INFECT DIS TROP MED 2024; 10: E1543

Sexually transmitted scabies in resource-limited settings: a facility-based cross-sectional study

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ABSTRACT:

Objective: Recent surges in scabies incidence in some countries have been attributed to increased transmission through sexual contact. Few data are available on the burden of sexually transmitted scabies in Sub-Saharan Africa. We aim to determine the incidence and sociodemographic variables associated with sexually transmitted scabies in Ile-Ife, Nigeria.

Patients and Methods: Three thousand three hundred nineteen medical records from a dermatology and genitourinary clinic in Ile-Ife, Nigeria, covering new patients treated between 2017-2023, were reviewed. Statistical tests were performed to determine the incidence of genital scabies, associated sociodemographic characteristics, and the relationship between sexually transmitted scabies and traditional non-HIV sexually transmitted infections (STIs). The level of statistical significance was set at $p<0.05$.

Results: Sexually acquired scabies were the third most frequent STI, constituting 25.84% (54/209) of all STI consultations and 18.18% (54/297) of newly confirmed scabies cases. It was diagnosed nearly exclusively in males (92.59%, $p<0.001$, OR: 12.025, 95% CI: 4.141-34.919) within the 20-29 age group ($p<0.001$). Sociodemographic and behavioral characteristics associated with genital scabies aligned with traditional STI risk factors ($p>0.05$). 61.1% of genital scabies cases exhibited concurrent STIs, notably anogenital warts (46.3%). Multiple STI diagnoses were four times more prevalent in scabies patients ($p<0.001$, OR: 4.369, 95% CI: 2.274-8.397). Regression analysis highlighted male sex, lower education, and socioeconomic status as pivotal factors for genital scabies. Additionally, male sex and a genital scabies diagnosis were predictive of multiple comorbid STIs.

Conclusions: Sexual transmission of scabies is common among young adult males and has a significant association with other STIs not fully preventable by condoms. There is a need for public health programs to raise awareness of non-condom preventable STIs among sexually active young adults.

Keywords: *Genital scabies, Sexually transmitted infections, Young adults, Incidence, Sarcoptes scabiei, Sexual behaviors, Social determinants of health.*

List of Abbreviations: *aOR: adjusted Odds Ratio; CI: Confidence Interval; HIV: Human Immunodeficiency Virus; IACS: International Alliance for the Control of Scabies; OR: Odds Ratio; STIs: Sexually Transmitted Infections.*

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INTRODUCTION

Sexually transmitted infections and infestations (STIs) have historically posed significant challenges to human health. Despite advancements in medical science and the discovery of effective antimicrobials, these diseases continue to impact public health, especially in low-middle-income countries where they cause high morbidity, mortality, and disability[1-3]. Although much research focuses on viral and bacterial STIs, the significance of sexually transmissible parasitic diseases remains vastly under-explored[4].

Scabies, caused by an obligate human parasite – *Sarcoptes scabiei var. hominis* – is a highly contagious disease that recently emerged on the list of important but neglected tropical diseases. It is transmitted through close contact, including sexual contact with infected individuals[5-7]. Recent increases in scabies incidence in some European countries have been linked to sexual transmission among adolescents and young adults, raising significant public health concerns[8,9]. Unlike conventional STIs, sexual transmission of scabies is not prevented by condom use and can spread during asymptomatic periods of up to eight weeks, complicating contact tracing[8,10]. Additionally, the potential for scabies to influence the transmission of other STIs, including HIV, remains uncertain[11,12].

Given its status as a neglected tropical disease and rising prevalence in many populations[8,10], this study focuses on the sexual transmission of scabies in Sub-Saharan Africa. Conducted at a semi-urban healthcare facility in southwest Nigeria, the research investigates the incidence and sociodemographic factors associated with sexually transmitted scabies (genital scabies) and examines its relationship with other STIs. The study aims to enhance the understanding of genital scabies and to inform public health strategies to address its increasing burden.

PATIENTS AND METHODS

We conducted a facility-based cross-sectional study. The records of patients who presented to the dermatology and genitourinary medicine outpatient clinics of the Obafemi Awolowo University Teaching Hospitals complex between March 2017 and April 2023 were reviewed to identify new cases of scabies and sexually transmitted infections. Using a data proforma, we extracted relevant clinical information such as age, sex, sexual behaviors, clinical diagnosis, and treatment outcomes of eligible cases. Figure 1 depicts the process of medical record review, selection, and categorization of eligible cases.

