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Original Research Article

Knowledge and experience of healthcare workers during the COVID-19 pandemic: a cross-sectional study in Tema, Ghana

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ABSTRACT

Background: Coronavirus Disease 2019 is a pandemic caused by a novel human coronavirus previously known as 2019-nCov. Healthcare workers are essential in the response to and management of such infectious diseases.
Methods: A hospital-based cross-sectional study was conducted at Tema General Hospital, Ghana. Data was collected from healthcare workers using a structured questionnaire. Descriptive statistics was done for all socio-demographic characteristics of respondents. Level of knowledge about coronavirus disease and factors influencing participants' willingness to work were summarized as frequencies, percentages and charts. Chi-square test was used to test for association between level of knowledge and all independent variables.
Results: A total of 157 healthcare workers participated in this study. The news media (135, 85.99%) was the commonest source of information for participants. Almost half of participants (47.8%) had been tested for coronavirus disease, and 91.08% had sufficient knowledge about the disease. Occupation (p=0.047) was significantly associated with participants' level of knowledge. A total of 46.49% disagreed with adequacy of personal protective equipment provided, with 70.06% admitting they have had to use their own personal protective equipment at work. A sense of duty (20, 31.8%) and motivation (14, 22.2%) positively influenced participants' ability to work while challenges faced included fear of contracting and transmitting the virus (98.7%) and stigmatization (70.7%).
Conclusions: The healthcare workers had sufficient knowledge about coronavirus disease. Insufficient personal protective equipment was evident during the pandemic. Measures must be established to ensure that barriers to work are eliminated while factors that enhance work output are encouraged.

Keywords: Knowledge, Experiences, Coronavirus disease 2019, Pandemic, Healthcare workers

INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is a pandemic caused by a novel human coronavirus (SARS-COV-2) previously known as 2019-nCov.[1,2] Incidence of COVID-19 was initially made known in December 2019 among patients who exhibited symptoms of viral pneumonia in Wuhan, China.[3,4] The patients were found to have had contact with the Huanan seafood market in Wuhan, China, where other non-aquatic animals were also being sold before the COVID-19 pandemic.[5,6] The disease spread to other parts of the world with cases documented on all continents. Coronavirus disease was eventually characterized as a global pandemic by the World Health

Organization (WHO) in a press briefing on 11th of March, 2020.[7] As at 20th September, 2020, the number of confirmed cases of COVID-19 worldwide was 30.6 million, with a resultant number of confirmed deaths being 950,000, depicting a death rate of 3.1%.[8] Ghana was also ranked the 5th country in Africa in terms of confirmed COVID-19 cases as at 20th September, 2020, with 45,877 infected cases and 297 confirmed deaths.[8] Healthcare workers (HCWs) are very essential in the response to, and management of such pandemics of infectious origin.[9] HCWs have a duty to work during a pandemic even when they are highly at risk of being infected. The risk of infection is increased for all categories of HCWs; both clinical and non-clinical staff.8 According to the Ghana Health Service (GHS), a total of 2,065 Ghanaian HCWs had been infected with the virus as at 9th July,2020, with six documented deaths.[10]

Effective response to pandemics depends on the ability and willingness of most uninfected HCWs to work relentlessly in spite of the risks they may face.[11] In the effort to contain the infection, delay the spread of infection, enforce contact tracing, obtain swabs for laboratory confirmation of cases and provide therapeutic and prophylactic treatment during pandemics such as COVID-19, HCWs are involved form the onset, and may be exposed together with their close contacts to direct confirmed cases.[9] The spread of the virus within healthcare facilities and the need for protection of HCWs who may be at risk of being exposed to the infection are important factors to be considered in this pandemic. It is however imperative for HCWs to have adequate knowledge and understanding on the possible transmission routes, the clinical manifestation of the disease, and preventive mechanisms. This is because HCWs may often be in close contact with infected persons and may be a major part of the infection transmission chain. Adequate knowledge on the prevention and protection procedures associated with COVID-19 could disrupt the transmission chain.[12] In battling a pandemic of such nature, it is also necessary to understand the knowledge base and experience of HCWs, particularly when there is widespread uncertainty with regards to the extent and severity of the pandemic. This information will be useful in informing and planning for a response to future pandemics.[9] Furthermore, some studies have revealed that lack of knowledge of HCWs about a pandemic may impede their ability to play an effective role in the response to and management of the pandemic.[13,14]

The willingness of HCWs to respond in situations of uncertainty and insecurity, during outbreaks, influences their availability and response to the need for ensuring containment of the outbreak.[15] Furthermore, experiences of HCWs have also been identified to influence their perception of risk which may have a significant impact on their response to a crisis. Experience of HCWs is often associated with their elevated risk perception, manageability of the threat posed by the pandemic, risk of transmission to future generations, direct personal impact and sense of control over events.[16]

HCWs have raised numerous concerns worth considering in the process of planning to ensure adequate workforce presence during a disease outbreak. Previous studies regarding HCWs' response to pandemics have generally not focused on their knowledge and experiences. Rather, most emphasis has been on the epidemiology of the infection in various settings, and issues such as health care demand, delivery and the need for emergency preparedness planning.[9,17,18] Hence the need to fill the research gap that exists on knowledge and experiences of HCWs at a treatment facility in Ghana on COVID-19. The study therefore sought to assess the knowledge and experience of HCWs at the Tema General Hospital (TGH) on COVID-19. Furthermore, factors that influenced their willingness to work and challenges encountered during the COVID-19 pandemic were examined.

