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Scabies-Related Factors in Children Aged 0 - 15 Years in a Southern Benin Municipality, 2023

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Abstract

Introduction: Scabies is a neglected tropical disease with little attention from the international community. This study aimed to investigate the associated factors of scabies within Lalo municipality in Benin in 2023. **Methods:** This was a case-control study. The sampling size, calculated using OPEN EPI software, was 226 children. Cases were selected exhaustively, and matched to controls by age and village, on a 1:1 basis, using two-stage random sampling. Data were collected from mothers or babysitters by means of a questionnaire. McNemar's Chi 2 test was used to compare cases and controls. Factors associated with scabies were identified using conditional logistic regression. **Results:** Overall, 122 cases and 122 controls with a mean age of 5.02 ± 3.01 years were involved in the study. Shared bunks (ORa [95% CI] = 6.32 [1.30; 30.82]), household size (ORa [95% CI] = 2.76 [1.05; 7.29]), scabies awareness (ORa [95% CI] = 3.27 [1.68; 6.38]) and personal hygiene (ORa [95% CI] = 3.08 [1.02; 9.25]) were associated with the occurrence of scabies in Lolo's municipality, Benin, in 2023. **Conclusion:** The identified associated factors show that scabies are indeed linked to poverty, but also to behavioral factors that could be changed through communication.

Keywords

Scabies, Associated Factors, Children

1. Introduction

Neglected Tropical Diseases (NTDs) are among the many communicable diseases prevalent in low- and middle-income countries. According to the World

Health Organization (WHO), NTDs are long-standing, poverty-related diseases burdening more than a billion of the world's most vulnerable and marginalized populations, mainly in tropical and subtropical zones [1]. Scabies is one of these NTDs. It is a cutaneous infection caused by a microscopic mite called Sarcoptes scabies variety hominis and transmitted by direct contact [1]. Scabies are largely neglected in research programs. Its epidemiology, diagnosis and control strategies have received little investment [2]. Scabies is a major public health issue, due to its high prevalence and the fact that it affects vulnerable populations. Currently, there are an estimated 300 million cases of scabies worldwide every year. Scabies are more prevalent in low- and middle-income countries, and in the lower socio-economic strata of high-income countries. Although it occurs worldwide, the highest prevalence is recorded in tropical and subtropical regions, affecting at least 100 million people at any one time. In Africa, scabiosis infestation prevalences of 4.4% (Egypt), 10.5% (Nigeria), 4% (Mali), 0.7% (Malawi), 8.3% (Kenya) had been reported [3]. A study carried out in Cameroon in 2015 revealed that the overall prevalence of scabiosis in boarding schools was 17.8% [4]. In Parakou (Benin), a study carried out in prisons reported a prevalence of 59.57% [5].

According to the literature, scabies affect all age groups, regardless of gender, but the risk is higher in children, the elderly, the immunocompromised and people living in overcrowded conditions and poverty [6].

With a view to reducing scabies prevalence, interventions are proposed. In 2017, on the recommendation of the Strategic and Technical Advisory Group of the WHO's NTDs Control Department, scabies was recognized as an NTD. The International Alliance for the Control of Scabies (IACS) was also created to minimize scabies-induced complications such as glomerulonephritis and rheumatic fever [2]. In Benin, as part of the fight against scabies, ivermectin, one of the scabies treatments, is supplied free of charge to health facilities for case management. Despite all these efforts, scabies in children remain a reality. The number of cases continues to rise and there is very little literature on scabies in Benin. In 2022, in the municipality of Lalo, Benin, 381 cases of scabies were recorded in children aged 0 to 15. But what are the factors associated with scabies in children? The present study was initiated to identify these factors, which are poorly documented in Benin. The results of this study will contribute to the development of appropriate control strategies.

2. Materials and Methods

2.1. Study Framework

The study was undertaken in four of Lalo's 11 most populated boroughs. Covering an area of 432 km² with an estimated population of 150,543 in 2022, the municipality owns 11 health centers, one of them located within Lalo's central district and run by a chief medical officer.

2.2. Study Type

This was a case-control study from March 27 to April 10, 2023.

2.3. Participants

Cases were made up of all 0 - 15-year-old children resident in one of the four most populous boroughs of Lalo municipality (Adoukandji, Gnizounmé, Hlassamé and Lokogba), diagnosed with scabies at the 2022 consultations fair and listed in the database set up by the National Leprosy and Burili Ulcer Control Program.

Controls were children aged 0 to 15 who lived in the same boroughs but had not been diagnosed with scabies.

Cases and controls whose parents were unavailable or did not consent to the study were not included.

