the last two months.This current finding is in line with a study in Gondar among religious students "YekoloTemari",which explain that travelling history was significantly associated with scabies infestation(30).those individuals who travel to scabies epidemic area had a chance of contact with scabies infected cases. Those travelled individuals had faced overcrowding living condition. In addition individuals had history of travelling faces limited materials for personal hygiene and self-care.

Our study also revealed that sharing clothes with scabies cases was significantly associated with scabies infestation. Those who had sharing habit of clothes with scabies cases were3 times (3.321, 95% CI: 1.452, 7.595) more likely to develop scabies than their counter parts. This finding was supported by a study done in Pakistan; those individuals who had habit of sharing clothes with scabies cases were more prone than its counter parts(36).this result also supported by a study done in Cameron boarding school which explain that those individuals who shared clothes with infected individuals were more likely to develop scabies than those who didn't share with them(12).this study also supported by a study done in Nigeria(32) and study done in kechabira district, southern Ethiopia(29).sharing clothes with scabies cases creates a good atmospheric conditions for a causative agent to transfer from source to susceptible host. Therefore when an individual have a habit of sharing clothes with scabies cases the chance of developing scabies was high due to direct contact in between an agent and a host. A scabies mite stay alive for a long period of time in clothes, unless the exposed to sun light and had proper and timely laundering. Those who had travelled non indigenous areas were new for every environment. This exposes an individual to had poor personal hygiene.

Frequency of bathing (taking shower) was found to be significantly associated with scabies infestation. Those who takes shower irregularly in a week was 3 times (2.715, 95%CI: 1.034, 7.125) more likely to develop scabies compared with those who takes shower once and more per day.This finding was in line with a study done in Pakistan(36).this study was in contrast with a study done(30).the possible explanation was delayed washing of body creates a favorable environment the body to reserve causative agent of scabies. Frequent washing of the body wash

out the parasite from the skin. A parasite which causes scabies infestation infests superficial part of the skin in between dermis and epidermis. Increasing the frequency of washing reduce the concentration of the parasite from the skin and thus prevents scabies. In addition washing with soap will act as anti-septic, which reduces the density of scabies causative agent.

In this study frequency of washing clothes were significantly associated with scabies infestation. Increasing frequency of washing clothes reduces chance of developing the disease. Those who washes their clothes more than a week were 2 times (2.180, 95%CI: 1.147, 4.144) more likely to develop scabies infestation compared with those individuals who washes their clothes at least once a week. Our finding was consistent with a study done in Cameron boarding school and Cameron prison health(27, 33),however this finding was inconsistent with a study done in Habiru district north Wollo zone(35). the reason why delayed frequency of washing clothes associated with scabies was washing clothes removes (reduces) a parasite from a reservoir and thus makes no more vehicle for transmission from person to person due to in animate object. Since scabies transmits from person to person due to cross-contamination with clothes contacted with infected individuals. Therefore the transmission speed ups when there is prolonged time to wash clothes. Delaying the frequency of washing clothes gives time for a parasite to live a longer time until infecting a susceptible host. Frequency of changing clothes significantly associated with scabies infestation. Those who changes their clothes after a week were 6 times (5.709, 95%CI: 1.882, 17.321) more likely to develop scabies than those who changes their clothes every other day. Majority of study participants have delayed behavior of changing their clothes. This finding ,however was in contrast with a study done in kechabira district southern Ethiopia(29).

Number of sleeping rooms in the house, sleeping habit, history of contact with scabies cases, sharing clothes with other family members, sharing beds/pillows, using soap during bathing and finger nail status were not significantly associated with scabies infestation. This result is opposite with a study done in east badewacho district southern Ethiopia(21)Egypt (28) and Pakistan(36).

8. Strength and limitation of the study

8.1. Strength

The strength of this research lies in its community-based study.no disturbance due to illness. Those participants who sleep due to illness were interviewed after getting verbal consent. Data collectors use photo of scabies infected skin to rule out other skin infection. Case definition of other skin infection was triangulated with case definition of scabies.

8.2. Limitation

Diagnosis was entirely relying on history taking and physical examination, but not supported by /skin scrapping/microscopy.

