

# PLOS Neglected Tropical Diseases

## Breaking the silence of female genital schistosomiasis in Ghana's health system: A case of health workers within the FAST project --Manuscript Draft--

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<b>Full Title:</b>	Breaking the silence of female genital schistosomiasis in Ghana's health system: A case of health workers within the FAST project
<b>Short Title:</b>	Health workers knowledge about Female genital schistosomiasis in Ghana.
<b>Article Type:</b>	Research Article
<b>Keywords:</b>	Neglected Tropical Diseases, Schistosomiasis, Female Genital Schistosomiasis, Mass Drug Administration, Ghana
<b>Abstract:</b>	<p><b>Background:</b> Female Genital Schistosomiasis (FGS) remains one a critical and neglected topics in Neglected Tropical Diseases (NTDs) and the health of women and girls worldwide. Health workers' knowledge of FGS is vital to the prevention and management of the disease. This study conducted implementation research to identify and address the FGS knowledge gap among health workers in Ghana.</p> <p><b>Methods:</b> This study was a 3-year (2020 -2022) implementation research applying a pragmatic uncontrolled quasi-experimental study design. The study involved a baseline assessment, an intervention phase involving the training of health workers about FGS and an endline assessment. A mixed-method approach was applied to data collection involving health workers in two schistosomiasis endemic districts and health workers across the country. NVIVO 12 and STATA 14 were used for qualitative and quantitative data analysis, respectively.</p> <p><b>Results:</b> Prior to the intervention, the level of awareness about FGS among health workers was less than 8%, and most participants only understood FGS as merely urogenital schistosomiasis in females.</p> <p>In response to this gap, an FGS education intervention in the form of training of health workers, student nurses alongside the distribution of FGS educational materials were carried out. The intervention enhanced health workers' awareness of FGS to more than 61%, encompassing an enhanced understanding of the disease's signs and symptoms to more than 60% , as well as its management strategies.</p> <p>Nevertheless, a key challenge remains in ensuring access to praziquantel, the primary medication for treating and preventing schistosomiasis.</p> <p><b>Conclusions:</b> The FGS intervention has improved health workers' awareness and understanding of FGS. However, there is still a need for expanded training of health workers as well as improvement in the access to praziquantel to facilitate FGS management. In addition, a holistic strategy encompassing all stakeholders at the individual, community, and health-system levels is required to improve the general knowledge and management of FGS</p>
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1 **Breaking the silence of female genital schistosomiasis in Ghana's health system: A case**  
2 **of health workers within the FAST project**

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27 **Abstract**

28 **Background:** Female Genital Schistosomiasis (FGS) remains one a critical and neglected  
29 topics in Neglected Tropical Diseases (NTDs) and the health of women and girls worldwide.  
30 Health workers' knowledge of FGS is vital to the prevention and management of the disease.  
31 This study conducted implementation research to identify and address the FGS knowledge gap  
32 among health workers in Ghana.

33 **Methods:** This study was a 3-year (2020 -2022) implementation research applying a pragmatic  
34 uncontrolled quasi-experimental study design. The study involved a baseline assessment, an  
35 intervention phase involving the training of health workers about FGS and an endline  
36 assessment. A mixed-method approach was applied to data collection involving health workers  
37 in two schistosomiasis endemic districts and health workers across the country. NVIVO 12 and  
38 STATA 14 were used for qualitative and quantitative data analysis, respectively.

39 **Results:** Prior to the intervention, the level of awareness about FGS among health workers was  
40 less than 8%, and most participants only understood FGS as merely urogenital schistosomiasis  
41 in females.

42 In response to this gap, an FGS education intervention in the form of training of health workers,  
43 student nurses alongside the distribution of FGS educational materials were carried out. The  
44 intervention enhanced health workers' awareness of FGS to more than 61%, encompassing an  
45 enhanced understanding of the disease's signs and symptoms to more than 60% , as well as its  
46 management strategies.

47 Nevertheless, a key challenge remains in ensuring access to praziquantel, the primary  
48 medication for treating and preventing schistosomiasis.

49 **Conclusions:** The FGS intervention has improved health workers' awareness and  
50 understanding of FGS. However, there is still a need for expanded training of health workers  
51 as well as improvement in the access to praziquantel to facilitate FGS management. In addition,

52 a holistic strategy encompassing all stakeholders at the individual, community, and health-  
53 system levels is required to improve the general knowledge and management of FGS.

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56 **Keywords:** Neglected Tropical Diseases, Schistosomiasis, Female Genital Schistosomiasis,  
57 Mass Drug Administration, Ghana.