METHODS

Study design and setting

A hospital-based cross-sectional study was conducted at TGH, Ghana from 14th June- 13th July 2020 to assess the knowledge and experience of HCW at the hospital during the COVID-19 pandemic. TGH is the largest public health institution in the Tema Metropolis which serves as the major referral centre for all other clinics in the metropolis and neighboring municipalities. TGH was one of the first treatment centres designated for the management of COVID-19 cases in Ghana (19).

Study population and sampling

Targeted population was HCWs of the TGH working during the COVID-19 pandemic. HCWs were categorized as physicians/medical doctors, pharmacy staff, nurses, laboratory/diagnostic staff, therapists/technicians, and administrative and support staff. A stratified random sampling (proportionate stratified sampling) technique was used to select respondents according to their job categories with the aim of obtaining a wide range of categories as possible, including a mix of age, sex and rank.

A sample size of 151 respondents was calculated with the formula

$$n= \frac{(z)^2*(p)(q)}{(d)^2}$$

Where n referred to the sample size, z referred to a Z-score of 95% with a confidence level of 1.96, and p referred to the proportion of participants with sufficient knowledge about the COVID-19 pandemic (0.89). A study conducted by Zhang et al in China showed that

89% of HCWs had sufficient knowledge about COVID-19 (20).

A sample frame (N) of 587 HCWs was obtained and categorized into various strata using professional groupings as the selection criterion. The strata of HCWs included; the physicians/medical doctors, pharmacy staff, nurses, laboratory/diagnostic staff, therapists/technicians and administrative and support staff. Each member of the various strata on the TGH staff list was serially numbered. Using a sample size (n) of 151, each stratum was multiplied by a sampling fraction (n/N) of 151/587 to determine, by proportionate to size, the number of respondents from each stratum. By simple random sampling technique and with the aid of a random number generator respondents were selected from each stratum.

Inclusion criteria

Staff of TGH who were on duty during the period of data collection and consented to be participants of the study were recruited.

Exclusion criteria

Staff of TGH who had been exempted from their duties due to the COVID-19 pandemic during the period of data collection such as national service personnel, interns from all departments, pregnant and lactating staff, drivers without assigned official vehicles, rotational nurses and residents were excluded from this study. Also, staff of TGH who were on annual and sick leave during the period of data collection were excluded from the study.

Data collection tool

A 56-item structured questionnaire was adapted from questionnaires of similar studies.[20–22] The questionnaire was pre-tested on 10 HCWs at TGH, and some questions were amended to ensure clarity accordingly. The HCWs who participated in the pilot study were excluded from the study. The questionnaire which is made up of four sections was administered in English.

Section A focused on social demographics. This section gathered general information such as age, sex, level of education, marital status, occupation and years of working experience.

Section B focused on HCWs' knowledge on COVID-19. Data on HCWs' sources of information on COVID-19 and HCWs who had been tested for COVID-19 were gathered. Knowledge of the HCW on the course of disease, mode of transmission and preventive measures were ascertained using 16 questions. Any correct response in relation to the 16 questions about the knowledge of COVID-19 was given one point. The total knowledge score ranged from 0 (no correct answer) to 16 (for all correct answers). A cut off mark of>11 (68.75%) showed sufficient knowledge and<11 indicated poor knowledge. Knowledge of the HCWs on the signs and symptoms and medications indicated for management of COVID-19 were also assessed.

Section C consisted of 11 items on a 5-point likert scale that examined factors that influenced HCWs ability to work. Open ended questions that sought to assess factors that motivated or demotivated the HCWs during the COVID-19 pandemic were also included in this section.

Section D also consisted of 10 items on a 5-point likert scale that focused on challenges faced by HCWs at a COVID-19 treatment facility. An open-ended question that sought to identify additional challenges the HCWs faced was also included in the section.

Four intern pharmacists were trained as data collectors. They sought consent from prospective respondents before administering the questionnaires.

Data analysis

Data from the questionnaires were entered into Microsoft Excel 2016 after checking for completeness and accuracy of the information. The data was cleaned and saved as Microsoft Excel file and exported to STATA 15.0 for statistical analysis. Socio-demographic characteristics of respondents were analyzed using descriptive statistics and percentages. Level of knowledge of HCWs about COVID-19 was summarized as frequencies and percentages. A Chi-square test was used to test for association between level of knowledge about COVID-19 and all the independent variables. Factors influencing the willingness of HCWs to work during the pandemic were summarized as frequencies, percentages and charts. Challenges HCWs face were summarized as charts.

RESULTS

A total of 157 HCWs participated in the study with a response rate of 100%. Over 70% of the participants were females. Table 1 shows the demographic characteristics of participants. The median age group was 21-30 years. Over 90% of the participants had attained tertiary education, and more than half of participants (95, 60.51%) were single. Majority of the respondents were nurses (61.15%) with the least category of participants being pharmacy staff (3, 1.91%).

More than half of the households (59.9%) had 1-5 members with most households having 1-5 adults (85.99%) and less than 6 children (95.5%). The largest household had 24 members.

Figure 1 shows that news media (135, 85.99%), social media (116, 73.89%) and official government websites and media (116, 73.89%) were the most common sources of information for HCWs on COVID-19, with journals being the least (42, 26.75%).

Table 1: The demographic characteristics of participants.