9. Conclusion

The prevalence ofscabies in North Mecha district was found to be high. Factors that statically significant association with scabies infestation among all age groups of North Mecha district community were age, family size, travelling history to scabies epidemic area in the last two month, sharing clothes with scabies cases, frequency of bathing, frequency of washing clothes and frequency of changing wear clothes.

10. Recommendation

Government level

Since scabies was a new emerging disease, training and developing clinical guideline was important. Therefore to train those health professionals and to facilitate disease prevention the government should allocate adequate budget. The government should allocate adequate budget for supplies, surveillance and training. The government and its partners should also work in collaboration to reverse the problem in a short period of time until scabies become no more public health problem. Enhance the information using different communication strategy like mass media and social marketing.

The government should redesign health policy. Because our health policy mostly gives great emphasis about prevention of disease, but still now those communicable diseases are community problems.

Non -Governmental Organization

Scabies had high prevalence in this woreda. Mass drug administration is needed. Scabies drugs are so scarce and costs the community. Therefore non-governmental organization should fund scabies drugs**.**

North Mecha Health Office

District health office should prepare campaign for mass drug administration. Because ministry of health Recommends mass drug administration if the prevalence of scabies reaches 15% (MDA).

North Mecha health office should implement full health extension program in every household

Health facility label

Health facilities should avail medical supplies. Health facilities should mobilize the community. They also strengthen referral linkage with and early identification of index cases and treat them to make them non-infectious for others. Health facilities should allocate adequate budget for active case surveillance and for medication from their health care financing system. Health care

providers give great emphasis for the disease and should prepare themselves to treat cases scientifically and strengthen outreach community service. Health facilities should forecast their medical supply needs based on indictors and should consider contacts.

Health posts should have regular visit time on personal hygiene of students and health education should be given on regular bases for school community.

Mass drug administration should give for index cases and their contacts in North Mecha district.

Health facilities should work curative and preventive health care activities to alleviate the problem.

Educational institution level

Scabies mostly affects school age children. Educational sectors should work jointly with health sectors on the health of students. They also strengthen health club in the school.

Community level

The community should improve awareness by using different strategies about scabies prevention, early health institution visit and early treatment.

The community should avoid travelling to scabies epidemic area and sharing clothes from infected individuals.

The community should a wake up about how scabies is serious if left untreated and the effect of secondary infection.

The community should improve personal hygiene. The community should wash clothes properly and expose it for sunlight to make non-infectious. They should also change their clothes less than weekly bases.

Taking shower/increasing the frequency of bathing reduces the parasite load from the body. Therefore they should wash their body at least a weekly bases or less than a week. The community should utilize water for personal hygiene.

Researchers

Researchers are recommended to conduct further study using qualitative methods to ascertain the reason why scabies is a current hot issue. Researchers also recommended doing cohort study to rule out the effect of secondary infection on kidney and heart. Study also conducted to determine whether scabies is still public health problem and how the service provision to overcome the problem.

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12. Annexes

12.1 Annex 1: Information sheet and consent form /English version

Date_____EC_/_____GC

Introduction

Dear participants!

My name is _____and I am MPH student at Bahir Dar University, collage of medicine and Health Sciences School of public health. I am doing a research entitled with Prevalence and associated factors of scabies in North Mecha District, North West Ethiopia

Purpose of the study

The objective of this study is to determine the prevalence and identify associated factors of scabies in North Mecha District, North West 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 was Conducted by maintaining privacy of each participant in isolated place in your house. Interviewwas done after physical examination of skin.

Confidentiality

All records werekept strictly confidential. Participant's identifications weren'tcollected for the study purpose.Instead code number was used. Personal identifying information wasn't shared outside of the study and it wasn't used in any of the publications.

Benefit of the study

The benefit of this study is to create awareness on scabies infections, transmission, possiblePreventionand burden of disease. This result will give hint to the woreda community to keep/improve their health. In addition, individual participants were benefited to get treatment after skin examination with their contacts.

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 wasn't 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 Co-operation with a great extent

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

Principal Investigator: GetanehChanie

Tel: +251-94705-0176

Email: getanehchanie094705@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.

