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Scabies Outbreak Investigation and Its Risk Factors in Gumbichu District, East Shewa Zone, Central Ethiopia: Unmatched Case-Control Study

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Abstract: *Introduction*: Scabies is one of the common public health problems but neglected parasitic disease caused by Sarcoptes scabiei var hominis. Global scabies prevalence was about a 204million cases with 0.21% of total disability-adjusted life years lost. In Ethiopia, scabies is common, especially during natural or man-made disasters. This study aimed to investigate the scabies suspected outbreak and risk factors in Gumbichu District, Central Ethiopia, 2021. *Methods*: A community-based unmatched case-control study among 96 participants (32 cases and 64 controls) was conducted in the Gumbichu district from July 1-20/2021. Data were collected using a structured questionnaire. Line-listed data were entered into Microsoft Excel for descriptive analyses. Multivariable logistic regression analysis was computed using SPSS version 25 to identify factors associated with scabies. The odds ratio of 95% CI and a p-value less than 0.05 were used to describe the strength of the association and statistical significance. *Results*: A total of 1231 scabies cases line listed with an overall attack rate of 16/1,000 population. The mean age was 14 years, and the most affected age group was 5–14 years. Frequency of shower per month [AOR (95% CI) = 6.51 (1.26-33.54)], sleeping with scabies patient [AOR (95% CI) = 10.52 (3.75-29.53)], contact history [AOR (95%) = 11.44 (1.72-76.22)], family size ≥5 [AOR (95% CI) = 8.63 (2.42-30.84)], and sharing clothes with scabies cases [AOR (95% CI) = 14.31 (3.04-67.35)] were found to be determinant factors of scabies outbreak. *Conclusion*: Frequency of shower per month, contact history, sleeping with scabies case, family size ≥5, and sharing clothes with scabies case were associated with a high frequency of scabies. Therefore, it is recommended to raise awareness about the transmission, prevention, and control of scabies disease.

Keywords: Scabies, Outbreak, Risk Factors, Ethiopia

1. Introduction

Scabies is a contagious ectoparasite of the skin caused by the microscopic mite *Sarcoptes scabiei var hominis* [1]. It is a contagious disease that is characterized by itching, generalized rash, and secondary infection. Female mites burrow into the stratum corneum of human skin to lay eggs [2]. Scabies is transmitted through direct skin-to-skin contact, making people who live in crowded environments in the world's poorest communities, particularly vulnerable. Scabies is not zoonotic and cannot be transmitted to humans from dogs or other animals with sarcoptic mange caused by other, genetically different varieties of the sarcoptic mite [3].

Signs and symptoms usually begin four to six weeks after primary infestation [4]. A tiny scabies mite burrows into the epidermis of the skin where it lives and lays its eggs. The most common symptoms of scabies are severe itching, especially at night, and a popular skin rash that may affect much of the body or be limited to common sites, like inter-digital space, flexor of the wrist, elbow, armpit, penis, nipple, and buttocks [5].

Scabies is one of the common but neglected parasitic diseases and is a major public health problem globally, especially in resource-scarce countries. Global scabies prevalence was about 204 million cases with 0.21% of total disability-adjusted life years lost, and, in resource-poor tropical settings, the sheer burden of scabies infestation and their complications impose a major cost on healthcare systems [6].

Scabies is transmitted through close personal contact between hosts and is often seen in families through contaminated clothing and bedding, sexual partners, among school children, and institutional people [5]. The risk of transmission of scabies increases with higher levels of population density, reflected by the high endemicity observed in communities living in poverty, with associated crowded housing conditions, and by outbreaks in residential facilities, prisons, schools, and refugee camps. Patients with underlying immunodeficiencies, such as human immunodeficiency virus, human T-lymphotropic virus type 1 infection, or corticosteroid treatment, as well as those with neurological problems, are more likely to develop crusted skin [7, 8].

Scabies affects people from all countries, particularly; children in developing countries are most susceptible, with an average prevalence of 5–10% [6]. The highest incidence is in tropical climates, with rates of up to 25% overall and up to 50% in some communities in the South Pacific and northern Australia [5]. Poverty and overcrowding are the main risk factors, and outbreaks in institutions and refugee Shelters are common. Scabies causes intense itch, severely affecting sleep and quality of life [9].

Scabies is a major health problem in Africa specifically in the sub-Saharan region including Ethiopia [10, 11]. About 86% of the children in Sierra Leone displacement camps are affected by scabies which is high in countries with unstable conditions and civil war. Ethiopia is one of the sub-Saharan African countries where scabies is endemic. In Ethiopia, 6.2% of school-age children, 13.6% of under-five children, and 5.6% of orphan school children are affected by scabies [11, 12].

