



Research Article

Knowledge and Awareness of Female Genital Schistosomiasis among Primary and Secondary Healthcare Personnel in Nasarawa State, Nigeria

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ABSTRACT

Female Genital Schistosomiasis (FGS) is a neglected tropical disease caused by an infection with *Schistosoma haematobium*. Although prevalent in sub-Saharan Africa, where it is a leading cause of severe reproductive health complications, the condition remains underdiagnosed. A study was carried out to assess the awareness of primary and secondary healthcare workers in Nasarawa State on the diagnosis and management of FGS, using a descriptive cross-sectional survey. The survey targeted healthcare personnel from both Secondary Health Facilities (SHFs) and Primary Health Facilities (PHFs), including medical doctors, nurses, pharmacists, laboratory scientists, community health extension workers (CHEWs), and laboratory technicians. Stratified random sampling technique was employed, with healthcare professionals stratified based on the level of their health facilities. Results showed that healthcare workers in secondary healthcare facilities demonstrated significantly higher awareness and understanding of FGS (90.00%) compared to those in primary health facilities (74.00%) ($P < 0.05$). Furthermore, 73.00% of respondents from the secondary health facilities correctly identified diagnostic criteria for FGS, compared to only 22.00% of the Primary Health workers. Treatment knowledge and experience were also significantly greater among respondents from the secondary health facilities. These findings reveal that, while FGS awareness is relatively high in secondary facilities, critical diagnostic and management gaps exist at the primary care level. Addressing these frontline deficiencies through capacity building is essential to reduce the regional burden of this neglected disease.

Keywords: Female genital schistosomiasis; Healthcare facilities; Healthcare personnel; Nasarawa State; Reproductive health

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INTRODUCTION

Female Genital Schistosomiasis (FGS) is a neglected gynecological condition caused by *Schistosoma haematobium* infection, and primarily affects women and girls in endemic areas across sub-Saharan Africa. The disease results from the deposition of *S.*

haematobium eggs in the female genital tract, which damage critical reproductive organs including the cervix, fallopian tubes, and vagina, and leading to inflammation, pain, abnormal vaginal discharge, and infertility. It is reported that FGS significantly increases susceptibility to other infections, mostly HIV, due to mucosal disruption and chronic

inflammation in the genital tract (CDC, 2020; Mazigo *et al.*, 2022). It can also result in severe reproductive health complications such as anemia, miscarriage, stillbirth, preterm delivery, and low birth weight in newborns, particularly in areas where infection intensity is high (Kjetland *et al.*, 2012). This infection is significantly associated with factors such as age, water sources, and swimming habits (Liman *et al.*, 2022).

Schistosomiasis is an important public health concern in Nigeria, which has one of the highest burdens of the disease worldwide. According to the World Health Organization, over 251 million people require preventive chemotherapy for schistosomiasis globally, with a substantial proportion residing in Nigeria (WHO, 2021). Pregnant women are particularly vulnerable as genital schistosomiasis can compromise the reproductive tract and contribute to adverse pregnancy outcomes including miscarriage, fetal anomalies, and stillbirth. Schistosomiasis is endemic in Nasarawa State. Liman *et al.*, 2022 reported 5.8 prevalence of schistosomiasis among school-aged children in Lafia, Nasarawa state. A more recent study reported the prevalence of schistosomiasis to range between 11.3% and 14% across several Local Government Areas of the state (Rabiu *et al.*, 2025).

Despite its severity, FGS remains grossly underdiagnosed and underreported. One of the major challenges in managing FGS is the frequent misdiagnosis of its symptoms as sexually transmitted infections (STIs). This often leads to social stigma for affected women and inappropriate treatments, which fail to address the infection (WHO, 2021; Sightsavers, 2024). In Nasarawa State, there is limited data specifically addressing the awareness and knowledge of FGS among healthcare workers in this region, which can limit the effective management of the disease.