Variables	Number	Percentage (%)
Sex		
Male	39	24.84
Female	118	75.16
Age (years)		
21-30	84	53.5
31-40	48	30.57
41-50	17	10.83
50+	8	5.10
Level of education		
Primary	1	0.64
Secondary	7	4.46
Tertiary	149	94.90
Marital Status		
Married	59	37.58
Separated	2	1.27
Single	95	60.51
Widowed	1	0.64
Profession/Occupation		
Administrative and support staff	33	21.02
Doctor/Physician	15	9.55
Nurse	96	61.15
Pharmacy staff	3	1.91
Therapist/Technician	10	6.37
Work experience (years)		
0-5	91	57.96
6-10	28	17.83
11-15	19	12.1
16-20	10	6.37
20+	9	5.73
Means of transport		
Facility's Bus	3	1.91
Own Car	38	24.2
Public transport	95	60.51
Taxi	13	8.28
Walking	8	5.1

Table 2: Knowledge of healthcare workers at Tema General Hospital about COVID-19.

Variable	Frequency N (%)
Questions	
COVID-19 is a viral infection (True)	146 (92.99)
People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. (True)	145 (92.36)
The quarantine period is 2 weeks when one comes into contact with a suspected COVID -19 patient (False)	13 (8.28)
The quarantine period is 2 weeks when one comes into contact with a confirmed COVID -19 patient unknowingly (True)	140 (89.17)
COVID-19 vaccine is available for use (False)	129 (82.17)
There is currently no effective cure for COVID-19 but identifying early symptoms and providing supportive treatment can help most patients recover from the infections. (True)	147 (93.63)
Not all persons with COVID-19 will develop severe cases. Only those who are elderly, have chronic illnesses and are obese are more likely to be severe cases (True)	130 (82.80)

Continued.

Variable	Frequency N (%)
Eating or contacting wild animals would result in the infection by the COVID-19 virus. (False)	82 (52.23)
A person with COVID-19 cannot infect others when a fever is not present. (False)	139 (88.54)
The COVID-19 virus spreads via respiratory droplets of infected individuals. (True)	149 (94.90)
Uninfected persons can wear masks to prevent the infection by the COVID-19 virus. (True)	149 (94.90)
Children and young adults do not need to take measures to prevent the infection by the COVID-19 virus. (False)	145 (92.36)
To prevent infection by COVID-19, an individual should avoid going to crowded places. (True)	151 (96.18)
Isolation and treatment of people who are infected with the COVID-19 virus are an effective way to reduce the spread of the virus. (True)	153 (97.45)
Recovery period for a mild case of coronavirus disease is 14-16 days (True)	92 (58.60)
Recovery period for a severe case of coronavirus disease is 3-6 weeks (True)	72 (45.86)
Knowledge about COVID-19	
Insufficient	14 (8.92)
Sufficient	143 (91.08)

Table 2 describes the knowledge of healthcare workers about the COVID-19 Pandemic. All the participants had heard of COVID-19 with more than half (52.2%) receiving training on COVID-19. Almost half of the participants (47.8%) had been tested for COVID-19. Majority of participants knew how to prevent the spread of COVID-19 (97.5%). Over 90% of the participants had sufficient knowledge about COVID-19 (Table 2).

Knowledge about the signs, symptoms and medications for the management of COVID-19 is depicted in Table 3. Most of the participants (91.7%) knew that fever and cough were symptoms of COVID-19. More than half of the participants (56.7%) were able to identify 6-10 signs and symptoms. Most of the participants (77.7%) knew vitamin C was used in the management of COVID-19. Almost 90% of the participants were able to identify 0-4 medications for the management of COVID-19.

About half of the participants (49%) agreed that provision of incentives influenced their ability to work during the pandemic. Over 75% of the participants also agreed that the provision of personal protective equipment (PPE) for HCWs influenced their ability to work during the COVID-19 pandemic but almost half of them (46.49%) disagreed with the adequacy of PPEs provided. One hundred and ten (70.06%) of the participants indicated that they have had to use their own PPEs at work during the pandemic. Most HCWs (92.73%) had used their own face masks, while 15.45% had used their own boot covers. Other PPEs used included gloves (32.73%), face shields (29.09%), disposable scrubs (24.54%) and hair covers (28.18%). About 80% of participants agreed that availability of protocols for disease prevention and control in the hospital influenced their ability to work. Less than half of the participants (41.4%) agreed that infrastructure and physical condition of the facility is appropriate for infection prevention and control (Table 4).

As shown in Figure 2, over one-third of the participants (40.1%) indicated at least one factor that positively influenced their ability to work during the COVID-19 pandemic. Three most important factors indicated included a sense of duty (20, 31.8%), motivation for healthcare workers (14, 22.2%) and sympathy for patients (12, 19.1%).

As per Figure 3, one hundred and fifty (95.54%) participants agreed that fear of contracting the virus from the workplace was a challenge, and almost all participants (98.7%) agreed that fear of contracting the virus and transmitting it to family members was a challenge. Stigmatization by friends and neighbours was also a challenge faced by 70.7% of participants. About two thirds of the participants (61.14%) agreed that stigmatization from family was also a challenge, while 88.53% agreed that fear of encountering or taking care of a patient with COVID-19 unknowingly was also challenging.

Table 3: Signs, symptoms and medications for the management of COVID-19.

Variable	Frequency N (%)
Signs and symptoms	
Fever	144 (91.72)
Headache	130 (82.80)
Cough	144 (91.72)
Running nose	113 (71.97)
Nasal congestion	88 (56.05)

Continued.