In Ethiopia, scabies is common, especially during natural or man-made disasters, such as flooding, drought, civil war and conflict, poor water supply and sanitation, and overcrowding living conditions. For example, according to public health emergency measures surveillance reports scabies is becoming beyond sporadic clinical cases, but turn to be a public health concern, affecting wider geographic areas and population groups, especially in drought-affected nutrition hotspot woredas [13]. As a global disease burden, Health Grove reported in 2013, the annual years of healthy life lost per 100,000 people from scabies has decreased by 30.1% since 1990, an average of 1.3 percent a year [14].

Multiple factors like overcrowding [15], poor public health education, overcrowded sleeping space, sharing of clothes, sharing of towels [16], improper personal hygiene practices [15, 17, 18], family size [19, 20], dementia [21], age below 15 years, homes affected by flooding [13] and traveling from non-endemic to scabies endemic areas [22], residing in rural areas, family history of scabies, educational status, household density, the existence of livestock or rodents at home, seasonal conditions, occupation, type of building for living, family history of itchy rash, poverty, low socioeconomic status and presence of head lice were identified as determinant factors in the previous studies from different parts of the world [19, 22].

Currently, Ethiopia is experiencing a scabies outbreak in drought-affected areas where there is a shortage of safe water for drinking and personal hygiene as a result of the direct impact of the drought [23]. In this regard, the Federal Ministry of Health (FMoH) in collaboration with partners is planning to respond and aims to rapidly stop community-level transmission of scabies outbreaks using a multi-sectoral intervention approach in affected and high-risk districts selected based on nutrition and scabies outbreak risk criteria [1]. In the last two years, scabies cases were continuously reported from the Gumbichu district to East Shoa Zonal Department, and still a major problem in the district. Currently, in April 2021 an increased number of a case report of scabies was reported to East Shewa Zonal Health Department from the Gumbichu District Health office. Hence, this study aimed to investigate the scabies outbreak and identify the risk factors of Scabies cases for the intervention of the outbreak.

2. Methods and Materials

2.1. Study Area

The study was conducted in Gumbichu, one of the districts of East Shewa Zone, Central Ethiopia. Administratively, the district has 33 kebeles / subdistricts (1 urban versus 32 rural). As projected from the 2007 Ethiopian Population Census, the 2020/21 population of the district is estimated to be 124,581 (61, 045 males, 63,536 women). Chefe Donsa town, the district capital, is located 90 km from Adama, the Zonal capital, and 62 km from Addis Ababa, the capital city of Ethiopia. The kebeles/subdistricts at which the investigation was conducted were Chefe Donsa, Goro Tigri, and Koka (Figure 1). Administratively, the district has 5 health centers and 35 health posts that provide primary health care services to the community.

2.2. Study Design and Period

We conducted a descriptive study followed by community-based unmatched case-control (1: 2 ratio) from July 1-20/2021 to identify potential risk factors of scabies and ways of transmission. Line-listed data analysis was performed.

2.3. Source of Population

All populations of the Gumbichu district were the source populations of this study.

2.4. Target Population

All populations in three kebeles of the Gumbichu district were the target populations of this study.

2.5. Study Population

All cases and selected controls in the three kebeles of the Gumbichu district were the study population.