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59

## 60 **Introduction**

61 One of the most prevalent Neglected Tropical Diseases (NTDs) in Sub-Saharan Africa (SSA)  
62 is called schistosomiasis, bilharzia or “snail fever.” Schistosomiasis is a parasitic disease that  
63 affects men, women and children living in tropical regions. Endemic in 78 countries, this  
64 disease affects more than 250 million people with approximately 90% of the disease burden  
65 found in Africa (1,2). Disease transmission occurs through contact with freshwater bodies  
66 where aquatic snails breed and releases the parasite that burrows through the skin in contact  
67 with water. Regular daily activities (washing, bathing, gathering water, swimming) put adults  
68 and children at continuous risk of infection. Current strategies to control schistosomiasis focus  
69 on preventive chemotherapy using donated praziquantel (1,2).

70 When a young girl or woman is infected with schistosomiasis, the worms mate producing  
71 millions of eggs every day inside her body. In the case of *S. haematobium*, the eggs are released  
72 into the genito-urinary tract embedding in the tissue causing inflammation that results in a  
73 granulomatous response around the eggs causing Female Genital Schistosomiasis (FGS)(3).

74 Thus, FGS is a gynaecological disease caused by untreated urogenital schistosomiasis. FGS  
75 results in abdominal and pelvic pains, disorders of menstruation, pain during intercourse,

76 vaginal bleeding after intercourse, inflammation of reproductive organs, genital lesions,  
77 miscarriage, ectopic pregnancy and infertility (4).

78 Increasing evidence shows that a woman with FGS has a threefold increased risk of HIV  
79 infection when she becomes sexually active (5–7). Timely treatment can prevent the disease  
80 and reverse some of the associated biological risk factors even in chronic infection (8).

81 Nonetheless, FGS remains one of the most important neglected areas in women’s and girls’  
82 health globally. An estimated 56 million women have FGS, nearly all in SSA (9). This infection  
83 is a greater concern for women and girls as their gender roles put them at a higher risk of being  
84 in contact with infested waters when completing household chores (10).

85 However, in Ghana, health workers' awareness of FGS and its associated consequences is  
86 lacking, and unfortunately even in places where the disease is endemic (11,12).

87 This study, therefore, conducted an implementation study to identify and address the FGS  
88 knowledge gap among health workers in Ghana. This involved a baseline assessment to  
89 examine the knowledge and understanding of FGS among health workers followed by an FGS  
90 intervention in the form of training and provision of educational materials to health workers.

## 91 **Methods**

### 92 **Study Design**

93 This was a 3-year (2020 -2022) implementation study applying a pragmatic uncontrolled quasi-  
94 experimental study design (pre and post-intervention) design. This paper is part of a bigger  
95 study called “FGS Accelerated Scale Together (FAST) Transition to scale project: improving  
96 women’s health by reducing morbidity from female genital schistosomiasis in Ghana (FAST  
97 Project)”. The main aim of the FAST project was to improve adolescent girls and women’s  
98 health by reducing morbidity associated with FGS through preventive and curative efforts.



99 For this aspect of the paper, we report the study activities that involved health workers in three  
100 phases of the study as described below:

### 101 **Phase 1: Pre-intervention**

102 This phase was a baseline assessment of the FGS knowledge gap among health workers in the  
103 country.

104 Firstly, interviews were held with health workers including directors of health and medical  
105 superintendents in two schistosomiasis-endemic districts in Ghana: North Tongu District and  
106 the Weija-Gbawe Municipality. The two districts were selected because they have several  
107 communities along the Volta Lake (the largest artificial reservoir in the world) and Weija Dam  
108 (the second largest water reservoir in the country after the Volta reservoir), where the Ghana  
109 Health Service reports that schistosomiasis prevalence is at least 80% (13). Hence, these  
110 regions were chosen for the interviews to learn about the knowledge gaps among health  
111 workers, which can then be applied to other regions.

112 Secondly, we engaged relevant stakeholders such as Ghana Neglected Tropical Diseases  
113 Programme (NTDP) to identify policy gaps in FGS control. Following the discussions, the  
114 Ghana National FGS Committee was established to work towards helping to integrate FGS  
115 into routine health services.

116

### 117 **Phase 2: Intervention**

118 Phase two was the implementation of FGS intervention activities which was based on the  
119 baseline assessment. Four main activities were undertaken:

#### 120 ***Online training of health workers***

121 The FAST Package team, together with the Geneva Learning Foundation, Bridges to  
122 Development, conducted an online, interactive, peer-to-peer training on FGS targeting

123 healthcare professionals. The goals of the training were to train healthcare providers to  
124 integrate FGS into their clinical practice so that they can improve women's reproductive health  
125 by decreasing the burden of FGS and to encourage learners to co-create solutions within their  
126 local context to address FGS.

127 Of the 119 applicants who participated in the online FGS course/training held between May  
128 and June 2021, 62 successfully completed the entire session. The participants were a mix of  
129 doctors, obstetrics and gynecology specialists, nurses/midwives, physician assistants, health  
130 information officers, nursing educators, and public health professionals and lecturers from the  
131 northern, middle-belt, and southern geographical regions in Ghana.