Participant code _____

Data collector's signature _____ date_____

12.2. Questionnaire-English version

Code	Questionnaire	Coding categories	Skip
Part I: Presence of clinical features of scabies			
101	Do you have scabies symptoms? If the answer is yes, what are the symptoms?	1.Skin rash 2. itching	If the participant had no symptoms skip to part II
102	During at what time your itching becomes intense?	1.Day time 2.at night	

103	Is rash seen?	1.Yes 2.No	
104	If yes, Onset of rash?	……../……../…..DD/MM/YY	
105	How long have you had a rash?	…….Days(duration of rash)	
106	Do you still have a rash?	1.Yes 2.No	
107	On physicalexamination, Does he/she have scabies infestation?(pleasesee most affected areas like genitals (male),inner part of the wrist,feet, elbow ,hand ,folds under the arm ,folds under the arm, axillaries ,umbilicus and buttock	0…….No scabies infestation. 1…….have scabies infestation.	
108	Is there nearby health post/health center?	1.Yes (date went to health facility)…….DD/MM/YY 2.No	
109	Do you visit health facility for this illness?	1.Yes 2.No	
110	Did you take treatment?	1.Yes 2 No	
Part II: Socio-economic and Demographic characteristics			
201	Your age?	…….years	
202	Sex?	1.Male 2.Female	
203	What is your marital status?	0……single 1…….married 2……divorced 3……..widowed	

204	What is your Educational status?	0……..College and above 1……Secondary 2……Primary 3…….Read and Write 4……Unable to read and write	
205	What is your occupation?	0…….Government employer 1…….Merchant 2…….Housewife 3……Daily laborer 5……Student 4……Farmer 5……other (specify)……..	
206	What is your religion?	0…….Muslims 1……..Protestant 2……Orthodox 3……..other(specify)	
207	Number of families in the house hold?	……	
208	Number of sleeping rooms in the house?	……	
209	Residence	0.Urban 1.Rural	
	Part III: Associated factors		
301	Have you ever travel to a place with a scabies epidemic area (the last two months)	0……No 1……..Yes	

302	Has the person whom you are sleeping with scabies?	0……..No 1……...Yes	
303	What is your habit of sleeping?	0…..alone 1…..with others	
304	Have you shared any clothes with your family members?	0...No 1…Yes	
305	Have you shared any clothes with someone with scabies cases?	0….No 1…. Yes	
306	Have you shared beds/pillows with someone?	0….No 1…Yes	
307	Do you wash your body?	0….No 1…Yes	**No.Skip to 309**
308	If yes, how frequent do you wash your body?	0...Once and more per day 1…once per week 2…Irregularly in a week	
309	What do you use detergent to take shower?	1. Water only 2.water with soap 3. Other	
310	Do you wash your clothes?	1.Yes 2.No	No.skip to 311
311	If yes, when do you wash your clothes?	1. at least once per weakly 2. more than a week	
312	When do you change your clothes that you wear now?	0…..every other day 1……weekly 2…….after a week	
313	Is there any shortage of water to wash your body and clothes?	0…No 1…Yes	
314	When do you wash your hand?(Please	1…before eating	

	encircle if more than one answer)	2…after eating 3…after toilet 3…before feeding a child 4…after any contact 5…after toileting a child	
315	Is your finger nail always cut short?(Please see current finger nail status)	0…..have short finger nail 1….Not short	
316	What is/are source/s of water for daily bases	0…..Pipe 1….Well 2…..Spring 4…...River 5…..Others	
317	Is your home affected by flooding?	0….. No 1…..Yes	
318	Do you have animals inside the house?	0……No 1….Yes	
319	The main material of your housing floor?	0…..Solid material 1…..Not solid material	

Thanks for your collaboration!!!

12.3 Annex 2: Information sheet and consent form /Amharic version

<u>አጠቃላይ መረጃ</u>

በባህር ዳር-ዩንቨርሲቲ ህክምና እና ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ሳይንስ ትምህርት ክፍል በጥናቱ ለሚሳተፉ የፈቃድ መጠየቂያ እና መቀበያ ፎርም/ሺት/

<u>መግቢያ፡</u>

ሰላም እንደ ምን አሉ?