2.4. Sampling

The sample size was calculated using OPEN EPI software. Considering the source of water supply as the main exposure, appreciated in our study through personal hygiene. According to the 2017-2018 Demographic and Health Survey, 29% of the population of Benin does not have access to drinking water [7].

Considering the two-sided confidence level (1-alpha) of 95%, the power (percentage chance of detection) at 70%, the ratio of controls to cases: 1/1 = 1, the percentage of exposed controls at 29%, the extreme minimum odds ratio to detect at 2), according to the Kelsey method, the sample size for cases and controls was 113, *i.e.*, a total estimated size of 226 children to be surveyed.

However, in the database for the four target boroughs, there were 122 cases of scabies, all of which we included in our study. This brought our sample size to 244 children, *i.e.*, 122 cases and 122 controls.

Cases were selected exhaustively; from the database of consultations carried out in 2022, all cases of scabies from the four boroughs were involved in the study.

A control was selected in the same locality for each case identified.

Initially, the database was used to list cases by age and village.

In each village providing cases, the same number of controls were selected by two-stage random sampling. In the first stage, the first house in the village to be visited was selected. For this purpose, a pen was tossed from the center of the village, and the houses in the direction of the pen tip were numbered. From the list of these numbered houses, the first house to be visited is selected by simple random choice. Once this first house had been chosen, the other houses were visited, one after the other, until the required number of witnesses for the village was reached.

If a house had several children of the required age, only one was selected by simple random choice (second degree).

2.5. Variables

Variables studied were household-related factors (age of child's guardian, ethnicity, marital status, education level, average income, household size), child-related factors (age, gender, school level, personal hygiene, bed-sharing, matting, sheets, clothes exchange, towels, sponges) and health system-related factors (access to

health care and scabies awareness activities).

Average income, defined as the money the holder earns per day, was determined by a composite indicator of the economic well-being of the household to which he/she belongs. This variable had two modalities: "Less than 1123FCFA" and "Greater than or equal to 1123FCFA".

2.6. Data Collection

Data were collected through a questionnaire administered to the children's parents.

2.7. Data Analysis

Data were analyzed using Stata 11 software, in a descriptive and an analytical phase.

In the descriptive phase, central tendency and dispersion parameters were used to describe the sample. McNemar's Chi^2 test was used to compare the characteristics of cases and controls.

In the analytical phase, factors associated with scabies in children were identified by bivariate and multivariate analysis. Bivariate analysis using simple conditional logistic regression was used to determine the association between dependent and independent variables, using crude odds ratios (ORs) and their 95% confidence intervals [95% CIs]. Cross-tabulations between independent variables were also performed to highlight interactions. In multivariate analysis, based on multiple conditional logistic regression, variables with a p-value of less than 20% in the bivariate analysis were introduced into the initial model, with stepwise top-down elimination, at the 5% significance level. The reference modalities were those presenting the lowest risk.

2.8. Ethical Concerns

This study was conducted in compliance with ethical and deontological aspects. Approval was obtained from health officials and administrative authorities of the municipality before data collection began. The free and informed consent of parents was obtained before the questionnaire was administered.

Data collection, processing and presentation were carried out with respect to the anonymity of the respondents and the confidentiality of the information obtained.

3. Results

3.1. Sample Description

The characteristics of the 244 participants, including 122 cases and 122 controls, are presented in Table 1 below.

3.2. Identification of Scabies-Associated Factor in Children through Univariate Analysis

In the bivariate analysis, the factors associated with scabies in children are summarized in Table 2.

Table 1. Characteristics of scabies cases and controls in four boroughs of Lalo, Benin 2023 (cases = 122 controls = 122).

Variables	Cases n (%)	Controls n (%)	p
Sex			
Female	58 (47.54)	71 (58.20)	
Male	64 (52.46)	51 (41.80)	0.502
Age			
0 to 9 years	113 (92.62)	113 (92.62)	0.000
>9 years	9 (7.38)	9 (7.38)	
Education level			
Out of school/Kindergarten	83 (68.03)	84 (68.85)	0.000
Primary/Secondary	39 (31.97)	38 (31.15)	
Personal hygiene			
<2 showers/d	29 (23.77)	9 (7.38)	0.000
≥2 showers/d	93 (76.23)	113 (92.62)	
Clothes/sponge/towel exchange			
Yes	107 (87.70)	77 (63.11)	0.000
No	15 (12.30)	45 (36.89)	
Bed sharing /matting/sheets			
Yes	119 (97.54)	96 (78.69)	0.000
No	3 (2.46)	26 (21.31)	

Table 2. Factors associated with scabies in children aged 0-15, bivariate analysis, Lalo in 2023 (cases = 122, controls = 122).