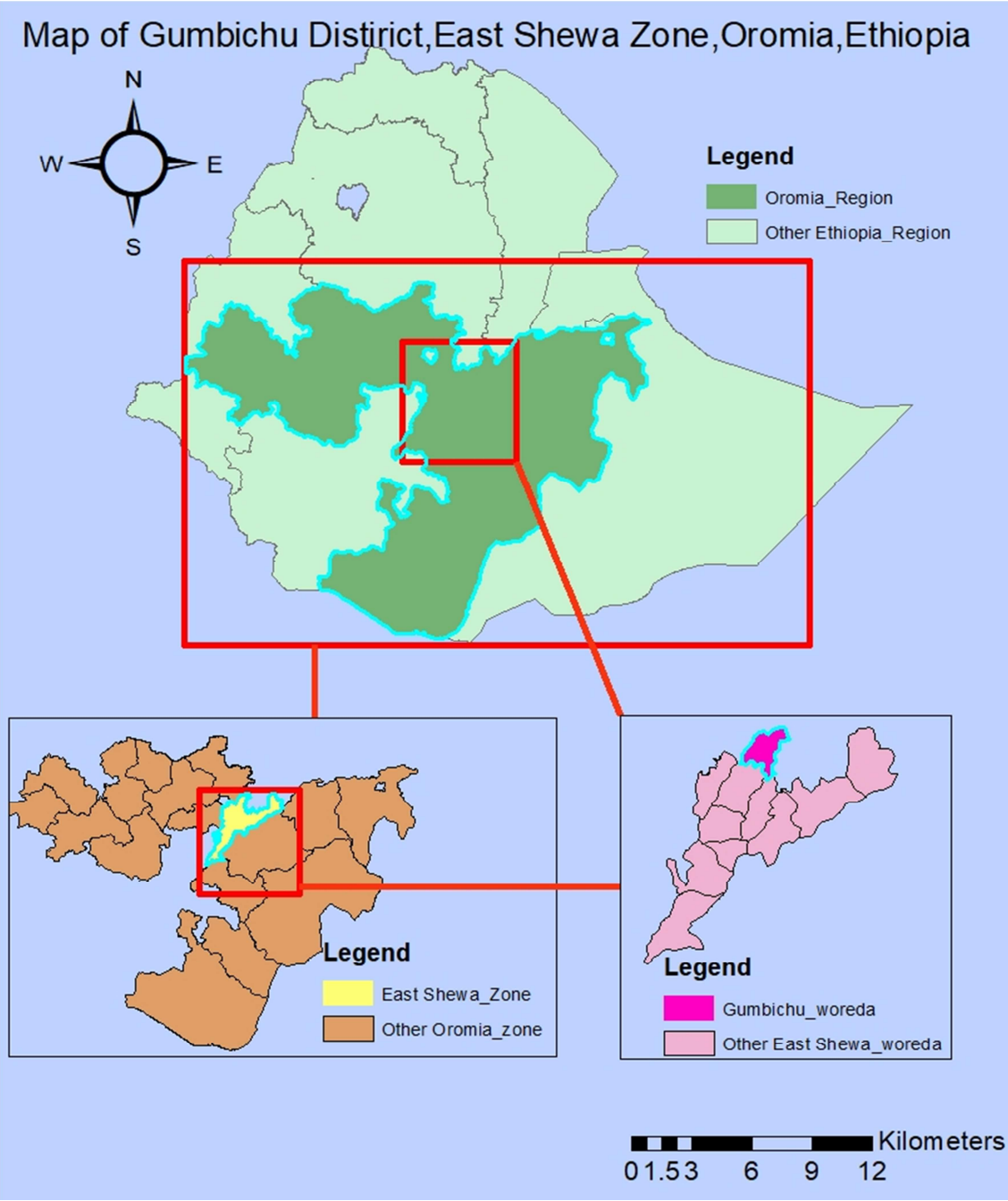

Figure 1. *Map of Gumbichu District, East Shewa Zone, Central Ethiopia, 2021.*

2.6. Sample Size Determination

The sample size of the study was calculated using Epi Info ™ 7 using the proportion of control exposed (26.56%) and the odds ratio of factors to scabies (AOR=3.87) from the previous studies [24]. Thus, the total sample size was 96 (32 Cases and 64 Controls). After a 10% non-response rate was considered and calculated, the final sample size was 105.

2.7. Sampling Technique and Procedure

The scabies cases were reported in April 2021 from Chafe Donsa, Goro Tigri, and Koka Daye kebeles in the Gumbichu district. So, the sample size was proportionally allocated to each kebele. The number of study participants was assigned to each kebele proportional to their average case size (Figure 2). To select the final study units and get the required sample,

we reviewed the scabies line list then using a simple random sampling technique case was selected and two controls for each case from neighbors who did not develop scabies during the period of the study were selected.

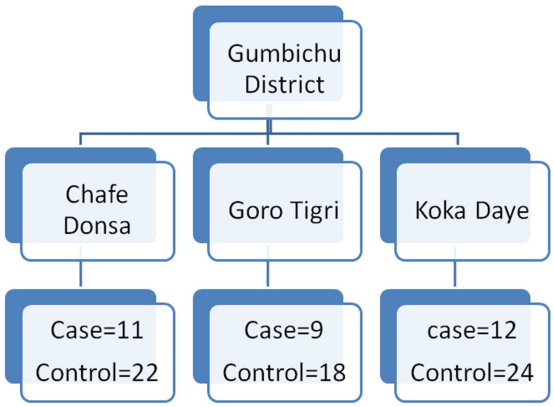

Figure 2. *Flow chart indicating the sampling procedure for a study conducted on Scabies Outbreak Investigation and Its Risk Factors in Gumbichu District, East Shewa Zone, 2021.*

2.8. Data Collection Procedures

We used a semi-structured questionnaire, which is tailored from different kinds of literature, to collect data including socio-demographic characteristics, clinical features for cases, and possible risk factors. The data were collected by two nurses through face-to-face interviews with cases and controls. The questionnaire was primarily prepared in English and then translated into the local language Afan Oromo and back-translated into English by another translator. Orientation was given to data collectors on the questionnaire. The collected data were checked for completeness and consistency before data entry. A line list of the cases was collected from the district health office for further analysis.