በአሁኑ ሰዓት በሰሜን ሜጫ ወረዳ የእከክ በሽታ ስርጭት እና አጋለጭ ሁኔታዎችን ለመለየት ጥናት እያካሄድን እንገኛለን፡፡እርስዎ በጥናቱ እንዲሳተፉ ተመርጠዋል፡፡

<u>የጥናቱ ዋና አላማ፡-</u>

የእከክ በሽታ ስርጭት ሁኔታ ምን ያህል እንደሆነ እና ስለሚያጋልጡን ምክንያቶች፤መተላለፊያ መንገዶች ለማወቅ ለሚካሄደዉ ጥናት መረጃ እየሰበሰብን እንገኛለን፡፡

ጥናቱ በሰሜን ሜጫ ወረዳ ባሉበተ መረጡ ቀበሌዎች ባሉየህ/ሰብ ክፍሎች ስርጭቱ ምን ያክል እንደሆነ እና ለበሽታዉ አጋለጭ ምክንያቶችን ለማጥናት ነዉ፡፡

<u>የጥናቱ ጊዜ፡-</u>

የጥናቱ ጊዜ በሚገኘዉ የናሙና መጠን የሚወሰን ሲሆን 2 ወር እና ከዛም በላይ ሊወስድ ይችላል፡፡

<u>ሊከሰቱ ስለሚችሉ ስጋቶች ና የምቾት መጓደሎች፡-</u>

ጥናቱ ለችግር የሚያስከትል ወይም የሚያሰጋ ነገር የለውም፡፡

<u>የጥናቱ ሂደት፡-</u>

እርስዎ በጥናቱ ላይ ለመሳተፍ ፍቃደኛ ከሆኑ፣ሁሉም ተሳታፊ በህክምና ባለሞያ የቆዳ ላይ ምርመራ እና የቃል መጠይቅ ይደረግላችኋል ፡፡ ምርመራዉ የሚካሂደዉ የእርስዎንም ስጠር በጠበቀ መልኩ ይሆናል፡፡

<u>የጥናቱሚስጢራዊነቱ፡-</u>

የሚሰጡት መረጃ ሚስጥራዊነቱ የተጠበቀ ነው፡፡ በስም አይፃፉም የዚህ ኮድ መፍቻ በፋይል ተቆልፎ የሚቀመጥ ሲሆን የተፈቀደለት ሰው ብቻ ፋይሉን ማየት ይችላል፡፡ ከዚህ ጥናት በሚወጡ ዘገባዎች ወይንም 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 ይጠበቃሉ::

<u>የሚያስገኘው ጥቅም፡-</u>

በጥናቱ በመሳተፈዎ ምንም አይነት ክፍያ አይጠየቁም ወይም የሚያገኙት ገንዘብ አይኖርም::ሆኖም ግን የእርስዎ በዚህ ጥናት መሳተፍ የእከክ በሽታን ለመከላከል ለሚደረገዉ ጥረት አወንታዊ ተቀሜታ አለው::ነገር ግን በምርመራ ወቅት የእከክ ታማሚ መሆንዎ ከተረጋገጠ እርስዎ እና ከእርስዎ ጋር ንክኪ ሊኖራቸዉ የሚችሉ ቤተሰቦች ህክምና እነሰጣለን::

<u>ከጥናቱ ስለማቋረጥ፡-</u>

በጥናቱ የሚሳተፉት ፈቃደኛ ከሆኑ ብቻ ነው::ስለዚህ መሳተፍ ከጀመሩ በኃላ ማቋረጥ ወይም መመለስ የማይፈልጉት ጥያቄ ከሆነ ይለፈኝ ማለት ሙሉ መብትዎ ነው::በጥናቱ መሳተፍ ወይም አለመሳተፍ አገልግሎት 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 ዉጤት ምን እንደሆነ ለማዉቅ ከፈለጉ በሚከተለዉ አድራሻ ሊያገኙን ይችላሉ::

የጥናቱ አስከያጅ ፡ ጌታነህ ጫኔ

ስ.ቁ፡-09-47-05-01-76

ኢሜል፡getanehchanie094705@gmail.com

ጊዜዎትን ሰጥተዉ ስለተባበሩኝ በጣም አመሰግናሉ፣አሁን በሰጠነዎት መረጃ ላይ ተመስርተዉ በጥናቱ ለመሳተፍ ፈቃደኛነዎት

ሀ. አወ ፈቃደኛ ነኝ

ለ. ፈቃደኛ አይደለሁም

የተሳታፊው የሚስጥር ኮድ _____

የመረጃ ሰብሳቢው ፊርማ _____.ቀን_____

በቅድሚያ እናመሰግናለን!