Diagnosis of Scabies

Scabies were diagnosed by blending the 2020 International Alliance for the Control of Scabies (IACS) criteria for the diagnosis of scabies with documented clinical response to standard scabies treatment[13]. Pa-

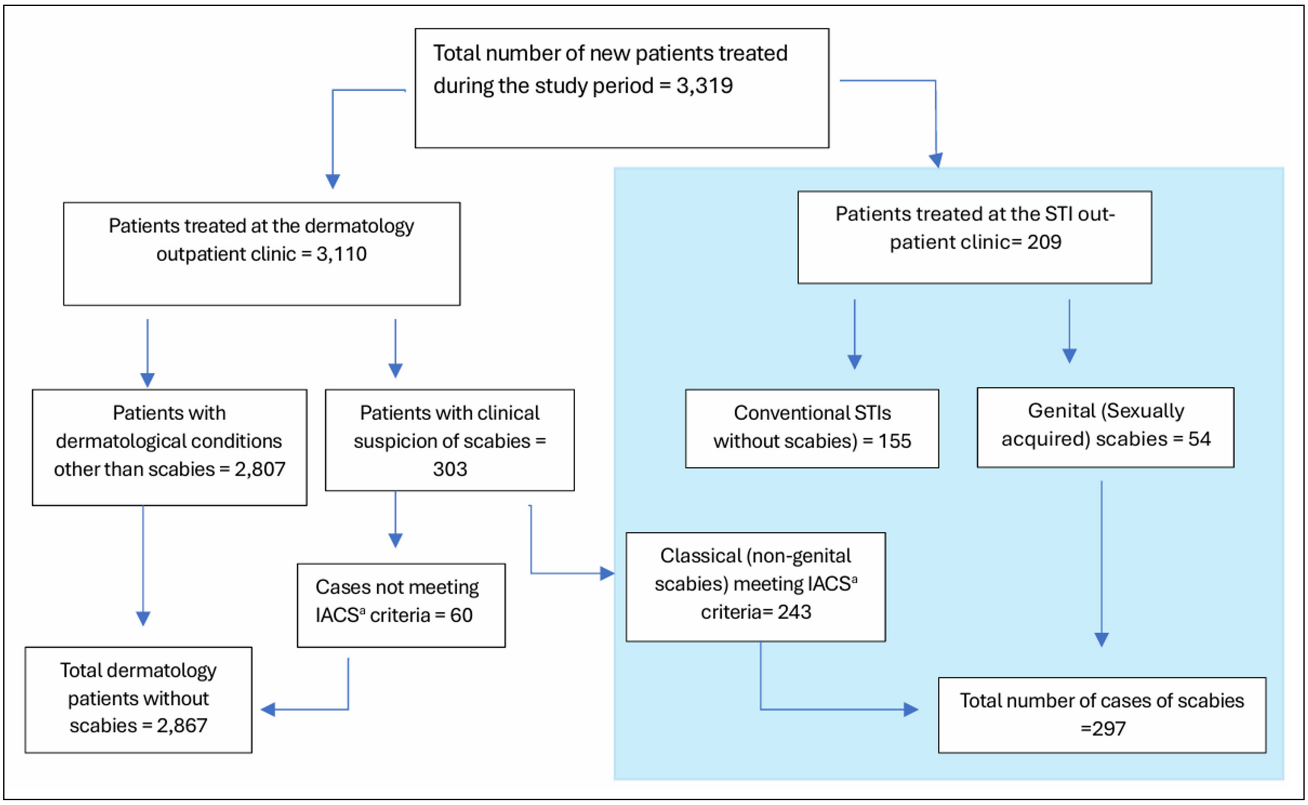

Figure 1. Algorithm summarizing record review process. ª = International Alliance for the Control of Scabies (IACS) Shaded (blue) area = patients included in the study.

tients were confirmed to have scabies if their clinical documentation met any of the following criteria:

i. Evidence of *Sarcoptes scabiei* infestation such as mites, eggs, or scybala on light microscopy of skin samples or direct visualization of mites on the skin during clinical examination using a dermatoscope (level A diagnosis, International Alliance for the Control of Scabies (IACS) criteria)[13].

ii. At least one classical feature of scabies, such as scabies borrows or typical lesions affecting the male genitalia (Level B diagnosis, IACS criteria)[13], plus documented evidence of an adequate clinical response to standard treatment with scabicides.

iii. At least two classical clinical history features plus characteristic distribution of skin lesions (Level B diagnosis, IACS criteria)[13], in addition to the documented resolution of symptoms with standard treatment with scabicides.

Sexually transmitted infections (STIs) were diagnosed based on clinical symptoms and laboratory confirmation, except for genital warts and genital herpes, which were diagnosed solely through clinical evaluation. All patients with STI symptoms underwent a standardized screening protocol, including serological tests for syphilis, HIV, hepatitis B, and hepatitis C, as well as microscopic examination, culture, and sensitivity testing of high vaginal, urethral, and/or cervical swabs. Additional tests, such as biopsies and imaging studies, were performed as needed based on the patient's specific clinical signs and symptoms.

Sexually transmitted scabies (genital scabies) were diagnosed using the IACS criteria[13]. For a diagnosis of genital scabies, patients had to:

1. Present primarily with genital symptoms to the STI clinic.
2. Provide a history of sexual contact.
3. Meet the IACS criteria for scabies diagnosis.

Eligibility Criteria

Patients were included in the study if they were newly diagnosed patients with confirmed scabies (i.e. if they met the IACS criteria for the diagnosis of scabies) or if they had documented laboratory evidence of at least one sexually transmitted infection (except for genital herpes and anogenital warts for which we relied on clinical diagnosis).

Exclusion Criteria

People living with HIV were excluded from this study because, following a confirmatory test, they were referred to specialized care outside of the STI clinic and could not be followed up. Cases identified as suspected scabies according to the IACS criteria[13], including those with atypical lesions or distribution, were also excluded. Additionally, unusual cases of scabies, such as crusted scabies, bullous scabies and scabies in the immunocompromised patient were not included. Patients returning for follow-up, those presenting with relapse or re-infection within three months of their initial diagnosis, and cases with incomplete demographic data (age and sex) were similarly excluded from the study.

