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Scabies among children in Ethiopia

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ABSTRACT

Scabies disease is a common and unacceptable disease among young children in developing countries including Ethiopia. This study assessed the prevalence and factors associated with scabies among 5-14 year old children in Boricha District, Sidama Zone, Southern Ethiopia. Multi-stage sampling was employed and children were examined for scabies followed by parent interviews. Descriptive statistic and multivariable analyses were used. Among 590 selected school age children, the prevalence of scabies was 98 (16.6%) [95% CI: 13.6-19.7]. No formal education status of mothers [3.20 , 95% CI (1.03-9.90)], poor household wealth index [3.14, 95% CI (1.10-8.91)], children age 10-14 years [1.84, 95% CI (1.02-3.323)], practice of sharing a bed with a person who had itching lesion [3.38, 95% CI (1.51-7.58)], skin contact with person who had itching lesion [11.67, 95% CI (5.07-26.9)], family member with itchy signs [12.7, 95% CI (5.3-30.6)], frequency of bath of once in more than every two weeks [3.52, 95% CI (1.46-8.74)] were significantly associated with the scabies disease. The prevalence of scabies in the study area was substantially high. Family socioeconomic characteristics and hygiene practice were associated with scabies. Prevention should be focused on economic empowerment and hygiene-related interventions.

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1. INTRODUCTION

The Scabies, caused by *Sarcoptes scabiei var hominis*, is a parasitic infestation. The parasite is a microscopic mite that burrows into the skin and lays larvae, inducing an immune response from the host that results in extreme itching and rash [1]. Transmission of scabies is person-to-person by skin contact with an infested individual [1], [2] and the probability transmission increases due to contact with individuals with crusted scabies [1]. The disease occurs worldwide [2] and the highest rates of infestation were reported from countries with hot, tropical climates and where an environment of overcrowding and poverty co-exist [1]. Schools, prisons and refugee camps are institutions where individuals are vulnerable for scabies disease [3], [4].

The infestation is estimated to affect more than 200 million globally and prevalence is estimated in the recent scabies-related literature range from 0.2% to 71.4% [1], [5]. It is also a common disease in African countries [6]. The prevalence of scabies was substantially higher in children than in adolescents and adults [4]. The prevalence varies from 2.9% in Nigeria, [7] 4% in Mali, [8] 4.4% in Egypt, [9] 17.8% in Cameroon [3] to 9.3-48.1% in Ethiopia [10]–[12]. Despite studies reporting high prevalence, scabies has never been accorded a priority in health programs including active screening in communities and in schools [13].

Moreover, scabies is considered a neglected tropical disease (NTDs) [6], [13] and as skin NTDs are often underreported [13], Ethiopia developed a master plan in 2013 [14] and 2016 [15] to address interventions for NTDs. The plan was implemented from 2013-2015 and 2015/16-2019/20, respectively, in all regions of Ethiopia. Unfortunetally, scabies was not included in the list of NTD-prioritized diseases for intervention in the country [14], [15]. In addition, as scabies is also a common contagious parasitic skin disease [16], prevalent skin disease among school children [11], [17]–[20] and attack rate is high among age 5-14 years than other age (0-4 and >15) [11], [21]. Studies among the most affected age group is scant in the country. Therefore, this study aimed to assesses the prevalence and its associated factors of scabies among 5–14 year old children, in Boricha District, Sidama Zone, Ethiopia.

2. RESEARCH METHOD

2.1. Study setting and period

The study was conducted in the Boricha District, Southern Ethiopia, which is 306 km away from Addis Ababa, the capital of Ethiopia. According to the District Health office report, the estimated population in 2018 was 332,791. Among these 106,493 (32%) of the population were 5-14 years-old children [22]. The district had 42 *kebeles* (lowest administrative units). The district's climate was characterized as 87% hot climate and 13% medium climate. The health service coverage of the district was 85%. According to 2017 District`s Water and Energy office report, about two-thirds (65%) of households obtain their drinking water from an improved source [23]. A community-based cross-sectional study design was employed from January 20 to February 5, 2019.

2.2. The study population

All 5-14 year-old children in the Boricha district were the source population and all 5-14 year-old children in selected district kebeles were included in the study population. Children ages 5-14 years who were severely ill from other diseases at the time of study were excluded.