ክፍል አንድ፡- የእከክ በሽታ ምልክቶች እና ተያያዥነት ያላቸዉ ጥያቄዎች (ለታማሚዎች ብቻ)

ተ.ቁ	ጥያቄ	አማራጭእናመለያኮድ	ይዘለል
101	የእከክ በሽታ ምልክት በሰዉነትዎት ላይ አለ?	0...የለም 1...አለ	
102	ለጥያቄ ቁጥር 102 መልስዎ አለ ከሆነ ፣ምን አይነት ምልክት ነዉ	0...የሰዉነትሽፍታ 1...እረፍትአልባማሳከክ	
103	በብዛት የሚያሳክክ ሀ/ሽ መቸ መቸ ነዉ?	1... ቀንቀን 2...ማታማታ	
104	መቸ ነበር መጀመሪያ የቆዳ ሽፍታ የወጣዉ?	1...ባለፈዉሳምንት 2...ከሁለት ሳምንት በፊት 3...በዚህ ሳምንት 4...አላስታዉስም	
105	ሽፍታዉ ለምን ያህል ጊዜ ቆየ	----------	
106	ሽፍታዉ እስካሁን አለ?	1... የለም 2... አለ	

107	አሁን በምርመራዉ ሲታዩ የእክክበሽታ ታማሚናቸዉ ወይ	0.....ታማሚአይደሉም 1.....ታማሚናቸዉ	
108	በአካባቢያችሁ የጤና ተቋም አለ?	1... የለም 2... አለ	
109	በእከኩ ምክንያት ጤና ተቋም ሂደዉያ ዉቃሉ?	1...የለም 2...አዎ	
110	መድሃኒት ወስደዉ ነበር	1...የለም 2...አዎ	
111	አሁን በአጠቃላይ በምርመራዉ ሲታዩ የእከክ በሽታ አለባቸዉ ወይ	1. የለበትም/ባትም 2. አለበት/ባት	

ክፍል ሁለት ፤የተጠያቂዉ አጠቃላይ የማህበራዊና ኢኮኖሚያዊ መረጃን የተመለከተ መጠይቅ

ተ.ቁ	ጥያቄ	አማራጭ እና መለያ ኮድ	ይዘ ለል
201	እድሜሽ/ህ ስንት ነዉ?	----------?	
202	ፆታ	1.ሴት 2. ወንድ	
203	የጋብቻ ሁኔታ	0...ያላገባ/ች 1...ያገባ/ች 3...የፈታ/ች 4...የሞተችበት/ባት	
204	የትምህርት ሁኔታ	0...ኮሌጅ እና በላይ 1...ሁለተኛ ደረጃ 2...የመጀመሪያ ደረጃ 3...ማንበብ እና መጻፍ የሚችል 4...ማንበብ እና መጻፍ የማይችል/ትችል	
205	የስራ ድርሻ	0...የመንግስት ሰራተኛ 1...ነጋዴ 2...የቤት እመቤት 3...የቀን ሰራተኛ 4...ተማሪ 5...አርሶ አደር	