132 As part of the training, participants developed feasible action plans to integrate FGS into their  
133 practice and establish and maintain awareness in their context. The action plans were designed  
134 to reflect actions that could be undertaken without additional budgetary support and within the  
135 learners' own domains of influence.

### 136 ***Face-to-face Subject Matter Experts (SME) training***

137 To create a sustainable system of training healthcare providers within the health systems in  
138 Ghana, the FAST Package team, carried out a 3 day FGS training March 2022 to create a  
139 cohort of national FGS Subject Matter Experts. Individuals were first identified from the the  
140 online training program. These individuals had demonstrated intrinsic motivation to learn about  
141 FGS through their online participation. This resulted in a multidisciplinary range of training  
142 SMEs including obstetricians / gynecologists, doctors, nurses, midwives and health information  
143 officers. This training had 30 participants.

144 After the training, participants were given 100 copies (5 copies each) of FGS booklets to  
145 distribute to their constituents to help disseminate FGS awareness and management. Experts  
146 in the field of FGS, home and abroad, collectively developed the FGS booklet to fit the context

147 of Ghana. The content of the FGS book included the causes, treatment and prevention of  
148 schistosomiasis and FGS (9). All participants (trainees and facilitators) were officially  
149 recognized as SMEs on FGS through the awarding of certificates upon completion of the  
150 training.

### 151 ***Training of frontline health workers on schistosomiasis at endemic districts***

152 Training of frontline health workers was carried out in two schistosomiasis endemic districts  
153 (North Tongu and Weija-Gbawe Municipality). The total number of participants for the  
154 training was 116, of which 41 and 75 were from North Tongu and Weija-Gbawe Municipality  
155 respectively. After the training, 234 copies of the FGS booklets were distributed to health  
156 workers in North Tongu and 429 copies were distributed to health workers in Weija-Gbawe  
157 Municipality.

### 158 ***Face-to face training of health workers and students***

159 A series of FGS training of health workers and students in the nursing, midwifery and medicine  
160 was carried out by the SMEs in their various continuants. For instance, within the period, series  
161 of lectures on FGS was delivered to over 300 nursing students, 100 midwifery students and  
162 100 **medicine** students at UHAS, Ho in the Volta Region of Ghana. In addition, lectures on  
163 FGS were held for over 600 nursing and midwifery students at Nursing and Midwifery training  
164 college (NMTC), Berekum in the Eastern Region of Ghana.

165 Further, FGS presentations/education were made to about 700 health workers in the eastern  
166 region. The participants included: District directors of health, SHEP coordinators, nurses and  
167 NTD coordinators.

168 The Ghana National FGS Committee in collaboration with the Ghana NTDP organised  
169 schistosomiasis and FGS face-to-face awareness training for health workers in 15 districts in

170 the Volta, Western and Central regions of Ghana. Over 600 health workers were involved in  
171 the training on FGS.

### 172 **Phase 3: Post-intervention**

173 Phase three was the evaluation of the intervention. A cross-sectional mixed method approach  
174 was applied in data collection involving In-Depth Interviews (IDIs) with health workers as well  
175 as quantitative data of health workers in a pre- and post-training assessment format.

### 176 **Data Collection, Management and Analysis**

177 Graduate-level Research Assistants (RAs) who were trained for five days were used to collect  
178 the qualitative data. Interview guides were pretested before the actual data collection. The  
179 interviews were face-to-face, and the participants were purposively sampled to include  
180 Doctors, Nurses and Midwives based on their involvement in Obstetrics and gynaecology  
181 activities. A total of 4 IDIs and 16 IDIs were conducted at baseline and endline respectively.

182 All qualitative interviews (IDIs) were audio recorded and later transcribed. The transcripts were  
183 reviewed for accuracy and completeness. Guided by the objectives of the study and the themes  
184 from the transcripts, a codebook was developed. Thematic analysis was carried out using  
185 NVIVO 12 software to interpret themes or patterns in the data pertinent to the study aims.

186 In addition, quantitative data were collected from 116 training participants in the form of pre  
187 and post-training evaluations to determine the changes in FGS knowledge among the health  
188 workers. This was done among health workers in the schistosomiasis endemic districts of North  
189 Tongu and Weija districts. The quantitative data were collected using a paper-based  
190 questionnaire and then entered STATA 14.0 for cleaning and analysis. The data were analysed  
191 using simple frequencies and percentages.

### 192 **Ethical consideration**

193 Ethical clearance for this study was obtained from the GHS Ethics Review Committee (GHS-  
 194 ERC 003/04/21) and the University of Health and Allied Sciences Research Ethics Committee  
 195 (UHAS-REC A.5 [4] 20-21). Written informed consent was obtained from all respondents in  
 196 the study.

