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PREVALENCE OF SCABIES AMONG CHILDREN IN CHARITABLE CHILDREN'S INSTITUTIONS IN NAIROBI COUNTY

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ABSTRACT

Background: **Human scabies is a papular pruritic skin rash following infestation with the ectoparasite Sarcoptes scabiei. Primary mode of transmission is through skin-to-skin contact and it is therefore common in institutionalized individuals.**
Objectives: **The objective of this study was to determine the prevalence of scabies among children domiciled in charitable children's institutions (CCIs) within Nairobi County and evaluate the knowledge level of CCI managers about scabies.**
Methods: **A cross-sectional survey was conducted among children aged 6 months to 18 years in 10 CCIs from Langata and Dagoretti sub counties in Nairobi County using multi-stage random selection. Additionally, the knowledge of all 10 CCI managers regarding scabies was assessed using questionnaires.**
Results: **The prevalence of scabies was 6.4%. The prevalence was higher among males and in the age group of 6-12 years. Most CCI managers demonstrated good knowledge about scabies, with a significant association found between scabies and sleeping with a child exhibiting itchy skin.**
Conclusion: **The prevalence of scabies among children in the selected CCIs in Nairobi County was relatively low, and CCI managers exhibited good knowledge of scabies prevention and management. Recommendations include regular medical visits and education for CCI managers on scabies prevention and management, alongside the need for larger studies to ascertain the true extent of scabies in CCIs nationwide.**

INTRODUCTION

Scabies is an intensely pruritic skin infestation caused by the host-specific mite *Sarcoptes scabiei var hominis*. That is mainly spread through skin to skin contact with infected persons (1). It is a global public health problem with approximately 300 million cases reported annually.(2)Long and short term complications associated with scabies include sleep loss, poor academic performance, post-streptococcal glomerulonephritis, and stigmatization.

According to the WHO, data from 18 prevalence studies conducted between 1971 and 2001 reported a scabies prevalence ranging between 0.2% and 24%(3). Epidemics frequently occur in orphanages, nursing homes, hospitals, long-term care facilities, and other institutions throughout the world (4). There is a high prevalence of scabies in the charitable children institutions (CCIs) owing to close contact between children and overcrowding within these institutions.

It is estimated that there are 2.6 million orphaned and vulnerable children (OVCs) in Kenya today, most of whom live in children's homes. There is a knowledge gap about the local burden of scabies in these children, and the unique health needs of these children have not been captured within the Kenyan health sector strategic plan(5).

To address this gap, the study aimed to determine the prevalence of scabies within CCIs in Nairobi and the knowledge of CCI managers about scabies. It is anticipated that the findings will contribute to MOH and Child Welfare society activities geared towards creating awareness and preventive measures for scabies.

METHODS

Study design

This was a quantitative, cross-sectional study carried out in January and February 2021.

Study site

The study was in 10 randomly selected CCIs from Langata and Dagoretti subcounties in Nairobi County, Kenya.

Study population

These were the children between the ages of 6 months and 18 years living in selected CCIs within Nairobi County and their managers.

Inclusion criteria

Children living in the selected CCIs within Nairobi County aged between 6 months and 18 years.

Managers in the selected CCI who had served for at least 3 months.

Exclusion criteria

Children who declined assent and CCI managers that declined consent for participation.

Sampling method

The County of Nairobi is divided into 9 sub-counties. A multi-stage random sampling was used to identify 2 sub-counties for the study.

Within each sub-county 5 CCI's were randomly selected from the registered institutions.

These were 3 faith based (F), 4 private based (P), and 3 community-based.

