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Prevalence of Scabies and Its Risk Factors among Almajiri School Children in Gombe State, Nigeria

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Abstract
This study provides an epidemiological evaluation of scabies in Almajiri school children in Gombe State, Nigeria. Scabies is a parasitic disease caused by Sarcoptes scabiei that resulted to high morbidity, social stigma, and secondary infections. This research was aimed at determining the prevalence of scabies and the impact of overcrowding risk factor among Almajiri school children in Gombe State. The study employed a cross-sectional design involving five Local Government Areas (LGAs) of Gombe State. Simple random sampling and purposive methods were used to select schools and recruit study participants. The sample were collected from Four hundred (400) consented Almajiri children (5-20 years) attending Tsangaya school within the five LGAs of Gombe State. Scabies mites` parasites were collected following standard protocol and transported to the microbiology laboratory of Gombe State University for parasitological examination using standard keys. Interview coupled with structured questionnaire was administered to collect data on sociodemographic characteristics as well as information on personal and environmental hygiene. The data obtained were processed using SPSS version 26 and statistically analysed using descriptive statistic and two-way analysis of variance (ANOVA). The findings of the study revealed a significant difference in the level of scabies prevalence, with the overall prevalence of 15%. The highest prevalence (3.7) was recorded in Funakaye, followed by Nafada (3.3) but the least was recorded in Kwami (2.3). The disease is more prevalent among 11-15 years age group with the least recorded among those aged above 15 years. Based on the tsangaya schools where the Almajiri children are living, the highest prevalence was recorded in Gwani Buna Nasiru (21.2%) in Funakaye LGA while the least was recorded in Gwani Sani Gombe (7.1%) in Gombe LGA. The study revealed a significant association between overcrowding and scabies prevalence. Among the determinant of scabies infestation in the study area, overcrowding was found to be the statistically significant ($p < 0.036$), serving the principal risk factor in the study area. These findings highlight the pressing need for targeted public health interventions in Gombe State.

Keywords: Epidemiology, Risk factors, Scabies, Almajiri, Gombe North

INTRODUCTION

This study examined the epidemiology and risk factors of scabies infestation among Almajiri school children in Gombe north senatorial district of Gombe State. The study collected data from Almajiri students. The word Almajiri refer to children (mostly boys) in northern Nigeria who are enrolled in traditional Islamic Education, known as Tsangaya, which is run by islamic teacher (known as (Malam) for the purpose of Qur,anic reading, memorization and reciting. The Almajiri students usually sleep in an overcrowded room, which facilitate the spreading of scabies infestation.

Scabies is an infestation of the skin associated intense itching and a pimple like rashes on the skin. Scabies is a common cosmopolitan public health skin parasitic disease that predominantly affects marginalized population especially children. It is a contagious skin disease caused by the infestation with an obligatory parasitic female human itch mites (*Sarcoptes scabiei* var. *hominis*) that burrow and thrives under the epidemic of the skin layer (Nair *et al*., 2016). The disease is transmitted and spread from one person to another through contact among people with poor hygiene and is primarily linked to poverty (Ugbomoiko *et al*., 2018) and overcrowding as determinant factors (Ekuerhare *et al*., 2024).

The clinical symptoms of the disease resulted when the eggs laid by the female mites` hatches. The biochemical and immunological responses (Hay *et al*., 2012) resulted into the clinical manifestation of symptoms such as intense itching/pruritus that lead to scratching, skin eruptions, papules, vesicles, and scabies nodules (Emanghe *et al*., 2025). These are followed by subsequent compilations caused by bacterial attack on the skin.

In 2017, the Strategic and Technical Advisory Group (STAG) of World Health Organization (WHO) recommended for the inclusion of scabies in the neglected tropical diseases NTDs list and it was acknowledged as one of the NTDs because of the fulfilment of the criteria which include been disproportionately affecting populations living in poverty and cause important morbidity and mortality; primarily affecting populations living in tropical and sub-tropical areas; be immediately amenable to control, elimination or eradication, and finally be relatively neglected by research" (Feasey *et al.*, 2010; El-Moamly, 2021). In 2020, scabies were included in the updated WHO roadmap for neglected tropical diseases 2021–2030 (WHO, 2021) for being neglected and affecting poorest of the poor marginalized populations.(WHO, , 2020). Although Scabies was listed to the World Health Organization's list of Neglected Tropical Diseases (Feasey *et al.*, 2010), but has not been generally recognised as a public health priority in most developing countries, due to inadequate case surveillance survey to fully surface its scope and determinant factors.