197

## 198 **Results**

199 This section presents quantitative results from pre- and post-training evaluations of health  
 200 workers from North Tongu and Weija districts as well as online training evaluation across  
 201 health workers in Ghana. The section also presents the qualitative findings from baseline and  
 202 endline IDIs from North Tongu and Weija districts.

203

### 204 **Socio-demographic characteristics**

205 Table 1 presents the sociodemographic characteristics of frontline Health workers from the  
 206 North Tongu and Weija districts who participated in the qualitative interviews (IDIs). The  
 207 majority of the participants at the endline were females and the average age of the participants  
 208 at baseline and endline was 34 and 48 years respectively.

209 *Table 1 : Sociodemographic characteristics of IDI participants*

Variable	Endline		Baseline	
	Freq (16)	Percent (100%)	Freq (4)	Percent (100%)
<b>Sex</b>				
Female	14	87.5	2	50
Male	2	12.5	2	50
<b>Rank</b>				
CHN	3	18.75	0	0
Medical Officer	3	18.75	2	50
Medical Superintendent	1	6.25	2	50
Midwife	2	12.5	0	0
Nurse	5	31.25	0	0
Physician Assistant	2	12.5	0	0

<b>Education</b>				
Degree	6	37.5	0	0
Diploma	7	43.75	0	0
Masters	3	18.75	4	100
<b>Average age</b>	34		48	
<b>Average number of years of services</b>	5		8	

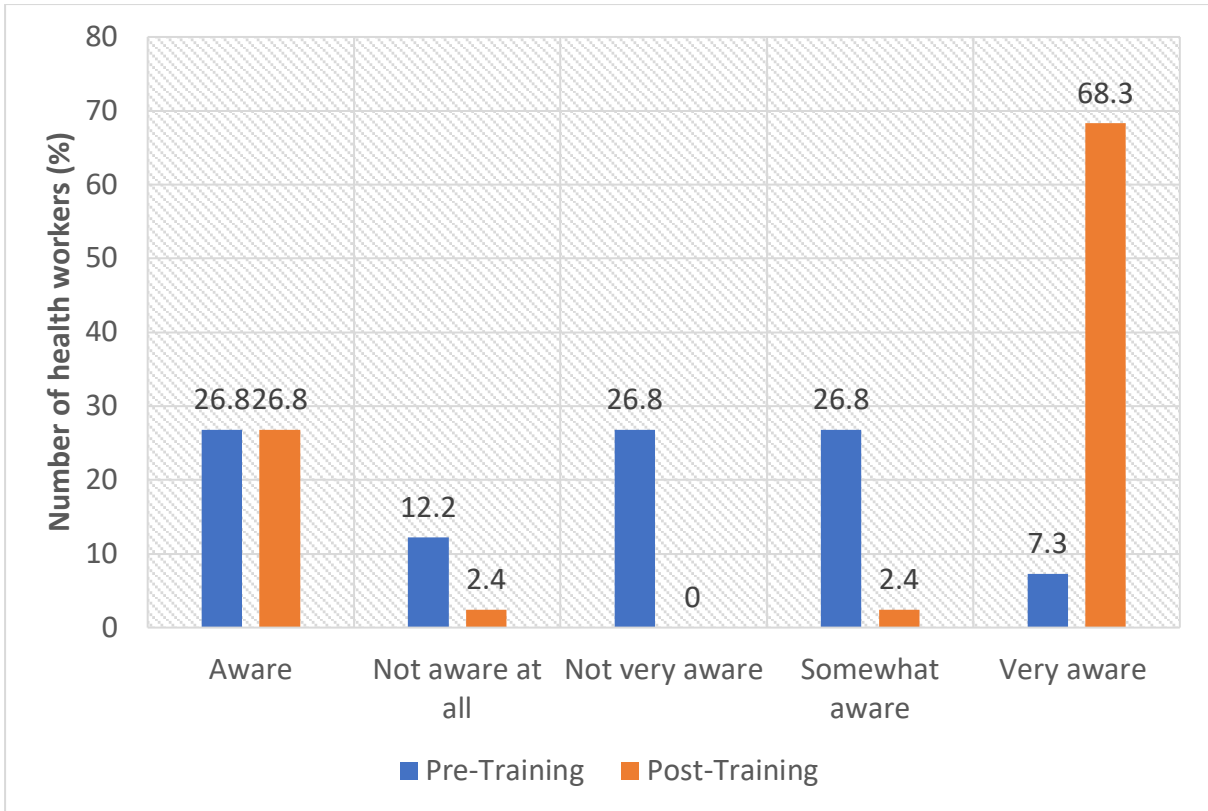
210

211 **Awareness about schistosomiasis and FGS**

212 In the quantitative assessment in the two schistosomiasis endemic districts, the results showed  
 213 that before FGS training, health workers' level of awareness (very aware) about FGS was less  
 214 than 8% (North Tongu 7.3%; Weija 4.1%). Nonetheless, after the FGS training, more than 68%  
 215 (North Tongu 68.3%; Weija 69.4%) of the participants mentioned that they were now very  
 216 aware of FGS (Figure 1 and 2), representing more than 61% improvement in the level of level  
 217 of awareness of FGS.