Variable	Frequency N (%)
Fatigue	111 (70.70)
Muscle pain	53 (33.76)
Joint pain	44 (28.03)
Difficulty in breathing	134 (85.35)
Loss of appetite	55 (35.03)
Diarrhea	45 (28.66)
Smell disturbances	83 (52.87)
Skin rashes	11 (7.01)
Epigastric pain	23 (14.65)
Knowledge about signs and symptoms of COVID-19	
0-5	37 (23.57)
6-10	89 (56.69)
>10	31 (19.75)
Medications	
Hydroxychloroquine	86 (54.78)
Doxycycline	15 (9.55)
Chloroquine	47 (29.94)
Enoxaparin	6 (3.82)
Azithromycin	75 (47.77)
Zinc	55 (35.03)
Vitamin C	122 (77.71)
Methylprednisolone	11 (7.01)
Knowledge about medications for management of COVID-19	
0-4	140 (89.17)
>4	17 (10.83)

Table 4: Factors that influence the ability of healthcare workers to work during the COVID-19 pandemic.

Variables	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
	N (%)	N (%)	N (%)	N (%)	N (%)
Incentives are provided by the institution for workers	38 (24.20)	39 (24.84)	13 (8.28)	32 (20.38)	35 (22.29)
Motivation/Incentives for various categories of healthcare workers is fair	47 (29.94)	28 (17.83)	10 (6.37)	43 (27.39)	29 (18.47)
PPEs are supplied/provided for workers	44 (28.03)	81 (51.59)	10 (6.37)	17 (10.83)	5 (3.18)
PPEs provided/supplied for workers is adequate	35 (22.29)	36 (22.93)	13 (8.28)	54 (34.39)	19 (12.10)
There are protocols for disease prevention and control in the institution	53 (33.76)	73 (46.50)	13 (8.28)	15 (9.55)	3 (1.91)
Information dissemination on COVID-19 by the institution is adequate	26 (16.56)	65 (41.40)	20 (12.74)	38 (24.20)	8 (5.10)
Training on COVID-19 for staff is adequate	25 (15.92)	49 (31.21)	20 (12.74)	49 (31.21)	14 (8.92)
There is an incentive COVID-19 insurance policy for staff	32 (20.38)	37 (23.57)	31 (19.75)	26 (16.56)	31 (19.75)
Infrastructure and physical condi tion of the facility is approp-riate for infection prevention and control	23 (14.65)	42 (26.75)	22 (14.01)	51 (32.48)	19 (12.10)
The facility assists staff to access transportation to and from work	23 (14.65)	29 (18.47)	21 (13.38)	45 (28.66)	39 (24.84)
The facility provides accommo dation for staff directly in contact with COVID-19 patients.	18 (11.46)	22 (14.01)	29 (18.47)	38 (24.20)	50 (31.85)

Table 5: Association between level of knowledge and demographics.

Variable	Knowledge N (%)		x^2	P value
	Insufficient	Sufficient		
Age (in years)				
21-30	9 (10.71)	75 (89.29)	1.3301	0.7220
31-40	4 (8.33)	44 (91.67)		
41-50	1 (5.88)	16 (94.12)		
>50	0 (0.00)	8 (100.00)		
Sex				
Male	2 (5.13)	37 (94.87)	0.9172	0.3380
Female	12 (10.17)	106 (89.83)		
Level of education				
Primary	0 (0.00)	1 (100.00)	3.5639	0.1680
Secondary	2 (28.57)	5 (71.43)		
Tertiary	12 (8.05)	137 (91.95)		
Marital status				
Single	9 (9.47)	86 (90.53)	4.6221	0.2020
Married	4 (6.78)	55 (93.22)		
Separated	1 (50.00)	1 (50.00)		
Widowed	0 (0.00)	1 (100.00)		
Occupation				
Administrative and support staff	5 (15.15)	28 (84.85)	9.6548	0.0470
Doctor/physician	0 (0.00)	15 (100.00)		
Nurse	6 (6.25)	90 (93.75)		
Pharmacy staff	0 (0.00)	3 (100.00)		
Therapist/Technician	3 (30.00)	7 (70.00)		
Working experience				
0-5	8 (8.79)	83 (91.21)	4.9295	0.2950
6-10	5 (17.86)	23 (82.14)		
11-15	1 (5.26)	18 (94.74)		
16-20	0 (0.00)	10 (100.00)		
20+	0 (0.00)	9 (100.00)		
Training				
Have received training	8 (10.67)	67 (89.33)	0.5411	0.4620
Haven't received training	6 (7.32)	76 (92.68)		