Given the documented burden of schistosomiasis in Nasarawa State (Liman *et al.*, 2022), efforts to enhance healthcare workers' understanding of FGS can lead to improved diagnosis and management of the infection, and this is in line with global health initiatives aimed at reducing the burden of neglected tropical diseases and promoting maternal health (World Health Organization, 2019). By providing data on the current level of FGS awareness among healthcare workers in Nasarawa State, this study will help inform health policy and the design of targeted interventions to address FGS and improve reproductive health outcomes in the state. Hence, the study intends to answer the following research

questions: What is the baseline level of awareness regarding FGS among frontline healthcare workers in Nasarawa State? Is there a significant difference in the diagnostic and management knowledge of FGS between primary and secondary healthcare workers? What are the specific knowledge and practice gaps in FGS management at the primary healthcare level compared to the secondary level?

Therefore, the aim of this study, is to assess and compare the knowledge of primary and secondary health workers in the diagnosis and management of Female Genital Schistosomiasis (FGS) in Nasarawa State, Nigeria.

MATERIALS AND METHODS

Description of Study Area

The study was conducted in Nasarawa State, located in North Central Nigeria (Figure 1). The state lies between latitude 7°45'N to 9°25'N and longitude 7°E to 9°E of the Greenwich Meridian. Nasarawa shares boundaries with Kaduna State to the north, Plateau State to the east, Taraba and Benue States to the south, and Kogi State and the Federal Capital Territory (FCT) to the west. Administratively, the state is divided into three senatorial zones; northern, western, southern, and has a total of 13 Local Government Areas (LGAs). It has a land area of 27, 1378 square kilometers and a population of about 1,826,883 (NPC, 2006).

Nasarawa is largely agrarian, with a population that depends on natural water bodies for domestic use, agriculture, and recreation. These factors contribute to the transmission of waterborne diseases such as schistosomiasis (WHO, 2021). The state's tropical climate and the presence of rivers also support the lifecycle of *Schistosoma haematobium* (Liman *et al.*, 2022; Rabiu *et al.*, 2025).

Study Design

This study employed a descriptive cross-sectional survey design to assess the awareness, knowledge, and clinical experiences of healthcare workers regarding Female Genital Schistosomiasis (FGS) in Nasarawa State, North Central Nigeria. The survey targeted healthcare personnel from both Secondary Health Facilities (SHFs) and Primary Health Facilities (PHFs), including medical doctors, nurses, pharmacists, laboratory scientists, community health extension workers (CHEWs), and laboratory technicians. These cadres were selected based on their direct involvement in reproductive health service delivery and disease diagnosis. Only those who consented to participate were included in the study sample.