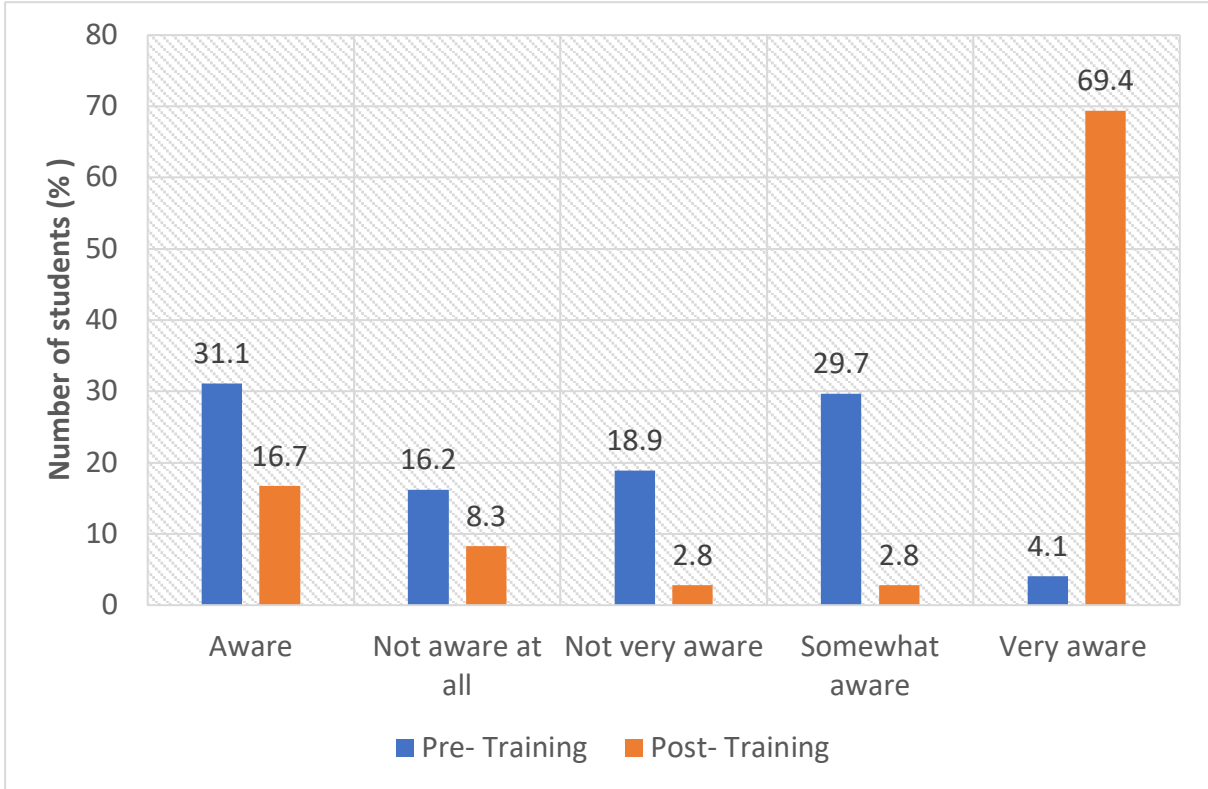
218 Similarly, in the qualitative assessment, the majority of the health workers who participated in  
 219 the baseline and endline assessments indicated that they had heard of schistosomiasis.  
 220 However, with regard to FGS, the knowledge level was low before the FGS training  
 221 intervention. Furthermore, some of the health workers confessed that before the FGS training,  
 222 they were not aware that women can get schistosomiasis and therefore they did not know about  
 223 FGS prior to the training. They therefore acknowledged that the FGS intervention (FGS  
 224 training and FGS booklet) has improved their competencies around FGS. These results suggest  
 225 that the FGS training was effective in raising health workers' awareness of FGS.

226 **Figure 1: Awareness about schistosomiasis and FGS (North Tongu)**



227  
228

229 **Figure 2 : Awareness about schistosomiasis and FGS (Weija)**



230  
231  
232

233 “Before this training, I knew nothing about FGS. What I knew about was the normal  
234 schistosomiasis (IDI-Health worker, North Tongu, Endline)”

235

236 “At first, I didn't know females get schistosomiasis. I knew about only the males. However,  
237 after the training, I am now aware of FGS...However, I did not get any FGS case after the  
238 training yet. In fact, I told one of my colleagues that I missed an FGS case because I  
239 encountered a lady before the FGS training and all the complaints she presented to me were  
240 related to FGS but because I was at that time not aware of FGS, I think I missed her. And  
241 there is no way I could trace her up (IDI-Health Worker, Weija, Endline).