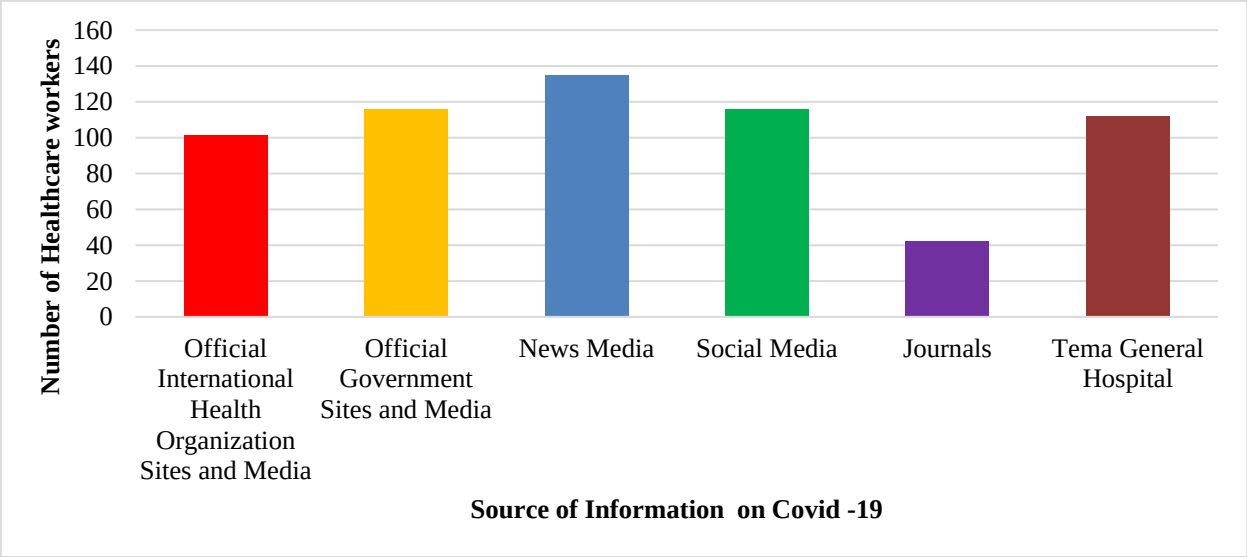

Figure 1: Sources of information on COVID-19 for healthcare workers at Tema General Hospital.

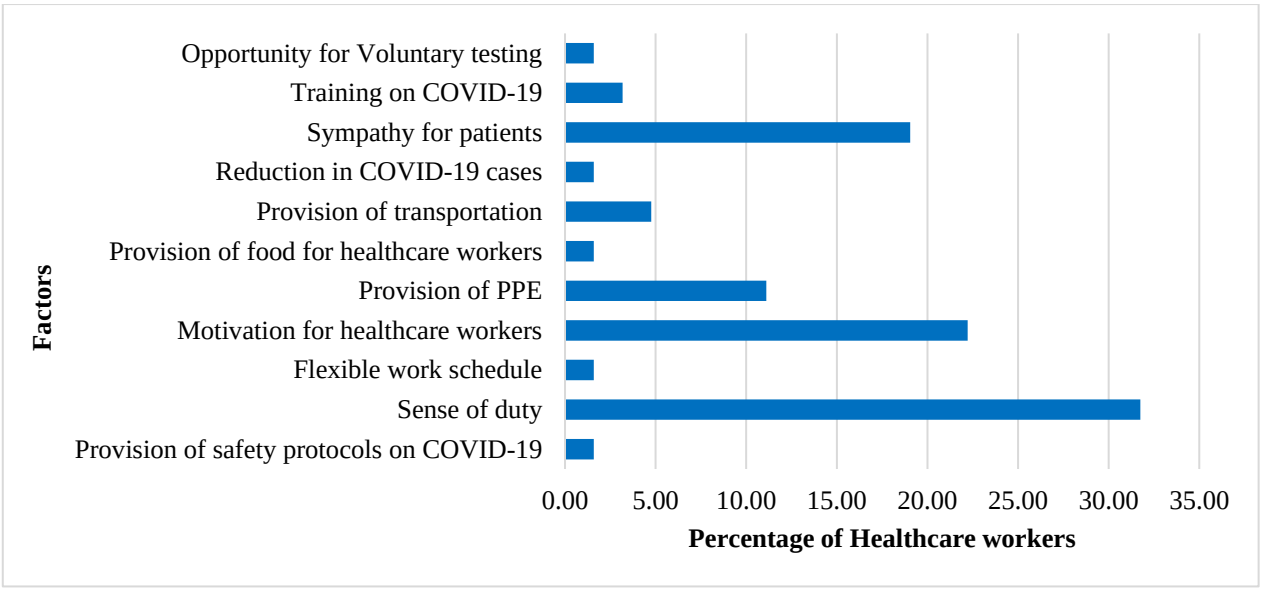

Figure 2: Factors that positively influence healthcare workers' ability to work during the COVID-19 Pandemic.