Globally, there are approximately 300 million cases diagnosed every year (Khan & Khan, 2026). In 2021, scabies caused 5.3 million DALYs, 206.6 million prevalence, and 622.5 million incidence, primarily affecting children and young people (Li *et al.*, 2024a). The burden was heaviest in middle SDI regions which include Nigeria, India, Indonesia and Egypt. Oceania, Tropical Latin America, and East Asia ranked as the top three regions in global scabies burden (Li *et al.*, 2024b).

The burden is high in tropical and humid regions (Karimkhani *et al.*, 2017). The average prevalence In developing countries such as Nigeria, is estimated to be 5 to 10% (Leung *et al.*, 2020). The prevalence of scabies globally include 18.4% in Urban Field Practice Area of Rajendra Nagar, Patna, India by Ahmed (2026); 32% among caregivers presenting at a tertiary care hospital of Islamabad, Pakistan (Khan & Khan, 2026); 3.1% among primary schoolchildren in a low socio-economic area in southeast of Iran (Sanei-Dehkordi *et al.*, 2021); 9.4% in the middle belt of Ghana (Kudzordzi *et al.*, 2025); 60.7% in Duhok City, Iraq (Ismael *et al.*, 2025); 7.9% in Southwest Ethiopia (Shifera & Yosef, 2024); 21% in Cross River State, Nigeria (Emanghe *et al.*, 2025); 13.75% among university Students in Delta State, Nigeria (Ekuerhare *et al.*, 2024). In 2017, outbreak of Scabies was reported in Gombe central prison, Gombe State, where about 53 inmates were infested. This stimulated an intervention by the Gombe State Ministry of Health, which initiated treatment for all inmates to prevent further spread (Premium Times, 2017, January 18).

Understanding the distribution and determinants risk factors of scabies could help guide disease control policy makers and can provide a baseline data for scientific and public health stakeholders. Published estimates of the prevalence and risk factors for scabies in Gombe State is limited. Currently, there is nearly no scholarly published indexed data on the prevalence of scabies infestation among Almajiri school children in Gombe State. For the purpose of documenting the prevalence and risk factor profile of scabies among Almajiri school children in Gombe North, this study was designed fill this worthy gap

MATERIALS AND METHODS

Study Area

Gombe State is located in the North-Eastern part of Nigeria, which lies between Latitudes 10.2897^{o}N and Longitude 11.1673^{o}E. The state has an area of 20,265 Km^{2} and a population of around 2,365,000 people as 2006 (NPC, 2009). Gombe has two distinct climates: the dry season (November-March) and the rainy season (April-October). The mean annual rainfall ranges

from 700 mm to 850 mm, while ambient temperature ranges from 24-34 ^{o}C and relative humidity ranges from 55-65%. The vegetation of Gombe State can be described as Sudan Savannah with open grassland which dries up during the dry season. Gombe State shares boundaries with Yobe State to the North, Adamawa and Taraba State to the South, Borno State to the East, and Bauchi State to the west. Gombe State is divided into eleven Local Government Areas (LGAs). These are: Akko, Balanga, Billiri, Dukku, Funakaye, Gombe, Kaltungo, Kwami, Nafada, Shongom and Yamaltu Deba. The Gombe North Senatorial District comprises of five Local Governments Areas these include: Kwami, Dukku, Nafada, Funa Kaye and Gombe Local Government Area (Figure 1).