242

#### 243 **Health workers knowledge in FGS diagnosis**

244 Following the implementation of a FGS training intervention, there was a significant increase  
245 in healthcare workers' ability to diagnose FGS. In North Tongu, the percentage of health  
246 workers reporting confidence in FGS diagnosis rose from 26.8% to 97.6%, demonstrating an  
247 impressive 70.8% improvement. Similarly, in Weija, the proportion of confident healthcare  
248 workers increased from 35.4% to 95.8%, representing a notable 60.4% rise (Table 2). These  
249 findings illustrate the positive impact of training on healthcare workers' capacity to diagnose  
250 FGS effectively. This improved diagnostic ability will ultimately lead to earlier detection and  
251 treatment of FGS, contributing to improved patient outcomes and enhanced public health  
252 efforts.

253

#### 254 **Health workers knowledge in FGS Recording in DHIMS 2 System**

255 The District Health Information Management System–2 (DHIMS 2) serves as the central  
256 database for capturing disease data within the healthcare system. However, prior to a recent  
257 training initiative, health workers lacked the necessary knowledge to identify and record



258 Female Genital Schistosomiasis (FGS) cases within the DHIMS 2 system. This resulted in an  
 259 underreporting of FGS prevalence within the region. Following the implementation of a  
 260 dedicated training program, a significant improvement in FGS data recording was observed.  
 261 Health workers indicated that the training equipped them with the necessary knowledge and  
 262 skills to effectively identify FGS cases and accurately record the information within the  
 263 DHIMS 2 system. Thus, knowledge to identify and record FGS increased by 100%(Table 2).

264 *Table 2 : Knowledge to diagnose, record and treat FGS*

	North Tongu		Weija	
	Pre-Training	Post-Training	Pre-Training	Post-Training
<b>Knowledge to diagnose FGS</b>				
No	30 (73.2)	1 (2.4)	42 (64.6)	3 (4.2)
Yes	11 (26.8)	40 (97.6)	23 (35.4)	69 (95.8)
Total	41 (100)	41 (100)	65 (100)	72 (100)
<b>Knowledge to treat FGS</b>				
No	30 (73.2)	2 (4.9)	48 (75)	0 (0)
Yes	11 (26.8)	39 (95.1)	16 (25)	71 (100)
Total	41 (100)	41 (100)	64 (100)	71 (100)
<b>Knowledge to refer FGS</b>				
No	24 (58.5)	0 (0)	26 (39.4)	4 (5.7)
Yes	17 (41.5)	41 (100)	40 (60.6)	66 (94.3)
Total	41 (100)	41 (100)	66 (100)	66 (100)
<b>Knowledge to record FGS</b>				
No	28 (68.3)	0 (0)	29 (44.6)	0 (0)

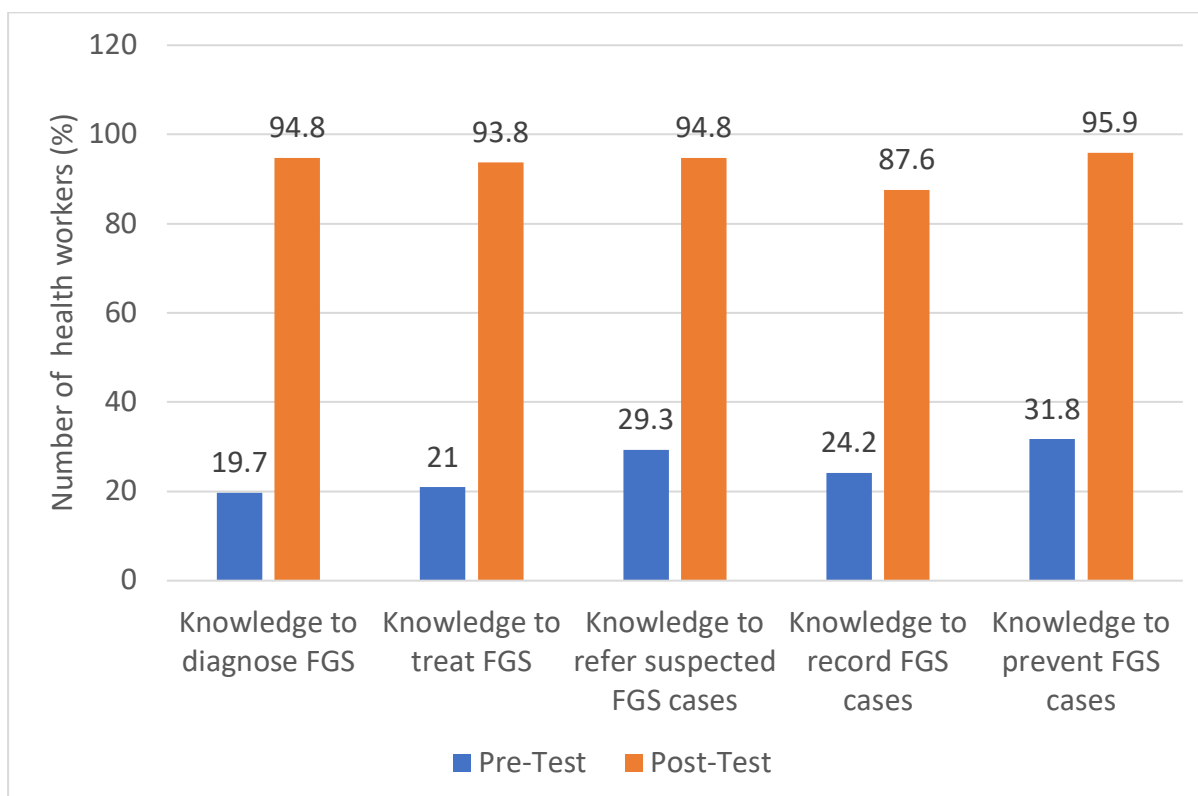
Yes	13 (31.7)	41 (100)	36 (55.4)	71 (100)
Total	41 (100)	41 (100)	65 (100)	71 (100)
<b>Knowledge to prevent FGS</b>				
No	22 (53.7)	0 (0)	24 (38.1)	0 (0)
Yes	19 (46.3)	41 (100)	39 (61.9)	71 (100)
Total	41 (100)	41 (100)	63 (100)	71 (100)