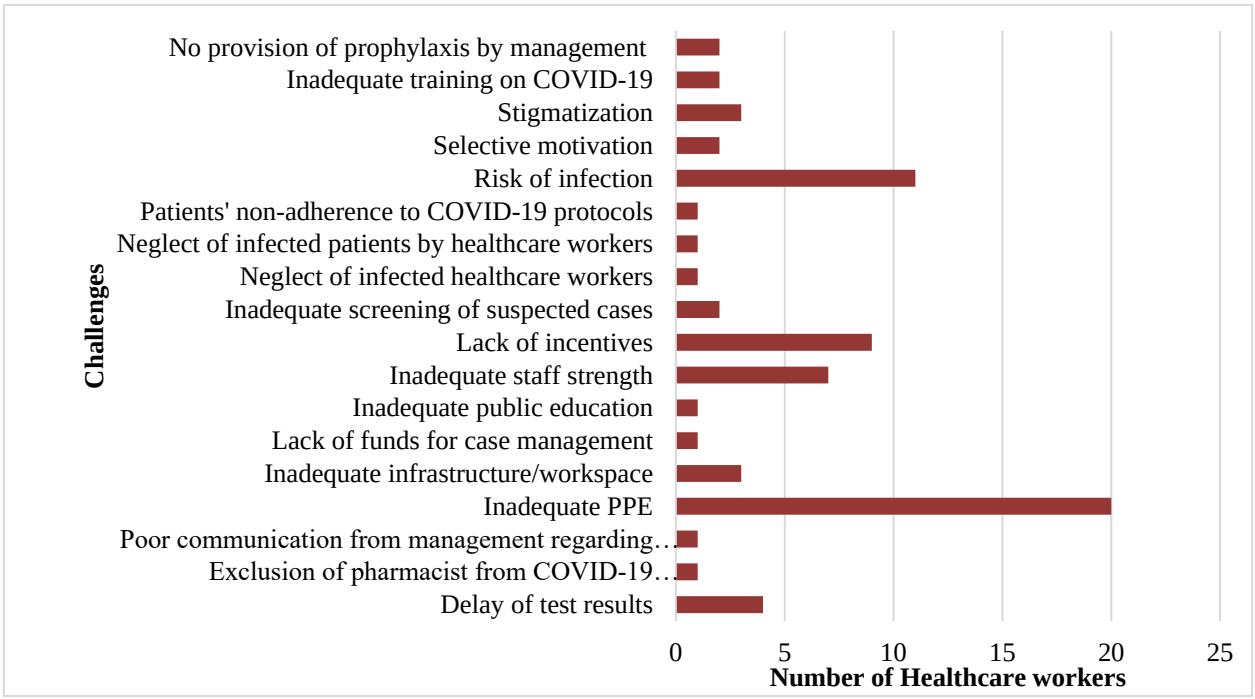

Figure 3: Challenges healthcare workers face at Tema General Hospital during the COVID -19 Pandemic.

More than a third of participants (38.2%) indicated at least one challenge they faced at the hospital during the COVID-19 pandemic when asked, with the four most important challenges being inadequate provision of PPE (20, 33.3%), lack of incentives (9, 15.0%), risk of infection (11, 18.3%) and inadequate staff strength (7, 11.7%).

The study also showed that occupation (p=0.047) was significantly associated with the level of knowledge of healthcare workers on COVID-19. However, age, sex, level of educational, marital status, working experience, and training were not significantly associated with the level of knowledge of participants about COVID-19 (Table 5).

DISCUSSION

This study assessed the knowledge and experience of HCWs at TGH, a COVID-19 treatment centre during the pandemic. A total of 157 participants filled the questionnaires, with a response rate of 100%. Participants included physicians/medical doctors, pharmacy staff, nurses, laboratory/diagnostic staff, therapists/technicians

and administrative and support staff. This gave a wide representation of both clinical and non-clinical staff of the hospital. Majority of the participants were females, young adults and had attained tertiary education, consistent with findings from similar studies conducted in Nigeria.[22,23] Nurses constituted the highest number of participants, which was in agreement with findings from a study conducted in South-south Nigeria.[22] This was in contrast with findings from similar studies conducted in Uganda and Nigeria where medical doctors were in the majority.[22,23] Most participants were single, commuted to work with public transport and had worked for less than 6years, which was not in conformity with findings from the study conducted in South-south Nigeria where most participants were married and commuted to work with private means of transportation.[6] The results also revealed that majority of the HCWs are young who have several active years in service ahead, therefore their safety and wellbeing especially during pandemics should be safeguarded. Majority of the participants being female is in agreement with statistics from the GHS where females constituted 68% of the workforce in the Greater Accra Region of Ghana.[24] There is also an assertion that females represent an overwhelming majority of the healthcare workforce worldwide.[25,26]

The study revealed that, majority of the HCWs' sources of information on COVID-19 was the news media (135, 85.99%), social media (116, 73.89%), official government websites and media (116, 73.89%) while information from journals was the least (42, 26.75%). This was consistent with findings from studies conducted in Iran and Pakistan.[21,27] Social media was mentioned by most HCWs as their source of information on COVID-19 in several similar studies which could be due to recent increase in access to social media, the ease of its use and increased appeal especially by young adults.[22,28–30] However, this may expose users to the risk of being misled, misinformed and burdened with overload of information. High patronage of official government websites and media by the participants in this study was in agreement findings from studies conducted in Uganda and Iran.[6,21] This was in contrast with findings from a study conducted in Nigeria where the most common source of information on COVID-19 for participants was from colleagues.[22]

All the participants had heard about COVID-19, which was higher than findings from similar studies conducted on HCWs where less than 100% of the participants had heard about COVID-19.[30,31] This study revealed that the HCW had high knowledge about COVID-19, with 91.8% demonstrating sufficient knowledge. This was in agreement with a similar study conducted in Peshawar Pakistan, where 90.7% of the participants had sufficient knowledge about COVID-19.[31] However, the proportion of HCW who had sufficient knowledge on COVID-19 in this study was higher than that obtained in similar studies conducted in Vietnam (88.4%) and Uganda (82.4%), although participants in those studies also demonstrated sufficient knowledge on COVID-19.[6,30] This was in contrast with findings from a similar study conducted in India, where the HCWs demonstrated insufficient knowledge.[28]

Over 90% of the participants had sufficient knowledge on the need for isolation and quarantine, provision of supportive care for infected individuals, mode of spread of the infection via respiratory droplets, prevention of infection by wearing face masks and avoiding crowded places and the need for both children and young adults to take precautions to prevent spread of infection. This was consistent with findings from studies conducted in China, Iran and Pakistan where respondents also demonstrated sufficient knowledge in prevention of the infection by wearing masks, restricting travel to infected areas, isolation of infected patients, and provision of supportive care for infected persons.[21,31,32] However, majority of the HCWs demonstrated insufficient knowledge about the recommended quarantine period and duration of recovery for both mild and severe cases of COVID-19, which contrasted with participants' responses to similar questions asked in studies conducted in Uganda and Vietnam where participants demonstrated a high knowledge about period of quarantine and duration of recovery.[6,30]