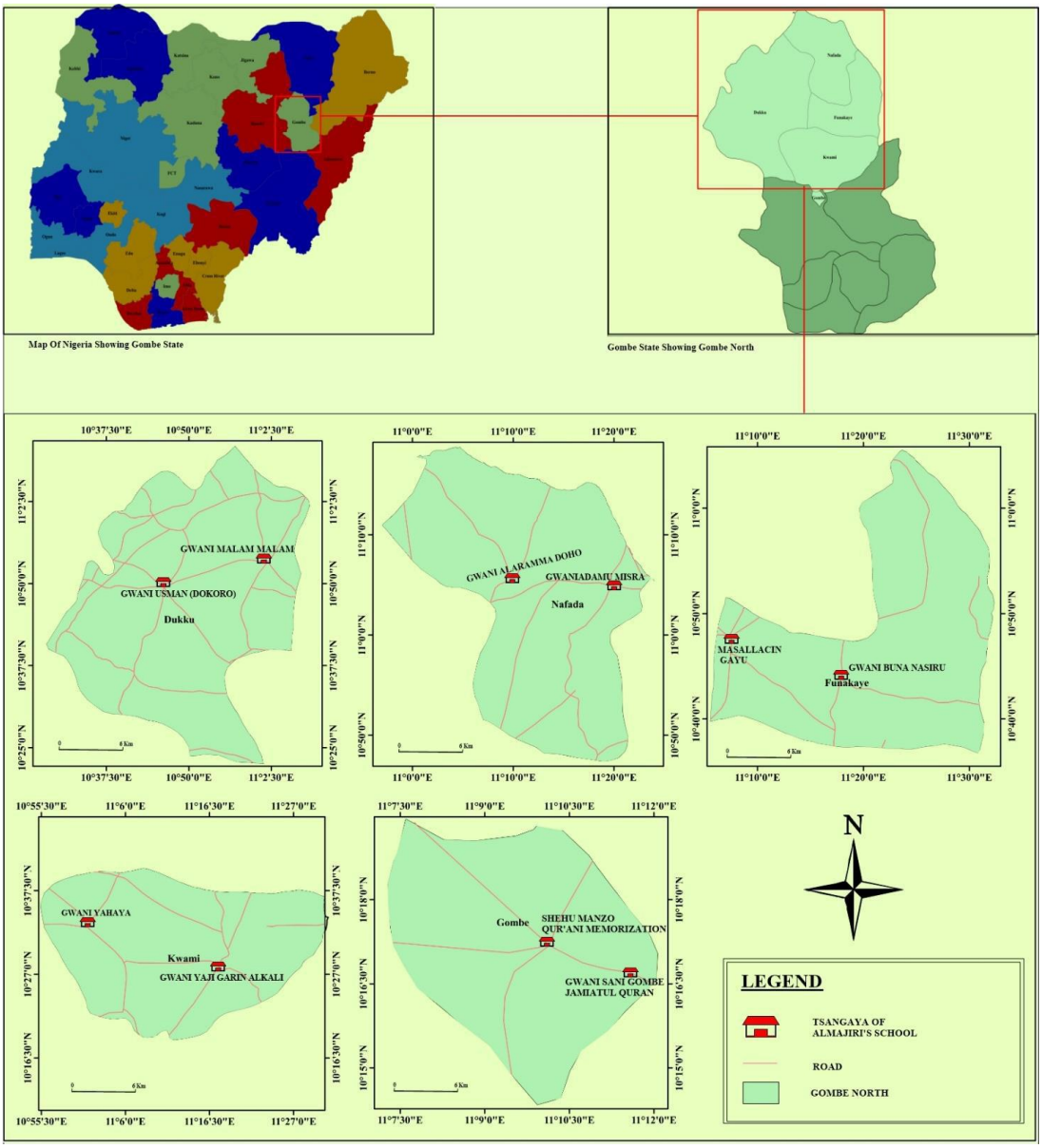

Figure 1: Map of Gombe North Senatorial Zone Showing the Study Area. Source: Gombe State University GIS Unit, 2023.