265

266 **Knowledge of FGS from Online Training**

267 Similarly, pre- and post-training evaluation of the FGS online training showed improvement in  
 268 knowledge to diagnose, treat, record and prevent FGS (Figure 3). For instance, there was a  
 269 75.1% increase in knowledge to diagnose, amongst those who completed the course (Figure  
 270 3).

271 *Figure 3: Knowledge of FGS from Online Training*



272  
273

274 **Scarcity of praziquantel hamper schistosomiasis and FGS treatment efforts**

275 Healthcare workers reported encountering difficulty in obtaining praziquantel, often finding it  
276 unavailable at both health facilities and pharmacies. This scarcity forced them to adopt  
277 alternative approaches, such as occasionally resorting to antibiotics as a treatment option. In  
278 some cases, they would prescribe praziquantel to patients, leaving them to independently  
279 search for and purchase the medication at pharmacies, where its availability was uncertain.

280

281 *“When they come to the health facility and we do not have praziquantel at the facility, I*  
282 *prescribe it to them to go buy from the pharmacy shop. Mostly we do not have praziquantel in*  
283 *the health facilities (IDI, Health Worker, Weija, Endline)”*

284

285 *“I think some of my colleagues sometimes give them antibiotics and painkillers if there is no*  
286 *praziquantel. Sometimes, after MDA, they give us the remaining praziquantel. If a patient*  
287 *comes and fortunately we have some, then we can give the praziquantel (IDI, Health Worker,*  
288 *North Tongu, Endline)”*

289

290 **FGS health seeking**

291 Health care workers highlighted the occurrence of delayed care-seeking for schistosomiasis  
292 among women, often due to a lack of awareness about the disease and its potential progression  
293 to FGS. These women often remain unaware of their infection until they present for antenatal  
294 care (ANC) services. Notably, during ANC examinations, trained health workers can identify  
295 suspected cases of schistosomiasis/FGS. This was exemplified by a medical superintendent  
296 who recounted an instance where he implemented routine testing for schistosomiasis during  
297 ANC, leading to the identification of multiple cases.

298

299 *“the very young ones do not know how they contracted it (schistosomiasis). ..like the routine*  
300 *tests that we do for the pregnant women, occasionally some of them test positive for*  
301 *schistosomiasis. I think we discharged a woman treated for FGS a month ago. I think we were*  
302 *just doing routine testing and then, schistosomiasis ova was present...”(IDI, medical*  
303 *superintendent, North Tongu).*

304

305 The cost of treatment for schistosomiasis and FGS presents a barrier to seeking appropriate  
306 care, particularly for vulnerable populations. Healthcare workers reported that many  
307 community members either forgo treatment entirely or resort to low-cost alternatives due to  
308 financial constraints. These alternatives, such as herbal remedies or delaying treatment until  
309 mass drug administration (MDA) campaigns, may not be effective and can lead to further  
310 complications. The high cost of treatment can be attributed to the scarcity of praziquantel, the  
311 primary medication for schistosomiasis and FGS, at both health facilities. This scarcity often  
312 forces individuals to seek treatment at **chemical** shops, where prices are typically higher.

313

314 *“Sometimes due to cost, parents do not treat the child when the child has schistosomiasis. They*  
315 *wait till it is time for MDA because, during that period, they can get it for free (IDI-Health*  
316 *worker, North Tongu, Baseline)”*

317

318

## 319 **Discussion**

320 Gender roles expose females to schistosomiasis and FGS and therefore the need for strategic  
321 interventions, particularly in schistosomiasis endemic communities. The study sought to use

322 an implementation design to identify and address the FGS knowledge gap among health  
323 workers in Ghana.