2. Weighted sample sizes based on the number of children living in the different CCIs was then calculated to determine the number of children to be recruited from each CCI to ensure that the sample sizes were representative. Stratification for age groups was done. The flow chart below summarizes the sampling technique:

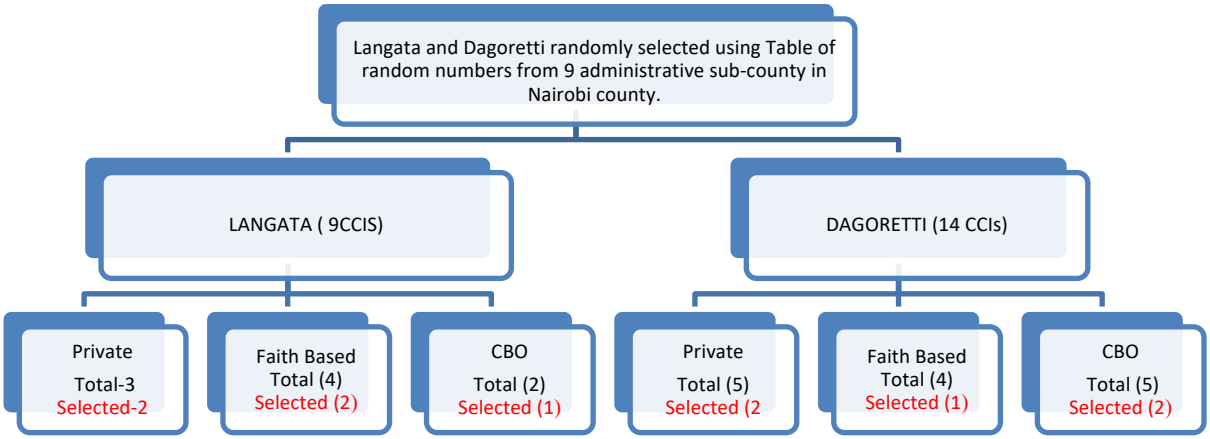

Figure 1: Flowchart showing the multistage random sampling method

Case Definition of scabies: An adapted Summary of International Alliance for the Control of Scabies (IACS) criteria

The 2018 IACS Criteria for the Diagnosis of Scabies is a case definition adopted from the research, mapping projects and surveillance after control interventions(6) and was used to make a diagnosis of scabies(7). (Table 1)

Table 1

Case definition of scabies; Adapted from IACS criteria

Level	**Criteria**
Clinical scabies	At least one of the following: Scabies burrows Typical lesions affecting male genitalia Typical lesions in a typical distribution and two history features
History features	Itching Close contact with an individual who has itching or typical lesions in a typical distribution

Study procedure

All the children who met the eligibility criteria were asked questions in person using a standardized questionnaire with the help of caretakers when needed and were examined by the principal investigator who was a qualified doctor.

The 10 CCI managers were issued with a questionnaire that assessed their knowledge about scabies. The questionnaire included

questions on etiology of scabies, clinical presentation, diagnosis, management, prevention and complications of scabies.

Quantitative data

Quantitative data was checked daily for completeness and coded for entry. Data was entered into Microsoft excel database and transferred to SPSS version 23. Descriptive summary statistics of baseline child and facility characteristics were analyzed and presented as means or medians for continuous variables and frequencies for categorical variables. The percentage of children with scabies in the CCIs was calculated and presented as a percentage with the corresponding 95% confidence interval. Graphical displays using tables, pie charts, histograms, and bar graphs was utilized.

The difference in outcome (prevalence of scabies) by different age categories, sex, and sharing beds was assessed using multivariate analysis. Associations were tested using Chi-square and correspondent P values. A p-value of <0.05 was used to define statistically significant associations.

Ethical considerations

Ethical approval was sought from the Kenyatta National Hospital-University of Nairobi Ethics Research Committee (KNH-UoN ERC) Protocol number P146/03/2020 and permission was obtained from the national commission for science, technology, and innovation (NACOTSI), the county health in charge, county commissioner, county children officer, National Council of Children Services (NCCS) and the respective institution administration.