Categorization of data and patient stratification:

The data of eligible patients were categorized into three groups as follows:

1. Genital scabies cohort: patients seeking treatment at the STI clinic for genital complaints consistent with sexually acquired scabies.
2. STI cohort: patients treated for STIs other than genital scabies.
3. Classical scabies cohort: newly diagnosed patients with symptoms and signs meeting the IACS criteria for scabies[13], acquired through non-sexual contact.

The categorization and data distribution are illustrated in Figure 1.

The patients were stratified into social classes using the revised scoring scheme for socioeconomic status in Nigeria, integrating educational attainment and occupation[14]. Subjects whose scores placed them in the upper class or upper middle class according to the scheme were designated as belonging to the upper social class. In contrast, those classified in the lower social class encompassed subjects whose scores fell within the lower middle- and lower-class categories of the scheme.

Statistical Analysis

The data were analyzed using IBM SPSS statistical analysis, Software version 25.0 for Windows (IBM Corp., Armonk, NY, USA). Data was summarized using frequency, percentages, means, and median where applicable. The normality of data distribution was assessed using the Shapiro-Wilk and the Kolmogorov-Smirnov tests. Differences in the means were compared using the Students' t-test for normal distributions, while the independent samples median test (Mann-Whitney U test) was used for non-normal distributions. The relationship between dichotomous variables of interest was tested using Chi-square and odds ratio. Binary logistic regression analysis was performed to determine the predictors of genital scabies. Findings were reported to be statistically significant if p-values were <0.05.

Handling missing data in statistical analysis

Missing data points were excluded from statistical analysis to ensure accuracy. However, the presence and extent of missing data are documented in the relevant tables to facilitate a more informed interpretation of results.

RESULTS

Incidence and Trend of Genital Scabies

Of the 3,319 new consultations reviewed, 209 (6.3%) were confirmed STI-related consultations and 297 (8.9%) cases of scabies. Genital scabies constituted 1/4th (54/209, 25.8%) of all STI consultations and 54/297 (18.2%) of all newly confirmed cases of scabies treated during the period (Figure 1). Genital scabies exhibited a net decline in incidence throughout the study, as shown in Figure 2.

All subjects in this study were identified with their biological sex. Males outnumbered females both among patients with STIs and those with scabies, with respective ratios of 1.6:1. and 1.7:1. This sex disparity was primarily driven by a high male preponderance in cases of genital scabies, with a male-to-female ratio of 12.5:1 (p<0.001, OR: 12.025, 95% CI: 4.141-34.919). When genital scabies were excluded, the male-to-female ratio reduced to 1.04:1 in the STI cohort and 1.36:1 in the classical scabies cohort (Table 1, Supplementary Table 1).

The mean age of patients with genital scabies was 26.56±7.55 years. The age distribution of the study subjects is shown in Figure 3. There was no significant age difference (p=0.163) between patients diagnosed with genital scabies and those with other STIs. Only 9.3% (5 out of 54) of patients with genital scabies were under 19 years old, while nearly one-third (30.5%, 74/243) of patients with classical scabies were below 19 years (p<0.001) (Supplementary Table 1).

Social determinants of health, including education, employment, and socioeconomic status, were compared between patients with genital scabies and those with other STIs, as shown in Table 1. Only lower education (p=0.029) and socioeconomic status (p=0.026) were significantly associated with genital scabies.

About one-third (35.4%, 74/209) of STI patients had two or more STI diagnoses. The frequency and distribution of concomitant STIs in the study population are shown in Table 1 and Figure 4. Anogenital warts 46.3% (25/54) and genital ulcer syndrome 11.1% (6/54) were the most frequent comorbid STIs in patients with genital scabies. Patients with genital scabies exhibited similar sexual and STI risk behaviors to those in the STI cohort, as detailed in Table 2.

Variables commonly associated with STI risk, such as age, sex, educational status, social class, number of lifetime sexual partners, and substance use (marijuana and cigarette), were included in the regression model. Significant predictors for genital scabies were male sex (p<0.001, aOR 17.112, 95% CI: 4.965-58.973), age below 30 years (p=0.031, aOR 3.470 95% CI: 1.118-10.765) and lower educational background (p=0.037, aOR 2.980, 95% CI: 1.068-8.314) (Table 3).

DISCUSSION

Recent studies have highlighted a concerning rise in scabies incidence worldwide, particularly among adolescents and young adults[8,9,15-18]. Some researchers[8,9] suggest that sexual transmission may account for the

Figure 2. Line chart illustrating fluctuations in the annual incidence of both genital and classical (non-genital) scabies between March 2017 and April 2023. The incidence of scabies (green) fluctuated throughout the study period, with both genital and classical scabies contributing to observed peaks at different time periods. Except for a spike observed during the peak of the SARS-CoV-2 pandemic in 2020 (red triangle), there was a gradual decline in the incidence of genital scabies throughout the study period.

Table 1. Comparison of socio-demographic and clinical data between patients with genital scabies and patients with other STIS.