Ethical Consideration

This study was reviewed and approved by Gombe State Ministry of Health (GSMOH) ethical committee with ethical approval No: MOH/ADM/621/VOL1/549. Approval was given from the Ministry of Health Ethical Committee. Prior to data collection, the head of the Tangaya schools were sensitized and respondents were fully informed about the nature, benefits, and

objectives of the study and were granted the right withdraw at any time. Informed consents were obtained from all the respondents before the commencement of the study.

Study Design and Participants

Cross-sectional study was employed where data were collected from ten (10) Tangaya Almajiri schools across five (5) Local Government Areas in Gombe State, Nigeria, between March to August, 2025. The Tangaya schools were selected using simple random sampling while purposive sampling was employed to recruit the study participants. Sociodemographic characteristics of the study participants were collected using structured questionnaire. Data were collected from four hundred (400) consented Almajiri children derived from the five LGAs under study. Each LGA were visited four times in a month and each Tangaya school were visited at the interval of two weeks. Samples were collected each month from each stangaya school, based on the number of school children.

Sample Size Determination

The sample size was determined using standard formula as documented bySchofield & analysis, (2006):

$n=Z^2pq/d^2$

where:

n= minimum sample size

z= standard normal deviate for a desired significance level = 1.96 (for 95% confidence).P= Best available estimate of the actual proportion of subjects with superficial skin infections, in the study population = 65%= 0.65 (Ugbomoiko *et al*. 2018).

q= proportion of failure= q = 1 – p = 1 – 0.65 = 0.35

d= precision, tolerance limit/margin error = 0.05.

$$n = \frac{(1.96)2 \text{ X } 0.65 \text{ X } 0.35}{(0.05)2}$$

n= 350

The sample size was rounded up to 400 to minimize error.

Parasite (*Sarcoptes scabiei*) Collection and Identification from Almajiris Infected with Scabies

Sarcoptes Scabiei sample were collected from the fingers, knees and elbows of the consented Pupils aged (6-20 years) attending Tsangaya school using a surgical blade according to Walton & Currie, (2007). The collected mites were transferred in a well labelled petri dishes and transported to the Microbiology laboratory within 30 minutes for parasitological examination (Walton & Currie, 2016). The mite were incubated at 35^{o}C for 30 minutes before being morphologically identified under a light microscope in accordance with the established protocols (Arlian, 1989).

Inclusion and Exclusion Criteria

Boarding and non-boarding Almajiri who are 6 -20 years of age were included in the study. Those below 6 years and above 20 years were excluded. Also those that refused to partake in the study were excluded.

Statistical Analysis

The data obtained were processed using SPSS version 26 and statistically analysed using descriptive statistic and two-way analysis of variance (ANOVA) at 5% level of significance.

RESULTS

Demographic Characteristics of the Study Subjects

Table 1 summarizes the demographic profile of the study participants (N = 400). The majority of participants were aged 11–15 years, accounting for 182 individuals (45.5%), followed by those aged 5–10 years (168; 42.0%). Participants older than 15 years constituted the smallest proportion of the study population (50; 12.5%). Regarding living arrangements, most participants resided in boarding Almajiri schools, representing 292 individuals (73.5%). In contrast, an equal proportion of participants lived with their families in urban and rural settings, each accounting for 54 individuals (13.5%), respectively. In terms of housing conditions, a substantial proportion of participants lived in an overcrowded condition. Specifically, 256 participants (64.0%) lived in rooms accommodating more than 10 children, while 144 participants (36.0%) resided in rooms with 6–10 children.

Table 1: Demographic characteristics of respondents

Variable	Frequency	%
Age (years)		
5–10	168	42.0
11–15	182	45.5
>15	50	12.5
Total	**400**	**100**
Living arrangement		
Boarding (Almajiri school)	292	73.5
With family (urban)	54	13.5
With family (rural)	54	13.5
Total	**400**	**100**
Number per room		
6–10 children	144	36.0
>10 children	256	64.0
Total	**400**	**100**

Distribution of Scabies among Age Group

Table 2 shows the distribution of scabies infestation across different age groups among the study participants (N = 400). A total of 58 participants (14.5%) were diagnosed with scabies. The highest proportion of scabies cases was observed among participants aged 11–15 years, with 29 cases (7.3%), followed by those aged 5–10 years, with 21 cases (5.3%). Participants older than 15 years had the lowest prevalence, with 8 cases (2.0%). Despite these variations in prevalence across age groups, there was no statistically significant association between age and scabies infestation ($\chi^2 = 0.80$, df = 2, p = 0.67). This suggests that, although adolescents (11–15 years) appeared to have a relatively higher burden of infestation, age was not a significant determinant of scabies occurrence in this study population. The findings reveals that scabies affects all age groups within the study population, with no significant age-specific predisposition.