2.9. Data Quality Control

To assure the quality of data, data collectors were given orientation on questionnaires. Each questionnaire will be checked daily for completeness and consistency. Standard case definition was used to classify cases. The all-line list and completed questionnaires were checked for completeness and consistency before data entry into the computer.

2.10. Data Processing and Analysis

Data were described using frequency (percentage), median (range), and mean (standard deviation). Descriptive statistics were presented as tables and a figure. Association between socio-demographic and behavioral variables and the presence of scabies infestation was assessed at two stages – a bi-variable binary logistic regression where associations between individual independent associated factors and scabies (yes/no) were assessed. In the second stage, a multivariable binary logistic regression was used to build a model including all the variables with a P-value <0.25 from the bivariate analysis. Adjusted odds ratio (AOR) and 95% confidence intervals (CI) were generated to show the presence and strength of association between independent variables and scabies (yes/no). A P-value of <0.05 was considered statistically significant for the multivariate analysis. SPSS for Windows version 25 was used for data analysis.

2.11. Inclusion and Exclusion Criteria

2.11.1. Inclusion Criteria

Cases: Any resident of the Kebeles, Gumbichu District, with signs and symptoms (specifically itching and rash) of scabies, was selected for investigation during the investigation period.

Controls: Any resident of the community of Kebeles without any signs and symptoms of scabies was selected during the investigation period.

2.11.2. Exclusion Criteria

Cases: Those who refused to participate or non-residents of the selected kebeles were excluded.

Controls: Those who refused to participate as well as family members from the same household were excluded from the study (if there are two or more persons in a single household, only one person was randomly selected).

2.12. Standard Case Definition

Suspected Case: A person with signs and symptoms consistent with scabies was suspected. The characteristic symptoms of a scabies infection include superficial burrows, intense pruritus (itching) especially at night, a generalized rash, and secondary infection on the head, face, neck, armpit, elbow, wrist, palms, buttocks, and soles [1].

Confirmed Case: A person who has a skin scraping in which mites, mite eggs, or mite feces have been identified by a trained health care professional [1].

Contact: A person without signs and symptoms consistent with scabies who has had direct contact (particularly prolonged, direct, skin-to-skin contact) with a suspected or confirmed case in the two months preceding the onset of scabies signs and symptoms in the case [1].

2.13. Study Variables

Dependent Variable: Scabies infestation was a dependent variable.

Independent Variables: Socio-demographic (age, sex, occupation, marital status, religion, and family size), travel history, contact history, adequacy of water for personal hygiene, sharing clothes, Sleeping together on one bed, and overcrowding conditions were independent variables.

2.14. Data Dissemination

The study finding was prepared to share with SPHMMC/School of public health/ EFETP Coordinators and mentors, ORHB, East Shoa Zone Health Department, and Gimbichu district in both hard copy and electronic soft copy.

3. Results

3.1. Descriptive Epidemiology

From July 1–20, 2021 we identified a total of 1231 suspected scabies cases that line listed from three villages in the district. The overall prevalence of scabies was 1.6 and the attack rate (AR) in the three villages was 16 per 1000 populations with no scabies-related death (CFR = 0).

Out of 1231 total suspected scabies cases, 731 (59%) of them were males while 500 (41%) were females (Figure 2). The mean age was 14 years, ranging from 1 to 72 years. Children of 5–14 years of age were the most affected age group with an attack rate of 23/1000 population followed by the under 5 years age group which accounts for 21/1000 population (Table 1). The age-specific attack rate (ASAR) was highest among the age group of 5−14 (7/1000 population) with 17/1000 population in Koka Daye followed by Goro Tigri (7/1000 population) kebele (Table 2).

The index case of the outbreak was perceived on April 24, 2021, and the rumor was reported to the district health office on May 12, 2021. Then on May 16, 2021, the Gumbichu district health notified the situation to East Shewa Zone Health department. The investigation team was deployed to assess the situation and intervention was started. The burden of cases has been started to rise then after and reached pick on May 14, 2021, then decline gradually after intervention (Figure 3).