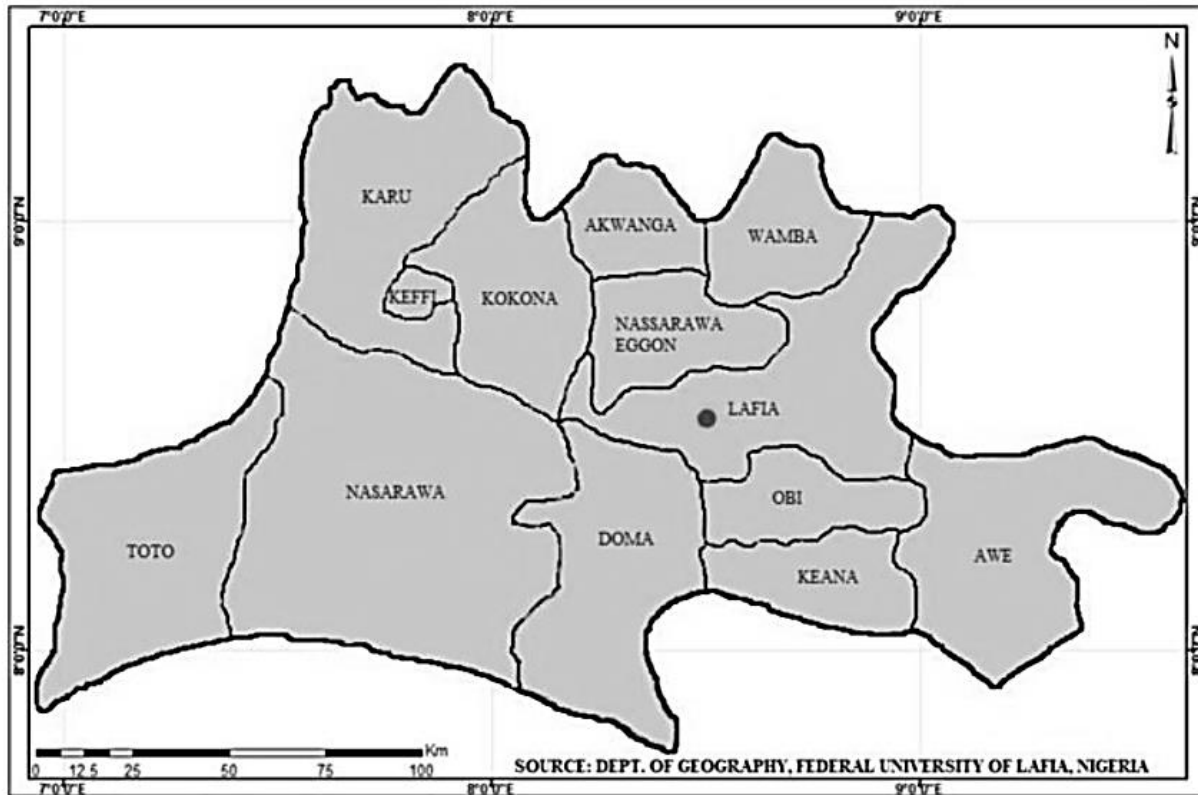


Figure 1: Map of Nasarawa State and the Study Area (Ayiwulu *et al.*, 2020)

Sampling Method

A stratified random sampling technique was employed, with healthcare professionals stratified based on the level of their health facilities.

Sample Size Determination

A sample size of 750 was adopted using the Yamane's optimal sample size determination formula:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = required sample size

N = population size (total number of health workers in Nasarawa State)

e = margin of error (0.05)

Data Collection

Data from participants were collected using a semi-structured, self-administered online questionnaire. The questionnaire link (<https://forms.gle/RPTquWrmrVS2zjHR7>) was distributed through professional networks, hospital contacts, and direct communication with facility management. Online questionnaires were administered to 350 personnel in secondary health facilities and 400 in primary health facilities. The

survey covered all 13 Local Government Areas in the state.

Data Analysis

Data was collated, coded and analyzed using the IBM SPSS version 23 software. Data was cross-checked on the field for completeness and then entered into an Excel sheet and cleaned before importing into SPSS. Absolute numbers and simple percentages were used to describe categorical variables such as awareness levels, and knowledge of diagnosis and treatment. A Chi-square test was performed at 5% level of probability to assess the levels of interactions among the variables.

RESULTS

Results showed that participants from the Secondary Health Facilities (SHF), ($N = 350$) were primarily male (210; 60%), followed by female (140; 40%). In contrast, respondents from the Primary Health Facilities (PHF) ($N = 400$) were predominantly female (276; 69%), followed by male (124; 31%) (Figure 1).

The distribution of SHF respondents by occupation is presented in Figure 2. Participants from the Secondary Health Facilities (SHF) included Medical Doctors ($n = 102$; 29%), Nurses ($n = 137$; 39%), Laboratory Scientists ($n = 41$; 12%), and Pharmacists

(n = 70; 20%). All respondents from the Primary Health Facilities (PHF) were exclusively Community Health Extension Workers (CHEWs).

Figure 3 presents the results of the assessment of general knowledge on schistosomiasis among the respondents. Overall, 97% of respondents from Secondary Health Facilities (SHFs) demonstrated general knowledge of schistosomiasis, compared to 86% among the participants from Primary Health Facilities (PHFs). Awareness levels also differed between the two healthcare tiers, with 315 (90%) of SHF respondents reporting that they had heard of FGS, compared to 297 (74%) among PHF respondents.