Table 2: Age-Specific Distribution of Scabies Cases among Study Participant.

Age Group (years)	No. Examined	N0. Positive	%
5–10	168	21	5.3
11–15	182	29	7.3
>15	50	8	2.0
Total	400	58	14.5

$\chi^2 = 0.80$, df = 2, p=0.67

Prevalence of Scabies based on Tsangaya Schools in the Study Area

Table 3 shows the distribution of scabies infestation in the ten Tsangaya schools surveyed in the study area. Of the 400 Almajiris examined 58 (14.5%) were found infested with scabies. Among the tsangaya schools, the highest prevalence was recorded in Gwani Buna Nasiru (21.2%) followed by Masacin Gayu (20.0%) and Gwani Alarama Dogo (19.4%) while the least prevalence were found in Gwani Sani Gombe (7.1%).

Table 3: Prevalence of Scabies by Tsangaya School

Tsangaya School	No. Examined	No. positive	%
Masacin Gayu	40	8	20.0
Gwani Alarama Dogo	36	7	19.4
Gwani Buna Nasiru	33	7	21.2
Gwani Adamu Misra	41	6	14.6
Shehu Manzo Qur'ani	48	6	12.5
Gwani Tsaman Dokoro	37	6	16.2
Gwani Yayaji Garin Alkali	39	5	12.8
Gwani Malam Malam	32	5	15.6
Gwani Sani Gombe	56	4	7.1
Shehu Yahaya	38	4	10.5
Total	400	58	14.5

(χ^2_{calc}= 3.146, χ^2_{tab}=16.919 p=0.958, df=9)

Prevalence of Scabies Infestation among Selected Local Government Areas in Gombe State

Table 4 presents the distribution of scabies infestation among Almajiri school children across five Local Government Areas (LGAs) in Gombe North Senatorial District (N = 400). Overall, 58 participants (14.5%) were diagnosed with scabies. The highest number of scabies cases was recorded in Funakaye LGA, with 15 cases (3.7%), followed by Nafada with 13 cases (3.3%) and Dukku with 11 cases (2.7%). Lower proportions were observed in Gombe LGA, which recorded 10 cases (2.5%), and Kwami LGA with 9 cases (2.3%). Despite these variations in the distribution of cases across the LGAs, statistical analysis showed no significant association between location and scabies infestation (χ^2 = 3.15, p = 0.958). This indicates that the prevalence of scabies was relatively uniform across the study areas, with no LGA demonstrating a significantly higher burden than others. Overall, the findings suggest that scabies infestation is widespread across all surveyed LGAs in the district, without significant geographic variation.

Table 4: Distribution of Scabies Infestation among Almajiri School Children across Five Local Government Areas (LGAs) in Gombe North Senatorial District

LGA	No. Examined	No. +ve	(%)
Funakaye	73	15	3.7
Nafada	73	13	3.3
Dukku	73	11	2.7
Gombe	104	10	2.5
Kwami	77	9	2.3
Total	400	58	14.5

χ^2 =3.15, p=0.958

Association between Selected Risk Factors and Scabies Infestation among the participants

Table 5 presents the relationship between selected risk factors and the prevalence of scabies infestation among the study participants (N = 400). Overall, 58 participants (14.5%) were found to be infested. Bathing frequency showed no statistically significant association with

scabies infestation ($\chi^2 = 6.05$, df = 3, p = 0.109). Although participants who bathed 2–3 times per week (5.5%) and once weekly (5.3%) had slightly higher prevalence compared to those bathing daily (3.8%), these differences were not significant.