324 The findings of the study revealed that the level of awareness of urogenital schistosomiasis as  
325 well as some common symptoms of schistosomiasis such as blood in the urine was high among  
326 health workers. However, it was observed that at the time of baseline assessment and before  
327 FGS training intervention, very little was known about FGS awareness, diagnosis and  
328 treatment. This finding is in tandem with previous studies in Tanzania and Nigeria that reported  
329 high knowledge about schistosomiasis among healthcare workers but limited knowledge about  
330 FGS (14,15). FGS is frequently given little attention in medical education and continues to be  
331 poorly understood by health workers, which commonly results in FGS being misdiagnosed or  
332 mistakenly diagnosed as an STI or cervical cancer and then given improper treatment (9).  
333 Traditionally, urogenital schistosomiasis has been primarily associated with male symptoms  
334 and this focus on male-specific manifestations has led to the neglect of FGS, which primarily  
335 affects women and often presents with less obvious symptoms (16,17).

336 Nonetheless, due to the study intervention, the level of awareness and knowledge on diagnosis  
337 and treatment of FGS among health workers was reported to have improved within the period,  
338 demonstrating the impact of the intervention. Continuous FGS education among health workers  
339 is very important in controlling FGS. The Ghana National FGS Committee mentioned that they  
340 would continue with the in-service training of nurses across the country and will also engage  
341 the Nurses and Midwifery Council concerning curriculum revision to incorporate FGS  
342 diagnosis and management. With these initiatives, FGS discussion will be reinforced at the  
343 school and practice levels. Improved competency about FGS among health workers will  
344 facilitate the prevention, diagnosis and treatment/management of FGS and therefore calls for  
345 more efforts to sensitize health workers about FGS beyond this study.

346 The result also showed that the intervention has improved knowledge and skills to effectively  
347 identify FGS cases and accurately record the information in the DHIMS 2 system. This will  
348 data capturing skills obtained will ultimately provide a more accurate picture of FGS  
349 prevalence, enabling targeted interventions and improved patient care.

350 Although praziquantel is the recommended medication for the treatment and prevention of  
351 schistosomiasis and FGS in Ghana (18–21), access and use of the medication is a challenge.  
352 Praziquantel is usually not available at health facilities for the treatment of schistosomiasis(15).

353 This is not surprising given that praziquantel is a programmed medicine and it is only available  
354 during MDA and sparsely available in health facilities and pharmacies/drugs shops. In addition,  
355 those found at some of the pharmacies/drug shops are not affordable for community members.

356 For instance, the price of a single 600mg tablet of Praziquantel is about GHc50 ( USD5) and  
357 given that praziquantel is prescribed at a single dose of 40 mg per kilogram of body weight  
358 (9,18), if a child weighs 45kg, he or she will require as many as three tablets. The cost of  
359 treatment with praziquantel can be disastrous if a complete dose is considered, as single dose  
360 is more than three times the daily minimum wage (GH 14.88)(22) of a worker in Ghana. These  
361 findings highlight the need for continued efforts to address supply chain issues to ensure  
362 effective and accessible treatment for FGS patients (23).

363

### 364 **Conclusion**

365 There has been a lack of awareness and knowledge about Female Genital Schistosomiasis  
366 (FGS) among healthcare workers, leading to missed diagnoses and inadequate treatment. While  
367 the study intervention has improved some health workers awareness and the knowledge to  
368 diagnose and treat FGS, continued efforts are crucial to achieving greater impact.

369 We therefore recommend the following to expand FGS knowledge and awareness:

- 370 • Curriculum Integration: Incorporating FGS diagnosis and management into the training  
371 curriculum for healthcare workers at all levels is essential for equipping them with the  
372 necessary skills to identify and treat the disease.
- 373 • Equipped Facilities: Ensuring health facilities are adequately equipped with  
374 praziquantel, medical equipment, and supplies is crucial for effective diagnosis and  
375 treatment of FGS.
- 376 • Continued training and refresher courses: Providing ongoing training and refresher  
377 courses for healthcare workers helps ensure they stay up-to-date on the latest FGS  
378 information and treatment protocols.
- 379 • Public awareness campaigns: Raising public awareness about FGS symptoms, risk  
380 factors, and available treatment options is crucial for encouraging people to seek timely  
381 medical attention.
- 382 • Community Engagement: Engaging community leaders and health workers in raising  
383 awareness and promoting FGS prevention strategies can contribute significantly to  
384 reducing the disease burden.
- 385 • Collaboration and Partnerships: Fostering collaboration and partnerships between  
386 healthcare systems, research institutions, and NGOs can accelerate progress toward  
387 FGS elimination.

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