	Other STIs N=155	Genital scabies N=54	Total N=209	*p*-value	Odds ratio¶	95% CI
SOCIO-DEMOGRAPHIC CHARACTERISTICS						
Sex						
Female (ref)	76 (49.0)	4 (7.4)	80 (38.3)			
Male	79 (51.0)	50 (92.6)	129 (61.7)	**<0.001**	12.025	4.141- 34.919
Age group						
≤18 years (ref)	7 (4.5)	5 (9.3)	12 (5.7)			
>18 years	148 (95.5)	49 (90.7)	197 (94.3)	0.305†	0.464	0.141-1.527
Educational qualification						
Tertiary or higher (ref)	128 (82.6)	37 (68.5)	165 (78.9)			
Secondary school or lower	27 (17.4)	17 (31.5)	44 (21.1)	**0.029**	2.178	1.072-4.424
Employment status						
Employed (ref)	67 (43.2)	20 (37.0)	87 (41.6)			
Unemployed or schooling	88 (56.8)	34 (63.0)	122 (58.4)	0.427	1.294	0.684-2.448
Social class						
Upper (ref)	36 (23.2)	5 (9.3)	41 (19.6)			
Lower	119 (76.8)	49 (90.7)	168 (80.4)	**0.026**	2.965	1.099-8.001
Marital status						
Single (ref)	112 (72.3)	43 (79.6)	155 (74.2)			
Married	43 (27.7)	11 (20.4)	54 (25.8)	0.289	0.666	0.316-1.410
CLINICAL CHARACTERISTICS						
Number of STIs						
Single STI diagnosis (ref)	114 (73.5)	21 (38.9)	135 (64.6)			
Multiple or Comorbid STIs	41 (26.5)	33 (61.1)	74 (35.4)	**<0.001**	4.369	2.274- 8.397
Symptom duration						
3 weeks or less (ref)	16 (10.4)	6 (11.8)	22 (10.7)			
Greater than 3 weeks	138 (89.6)	45 (88.2)	183 (89.3)	0.783	0.870	0.3209-2.3561
Missing data	1 (0.6)	3 (5.6)	4 (1.9)	0.059	0.110	0.0112-1.085
Treatment outcome						
Defaulted (ref)§	98 (63.2)	16 (29.6)	114 (54.5)			
Resolved symptoms‡	57 (36.8)	38 (70.4)	95 (45.5)	**<0.001**	4.083	2.091-7.973

Odds ratio¶ = crude (unadjusted) odds ratio
† = Fishers exact test.
Resolved symptoms‡ = patients that demonstrated resolution of clinical symptoms post-treatment and or showed favorable laboratory results leading to discharge from the STI clinic.
Defaulted§ = Patients were categorized as "defaulted" if they missed two or more consecutive follow-up appointments at least 3 weeks apart or were completely lost to follow-up.
CI = confidence interval.
STIs = sexually transmitted infections.
Ref. = reference variable.

observed surge in this age group. In our study population, we identified 297 confirmed cases of scabies, representing 8.95% of consultations. This finding reveals an unprecedented 18-fold increase from the previously reported incidence rate of 0.5% at the same facility about a decade earlier[19]. Such a remarkable surge, equating to a staggering 1,690% increase, echoes the disturbing trend of the rising global prevalence of scabies. Sexually transmitted scabies comprised 25.8% (54/207) of STIs and contributed to 18.2% (54/297) of scabies cases in our study population. This mirrors observations by Mostafa and Roshdy[20] and aligns with the incidence rates of sexually acquired scabies (1.5% to 17.8%) reported in diverse populations[12,20-22]. Additionally, our findings reinforce observations by other researchers[8,9,23] across diverse countries that sexual transmission substantially contributes to the recent rise in scabies incidence.

Despite the sustained frequency of classical scabies in this study, there was a remarkable overall decline in the incidence rate of genital scabies, plummeting from 37.6 cases per 1,000 persons at the start of the study to 2.9 per 1,000 persons at the end of the study period (Figure 2). The implementation of effective treatment services and intensification of contract tracing for STI patients in our facility likely played pivotal roles in this observed decline. Adopting similar rigorous contact tracing strategies for patients with