Similarly, sharing of personal items was not significantly associated with infestation ($\chi^2 = 0.13$, df = 1, p = 0.717). Participants who reported sharing personal items had a prevalence of 8.8%, compared to 5.8% among those who did not, but this difference did not reach statistical significance. Conversely, overcrowding demonstrated a statistically significant association with scabies infestation ($\chi^2 = 4.40$, df = 1, p = 0.036). Participants living in overcrowded conditions had a higher prevalence (8.0%) compared to those not exposed to overcrowding (6.5%), indicating that overcrowding is a significant risk factor in this population. Access to water was also not significantly associated with scabies infestation ($\chi^2 = 2.07$, df = 2, p = 0.356), although a higher prevalence was observed among participants with irregular water access (8.5%) compared to those with regular access (6.0%). Among the factors examined, only overcrowding showed a statistically significant association with scabies infestation ($p < 0.05$), highlighting its importance as a key determinant in the transmission of the disease within the study population.

Table 5: Association Between Selected Risk Factors and Scabies Infestation among the Participants

Risk Factor	Category	No.Examined	No,+ve (%)	χ^2	Df	Pvalue
Bathing frequency	Daily	170	15 (3.8)			
	2–3×/week	109	22 (5.5)	6.05	3	0.109
	Once/week	121	21 (5.3)			
	sub-total	400	58 (14.4)			
Sharing of personal items	Yes	194	35 (8.8)	0.13	1	0.717
	No	206	23 (5.8)			
Overcrowding	Yes	160	32 (8)	4.40	1	0.036
	No	240	26 (6.5)			
Access to water	Regular	239	24 (6)			
	Irregular	161	34 (8.5)	2.07	2	0.356
	sub-total	400	58 (14.5)			

Significant at $p < 0.05$

DISCUSSION

This study examined the prevalence of scabies infestation and the determinant factors among Almajiri school children in Gombe North Senatorial district of Gombe State. The study reported about 58 subjects infested with scabies in Northern Gombe, Nigeria, substantiating the occurrence of the parasites in the study area. A prevalence of 14.5% was recorded in the study area. This prevalence found in the Northern Gombe is similar to the rate reported by other researchers in Nigeria and other parts of the world. The prevalence is slightly higher than the one reported by Sara *et al.* (2018) and Shifera & Yosef (2024) in Southern and Southwest Ethiopia among the resident of East Badewacho and pastoralist community respectively. Reason for the variation may be attributed to the study participant employed in the course of the study. While this study uses Almajiri school children who are vulnerable marginalized population with very low parental care due to the nature of Almajiri schooling where parents send their children to one knowledgeable Qur,anic scholar who can host more than one hundred students and no one take care them but remain wandering on people houses looking for food and finally all sleep in one room congested. But the latter studies were conducted among residents that are living their houses with more or less minimal congestion. Moreover, the prevalence was also slightly higher than the one reported in Delta State (13.5%) among students residing in the hostels of Delta State University, Abraka, Nigeria (Ekuerhare *et al.*, 2024) and the one reported by Asfaw *et al.* (2023) among public primary

school of Debre Tabor in Northwestern Ethiopia. However, it was lower than the prevalence reported in Cross River State (21%) by Emanghe *et al.* (2025) and Nasarawa State (65%) by Ugbomoiko *et al.* (2018).

The study revealed the highest prevalence among those Almajiri children aged 11-15 years, although not statistically significant. This is in line with the default age ranges of the Almajiri children, because under normal circumstance, the system is for children of those age and they are the set that are normally control by the scholar (Known as malam) and as such used to sleep together congested, unlike the older ages that normally have freedom and opportunity of sleeping somewhere else that is not congested. The findings aligned with the research conducted in Bangladesh, where similar prevalence was recorded among resident school and madrasah children by Islam & Shakil, (2025). The findings contradict with the report of Emanghe *et al*. (2025) who study reveals the highest prevalence among those aged less than ten years.