RESULTS

Facilities Demographics

Three (3) were supported by faith-based organizations, 3 were under community-based organizations and 4 were privately owned. Half of the CCIs had less than 50 children, and 3(30%) had between 50-99 children. Although all the CCIs reported that children bathed daily, there was sharing of beds. Only 5(50%) homes washed clothes daily. Only 1(10%) had healthcare workers (4 nurses) working within the institution. (Table 3)

Table 2

Characteristics of selected CCIs

Characteristic	Category	Frequency, N=10	Percentage (%)
Sponsor	FBO	3	30
	CBO	3	30
	Private	4	40
Number of children per CCI	< 50	5	50
	50-99	3	30
	100-199	1	10
	200-249	1	10
Living conditions	Sharing of beds	10	100
	washing clothes Daily	5	50
	Use of bleach/warm water	6	60
	Washing clothes together	4	40
	Bathing daily	10	100
Health services	Nurse	1	10

CCI - charitable children's institutions

FBO – Faith-based Organization

CBO – Christian-based Organization

Distribution of Children within Selected CCIs

There was a total of 727 children in the 10 facilities and 711 (males-418 and females-293) were aged between 6 months and 18 years. The CCI, with the largest number of children, had 216 children while the one with the least number had 24. We enrolled a total of 280 children into our study using proportionate sampling technique (Table 4).

Table 3

Distribution of children per selected CCIs

CCI ID number	Total no of Children per CCI	Number of children aged 6months-18 years	Males Frequency (%)	Females Frequency (%)	Number & Proportionate contribution of children by the CCI into the study n (%) n=280
001	24	24	0(0)	24(100)	10(3.5%)
002	28	28	15(53.6)	13(46.4)	11(3.9%)
003	44	44	26(59.1)	18(40.9)	17(6.1%)
004	57	48	33(68.8.9)	15(31.2)	25(8.9%)
005	48	47	22(46.8)	25(53.2)	19(6.7%)
006	216	216	152(70.4)	64(29.6)	85(30.3%)
007	42	36	3(8.3)	33(91.7)	16(5.7%)
008	98	98	52(53.1)	46(46.9)	38(13.6%)
009	120	120	85(70.8)	35(29.2)	40(3.9%)
010	50	50	30(60)	20(40)	19 (6.7%)
TOTAL	727	711	418	293	280(100%)

Demographic and clinical characteristics of children enrolled into the study

The mean age of the enrolled children was 10.2 years (SD 4.6). Under 5-year-old participants were 17.6%, 48.2% were aged between 6-12 years and 33.9% were older than 12 years. The majority were males at 51.1%. Overall, 28 (10%) of the participants were children living with HIV(CWHIV) as shown in Table 4 below. Of the 280 children 273 (97.4%) did not have any other chronic condition while 4 (1.4%) reported having a diagnosis of asthma, and 1 each (0.4%) had epilepsy, cerebral palsy, and malnutrition respectively. Overall, 76 (27.1%) children shared a bed with another child and this included 24 (8.6%) who were sharing with a child who had an itchy skin rash. There were 95 (33.9%) children who reported sharing clothes with other children.

Table 4

Demographic & clinical characteristics of children enrolled into the study

Characteristic	**Category**	**Frequency N=280 Proportion (%)**
Mean age	10.2 years	SD-4.6
Age (Years)	≤ 5 6-12 >12	50 (17.6) 135 (48.2) 95 (33.9)
Gender	Male Female	143(51.1) 137(48.9)
HIV status	Positive Negative	28(10) 152(90)
Underlying medical conditions	Asthma Epilepsy Cerebral palsy Malnutrition No chronic illness	4(1.4) 1(0.4) 1(0.4) 1(0.4) 273(97.4)
Sleeps with Child with itchy skin	Yes No	24(8.6) 256(91.4)
Share clothes	Yes No	95(33.9) 185(66.1)
Sleep alone	Yes NO	204(72.9) 76(27.1)

Prevalence of scabies

A total of 18 of the 280 study participants were found to have clinical features consistent with scabies infestation. The prevalence of scabies therefore was 6.4% (95% CI, 4.1-9.9%). Another 22 (7.9%) had fungal skin infections and 6 (2.1%) had other skin conditions. Scabies was the commonest skin condition affecting the study population.