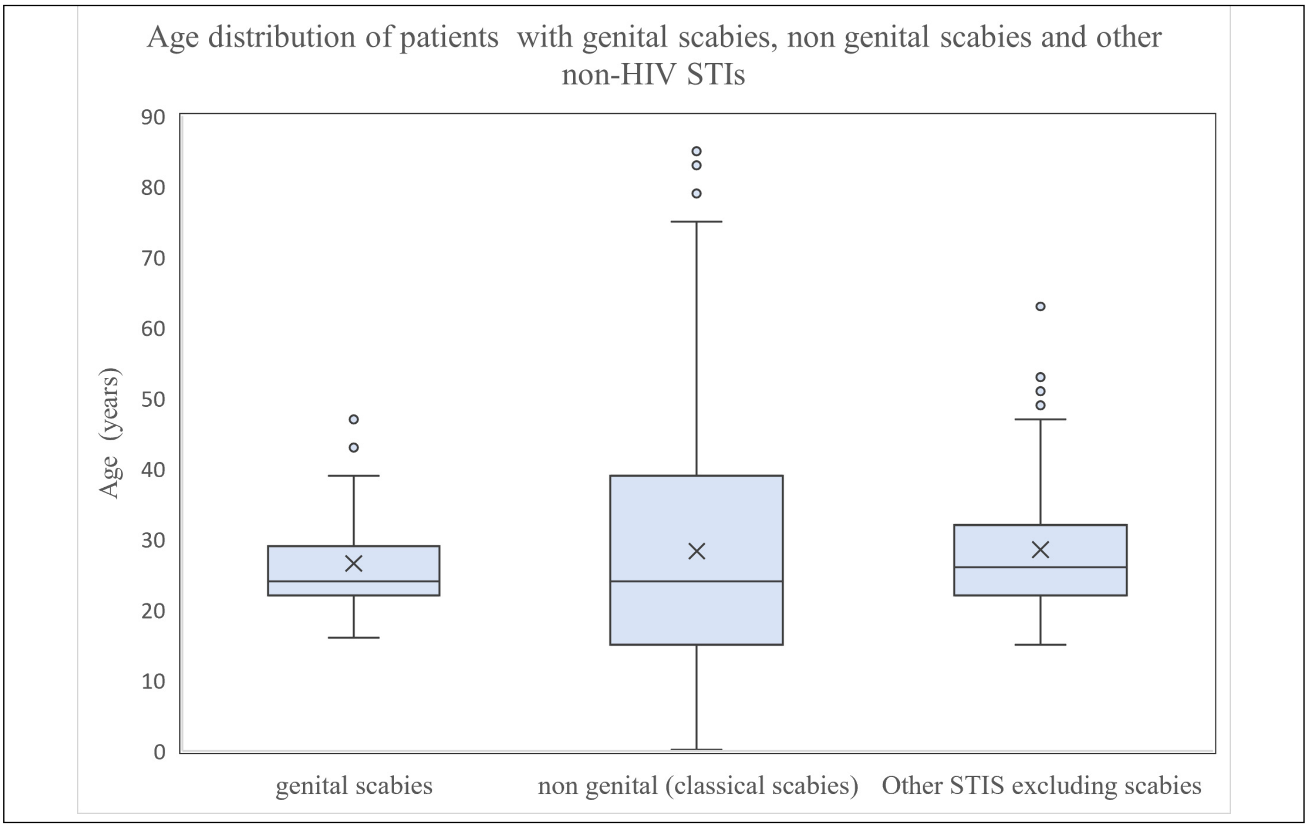

Figure 3. Box Plot comparing the age distribution of the study population. There was no significant age difference between patients diagnosed with genital scabies and those with other non-HIV STIs, with a mean age of 26.56±7.55 and 28.54±9.38 years respectively, (p=0.163, 95% CI: -0.807-4.767). Patients with classical scabies shared a comparable median age [24 years, Interquartile range (IQR): 15-39 years] with genital scabies [24.00 years Interquartile range (IQR): 22.00-29.00 years] (p=0.902).