Variables	Cases	Controls	OR raw	CI 95%	p
	Children-related factors				
Sexe					
Male	64	51	1.5	[0.91 - 2.46]	0.109
Female	58	71	1		
Personal hygiene					
<2 showers/day	29	9	4.33	[1.78 - 10.52]	0.001
≥2 showers/day	93	113	1		
Exchange of clothes/towels/sponges					
Yes	107	77	4	[2.00 - 7.99]	0.000
No	15	45	1		
Bedding sharing					
Yes	119	96	12.5	[2.96 - 52.77]	0.001

Continued

No	3	26	1		
Household-related factors					
Household size					
>5	103	86	3.12	[1.40 - 6.92]	0.005
1 to 5	19	36	1		
Daily income					
<1123 FCFA	95	84	1.55	[0.88 - 2.71]	0.127
≥1123 FCFA	27	38	1		
Health system-related factors					
Scabies awareness					
No	62	37	2.56	[1.43 - 4.56]	0.001
Yes	60	85	1		

The table shows that five variables were associated with scabies in the univariate analysis. These were personal hygiene, exchange of clothes/towels/sponges, sharing of bunks, household size and scabies awareness.

3.3. Multivariate Analysis

The final model, presented in Table 3 below, shows that the joint action of bunk sharing, household size, personal hygiene and scabies awareness were likely to lead to scabies in children aged 0 - 15 in the four boroughs of Lalo municipality in 2023.

Table 3. Factors associated with scabies in children aged 0 to 15, multivariate analysis, Lalo, 2023 (cases = 122, controls = 122).

Variables	OR ajusted	IC 95%	p
Bedding sharing			
Yes	6.32	[1.30 - 30.82]	0.022
No	1		
Household size			
>5	2.76	[1.05 - 7.29]	0.040
1 to 5	1		
Scabies awareness			
No	3.27	[1.58 - 6.38]	0.000
Yes	1		
Personal hygiene			
<2 showers/day	3.08	[1.02 - 9.25]	0.045
≥2 showers/day	1		

4. Discussion

4.1. Quality and Validity of Results

The scabies cases in the present study were drawn from the database, made up of cases confirmed during outpatient consultations carried out by a multidisciplinary team; this is a strength of the study. However, information bias could have marred the study. These could be linked to a lack of memorization, on the one hand, and to the double translation of questions and answers, on the other. These biases were minimized by triangulating the questions and recruiting interviewers who understood the local language and their training, with an emphasis on translating the questions.

Barring these biases inherent in studies based on declarative data, we believe that the results of the present study are valid, reliable and can serve as a basis for interventions to reduce the prevalence of scabies in the studied municipality.

4.2. Bedding Sharing

In this study, sharing bedding was associated with scabies in children, as in the studies by d'Almeida in 2021, Azene *et al.* 2020, Badeso *et al.* in 2019, and Hailu *et al.* 2019 in Ethiopia [8] [9] [10] [11]. These findings can be explained by the fact that scabies is a contagious disease whose pathogen, the mite, is transmitted from infected to healthy people through direct or indirect body contact, via toilet and bed linen and utensils.

4.3. Household Size

A household size of more than five people was associated with scabies in children. This result is consistent with those of d'Almeida in 2021, Azene *et al.* in 2020, Reta *et al.* in 2019, Ejigu *et al.* in 2018, and Wochebo *et al.* in 2017 [8] [9] [12] [13] [14]. The main explanation is that the large size of the household favors promiscuity and therefore the transmission of scabies through direct contact on the one hand, and indirect contact through the sharing of clothing and bedding on the other.

4.4. Personal Hygiene

Personal hygiene is a primary means of prevention against scabies contamination through direct or indirect contact. Our results concur with those of Agbessi *et al.* in their study on the prevalence and factors associated with scabies in prisons in Parakou, Benin, in 2019 [5]. Kouotou *et al.* also found the same association in their study of the prevalence and determinants of human scabies in schools in Cameroon [4].

4.5. Scabies Awareness

Lack of awareness was a risk factor statistically associated with scabies in the boroughs of Gnizoumne, Adoukandji, Hlassame and Lokogba within Lolo's municipality in Benin in 2023. Almeida *et al.* in 2021 and Ejigu *et al.* in 2018 in Ethiopia also reported that lack of information about scabies influenced its oc-

currence [8] [11]. Lack of appropriate information about scabies can lead to unfavorable practices such as poor personal hygiene, sharing bedding or clothing with others.

5. Conclusion

Scabies is a major health concern that requires precise, real-time responses. Communication must be initiated to bring about behavioral change in order to act on the modifiable factors identified in this study. It would be interesting to extend the same study to the other boroughs of Lalo municipality.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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