2.3. Sample size and sampling procedure

A sample size of 604 children was determined by using the single population proportion formula with the assumptions of 52.1% proportion of scabies, [24] 5% margin of error, 95% confidence level, 1.5 design effect, and 5% added for nonresponses. Multi-stage sampling was used to select the representative study participants. The first stage was a lottery method to select eight kebeles among 42 *kebeles* in the district. According to previous existing census data, there were a total of 19,044 eligible children in the selected kebeles [22]. The sample population for each *kebele* was allocated proportional to the size. No sampling frame was set to select the study subjects. Therefore, a modified method of cluster sampling recommended by the Expanded Program on Immunization of the World Health Organization was used in the second stage [25]. In this stage, household selection was undertaken randomly with the assumption to providing all the households having at least one child of 5-14 years old a fair chance of being selected. The data collectors utilized a centrally located landmark (such as a church, mosque and school) and then the walking direction was selected randomly with spinning a pen pointing the direction to walk (North, South, East, West or nearest of any direction). All households in the selected direction (from the landmark to the Kebele boundary) were considered as a cluster. If there were more than one eligible child in the same household, one was selected with a lottery method. Similar activities were done until the required sample size was obtained from a *kebele*.

2.4. Scabies diagnostic approach and operational definitions

Case definition and skin examination were the basis of a symptomatic description used by other scabies studies [7], [10], [24], [26]. Signs and symptoms included the presence of itching, linear burrows, visible lesions on at least two sites of the body (around the finger webs, wrists, upper and lower limbs, genitalia in boys, breast areolae in girls and belt area) at the time of data collection.

2.5. Data collection tool and procedure

A pre-tested and structured questionnaire was used to collect information from each child's parent and an observation checklist was used to collect physical examination data. The interview questionnaire and observation checklist were developed based on published literature and previous studies of similar setting studies [3], [7], [10], [24], [26]–[28]. The data collection was conducted during the academic break when the school pupils were in homes. The selected children were examined for scabies and simultaneously their mothers were interviewed. Physical examination was conducted by experienced nursing professionals based on an examination checklist.

Scabies status was considered as the dependent variable. The independent variables were socio-demographic factors, home environment and personal hygiene practices. Household wealth index was used to assess the economic status of the household. It was scored based on the number and types of materials or household assets like the presence of beds with cotton or sponge, radio or television, animal drawn cart to motorcycle, and other assets including owning livestock to farm land, stored raw consumable food like grain, cereals, and coffee, in quantities equal to or greater than a quintal.

The quality of data was ensured in various ways. The tools were developed in the English language and latter translated to "Sidamu Affoo" (local language of Sidama zone). The questionnaire was translated back to English by language experts to ensure the consistency. Eight diploma registered nurses for data collection and two bachelor degree health officers for supervision were selected based on ability to communicate in the local language and clinical work experience. They were trained for two days on the purpose of the study, the tools, interviewing techniques, discipline or approach to the interviewees and confidentiality of the respondents. The tools were pre-tested on 5% of the total sample size outside the study area's selected kebeles with active involvement of the data collectors and supervisors. Based on the pre-test results, minor modifications on the data collection approach were planned and the tools were slightly modified and finalized for data collection. Data collection was employed into two important approaches: Individual interview from mothers or care givers with a verbal response and physical examination of children body for scabies diseases.

2.6. Data processing and analysis

The collected data were error checked and coded before entered in to the computer database. Then data was entered using a data entry template created on Epi info version 7 software. Next, the data were exported to the statistical package for the social sciences software (SPSS) version 20 for further cleaning and analysis. Frequencies and cross tabulations were used to summarize the data. Crude and adjusted odds ratios from bivariate and multivariate analyses were used to measure the association between variables. In the present study, there were many independent variables from the interview, hence variables with a p-value below 0.25 with the outcome variable in the bivariate analysis were entered into the multivariable logistic regression model to reduce the confounder effect [29]–[31]. The required assumptions of the logistic regression were checked with Hosmer and Lemeshow fit test statistics. Odds ratio (OR) with 95% confidence interval (CI) at p-value<0.05 was used to declare the presence and the strength of association in the multivariable analysis.

2.7. Ethics approval and consent to participate

An ethical approval and clearance were obtained from the institutional review board (IRB) of the College of Medicine and Health Science, Hawassa University. A formal letter about the study was sent from the College to the District leaders. The objective of the study was explained for *kebele* leaders and parents. Informed written consent was obtained from every participant's parent or guardians and assent was obtained for children before collecting the data. The right of each respondent to refuse or answer for limited or all questions was respected. Omitting names of the study subjects from the questionnaire, re-plastering face of children on image were methods used to assure confidentiality of the information.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Socio-demographic characteristics of study population

A total of 590 households with at least one child 5-14 years old were identified from the selected clusters. All mothers in the 590 households were interviewed and 590 children (97.7% of sample size) were examined for scabies diseases. Out of the total children, 335 (56.8%) were male and more than half (52%) of the children were in the 10-14 years age group. One hundred twenty (20.5%) of children were from households in the lowest wealth index as shown in Table 1.