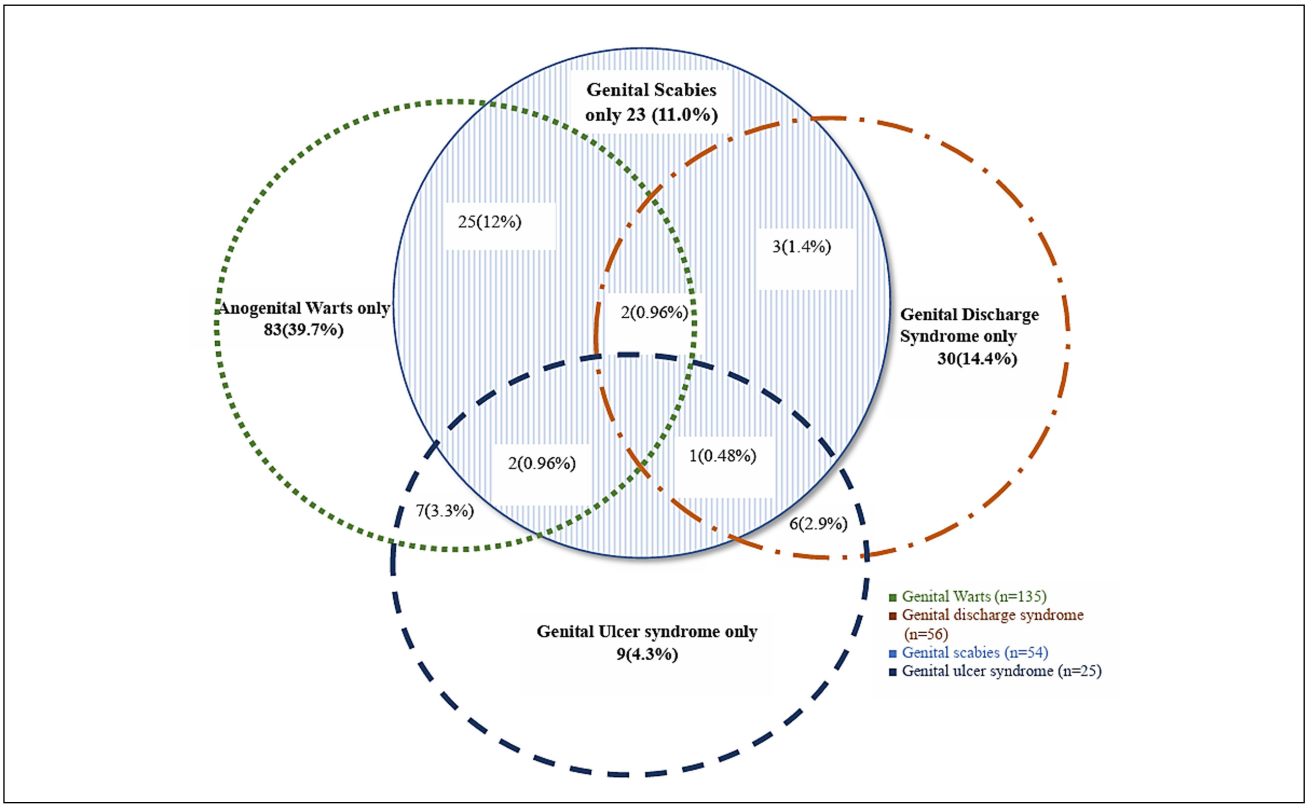

Figure 4. Venn diagram showing the frequency and distribution of comorbid STIs in the study population. Comorbid genital warts and genital discharge syndrome (22/209, 10.5%) and genital warts, genital ulcer syndrome, and genital discharge syndrome (2/209, 0.96%) are not represented in the chart.

Table 2. Comparative analysis of sexual and social behavior of STI patients with and without genital scabies.

	Other STIs N=155	Genital scabies N=54	Total N=209	*p*-value	Odds ratio¶	95% CI
SOCIAL HABITS						
Cigarette smoking (n=195)						
No (ref)	108 (74.5)	34 (68.0)	142 (72.8)			
Yes	37 (25.5)	16 (32.0)	53 (27.2)	0.374	1.3736	0.681-2.771
Missing data‡	10 (6.4)	4 (7.4)	14 (6.7)	0.801	0.862	0.259-2.871
Significant alcohol intake¶ (n=195)						
No (ref)	70 (48.3)	18 (36.0)	88 (45.1)			
Yes	75 (51.7)	32 (64.0)	107 (54.9)	0.133	1.6593	0.855-3.220
Missing data‡	10 (6.4)	4 (7.4)	14 (6.7)	0.801	0.862	0.259-2.871
SEXUAL BEHAVIORS						
Casual sexual relationships (n=205)						
No (ref)	46 (30.3)	17 (32.1)	63 (30.7)			
Yes	106 (69.7)	36 (67.9)	142 (69.3)	0.805	0.919	0.469-1.801
Missing data‡	3 (1.93)	1 (1.8)	4 (1.9)	0.969	1.046	0.107-10.275
Number of sexual partners in the preceding 4 weeks (n=209)						
≤1 (ref)	147 (94.8)	49 (90.7)	196 (93.8)			
≥2	8 (5.2)	5 (9.3)	13 (6.2)	0.222†	1.875	0.586-6.000
Type of sexual last sexual intercourse (n=173)						
Non casual (ref)	29 (22.7)	8 (17.8)	37 (21.4)			
Casual	99 (77.3)	37 (82.2)	136 (78.6)	0.492	1.3548	0.568-3.231
Missing data‡	27 (17.4)	9 (16.7)	36 (17.2)	0.900	1.054	0.461-2.412
Condom use (n=204)						
Never (ref)	44 (28.6)	12 (24.0)	56 (27.5)			
Yes	110 (71.4)	38 (76.0)	148 (72.5)	0.529	1.267	0.606-2.647
Missing data‡	1 (0.64)	4 (7.4)	5 (2.39)	0.027	0.083	0.009- 0.758
Condom used at last sexual intercourse (n=204)						
No (ref)	107 (69.5)	34 (68.0)	141 (69.1)			
Yes	47 (30.5)	16 (32.0)	63 (30.9)	0.844	1.071	0.539-2.128
Missing data‡	1 (0.64)	4 (7.4)	5 (2.39)	0.027	0.083	0.009-0.758
Unprotected sex despite awareness of symptoms (n=196)						
No (ref)	76 (52.1)	22 (44.0)	98 (50.0)			
Yes	70 (47.9)	28 (56.0)	98 (50.0)	0.326	1.3818	0.724-2.636
Missing	9 (5.8)	4 (7.4)	13 (6.2)	0.676	0.771	0.227-2.612
Partner notification of STI symptoms or diagnosis (n=208)						
No (ref)	58 (37.7)	31 (57.4)	89 (42.8)			
Yes	96 (62.3)	23 (42.6)	119 (57.2)	**0.012**	0.448	0.239-0.842
Missing data‡	1 (0.6)	0 (0.0)	1 (0.5)	0.973	1.058	0.043-26.368

†= Fishers Exact Test
Significant alcohol consumption¶ = drinking more than 60 grams of alcohol per day for men and more than 40 grams per day for women.
Missing data‡ were excluded from statistical computations of respective variables to maintain accuracy. However, they are included in the tables under the respective variables to provide a clear overview of how many data points were missing for each variable, allowing for an informed interpretation of results.
Ref = reference variable.

classical scabies could yield analogous results. Such an approach may also have broader implications for controlling the overall spread of scabies in the community.