Figure 5 presents results of the assessment of awareness of standard treatments for FGS among the respondents. Results showed that 305 respondents from SHFs (97%) reported knowledge of the standard treatment for FGS, compared to only 115 respondents from PHFs (39%). 118 (37%) of SHF participants reported having encountered a patient with FGS, in contrast to 79 (27%) of respondents from PHFs (Figure 5). A chi-square test of independence revealed that the difference in treatment knowledge between the two levels of healthcare facilities was statistically significant ($\chi^2(1, N = 612) = 240.0, p < .001$).

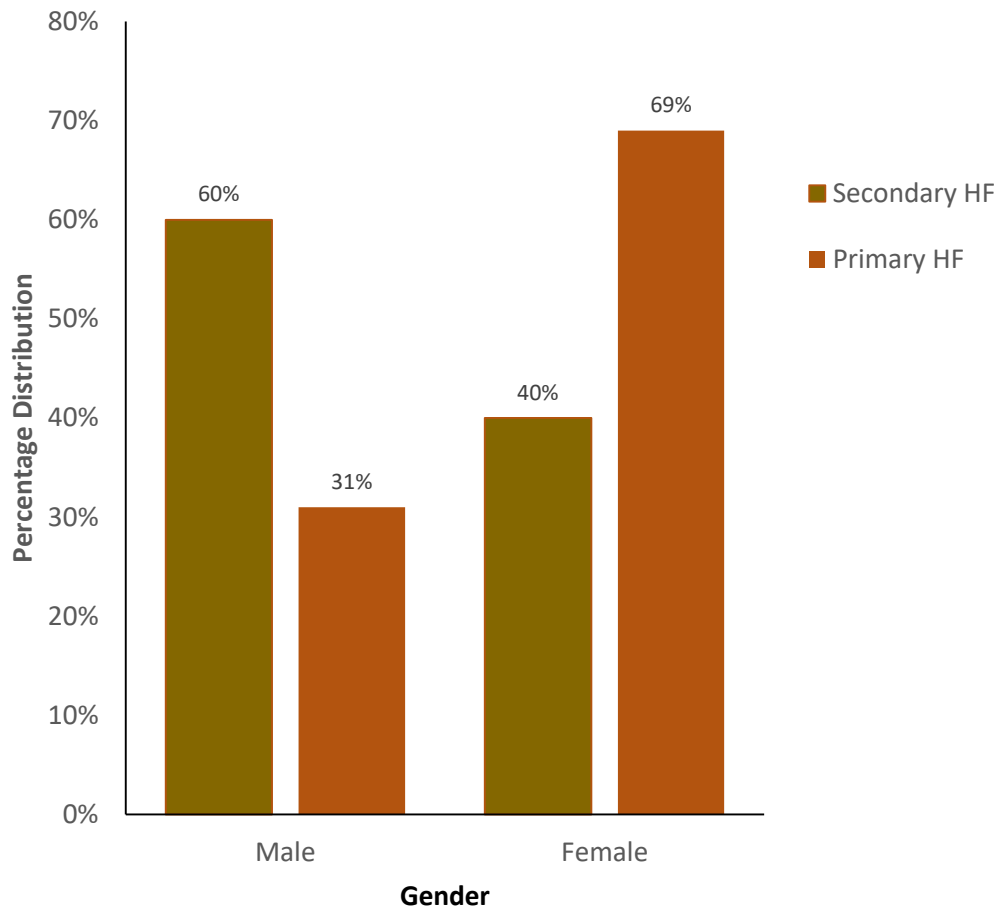


Figure 1: Gender Distribution of Respondents