Table 1. *Scabies attack rate by age-group of affected kebeles, Gumbichu District, East Shewa Zone, Central Ethiopia, 2021.*

Age group	Age group population	Number of cases	Attack rate per 1,000
<5	12,308	255	21
5_14	24,617	561	23
≥15	40,002	415	10
Total	76,927	1231	16

Table 2. *Distribution of scabies cases by affected kebeles, Gumbichu District, East Shewa Zone, Central Ethiopia, 2021.*

Kebele	Total Population	<5		5_14		≥15	
		Cases	ASAR/1000	Cases	ASAR/1000	Cases	ASAR/1000
Chefe Donsa	43,166	55	2	190	5	180	4
Goro Tigri	20,434	70	3	140	7	160	8
Koka Daye	13,327	130	10	231	17	75	6
Total	76,927	255	4	561	8	415	5

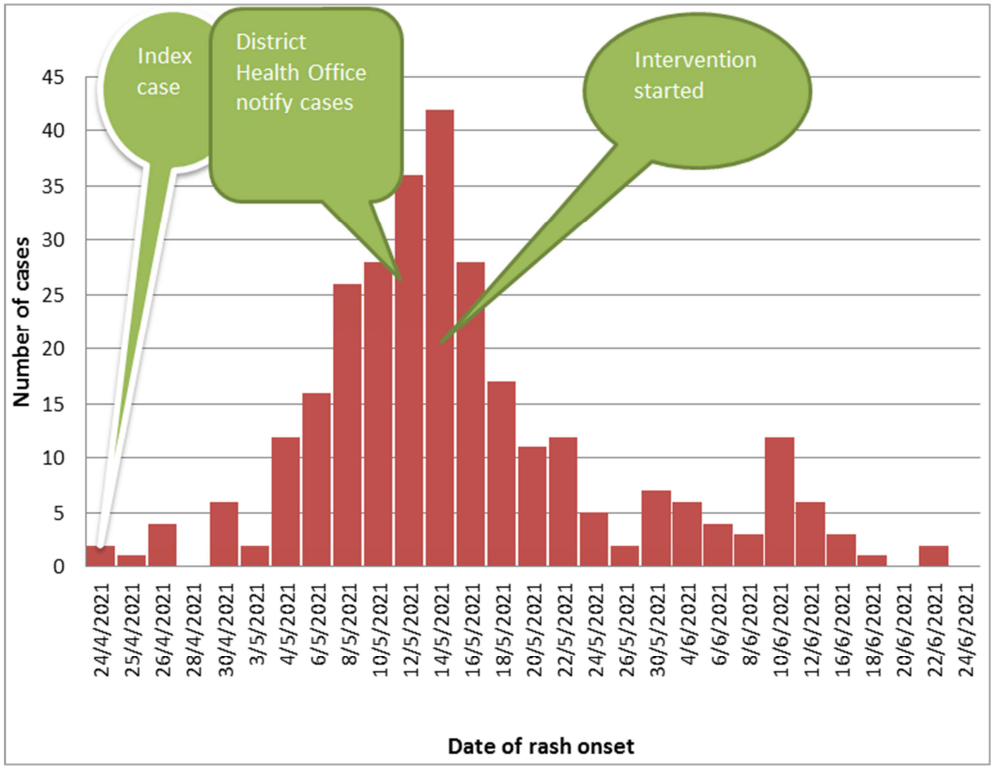

Figure 3. *Epidemic curve of scabies outbreak by date of onset, Gumbichu district, East Shewa Zone, Central Ethiopia, 2021.*

3.2. Case-Control Analysis

A total of 96 (32 cases and 64 controls) participants were randomly selected from the community to identify the risk factors for scabies outbreak in affected 3 kebeles with a case to control the ratio of 1: 2. Almost all cases had a history of

rash and itching, and 8 (25%) of them had a sign of secondary infection (figure 4). Among the total 32 interviewed cases, both males and females were equal in numbers (50%); and of 64 controls, 44 (69%) were males and 20 (31%) were females. The mean age of study subjects was 17.79 (3–52 years) years of age among cases, with, *p*. Value < 0.03 (Table 3).

Of the total cases, 16 (50%) of them did not visit a health facility to get treatment for an infestation. 44% of cases and 22% of controls had travel history within the past 2 months before the onset of symptoms. 30 (94%) of cases responded that they had a contact history with an active case of scabies. However, 52 (81%) of controls reported that they had no history of contact with scabies cases. Regarding the site of the rash on the body, 26 (81%) of cases had it on the Flexor wrist surface, 24 (75%) had it on the buttocks, followed by 21 (66%) of cases that had a rash on the Interdigital spaces, and the rest are stated in a table (Table 4).

Concerning risk factors, variables such as sex, age group in years, family members, traveling history to scabies epidemic area within the last 2 months, sleeping with scabies cases on one bed, Usage of soap for personal hygiene, Complaining of itching, Knowing about scabies, Share any clothes with Scabies case, Toilet Availability, and Frequency of shower were entered into a binary logistic regression model.

In bivariate analysis, family size ≥5, Contact history, sleeping with scabies patients on one bed Knowing about scabies, Sharing any clothes with Scabies case, Toilet Availability, and Frequency of showering once a month were significantly associated with scabies infestation (Table 5). All variables with a p-value less than 0.25 were entered into multivariable analysis to adjust for possible confounding.