Majority of the participants knew fever and cough were symptoms of COVID-19, with few aware of the atypical signs and symptoms such as joint pain, diarrhoea, epigastric pain and skin rashes. Most participants also identified vitamin C as useful in the management of COVID-19. This was in agreement with a study conducted in China where most participants had a high awareness of the main symptoms and treatment of COVID-19 while they demonstrated low knowledge of the atypical symptoms.[33] Knowledge has a direct influence on the practice and work output of HCWs, with sufficient knowledge providing a basis for good practice.[34] Since HCWs are at the frontline in dealing with the pandemic, it is imperative that they are fully aware of all the necessary information that pertains to COVID-19 including the associated risks.

It was observed that the type of occupation was significantly associated with knowledge, with both pharmacists and medical doctors demonstrating a higher knowledge on COVID-19, followed by the nurses. This was in contrast with studies conducted in Pakistan and Vietnam where pharmacists had higher knowledge on COVID-19 than the medical doctors and nurses.[30,31] The results were also in contrast with findings from the study conducted by Bhagavathula et al in India where medical doctors demonstrated higher knowledge than pharmacists. In a similar study conducted in Uganda however, there was no significance between knowledge and the various occupations of HCWs.[6] It is important that pharmacists, medical doctors and nurses demonstrate higher knowledge during a pandemic since they are in direct contact with patients.

Most participants agreed that provision of incentives and PPEs for HCWs, availability of protocols for disease prevention and control, provision of transportation for HCWs and provision of accommodation for HCWs in direct contact with COVID-19 patients influenced their ability to work. Participants indicated that the most important factors that positively influenced their ability to work during the pandemic were a sense of duty, motivation from management and sympathy for patients. Similar findings were observed in similar studies conducted in Nigeria and United Kingdom where the HCWs pointed out factors such as availability of safety protocols, provision of PPEs, need to be assisted with transportation, motivation for HCWs and provision of incentives to influence their work.[13,22] However, in two other similar studies conducted in Birmingham and West Midlands UK, HCWs indicated mainly a sense of duty to influence their work during a pandemic.[9,11] It is essential for measures to be put in place to ensure factors that do not enhance HCWs willingness and ability to work are eliminated while factors that motivate them are enhanced.

Most of the participants agreed that inadequate provision of PPEs for HCWs, lack of incentives from hospital management, increase in workload, fear of contracting the virus from the workplace and transmitting it to family members, stigmatization by family, friends and neighbours, fear of taking care of a patient with COVID-19 were challenges faced whiles working during the pandemic. This was in agreement with findings from studies conducted in Nigeria and Saudi Arabia where inadequate provision of PPEs, risk of contracting the infection, stigmatization, increased workload and lack of testing were mentioned as challenges being faced by the healthcare workers.[35,36] In the study conducted by Huynh et al, fear of contracting the virus and transmitting it to family members was indicated by the HCWs as a challenge.[30]

Although a cross-section of HCWs were sampled for this study, there was one limitation. In order to reduce overcrowding and enhance social distancing in health facilities throughout the country, a memo was issued by the GHS. Directives from the memo exempted some categories of HCWs such as national service personnel, interns from all departments, pregnant and lactating staff, drivers without assigned official vehicles, rotational nurses and residents from reporting to work during the period of data collection. Hence, those HCWs were not available to be sampled as respondents.

CONCLUSION

HCWs at TGH had sufficient knowledge on COVID-19, with pharmacists, medical doctors and nurses showing higher knowledge. Continuous professional development programmes must be organized for the HCW with more focus on the areas that require improvement to ensure they all have adequate required knowledge on COVID-19. A sense of duty, motivation from management, sympathy for patients, lack of incentives, poor leadership, and inadequate provision of PPEs influenced most HCWs willingness to work. Increase in workload, risk of infection and stigmatization were challenges HCWs faced during the pandemic. Measures must be put in place to ensure that challenges and factors that do not enhance HCWs willingness to work are eliminated while factors that serve as motivators are enhanced.

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QUESTIONNAIRE

Dear Sir/Madam,

This study is being conducted at Tema General Hospital to elicit information on healthcare workers' knowledge, experiences and challenges while working in one of the first assigned COVID-19 treatment centres in Ghana during the pandemic. Results of the study could inform policy makers on putting together policies for the management of healthcare workers in the future.

You are assured that your identity will be treated confidentially. Please answer all questions as honestly as possible, to the best of your knowledge.