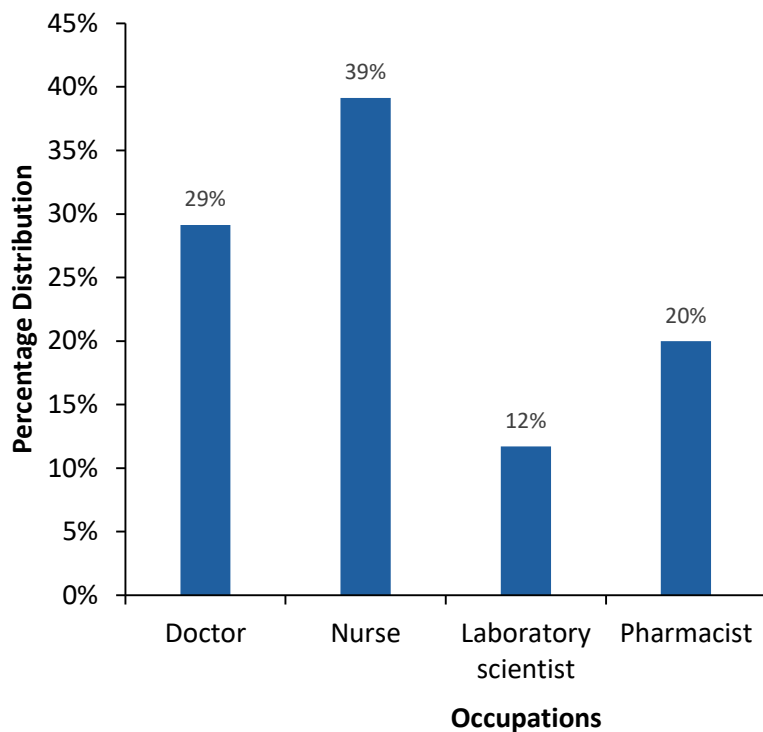


Figure 2: Distribution of SHF Respondents by Occupation

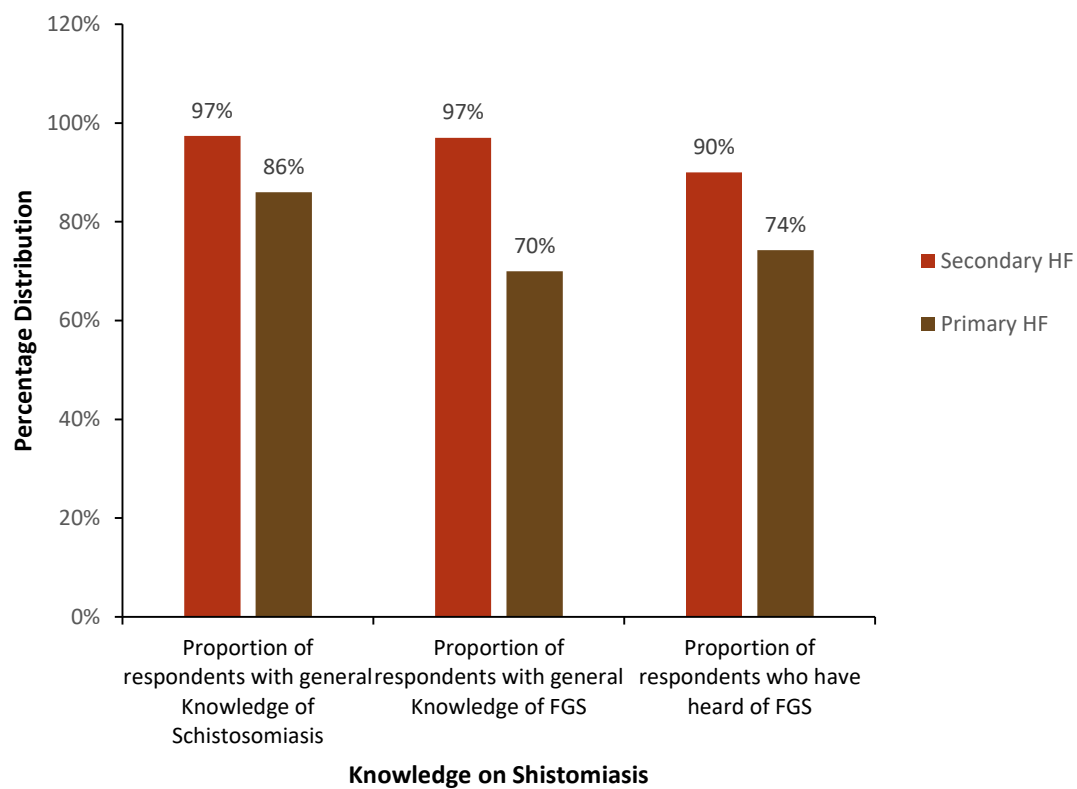


Figure 3: General Knowledge on Schistosomiasis and FGS

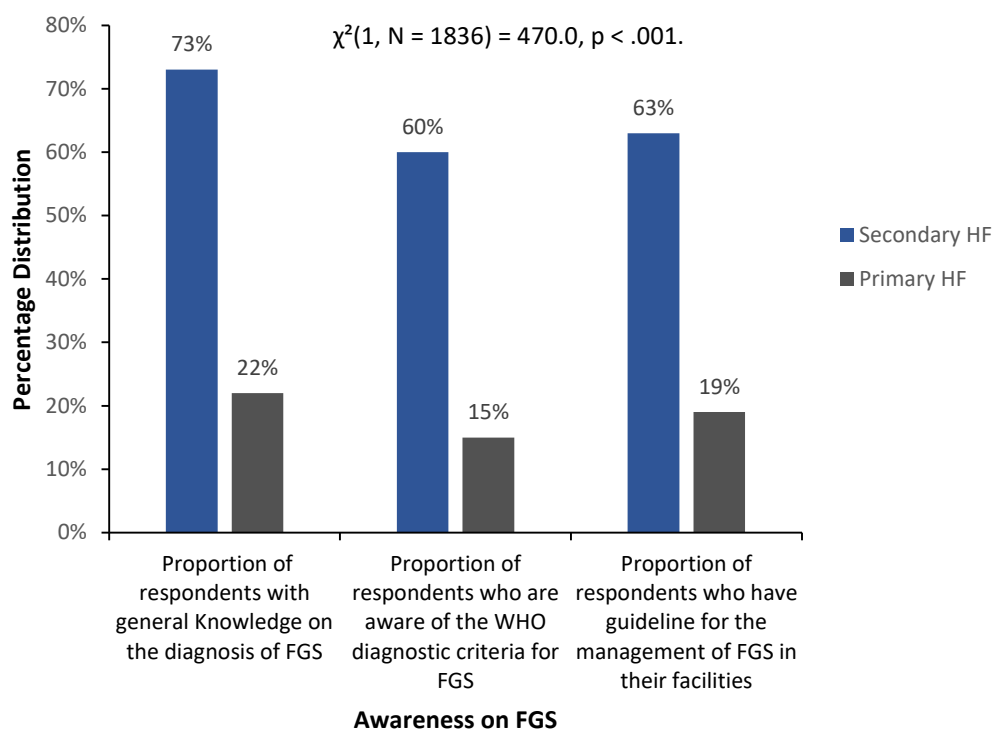


Figure 4: Awareness of Diagnosis for FGS among the Primary and Secondary Health Facilities in Nasarawa State