After adjusting for possible confounding factors the result of multivariable logistic regression analysis showed that Contact history, family size ≥5, sleeping with scabies patients on one bed Sharing any clothes with Scabies case, Toilet Availability, and Frequency of showering once a month were found to be the final independent variables significantly associated with a scabies infestation. Accordingly, the odds of developing scabies infestation was 11.44 among persons who have a contact history with scabies cases compared to those who have no history of contact with scabies cases with [AOR (95%) = 11.44 (1.72-76.22)].

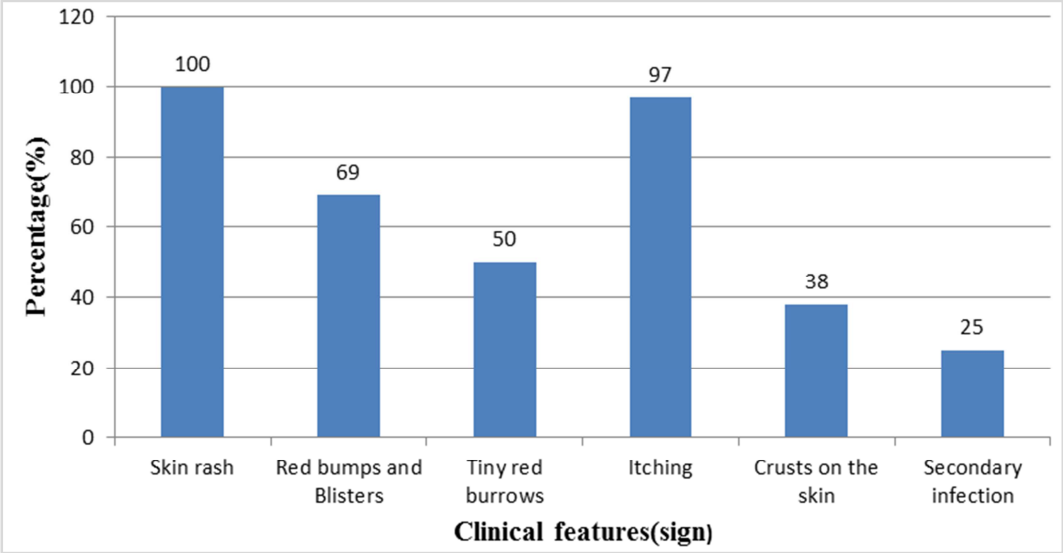

Figure 4. *Percentage of cases with clinical features of scabies, Gumbichu District, East Shewa Zone, Central Ethiopia, 2021.*

Table 3. *Socio-demographic characteristics of the cases and controls, Gumbichu District, East Shewa Zone, Central Ethiopia, 2021.*

Variables		Case, n (%)	Control, n (%)	Total, n (%)	P-Value
Sex	female	16 (50)	20 (31)	36 (38)	0.074
	male	16 (50)	44 (69)	60 (62)	
Age group in years	< 5	6 (19)	2 (3)	8 (8)	0.03
	5-14	14 (44)	30 (47)	44 (46)	
	≥ 15	12 (37)	32 (50)	44 (46)	
Family size	<5	14 (44)	40 (37)	54 (56)	0.555
	≥5	18 (56)	24 (63)	42 (44)	
Ethnicity	Amhara	2 (6)	4 (6)	6 (6)	0.129
	Oromo	28 (88)	60 (94)	88 (92)	
	Other	2 (6)	0 (0)	2 (2)	
Religion	Muslim	0 (0)	6 (9)	6 (6)	0.063
	Orthodox	20 (62)	36 (56)	56 (58)	
	Other	0 (0)	6 (9)	6 (6)	
	Protestant	12 (38)	16 (26)	28 (30)	
Occupation	Employed	0 (0)	2 (3)	2 (2)	0.301

Variables		Case, n (%)	Control, n (%)	Total, n (%)	P-Value
	Farmer	10 (31)	16 (25)	26 (27)	
	merchant	6 (19)	16 (25)	22 (23)	
	other	4 (13)	2 (3)	6 (7)	
	student	12 (37)	28 (44)	40 (41)	
Educational status	college/university	0 (0)	2 (3)	2 (2)	0.043
	illiterate	6 (19)	14 (22)	20 (21)	
	primary	12 ((38)	36 (56)	48 (50)	
	read and write only	8 (25)	10 (16)	18 (19)	
	secondary	6 (18)	2 (3)	8 (8)	
Marital Status	divorced	2 (6)	0 (0)	2 (2)	0.054
	married	18 (56)	26 (41)	44 (46)	
	single	12 (38)	36 (56)	48 (50)	
	widowed	0 (0)	2 (3)	2 (2)	