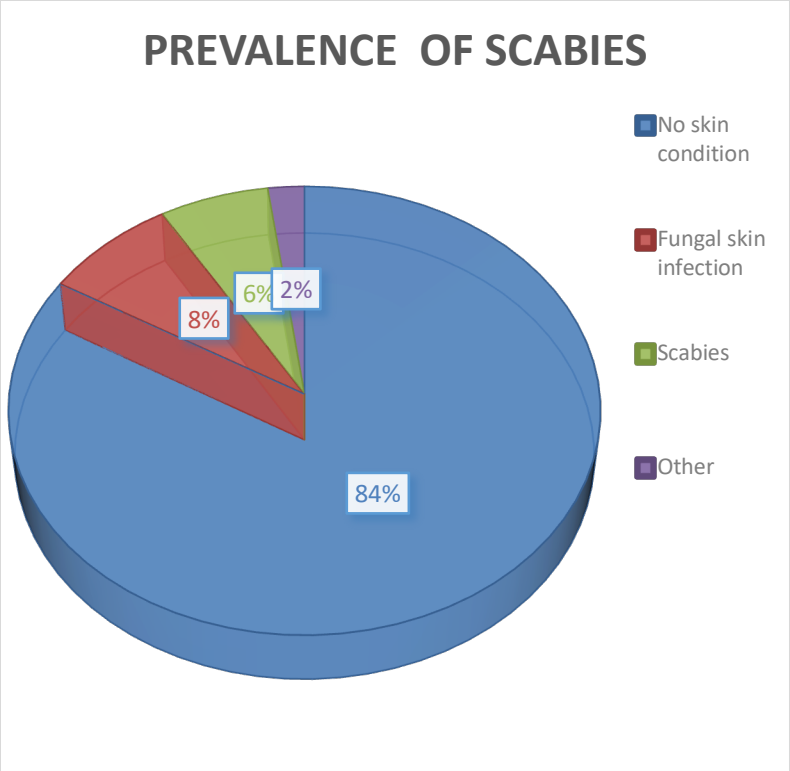

Figure 2: Prevalence of scabies

Distribution of scabies by age and sex

The majority of the children with scabies were aged 6-12 years at 72%, while those aged below 5 years and those older than 12 years were 17% and 11% respectively. (Table 4)

Male participants who had scabies were 67% whereas the females were 33%. (Table 6)

Distribution of scabies by CCI

There were 3 CCIs where no case of scabies was found. Two (2) CCIs had 4 cases each, two CCIs had 3 cases each, one had 2 cases and 2 CCIs had 1 case each. None of the children with scabies had HIV or any other underlying medical condition.

Location and types of scabies lesions

Locations where scabies lesions were frequently noted were elbows, 72.2%, webbed spaces of fingers, 66.7% and thighs and knees, 44.4%. Other locations seen less frequently included ankle and feet, scrotum, scalp, axilla, flexor surfaces of the wrist and abdomen. All the children (100%) had scratch marks and/or burrows. Erythematous papules were seen in 38.8% of the children with scabies while scabies nodules were documented at 22.2%.

Table 5

Location and types of scabies lesions

Location of the scabies lesion	
Body part	Frequency n=18 Percentage
Scalp	2(11.1)
Axilla	2(11.1)
Elbows	13(72.2)
Flexor surfaces of the wrist	1(5.5)
Webbed spaces of the fingers	12(66.7)
Abdomen	1(5.5)
Scrotum	2(11.1)
Thigh and knees	8(44.4)
Ankle and feet	3(16.7)
Type of scabies lesion	
Lesion	Frequency n=18 Percentage
Scratch marks or burrows	18(100)
Erythematous papules	7(38.8)
Scabies nodules	4(22.2)

Factors associated with Scabies

In the univariate analysis of associated factors, children aged 6-12 years were 5 and 3 times more likely to contract scabies compared to those aged above12 years (OR 5.0,95%CI 1.1-22.5, p=0.038) and those aged < 5 years (OR 3.0 95% CI 0.5 – 18.4, p=0.242). A child who was sharing a bed with another with an itchy skin was 9.2 times more likely to contract scabies compared to one who did not (OR, 9.2 95%CI, 3.2-26.7, p=0.001). However, in the multivariate analysis, although males were 3.6 times more likely to be affected compared to females the association was not statistically significant (OR, 3.6, 95%CI 1.0 – 13.3, p=0.051). Sharing a bed with an itchy child was the only factor noted to be significantly associated (AOR 8.1, 95% CI, 2.5-26.5, p=0.001). Sharing of beds and clothes were not associated with scabies (Table 6)