Please tick [√] or fill the blank spaces where applicable

Participant ID _____

Section A: Demographic data

1. Age:
   < 20years [ ] 21-30 years [ ] 31-40 years [ ] 41-50 years [ ] 50years and above [ ]
2. Sex:
   Male [ ] Female [ ]
3. Educational level:
   No formal education [ ] Primary [ ] Secondary/Vocational/Technical [ ] Tertiary [ ]
4. Marital status:
   Single [ ] Married [ ] Separated [ ] Divorced [ ] Widowed [ ]
5. Occupation/Specialty:
   Physician/Doctor [ ] Pharmacy [ ] Therapist/Technician [ ] Nursing [ ] Laboratory/Diagnostics [ ]
   Administrative and support [ ]
6. Years of working experience:
   0-5Years [ ] 6-10 years[ ] 11- 15years [ ] 16-20 years [ ] More than 20years [ ]
7. Means or transportation to work:
   Own car [ ] Rented taxi service [ ] Public transport [ ] Facility's bus [ ] Walking [ ] Other [ ]
   Please specify _____
8. Household information (Please state)
   Size of household: _____
   Number of Adults _____ Number of Children _____

Section B: Knowledge about COVID-19

9. Have you heard of the coronavirus disease? Yes [ ] No [ ]
10. What is/are your source(s) of information on COVID-19? Tick all that apply
    Official International health organization sites and media e.g. WHO, CDC [ ]
    Official government sites and media e.g. Ministry of Health [ ]
    News Media e.g. TVs, radios, Magazines, Newspapers [ ]
    Social Media e.g. WhatsApp, Facebook, Twitter, Instagram [ ]
    Journals [ ]
    The health facility [ ]
    Others [ ] Please Specify _____
11. Have you received any training in/by your institution on COVID-19? Yes [ ] No [ ]
12. Have you ever had a COVID-19 test? Yes [ ] No[ ]

- **Please tick the most appropriate answer to the following questions:**

No.	Item	True	False	I don't know
13	COVID-19 is a viral infection			
14	People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place.			
15	The quarantine period is 2 weeks when one comes into contact with a suspected COVID -19 patient			
16	The quarantine period is 2 weeks when one comes into contact with a confirmed COVID -19 patient unknowingly			
17	Covid 19 vaccine is available for use			
18	There is currently no effective cure for COVID-19 but identifying early symptoms and providing supportive treatment can help most patients recover from the infections.			
19	Not all persons with COVID-19 will develop severe cases. Only those who are elderly, have chronic illnesses and are obese are more likely to be severe cases			
20	Eating or contacting wild animals would result in the infection by the COVID-19 virus.			
21	A person with COVID-19 cannot infect others when a fever is not present.			
22	The COVID-19 virus spreads via respiratory droplets of infected individuals.			
23	Uninfected persons can wear masks to prevent the infection by the COVID-19 virus.			
24	Children and young adults do not need to take measures to prevent the infection by the COVID-19 virus.			
25	To prevent infection by COVID-19, an individual should avoid going to crowded places.			
26	Isolation and treatment of people who are infected with the COVID-19 virus are an effective way to reduce the spread of the virus.			
27	Recovery period for a mild case of coronavirus disease is 14-16 days			
28	Recovery period for a severe case of coronavirus disease is 3-6 weeks			

29. Are any of the following possible signs of coronavirus? Please tick all that apply
Fever [ ] Headache [ ] Coughing [ ] Sneezing [ ] Runny nose [ ] Nasal congestion [ ] Fatigue/tiredness [ ] Muscle pain [ ] Joint pain [ ] Difficulty in breathing [ ] Loss of appetite [ ] Diarrhoea [ ] Smell disturbance [ ] Skin rash [ ] Epigastric pain [ ]
30. Which of the following is/are indicated for use in the management of COVID-19
Hydroxychloroquine [ ] Doxycycline [ ] Clindamycin [ ] Chloroquine [ ] Enoxaparin [ ] Azithromycin[ ] Amoxycillin [ ] Zinc [ ] Magnesium[ ] Vitamin C [ ] Methylprednisolone [ ] I don't know [ ]

Section C: Factors that influence healthcare workers' ability to work

- **Please indicate to what extent you agree or disagree with the following statements:**

No.	Item	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
31	Incentives are provided by the institution for workers					
32	Motivation/Incentives for various categories of healthcare workers is fair					
33	PPEs are supplied/provided for workers					
34	PPEs provided/supplied for workers is adequate					
35	There are protocols for disease prevention and control in the institution					
36	Information dissemination on COVID-19 by the institution is adequate					
37	Training on COVID-19 for staff is adequate					
38	There is an incentive COVID-19 insurance policy for staff					
39	Infrastructure and physical condition of the facility is appropriate for infection prevention and control					
40	The facility assists staff to access transportation to and from work					
41	The facility provides accommodation for staff directly in contact with COVID-19 patients					

42. Has there ever been the need for you to use your own PPE at work? Yes [ ] No [ ]
43. If yes, which PPE did you use? Please tick all that apply
Gloves [ ] Face mask [ ] Face shield [ ] Disposable scrubs[ ] Hair cover [ ] Boot cover[ ]
Others [ ] Please speicify _____

44. What other factors influence your ability to work positively during the COVID-19 pandemic?

45. What other factors influences your ability to work negatively/demotivates you during the COVID-19 pandemic?

Section D: **Challenges faced by healthcare workers at a treatment facility**

- **Please indicate to what extent you agree or disagree with the following as challenges you face from working at a COVID-19 treatment facility during the pandemic**

No.	Item	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
46	Increase in healthcare worker to patient ratio					
47	Fear of contracting the virus from the workplace					
48	Fear of contracting the virus and transmitting it to family members					
49	Stigmatization by family					
50	Stigmatization by friends and neighbours					
51	Difficulty in accessing transportation to work					
52	Long travelling hours to work					
53	Fear of encountering or taking care of a patient with COVID-19 unknowingly					
54	Fear of being assigned to take care of a patient with COVID-19					
55	The need to take supplements as prophylactic immune boosters against COVID-19					

56. What other challenges do you face from working at a COVID-19 treatment centre?