3.1.2. Home environment

Out of all participated children, 427 (72.4%) share a bed with other people in the household and 483 (81.9%) share the same room with animals. The majority, 545 (92.4%) of the respondents, live in houses with floors made from mud as presented in Table 2.

Table 1. Socio-demographic characteristics of respondent

Variable n=590	Frequency (%)
Sex of children	
Male	335 (56.8)
Female	255 (43.2)
Age category	
5-9	283 (48.0)
10-14	307 (52.0)
Mother's education	
No formal education	304 (51.5)
Primary education	216 (36.6)
Secondary education and above	70 (11.9)
Father's education	
No formal education	329 (55.8)
Primary education (1-8)	233 (39.5)
Secondary education (9-12) and above	28 (4.7)
Mother's Occupation	
Housewife	488 (82.7)
Farmer	77 (13.1)
Merchant/Employed/Other	25 (4.2)
Father's Occupation	
Farmer	460 (78)
Merchant	113 (19.2)
Employed/Other	17 (2.8)
Household family size	
≤5	252 (42.7)
>5	338 (57.3)
Household wealth Index	
Lowest	121 (20.5)
Second	116 (19.7)
Middle	117 (19.8)
Fourth	118 (20.0)
Highest	118 (0.0)

Table 2. Home environment factors of respondent

Variable	Frequency (%)
Average water utilization in Liter per capita per day	
>5	420 (71.2)
≤5	170 (28.8)
Share same room with animals	
Yes	483 (81.9)
No	107 (18.1)
Number of rooms in house	
One	19(3.2)
Two	117 (19.8)
Three and above	454 (77.0)
House roof made from	
Grasses	516 (87.5)
Corrugated iron sheet	74 (12.5)
House floor made from	
Mud	545 (92.4)
Other material	45 (7.6)
House walls made from	
Wood and mud	569 (96.4)
Brick/stone	21(3.6)

3.1.3. Personal hygiene of respondents

More than three fourths, 476 (80.7%) of respondents had no history of skin contact with a person who had itching skin lesion. Regarding bathing habits, more than half, 340 (57.6%), of respondents wash their body once every two weeks and almost all 563 (95.4%) of respondents, use soap whenever they wash their body as shown in Table 3**.**

3.1.4. Prevalence of scabies

Of the 590 participating children, 98 (16.6%) [95% CI: 13.6%, 19.7%] were suffering with scabies. Almost all children diagnosed with scabies, 96 (98%), the rash and lesions were observed on their finger webs and wrists area. Among affected children, 57 (58.2%) were male and 60 (61.2%) were age 10-14 years.

Table 3. Personal hygiene practice of respondents

Variable	Frequency (%)
Skin contact with person who had itching lesion	
Yes	114 (19.3)
No	476 (80.7)
Child's travel history to an area where people have itching skin lesion	
Yes	72 (12.2)
No	518 (87.8)
Family member with itchy signs	
Yes	43 (7.3%)
No	547 (92.7%)
Sharing bed with person who had itching lesion	
Yes	427 (72.4)
No	163 (27.6)
Frequency of washing clothes	
Every week	437 (74.1)
Every two weeks	132 (22.4)
Once per more than two weeks	21 (3.6)
Frequency of bath	
Every week	162 (27.5)
Every two weeks	340 (57.6)
Once per more than two weeks	88 (14.9)
Using soap when washing body	
Yes	563 (95.4)
No	27 (4.6)
Sharing clothes with any another person	
Yes	119 (20.2)
No	471 (79.8)
Frequency of changing clothes	
Change once per every week	199 (33.7)
Change more than every week	39 (06.6)
No clothes to change	352(59.7)

3.1.5. Factors associated with scabies

Each variable was analyzed using bivariate logistic regression, and variables with a p-value of less than 0.25 were fitted to the multivariable logistic regression. Variables including sex of children, occupation of mother, house constructed materials and frequency of washing clothes were not fitted ($p<0.25$). In the multivariable analysis, mother's education, wealth index, child's age, sharing bed with those who had itching lesion, skin contact with person who had itching lesion, family member with itchy signs and frequency of bath were significantly associated with the scabies at $p<0.05$ as shown in Table 4 (See Appendix).