The findings of the current study disagree with the report by Ekuerhare *et al.* (2024), who documented a prevalence of 67.50% in a study to determine the prevalence of scabies among university students residing in the hostels of Delta State University. Reason for the discrepancy may be attributed to the nature of the study participants, as the current study employed marginalized vulnerable population known as Almajiri children while the latter examined university students who are relatively adults and hygienically sound. Furthermore, the study contradicted the findings of Emanghe *et al.* (2025), who reported high prevalence of scabies infestation among school children aged ≤ 10 years. This variation may be associated to the nature of the population under study. The current study uses Almajiri school children who are not under their parenting nurturing but living nearly on their own with higher degree of poverty, inadequate clothing, poor hygiene and poor resting room. Secondly, the normal age range for enrolling children into Almajiri schools is usually within 11-15 years, that is why this study recorded the highest prevalence among this age range. Conversely, the normal age range for enrolling children into western education primary school is 6-10 years, this may serve as the reason behind realizing higher prevalence rate among such ages.

On the prevalence of the infestation across the ten tsangaya schools, the highest prevalence was observed in Gwoni Banu Nasiru, an Almajiri school located in Funakaye LGA while the least prevalence was recorded in Gombe metropolis in tsangaya school known as Gwoni Sani Gombe. These findings supported the fact that the diseases are more prevalent among rural setting than urban setting. Although Funakaye is not a typical rural setting but when compare to Gombe metropolis it is peri-urban community, as such, the level of hygiene, exposure, and bed space conduciveness may be far better for those almajiri students living in Gombe metropolis. This agree with the findings of Nair *et al.* (2016), who reported prevalence of scabies among rural people than those living in urban setting. Based on the LGAs where the study was conducted, the prevalence was higher in Funakaye among all the LGAs under study. In this means that Funakaye is more prone to scabies infestation in the whole Gombe north senatorial district of Gombe State. This may be probably due to high congestion of the study subjects (Ugbomoiko *et al.*, 2018), which can drastically facilitate the spread of the disease, or there is poor housing condition where the almajiris children lived, or the rate of hygiene practice by the almajiris in Funakaye is poor than those found in other LGAs within Gombe State.

On the risk factors that sustain a disease in a particular community, only overcrowding was found as the determinant factor of scabies in Gombe north senatorial district. Scabies is a contagious disease (Nair *et al.*, 2016) which spread rapidly through contact between infested

victim and the healthy one. So because of the nature of Almajiri system in Nigeria which is associated with object poverty that resulted in minimal houses where the Almajiri students will rest at night, the students are congestly accommodated in one room where they lied next to each other, hence making close skin-to-skin contact. Overcrowding has been also reported as the risk factor of scabies elsewhere (Islam & Shakil, 2025) in Bangladesh; (Shifera & Yosef, 2024) in Southwest Ethiopia; (Sara *et al.*, 2018) in Southern Ethiopia. Contrastingly (Melese *et al.*, 2023) and (Emanghe *et al.*, 2025) reported sharing items such as clothes, bed spaces etc as the principal determinants of scabies infestation.

All these findings from this current researchers have pinpointed about the current epidemiological status of scabies and associated risk factors in Gombe North, Nigeria. The backing from existing literature have substantiated the relevance of this study and underscore the urgent intervention in the study area.

CONCLUSION AND RECOMMENDADTION

According to recent WHO guidelines the existence of 10% prevalence of scabies in a given community is an indication that require intervention in terms of mass drug administration and health education. The prevalence of 14.5% found in this study have substantiated the incidence of the disease in the study rea. This is the first study on scabies prevalence and risk factors among Almajiri school children in Gombe north senatorial district of Gombe State. The study revealed about 58 infested victims of scabies across the LGAs and found overcrowding as the principal determinant factor that sustained the infestation in the study area. This is a very important findings that underscore the need to incorporate collective efforts to tackle the infestation.

There is need for serious concerted effort by international, national, local authorities and NGOs in putting concrete intervention that can halt the transmission of this infestation. There is need for frequent screening and mass drug administration to all population at risk in the study area. Also there is need for strengthening active surveillance, ensuring health education and provision of medication to those infested with this pruritus skin diseases

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