		6...ሌላ ካለ ይገለጽ.....	
206	ሀይማኖትህ/ሽ	0...ሙስሊም 1...ፕሮቴስታንት 2...ኦርቶዶክስ 3...ሌላ ካለ ይገለጽ....	
207	በቤተሰቡዉስጥየሚኖረዉየቤተሰቡአባላትብዛት	.....	
208	መኖሪያቤታችሁዉስጥስንትምኝታክፍልክፍልአለዉ	.....	
209	አሁንነዋሪነትህ/ሽየትነዉ	0...ከተማ 1...ገጠር	
ክፍል ሶስት ፤ለእከክ በሽታ አጋላጭ ስለሆኑ ምክንያቶች የተዘጋጀ መጠይቅ			
301	ባለፉት ሁለት ወራት ዉስጥ ቀየዎትን ለቀዉ የእከክ በሽታ ወረርሽኝ ወዳለባቸዉ ቦታዎች ሂደዉ ነበር?	0...የለም 1...አዎ	
302	በባለፉት ሁለት ወራት ዉስጥ ከእከክ በሽተኛ ጋር ንክኪ ነበረዎት	0...የለም 1...አዎ	
304	የምኝታ ሁኔታ	0...ብቻየን 1...ከሰዉጋር	
305	በቤተሰብ አባላት ጋር ልብስ ተዋዉሰህ/ሽ ታዉቃለህ/ሽ	0... የለም 1...አዎ	
306	ከእከክ በሽተኛ ጋር ልብስ ተዋዉሰህ/ሽ ታዉቃለህ/ሽ	1.አዎ 2. የለም	
307	ከቤተሰቡ ጋር ወይም ከእከክ በሽተኛ ጋር አልጋ ወይም ትራስ በጋራ ይጠቀማሉ	0...የለም 1...አዎ	
30	ገላዎን ይታጠባሉ?	0...የለም	የለ

8		1...አዎ	ምክ ሆነ ወደ 311
309	ለጥያቄቁጥር 308 መለስዎአዎከሆነ፣ገላዎንበምንያህልጊዜልዩነትይታ ጠባሉ?	0...በቀን አነዴ እና ከዛ በላይ 1...ቢያንስ በሳምንት አንድ ጊዜ 2...አልፎ አልፎ በየሳምንቱ 3...ሌላካለ(ግለፁ)_____ _____	
310	ገላዎን ሲታጠቡ የምትጠቀሙት ምንድን ነዉ?	0...በዉሃ ብቻ 1... በሳሙና 2...ሌላ ካለ(ግለፁ)____	
311	ልብሰዎን ያጥባሉ?	0...የለም 1...አዎ	የለ ምክ ሆነ ወደ 313
312	ለጥያቄ ቁጥር 311 መልስዎ አዎ ከሆነ ,በየስንት ጊዜዉ ነዉ የሚያጥቡት?	0...ቢያንስ በሳምንት አንድ ጊዜ 1... ከሳምንት በላይ	
313	መቸ ነዉ አሁን የለበሱትን ልብስ የሚቀይሩት?	0...በየቀኑ 1...በየሳምንቱ	

		2...ከሳምንት በኋላ	
314	ልብሳችሁንና ገላችሁን ለመታጠብ የዉሃ እጥረት አለባችሁ?	0...የለም 1...አዎ	
314	እጅዎትን በምን ሰዓት ነዉ የሚታጠቡት (ከአነድ በላይ መልስ ከሰጡ ያክብቡ)	1...ምግብ ከመመገቤ በፊት 2...ምግብ ከተመገብሁ በኃላ 3...ሽንት ቤት ከተጠቀምሁ በኃላ 4...ከማነኛዉም ንክኪ በኃላ 5...ለህጻናት እንክብካቤ ካደረግሁ በኃላ	
315	የእጅ ጣትዎት ጥፍር ሁሌም አጭር ነዉ (እባክዎት ይመልከቱ)	0...አዎ 1... የለም	
316	በየቀኑ የምትጠቀሙትን ዉሃ ከየት ነዉ የምታገኙት?	0... የቧንቧ ዉሃ 1..ከጉድጓድ 2...ከምንጭ 3... ኩሬ2. 4... ወንዝ 5...ሌላ ካለ(ይገለፅ)-------	
317	ቤታችሁ በንርፍ ተጠቅቶ ያዉቃል?	0... የለም 1...አዎ	

318	በመኖሪያ ቤታችሁ ዉስጥ እንሰሳቶች አሉ	0...የለም 1... አሉ	
319	የመኖሪያ ቤትዎት ወለል የተሰራዉ ከምንድን ነዉ	0....ጠንካራ ሽፋን ያለዉ 1.....ጠንካራ ሽፋን የሌለዉ	

ስለ ትብብረዎት እናመሰግናለን መረጃዉን የሰበሰበዉ ባለሙያ ስም.....ፊርማ.....የሱፐር ቫይዘር ስም.....ፊርማ.....