3.2. Discussion

Scabies is a neglected public health problem and very common among young children in many developing countries including Ethiopia. This study addressed the prevalence of scabies and associated factors among children of age 5-14 years in Boricha District, Sidama Zone, Sothern Ethiopia. The prevalence of scabies among 5-14 year-old children was 16.6% [95% CI: 13.6%, 19.7%] in the study area. This finding is consistence with a study focused on 5-15 year old school age children in Fiji with a prevalence of 18.5 % [17]. The current prevalence is higher than that reported in Nigeria (2.9%), [7] Egypt (4.4%) [9] and Mali (4%); [8] and lower than the rates in Fiji (52.1%) [24]. The explanation for such a difference might be due to the small sample size (206) in the Nigerian study and school age children. This means that in all studies except Fiji, 5-14 year-old children might not be well-represented. In addition, socio-economic differences in the study areas might be another explanation for the inconsistency. In the current study, about 40% of participants were from lower wealth index (poor households) and participants were the vulnerable age group to scabies. Evidence shows that scabies is common among resource poor communities [2], [31], [32] and 4-14 year old children [11], [21].

Selected socio-demographic like the child's maternal education, wealth of the household and age of children were significantly associated with scabies. Children's mothers, who had no formal education, had a risk for scabies more than three times that of mothers with secondary education and above. This finding is supported by a similar studies [9], [28]. Most children's mothers (82.7%) in the study area were housewives. Educated mothers might have better awareness of personal hygiene and give better care for their children. Also, household economic status was significantly associated with scabies. Children from households of second tier wealth indexes had more than three times the odds of scabies infection compared with highest wealth index. It is consistence with another study in Ethiopia [33]. It might be due to the fact that scabies is more common problem among low economic status household than high [1], [20], [28], [31]. Moreover, children ages 10-14 years had more risk of scabies that children age 5-9 years. This is consistence with other findings [21]. Evidence

shows that the prevalence of skin diseases are more common in older children than in younger children (<10 years) [34]. The possible explanation might be that a child age 10-14 years had more skin contact with others while spending much of their time playing outdoors with their friends than children ages 5-9 years.

In the present study, personal hygiene related factors include body bath frequency, personal contact with another person and sharing a bed were significant predictors of scabies infestation. Taking a bath only once in more than two weeks has a higher risk of developing scabies when compared to taking a bath more regularly. This was in line with studies in Ethiopia [12], [35], [36]. It might be due to the fact that scabies infection is linked with poor personal hygiene practice [33], [37]. Children who had a history of skin contact with people who had itching lesion are more than 11 times more likely to develop scabies compared to those without similar prior contact. This is consistence with other studies in Ethiopia [12], [35], [36]. In addition, children with a history of sharing a bed with people who had itching lesion had more than three time the odds of scabies infestation compared with those who do not share a bed with another person with scabies. Our study was in agreement with studies from Pakistan, Egypt and Ethiopia [3], [9], [11], [27]. In addition, children living with household members with scabies were twelve times more likely to develop scabies. This is consistent with studies among school children in Cameron, Egypt and Ethiopia [3], [9], [12]. The possible reason for these three findings might be due to that the parasite can easily transfer from one to another through close skin contact with an infested individual, [2] contact with personal items like a bed [2] and if there is any infested individual in the household who may serve as a source of scabies infection [26].

The uses of standard case definition for scabies, high participation rate, focusing on several household and housing-related factors in the communities were the strengths of this study. However, the examinations based on clinical observation in the absence of dermoscopy and/or skin scrapings/microscopy was a limitation.

4. CONCLUSION

Generally, the prevalence of scabies in the study area was substantially high. This study agrees well with the prevalence range of other global and Ethiopian scabies study findings. Socio-demographic factors like the child's mother's education, wealth of the household and age of children, hygiene-related factors including frequency of bathing and sharing bed with a person who had itching lesions, the presence of a family member who had a history of itchy skin rash, and skin contact with a person who had itching lesions were factors associated with scabies infestation among children 5-14 years old. Finally, we recommend to government and non-government organizations to focus on economic empowerment and hygiene-related intervention. Communities should recognize these risk factors, take them seriously and provide interventions.