Regarding the demographic characteristics and STI risk behaviors associated with genital scabies, we recorded a slight male predominance in both classical scabies (M: F 1.8:1, 190/297, 64.0%) and STIs cohort (129/209, 61.7% M: F 1.6:1). However, when genital scabies was considered in isolation, a pronounced male sex preponderance (92.5%, M: F 12.5:1) was evident. Only 3.7% (4/107) of scabies in females were sexually acquired; in comparison, more than one-fourth of cases of scabies in males (26.3%) were acquired through sexual intimacy ($p<0.001$) (Table 1). Previous studies examining sex differences in classical scabies have yielded conflicting results, with most reporting no significant disparity[6,24-26]. In contrast, consistent reports of significant male sex bias in sexually transmitted scabies are found in literature[12,20-22].

Table 3. Predictors of genital scabies and concomitant sexually transmitted infections among STI patients.

	Genital scabies			Concomitant STIs		
Predictor variables	***p*-value**	**aOR**	**95% CI**	***p*-value**	**aOR**	**95% CI**
Sex (ref female)						
Male	<0.001	17.11	4.96-59.97	.37	2.20	.39-2.37
Age bracket (ref <30 yrs)						
30 and above	.03	3.47	1.12-10.77	.62	0.69	.16-2.99
Education (ref Secondary or lower)						
Tertiary or higher	.04	2.98	1.07-8.31	.31	2.30	.46-11.60
Social class (ref upper social class)						
Lower social class	.60	1.38	.42-4.55	.35	0.52	.13-2.05
History of smoking (ref No)						
Yes	.53	0.74	.30-1.87	.14	0.34	.08-1.44
Significant alcohol intake† (ref No)						
Yes	.88	1.07	.44-2.60	.96	0.97	.27-3.52
N° of lifetime sexual partners (ref <11)						
Greater than 11	.35	0.58	.18-1.82	**.01**	10.45	1.91- 57.19
Consistent condom use (ref No)						
Yes	.09	0.41	.14-1.15	.62	0.69	.16-3.00
Genital scabies (ref absent)						
Present	–	–	–	<0.001	15.01	4.42-51.01

Significant alcohol intake† = drinking more than 60 grams of alcohol per day for men and more than 40 grams per day for women.
aOR = adjusted Odds Ratio.

The underlying reasons for this male preponderance in genital scabies are unknown[7]. Sex differences in the epidemiology of ectoparasitic diseases are often attributed to differences in exposure risk due to traditional gender roles. However, the higher prevalence of genital mite infestations such as scabies and lice, which are acquired primarily through direct person-to-person contact, cannot be adequately explained by this theory[12,20-22,26]. Instead, factors such as differences in genital skin anatomy, sexual and social behaviors, and mite-related factors such as attraction to odor, heat, and lipids may be implicated[27-29].

For instance, studies have also shown that males generally engage in higher sexual risk behaviors than females, which may contribute to the higher incidence of sexually transmitted ectoparasites among males[22,26,30]. Nonetheless, genital involvement has been reported in up to 60% of males with scabies regardless of the route of transmission[13,31]. This indicates that increased STI risk behaviors may not fully account for the significant sex differences in genital scabies incidence, and anatomical and physiological differences in male and female genitalia may play a more prominent role.

The skin of the external genitalia is considerably thinner in males compared with females, potentially facilitating mite burrowing through the stratum corneum to establish disease[29]. Additionally, environmental factors such as temperature and humidity are known to influence mite survival[6,26,32,33]. It is plausible that physiological differences in genital skin, including temperature and stratum corneum hydration, may provide a more favorable environment for mite survival in males. However, further research is required to confirm the role of sex-related physiological differences in genital skin and scabies infestation.

Regarding age, the majority (73.4% 218/297) of patients with scabies in this study were adults aged 19 years and above. Age was a significant predictor of genital scabies, with nearly all diagnosed cases occurring in adults (90.7%, 49/54) within the age range of 19-47 years. Similarly, a substantial proportion of patients with classical scabies in this study were also adults (69.5%, 169/243). However, the age range for classical scabies was much broader, spanning from 0 to 85 years (Figure 3). This finding contradicts a recent report from Northern Nigeria, which indicated that 76.3% of scabies cases occurred in children below 15 years[34].

The discrepancy could be attributed to regional differences in sociodemographic factors such as income, education, and access to social amenities, known to influence scabies prevalence[34,35]. Our study, conducted in a semi-urban town in southwest Nigeria, reflects a population with more liberal attitudes towards sexual intimacy compared to the northern region. This cultural difference could explain variations in scabies transmission routes and the observed age differences. Moreover, sexual transmission has been identified as the most common route of scabies transmission among adults[26].

Considering that the patients with genital scabies in our study were significantly more likely to be adults (>18 years) compared to those with classical scabies (p=0.003 OR: 4.291, 95% CI: 1.643-11.206)

(Table 3) and that they shared similar age characteristics and STI risk behaviors with the STI cohort, the higher number of adults with scabies compared to children in our study population further underscores the significant contribution of sexual transmission to scabies incidence in our settings.