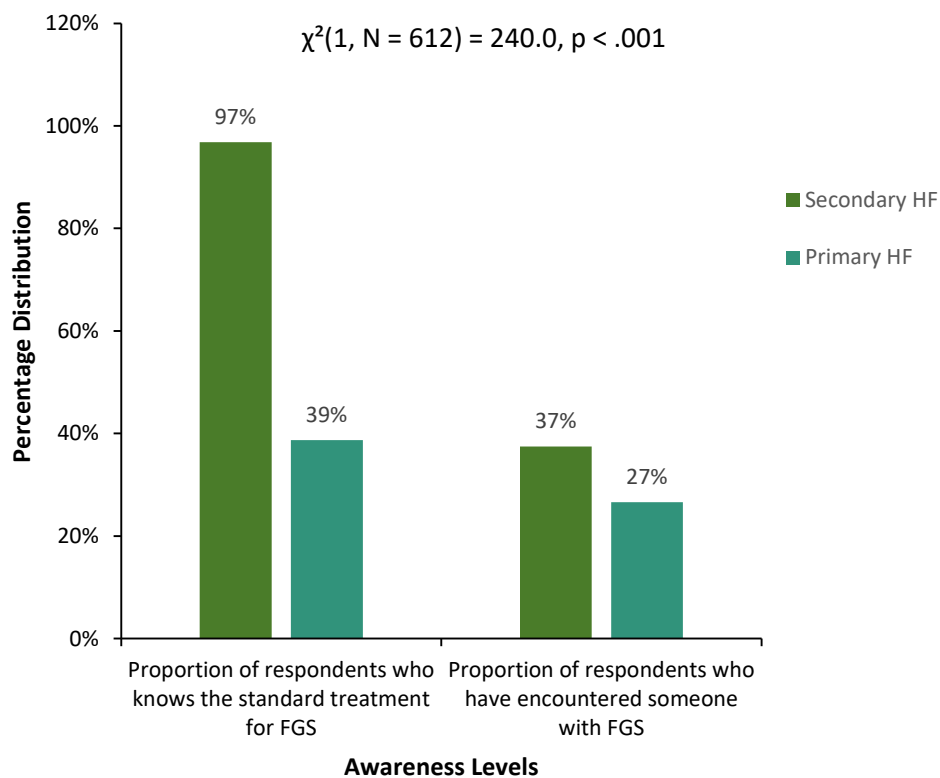


Figure 5: Awareness of Standard Treatment Measures for FGS among the Respondents

DISCUSSION

The demographic profile of respondents showed that the gender and occupational distributions differ between the primary and secondary health workers. In the SHFs, males were the majority, whereas females were more in the PHFs. Earlier studies have also reported similar variations in the numbers of healthcare respondents (Smith, 2020), and have indicated that higher-tier health facilities often have larger proportion of male professionals especially as medical doctors and pharmacists. This might be a result of socio-cultural and educational access factors. However, the PHFs focus on community-level care and tend to employ more female Community Health Extension Workers (CHEWs) (WHO, 2019). This cadre of healthcare is associated with maternal and child health services as well as community outreach activities. Therefore, female predominance in PHFs may enhance the acceptability and effectiveness of primary healthcare interventions in culturally sensitive settings. Also, female health workers often facilitate better communication with local populations (FHW, 2021).

In this study, respondents from the SHFs composed of Nurses, which were the largest group, followed by medical doctors, pharmacists, and laboratory scientists. This reflects the multidisciplinary nature of the secondary care, where clinical, pharmaceutical, and diagnostic services are integrated to manage more complex health conditions (NGC, 2021). The diversity of occupational cadres in SHFs supports a comprehensive approach to patient management, and the predominance of nurses is important for continuous patient care and coordination (Karam *et al.*, 2021). In contrast, the presence of CHEWs in PHFs is crucial for basic preventive and promotive services at the community level. They are focal in bridging the gap between formal health systems and communities, and they provide essential services such as immunization, health education, and disease surveillance (Rossi *et al.*, 2018). These demographic variations between SHFs and PHFs indicates the stratification of health workforce according to facility level and function. This is significant for tailoring health workforce policies, training programs, and resource allocation for optimum service delivery in the healthcare system.

This study revealed a high overall awareness of schistosomiasis among healthcare workers. Respondents from SHFs had significantly greater general knowledge than those in the PHFs. Also, 90% of SHF respondents had heard of FGS, while only 74%

of PHF respondents were familiar with the condition. As frontline health workers especially in rural communities, PHF workers are important in early detection and community-based interventions. However, their lower awareness may limit the capacity for timely identification and referral of suspected FGS cases. This will subsequently lead to underdiagnosis and continued disease burden in affected communities (Kukula *et al.*, 2019; WHO, 2022).