Table 4. *Site of the rash on the body of investigated cases, Gumbichu District, East Shewa Zone, Central Ethiopia, 2021.*

Site of Rash	Number of cases (= 32)	Percentage (%)
Flexor wrist surface	26	81
Interdigital spaces	21	66
Abdomen	12	38
Anterior axillary	14	44
Buttocks	24	75
Elbow	8	25
Ankles	18	56

Table 5. *Determinant factors of a scabies outbreak among participants in Gumbichu district, Central Ethiopia, 2021.*

Variables		Cases	Controls	COR (95%CI)	AOR (95%CI)	Adjusted P-value
Knows about scabies	Yes	18	42	0.21 (0.06-0.69)	0.37 (0.08-1.66)	0.194
	No	14	22	1	1	
Contact history	Yes	30	12	40.58 (7.93-207.65)	11.44 (1.72-76.22)	0.007**
	No	2	52	1	1	
Travel history	Yes	14	14	2.84 (0.78-10.38)	4.31 (0.85-21.80)	0.077
	No	18	50	1	1	
sleeping with scabies patients on one bed	Yes	30	12	9.53 (3.59-25.30)	10.52 (3.75-29.53)	<0.001**
	No	2	52	1	1	
Share any clothes with a Scabies case	Yes	28	10	18.90 (4.27-83.77)	14.31 (3.04-67.35)	0.001**
	No	4	54	1	1	
family size	≥5	18	24	4.02 (1.48-10.92)	8.63 (2.42-30.84)	0.001**
	<5	14	40	1	1	
Usage of soap for personal hygiene	Yes	28	10	0.21 (0.08-0.57)	0.20 (0.03-1.21)	0.081
	No	4	54	1	1	
Toilet Availability	Yes	18	54	0.19 (0.07-0.54)	0.10 (0.03-0.39)	.001**
	No	14	8	1	1	
Frequency of shower	1/month	6	16	4.99 (1.32-18.93)	6.51 (1.26-33.54)	0.025**
	2/week	14	34	3.65 (0.64-20.99)	5.10 (0.39-66.53)	0.214
	2/week	12	14	1	1	

There is also an association between sleeping with scabies patients on one bed and scabies infestation. Thus, the odds of acquiring scabies were about 10.52 times among persons sleeping with scabies patients on one bed than their counterparts [AOR (95% CI) = 10.52 (3.75-29.53)].

Those who Shared any clothes with the Scabies case were 14.31 times more likely to develop scabies [AOR (95% CI) = 14.31 (3.04-67.35)] compared to those who do not share any clothes with the Scabies case.

Additionally, Households whose family members ≥5 were 8.63 times more likely to develop scabies [AOR (95% CI) = 8.63 (2.42-30.84)] compared to those whose family members were <5. Those who have toilets are 10% less likely to develop scabies [AOR (95% CI) = 0.10 (0.03-0.39)] compared to those who have no toilets (table 5). Finally, those who take showers per month were 6.51 times more likely to develop scabies [AOR (95% CI) = 6.51 (1.26-33.54)] compared to those who take showers per week.

3.3. Public Health Actions and Responses

Treatment of cases including close contact with Systemic or oral scabicide in the form of tablets Ivermectin was given for > 2 years of age or 15 kg, adults except for pregnant women and lactating mothers to prevent the spread of scabies and re-infestation and Sulfur (5%-10%) ointment was given for children under 2 years, pregnant mothers and breastfeeding women. Drugs were supplied from the Chafe Donsa district health office. Risk factors were identified and successfully addressed to control the outbreak through church community involvement, and health information dissemination. Besides, personal hygiene week was declared and performed during an outbreak investigation period.

Finally, the number of cases declines after the treatment.

The other interventions were taken awareness creation on all contacts should be treated at the same time even if asymptomatic. Clothing, bedding, and linens used by an infected individual during the seven days before and during treatment should be washed or cleaned and dried sun, or putting clothes in a plastic bag for two days and above is also effective in letting the mite die. Routine cleaning of the house and health education on prevention is important to avoid reinfection.

4. Discussion

During the investigation period, we identified 1231 suspected scabies cases line lists from three kebeles, and 96 people were randomly selected from the community as case controls (32 cases and 64 controls) from three kebeles/subdistricts. The overall attack rate was 16 per 1000 population. This result is lower than the finding of the study conducted in the Sinana district which was reported to be 143 per 1000 population and almost similar to a study conducted in the Kechabira district with an overall attack rate was 20 per 1000 population [19, 24]. The lower attack rate observed in our study may be attributable to the fact that our study was community-based, resulting in a high denominator, whereas a study performed in the Sinana district was institution-based (school).