While socioeconomic factors have been reported to play a critical role in determining scabies prevalence in community settings[34-37], research on factors contributing to the sexual transmission of scabies remains limited. In 2004, Otero et al[12] identified being single, engaging in casual sexual relationships, and having a history of cigarette smoking, heavy alcohol consumption, and substance use as significant social factors associated with the sexual transmission of scabies. Our study also explored these factors and found that patients with genital scabies were more likely to be single, participate in casual sexual relationships, and have higher alcohol and cigarette consumption compared to those with other STIs. However, these differences did not reach statistical significance. Instead, lower levels of education and socioeconomic status emerged as variables significantly associated with scabies. Following multivariate analysis (Table 3), a lower level of education remained a significant predictor of genital scabies in our study population. This suggests that while high STI risk behaviors may have contributed to the risk of genital scabies in our study population, socioeconomic factors such as education and income are known to be significant risk factors for classical scabies and remain significant risk factors for genital scabies as well.

The link between genital scabies and other sexually transmitted infections is a subject of debate[11]. In our study, more than 1/3rd (35.4%, 74/209) of the patients treated for STIs had multiple diagnoses. Similar to earlier reports[12], concomitant STIs were four times more frequent in patients with genital scabies compared to the STI cohort ($p \leq 0.001$, OR: 4.369, 95% CI: 2.274-8.397). The most frequent concomitant STIs in patients with genital scabies were anogenital warts (46.3%, 25/54) and genital ulcer syndrome (11.1%, 6/54) (Figure 4). Unlike HIV and urethral discharge syndromes, which are more effectively prevented by condom use, infections like scabies are less preventable by condoms. Our findings suggest a significant association between genital scabies and other STIs that are not fully mitigated by condoms, implying a shared transmission risk. However, due to the cross-sectional nature of our study, we cannot draw definitive conclusions about causality. Longitudinal studies are required to conclusively determine whether genital scabies increases the risk of acquiring other STIs.

We investigated the predictors of genital scabies among STI patients, considering common STI risk factors (Table 3). Our results, consistent with the findings of Otero et al[12], identify male sex ($p<0.001$), age below 30 years ($p=0.03$) and lower education background ($p=0.037$) as significant predictors of genital scabies. Additionally, we found that a diagnosis of genital scabies significantly increases the odds of having multiple STIs by 15 times ($p<0.001$, aOR 15.017 95% CI: 4.421-51.006). Individuals with more than ten sexual partners in their lifetime face a tenfold increase in these odds ($p<0.001$, aOR 10.446, 95% CI: 1.908-57.187). Although partner notification was not factored into the multivariate analysis, bivariate analysis suggests a concerning trend: patients with genital scabies were significantly less inclined to inform their sexual partners about their STI diagnosis ($p=0.012$, OR: 1.659, 0.8550-3.2200). These findings underscore the heightened sexual risk behaviors linked with genital scabies and their significant role in amplifying the likelihood of acquiring other STIs.

Limitations

While this study fills crucial gaps and offers nuanced insights into the prevalence of genital scabies in Southwestern Nigeria, the study design, being cross-sectional, inherently limits our ability to determine causality or risk. Therefore, the inferences drawn regarding associated risk factors merely denote associations and do not definitively establish causative relationships. Furthermore, the facility-based nature of the study introduces selection bias, impeding the extrapolation of our findings to the broader community; as such, our results may not accurately represent scabies prevalence in a wider population. Nevertheless, the study's strengths, such as the utilization of standard diagnostic criteria for scabies, bolster the validity of our findings and facilitate comparison with other research endeavors.

CONCLUSIONS

This study highlights the emerging significance of scabies as a neglected tropical disease from a sexual health perspective. The high incidence of genital scabies among young adults underscores the need for public health interventions in this area. Furthermore, the evident sex disparity with male predominance brings to focus gender gaps in reproductive health care and suggests the need for more balanced and inclusive interventions. Finally, the association between genital scabies and other STIs not fully preventable by condoms highlighted in this study signals interconnected health challenges and the importance of integrated management.

Funding:
No funding was received for this study.

Authors' Contributions:
Atinuke Ajani conceptualized and designed the study and was responsible for data analysis and initial drafting of the manuscript. All listed authors contributed substantially to the data collection, result interpretation, manuscript editing, and approval of the final manuscript.

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Conflict of Interest:
The authors declare no conflict of interest.

Data Availability:
The data sets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics Approval:
This sub-study is part of a larger research project examining the patterns, prevention practices, sexual behaviors, and quality of life among patients with sexually transmitted infections in Ile-Ife. The study received ethical approval from the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex, holding both international and national registration numbers IRB/IEC/0004553 and NHEC/17/03/2021, respectively. The protocol was approved under ERC/2023/03/23 for a period of 12 months, with the approval granted on March 31, 2023.

Informed Consent:
Informed consent for this sub-study was waived due to the absence of direct patient contact or interaction, which ensured that patient care was not disrupted and that no additional patient-related activities were required. The institution's head of the medical records unit granted authorization to access and utilize patient records.

AI Disclosure:
Assisted technologies such as grammar checkers and language enhancement tools (Quillbot and ChatGTP 3.0) were used to improve the clarity, tone, and grammar of the manuscript, enhancing its overall quality and readability.

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