The respondents who reported prior awareness of FGS were further examined on their general knowledge of FGS. SHF participants answered 97% of the knowledge-based questions correctly, compared to only 70% among PHF respondents. A chi-square test ($\chi^2(1, N = 2,448) = 321.0, p < .001$) implies a substantial knowledge gap. A recent survey conducted in Anambra State, Nigeria, revealed that while all the health workers surveyed were aware of urogenital schistosomiasis, only a small fraction had any knowledge of FGS specifically (Chukwuocha *et al.*, 2024). Other authors attributed this knowledge gap to possible inadequacies in training or continuing education for PHF workers, particularly regarding less commonly discussed disease manifestations like FGS in many endemic countries (Mazigo *et al.*, 2022). Consequently, the lack of familiarity with FGS among healthcare providers will result in misdiagnosis and ineffective management. Since FGS is often misdiagnosed with other gynecological conditions, this knowledge gap may have great implications for women's reproductive health. Guideline dissemination across all levels of the healthcare system and improved diagnostic infrastructure could bridge this gap and contribute to earlier recognition and management of FGS (WHO, 2022).

The study showed that the respondents' knowledge on diagnosis of FGS differed significantly at the two levels of healthcare. Among respondents aware of FGS, 73% of SHF participants answered the diagnostic questions correctly as compared to only 22% of PHF participants. Also, 60% of SHF respondents reported that they were aware of the World Health Organization's diagnostic criteria for FGS, whereas only 15% of PHF respondents indicated the same. 63% of SHF personnel also reported the presence of FGS management guidelines in their facilities, in contrast to just 19% of PHF respondents. These findings align with existing literature highlighting the challenges in the diagnoses of FGS, particularly in primary healthcare settings. A study in Anambra State reported that healthcare workers had limited

understanding of FGS, leading to challenges in diagnosis and management (Aribodor *et al.*, 2023). Results of this study showed a significant difference in the knowledge and experience of the SHFs and PHFs health workers in the treatment and management of Female Genital Schistosomiasis. The majority of SHF respondents reported awareness of the standard treatment for FGS, compared to PHF participants. Similarly, a higher proportion of SHF personnel indicated that they had encountered FGS patients, while fewer PHF respondents reported such experience. The chi-square test confirmed that this disparity in treatment knowledge between the two healthcare levels was statistically significant. This significant gap is in accordance with other studies in Nigeria that reported challenges in the management of FGS, particularly at the primary healthcare level. Oluwole *et al.* (2023) and Okeke *et al.* (2024) reported that limited training, lack of awareness, and inadequate resources at PHFs often result in underdiagnosis and undertreatment of FGS in Ogun and Anambra States respectively. Moreover, the low exposure of PHF healthcare workers to FGS patients reduces their practical experience in managing the disease, further increasing the treatment gaps (Aribodor *et al.*, 2023).

The difference in Awareness and knowledge of the management of female genital schistosomiasis among secondary and primary healthcare workers in Nasarawa state was significant. Since Primary health care centres are the immediate healthcare providers in the communities (Mwinzi *et al.*, 2025), ensuring equitable knowledge and resources across healthcare tiers is crucial for effective control and management. Addressing these variations require comprehensive training programs for PHF workers on FGS treatment protocols and the and integration of FGS management guidelines into primary care settings.

CONCLUSION

The findings of the study revealed a significant disparity in the awareness, knowledge, and experience for Female Genital Schistosomiasis (FGS) between healthcare workers in secondary and primary healthcare facilities in Nasarawa State. The secondary healthcare workers demonstrated higher levels of awareness and understanding of FGS diagnosis and treatment. However, the primary healthcare workers who are the first point of contact in many communities showed considerable knowledge gaps. Given the role of PHFs in early detection and community engagement, it is crucial to strengthen their capacity through training, provision

of diagnostic tools, and integration of FGS guidelines into their system. Closing these gaps will improve case detection and treatment outcomes and also align with broader public health goals to reduce the burden of neglected tropical diseases and improve reproductive health in endemic areas.

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Conflict of Interest

The authors declare no conflict of interest.

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