In this study, 44% of cases were detected in children aged 5 to 14, and children under the age of 15 are more likely to contract scabies than those over the age of 15. Our findings are similar to those of studies conducted in Fiji and Cameroon, both of which show that school-aged children are frequently affected [9, 25]. Children in primary school were the most affected population, and most of them had a sign of secondary infection attributable to scabies. This might be because younger children, particularly those in school, are more susceptible to scabies infestations because school environments can raise the risk of cross-infestation and increase the number of contacts that can be passed on to family members.

The sites of rash flexor wrists (81%), buttocks (75%), and interdigital spaces (66%) were the main sites in the current study. This is nearly similar to the study conducted at boarding schools in Cameroon and the study conducted in the Kechabira district with the interdigital spaces and flexor wrists being the common sites affected by scabies [25]. This might be true as these parts of the body might be softer than the other body parties which are favorable fomites.

According to this study, Contact history and sharing clothes with scabies cases were statistically significant in acquiring scabies infestation. This finding is in line with studies conducted elsewhere [19, 26]. This could be due to the contagious nature of scabies through direct and indirect contact with active cases.

There are statistically significant associations between family sizes and scabies infestation that the odds of acquiring scabies are higher in those having more than five family members. This finding is consistent with the study done in the Solomon Islands indicating households with six to ten persons per household were 1.4 times more likely to acquire scabies compared to those households having less than 5 family members [27]. In addition, this result is also supported by other similar studies conducted in the west of Iran which revealed that scabies had been directly associated with family size [28]. This might be due to overcrowding among larger families compared to smaller ones, which increases sharing of clothes, beds, etc.

In contrast, Travel history was frequently reported as a determinant factor in scabies infection in previous studies [24, 26, 29], but in this research, it was found to be non-significant. Although it is not statistically significant, it is a predisposing factor to acquiring scabies infection since the travel history has a direct impact on access to water sources, food insecurity, poor personal and environmental hygiene, poor nutrition, and higher exposure to scabies cases due to movements for getting family income in the form of daily laborers, servants, and guards.

Even though the study has strengths, it has some limitations that might have little impact on the quality of study findings and discussion. Hence, the cases were selected from the line list at the district level, but unknown cases were present in the community which might have an impact on the identification of potential factors. Also, the diagnosis was carried out only on a clinical basis, which may result in the misclassification of cases. In addition, due to the small sample size, some confidence intervals are wider, for assessing risk factors for scabies. Furthermore, as we employed a case-control study, the role of recall bias could not be ruled out.

5. Conclusions

The scabies outbreak occurred in the Gumbichu district, East Shewa zone, Ethiopia. The proportion of scabies was found to be higher among 5-14 children. Frequency of showers per month, sleeping with scabies cases on one bed, contact history, sharing clothes with scabies cases, and family size ≥5 were determinant factors of scabies infestation in the Gumbichu district.

Therefore, increasing awareness creation about the transmission, prevention, and control methods of scabies disease is recommended. The district health office and cluster health center and health post workers have to increase their active surveillance since scabies diseases affect more communities because of late detection and response to the outbreak. Providing risk factors-related health education on prevention and control especially is recommended, at schools and community levels.

As long as each scabies outbreak is unique and requires an individualized approach, we recommend maintaining social mobilizing at health facilities, schools, and any public gathering areas to alleviate the spread of scabies. However, sharing of cloth and the presence of scabies-infected individuals in the family were risk factors for scabies infection. Early detection and treatment of cases and not

sharing of clothes should be considered.

Abbreviations

AR: Attack Rate
ASAR: Age-Specific Attack Rate
CDC: Communicable Disease Control
CFR: Case Fatality Rate
EFETP: Ethiopian Field Epidemiology Training Program
EPHI: Ethiopian Public Health Institute
SPHMMC: St Paul's Hospital Millennium Medical College
WHO: World Health Organization

Author Contributions

All authors contributed to the design of the study. FB analyzed the data, prepared tables and figures, and drafted the manuscript. All authors contributed to the interpretation of data, reviewed the manuscript, and gave final approval.

Availability of Data and Materials

The data upon which the result is based could be accessed with a reasonable request. A preprint has previously been published on research square (Balcha F, 2022) [31].

Ethics Approval

The study protocol was approved by the Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College and a Letter of support was obtained from the ORHB and East Shewa Zonal Health Office and was submitted to the Gumbichu District Health Office. Informed verbal consent was also obtained from all the study participants or their parents in the case of children. For the sake of confidentiality, the names of participants were not recorded on the questionnaire.

Consent for Publication

Not applicable.

Competing Interests

All authors declared that they have no competing interests.

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