Table 6

Factors associated with Scabies: Univariate analysis

		Scabies					
	n	Yes, *n (%)*	No, *n (%)*	OR (95% CI)	p-value	Adjusted OR	P
Age in years							
≤5	50	3 (16.7)	47 (17.9)	3.0 (0.5 – 18.4)	0.242	1.8 (0.2 – 13.7)	0.562
6 – 12	135	13 (72.2)	122 (46.6)	5.0 (1.1 – 22.5)	0.038	4.5 (0.9 - 23.7)	0.075
>12	95	2 (11.1)	93 (35.5)	Reference		Reference	
Gender							
Male	143	12 (66.7)	131 (50.0)	2.0 (0.7 – 5.5)	0.178		
Female	137	6 (33.3)	131 (50.0)	Reference			

Sharing of beds							
Yes	204	11 (61.1)	193 (73.7)	0.6 (0.2 – 1.5)	0.252		
No	76	7 (38.9)	69 (26.3)	Reference			
Sleep with itchy person							
Yes	24	7 (38.9)	17 (6.5)	9.2 (3.2 – 26.7)	0.001	8.1 (2.5 – 26.5)	<0.001
No	256	11 (61.1)	245 (93.5)	Reference			
Sharing clothes							
Yes	95	9 (50.0)	86 (32.8)	2.0 (0.8 – 5.3)	0.143		
No	185	9 (50.0)	176 (67.2)	Reference			

Knowledge of CCI managers about scabies

In this study, 9(90.0%) of the CCI managers had good knowledge about scabies with a score of >75% while 1(10.0%) had fair knowledge with a score of 66.7%. The manager with the lowest knowledge scored 66.7% and the most knowledgeable scored 100%.

Scores of CCI managers' knowledge of different aspects on scabies

Six out of ten CCI managers gave the right response to questions on risk factors for infection and on the need for isolation of scabies patients. Only 7 of the 10 respondents correctly answered on modes of transmission of scabies. Eight out of 10 CCI managers correctly responded on typical distribution in the body, associated complications, and early identification of scabies. Nine out of ten correctly answered questions on definition of scabies, association of scabies with poor hygiene, use of topical treatment and washing clothes of an affected child. Finally, all the managers knew signs and symptoms of scabies and that the sharing of clothes spread the illness.

Table 7

Scores of CCI managers different knowledge aspects on scabies

Knowledge aspect		Correct response Frequency (%), N=12
Definition of scabies		9 (90)
Signs and symptoms		10 (100)
Commonly affected areas in the body		8 (80)
Transmission	Who can get the disease	6 (60)
	Modes of transmission	7 (70)
	Sharing clothes, bedding	10 (100)
Association with poor hygiene		9 (90)
Associated complications		8 (80)
Appropriate treatment	Isolation of affected children	6 (60)
	Use of topical permethrin	9 (90)
Prevention	Washing clothes of affected child	9 (90)

	Identifying scabies early	8 (80)

DISCUSSION

Epidemiological data about scabies infestation in vulnerable children provide valuable information about its prevalence, risk factors and suggest a basis for methods of prevention and therapy. In this study 18 (6.4%) children within the CCIs had scabies which is much lower prevalence compared to studies done in a welfare home in Malaysia (8) (31%), and orphanages in Thailand (9) (87.3%) and Bangladesh (62%). (10) The reason for this may be that previous studies were done in one institution during outbreaks. However, our study findings were comparable to those from studies done in school environments in Malaysia (8.1%) (11)

Egypt (4.4%) (12), Nigeria (13) (10.5%), Mali (4%) and Malawi (8.7%) (14). The prevalence was also lower than that reported in low-income communities, where prevalence has been documented at up to 24%, likely due to poor hygiene, overcrowding, and limited access to water, while in the CCIs all children had a bath daily(3).