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APPENDIX

Table 4. Multivariate analysis of individual factors associated with scabies diseases 5-14 year-old children in Boricha district, South Ethiopia, 2019 *(Continue)*

Variables (n=590)	Scabies disease		COR (95% CI)	AOR (95% CI)	p-value
	Yes	No			
Household family size					
≤5	36 (14.3%)	215 (85.7%)	1	1	
>5	277 (81.7%)	62 (18.3%)	1.34 (0.85-2.09)	0.79 (0.45-1.46)	
Mother's education					
No formal education	62 (20.4%)	242 (79.6%)	3.331(1.29, 8.62)*	3.20 (1.03-9.90)*	0.044
Primary education	31 (14.4%)	185 (85.5%)	2.178 (0.81, 5.84)	2.03 (0.63-6.56)	0.239
Secondary and above	5 (7.1%)	65 (92.9%)	1	1	
Father's education					
No formal education	61 (18.5%)	268 (81.5%)	2.96 (0.68-12.8)	2.77 (0.28-27.4)	0.383
Primary education	35 (15.0%)	198 (85.0%)	2.30 (0.52-10.1)	2.34 (0.24-22.4)	0.461
Secondary and above	2 (7.1%)	26 (92.9%)	1	1	
Father's occupation					
Farmer	80 (17.4%)	380 (82.6%)	1	1	
Merchant	17 (15.0%)	96 (85.0%)	0.84 (0.48-1.49)	1.22 (0.59-2.53)	0.600
Other	1 (5.9%)	16 (94.1%)	0.30 (0.04-2.27)	0.18 (0.01-2.44)	0.200
Wealth index					
Poorest	21 (17.4%)	100 (82.6%)	2.27 (1.02-5.05)*	1.86 (0.65-5.33)	0.252
Poor	27 (23.3%)	89 (76.7%)	3.28 (1.51-7.13)*	3.14 (1.10-8.91) *	0.032
Medium	16 (13.7%)	101 (86.3%)	1.71 (0.74-3.95)	1.68 (0.56-5.07)	0.359

Table 4. Multivariate analysis of individual factors associated with scabies diseases 5-14 year-old children in Boricha district, South Ethiopia, 2019 *(Continue)*

Variables (n=590)	Scabies disease		COR (95% CI)	AOR (95% CI)	p-value
	Yes	No			
Rich	24 (20.3%)	94 (79.7%)	2.76 (1.25-6.06)	2.62 (0.95-7.25)	0.064
Richest	10 (8.5%)	108 (91.5%)	1	1	
Children's age					
5-9	38 (13.4%)	245 (86.6%)	1	1	
10-14	60 (19.5%)	247 (80.5%)	1.57 (1.01-2.44) *	1.84 (1.02-3.32) *	0.043
Number of rooms in the house					
One	6 (31.6%)	13 (68.4%)	2.67 (0.98-7.26)	2.44 (0.53-11.3)	0.254
Two	25 (21.4%)	92 (78.6%)	1.57 (0.94-2.62)	0.89 (0.42-1.88)	0.767
Three and above	67 (14.8%)	387 (85.2%)	1	1	
Share same room with animals					
Yes	74 (15.3%)	409 (84.7%)	0.63 (0.37-1.05)	0.96 (0.47-1.99)	0.919
No	24 (22.4%)	83 (77.6%)	1		
Sharing bed with person who had itching lesion					
Yes	87 (20.4%)	340 (79.6%)	3.54 (1.84-6.81) *	3.38 (1.51-7.58) *	0.003
No	11 (6.7%)	152 (93.3%)	1	1	
Sharing clothes with others					
Yes	32 (26.9%)	87 (73.1%)	2.26 (1.39-3.65) *	0.83 (0.40-1.72)	0.617
No	66 (14.0%)	405 (86.0%)	1	1	
Skin contacts with person who had itching lesion					
Yes	58 (50.9%)	56 (49.1%)	11.3 (6.92-18.4) *	11.67(5.07-26.9) *	.001
No	40 (8.4%)	436 (91.6%)			
Children's travel history to an area where people have itching skin lesion					
Yes	35 (48.6%)	37 (51.4%)	6.83 (4.01-11.6) *	1.25 (0.51-3.05)	0.622
No	63 (12.2%)	455 (87.8%)	1	1	
Family member with itchy signs					
Yes	28 (65.1%)	15 (34.9%)	12.7 (6.47-24.9) *	12.7 (5.3-30.6) *	.001
No	70 (12.8%)	477 (87.2%)	1	1	
Frequency of bath					
Every week	20 (12.3%)	142 87.7%)	1	1	
Every two weeks	48 (14.1%)	292 (85.9%)	1.17 (0.67-2.04)*	1.79 (0.87-3.67)	.115
Once per more than two weeks	30 (34.1%)	58 (65.9%)	3.67 (1.93-6.99)*	3.52 (1.46-8.74)*	.005

** Significant at p-value<0.05*