Studies have associated several epidemiological factors with the distribution of scabies infestation in populations, including age, gender, sharing beds, sleeping with a person with itchy skin, overcrowding and poverty. Scabies is most commonly observed in the very young, particularly school-aged children, followed by older children and young adults, as demonstrated in a recent population-based survey in Timor-Leste (15). In situations where scabies is endemic, this age factor most likely reflects low immunity as well as increased exposure(16). In our study, children aged 6-12 years reported the highest prevalence at 72%, while those aged below 5 years and those older than 12 years was 17% and 11% respectively. Children aged 6-12 years were 5 times more likely to contract scabies than those more than 12 years old, a statistically significant finding. (OR,95%CI 5.0, 1.1-22.5, p=0.038). Muhammad et al also reported that age between 6-12 years, male gender, sharing clothes, intimate close contact and crowded living conditions were highly associated with scabies. (8).

In the present study, although the children who were enrolled into the study were almost of equal numbers for gender (Males-51.1% and females-48.9%), 67% of the children with scabies were males and the females were 33% .The male predominance was in agreement with the results of other studies in a Malaysian orphanage, Cameroonian secondary schools and Brazil (8,17,18). However, Hegab et al reported similar infection rates across gender(12).

In our study, 3 out of the 10 CCIs selected did not have any case of scabies. All the 3 were located in Langata subcounty, a leafy suburb in the city where the middle-class live. They all had better infrastructure compared to the others and were funded from abroad. One had a fully functional clinic with four nurses and a pediatric consultant who reviewed the children every two weeks. The CCI with the highest scabies cases had 4. The distribution of scabies in different CCI was statistically insignificant. None of the children with scabies had HIV or any other underlying medical condition.

In our present study, sharing a bed with another child with an itchy skin was an indepedent predictor of scabies (AOR, 95% CI, 8.1, 2.5-26.5, p=0.001). Karim et al demonstrated that children who slept on the floor with other children contracted more severe infection and became re-infected in greater proportions. This facilitates skin-to-skin contact hence the higher

prevalence(19).On the other hand, Hay et al reported that clothing and blankets are not vital in the transmission of scabies, and that there is no conclusive evidence to suggest that washing of clothing and blankets is necessary for the prevention of scabies spread. Hay et al demonstrated that the mite is an obligate parasite and is highly susceptible to dehydration when off the host (1).Pruritus as an independent factor was also noted in a study in Cameroun Boarding schools (17).

In this study, 9(90.0%) of the CCI managers had good knowledge about scabies while 1(10.0%) had fair knowledge. Although, all the managers knew the signs and symptoms of scabies and the role of sharing clothes in the spread of the illness, only 6 out of 10 CCI managers gave the right response to questions on risk factors for infection and on the need for isolation of scabies patients. The knowledge of managers in our study was comparable to that reported in studies done in Saudi Arabia (20) and Guinea Bissau (21) (85.8% and 96% respectively). In another study, a lower level of knowledge was noted among college students in the United States (38%)(22). This could be due to the fact that scabies is a rare condition in the developed countries including the US due to higher economic status and hygiene status. Ejigu et al in a case-controlled study concluded that poor knowledge about scabies and parental illiteracy predicted occurrence of scabies infestation(23). Feldmeier et al also reported that illiteracy, low income, poor housing and sharing clothes and towels with other family members were all significant risk factors for the presence of scabies(18)

small sample size was used in this study. The study was time constrained and was limited to CCIs within Nairobi and therefore cannot be generalized to the rest of the country.

CONCLUSION

In conclusion, the findings of the study confirm that scabies is still an important health problem affecting children in the CCIs. The prevalence of scabies among children in the selected CCIs within Nairobi County was low. CCI managers had good knowledge on prevention and management of scabies. The study also revealed significant association between scabies and sleeping with a child with itchy skin.

Recommendations include regular medical visits and education for CCI managers on scabies prevention and management, alongside the need for larger studies to ascertain the true extent of scabies in CCIs nationwide.

CRediT Statement on the contribution of each author to the manuscript:

A H Mohamed: study concept, study design, data collection and analysis.

A H Mohamed, B Admani, FMurila, B Mutai: Oversight and manuscript writing.

Conflict of Interest (COI) Statement for each author: none.

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