Research Article

Assessing knowledge and awareness of COVID-19 among traders and sanitary workers in the Cape Coast Metropolis of Ghana

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Keywords: Knowledge, Attitude, Practice, COVID-19, sanitary workers, traders, Ghana

https://doi.org/10.29392/001c.77500

Journal of Global Health Reports

Vol. 7, 2023

Background

Since its emergence, Coronavirus Disease 2019 (COVID-19) has infected over half a billion people, killed over 6 million others, and ravaged the global economy on a scale that is unprecedented in recent history. In response, a global health emergency was launched that led to further disruptions in the ordinary way of life of people. The knowledge, attitudes, and practices (KAP) of people towards COVID-19 are central to infection control policies and the future course of the pandemic.

Methods

We employed an interviewer-administered, cross-sectional survey to examine the KAP of salespersons in a local market and sanitation workers of a public institution within the Cape Coast Metropolis of Ghana. Results were analysed by frequencies of responses for each KAP item on the questionnaire. Sociodemographic variables that predicted good knowledge of COVID-19 or preventive practices were determined using adjusted odds ratios (aORs).

Results

Out of the 206 participants, 123 (59.7%) obtained a knowledge score ⩾16.75 out of a total of 21, which was the threshold for good knowledge, while 41.3% were classified as possessing poor knowledge. On good attitudes towards COVID-19 prevention, 141 participants (68.4%) scored ⩾10.69 out of 12 to pass the threshold, while 31.6% had poor attitudes. Being female (aOR=6.19, P<0.001) or possessing a high school education (aOR=0.25, P=0.009) significantly predicted high knowledge scores. Being in the 15-30 age group (aOR=6.91, P=0.003) significantly predicted poor attitudes, while possessing a high school education (aOR=0.11, P<0.001) significantly predicted good attitudes.

Conclusions

The findings of this study underscore the need for intensified, targeted educational campaign on COVID-19 as the world prepares to live with the disease for the long while.

COVID-19, the disease caused by the novel coronavirus named SARS-CoV-2, was first reported in a group of infections linked to a wholesale food market in the Chinese city of Wuhan in 2019.[1] Symptomatic patients develop headaches, fever, dry cough, myalgia, fatigue, dyspnoea and diarrhoea, and a subset of these symptomatic patients progress to develop respiratory distress, septic shock, intractable metabolic acidosis and other haematological anomalies.[2-4] The high transmissibility, coupled with severe illness and death among some infected patients quickly projected the disease to pandemic status within three short months after its emergence. As at July 14, 2022, 2 ½ years later, the disease has infected over half a billion people and has been responsible for more than 6 million deaths globally, according to data from Johns Hopkins University Coronavirus Resource Centre, which has been tracking the spread of the virus.[5] In response, an unprecedented global health emergency was launched that saw closure of many international borders, entire cities and states put on lockdown and major changes in the ordinary way of life of people in hopes of breaking the transmission chain, with very little success. Additionally, the prohibitively high economic cost of such interventions have devastated

economies across the globe[6,7] and resulted in mass protests against strict containment measures.[8,9]

Worryingly, it now appears that COVID-19 has come to stay. The initial outbreak and panicked response resulted in a decline in infection rates, but many nations have since experienced multiple waves of infections. In the period between 4-10th July, 2022, over 5.7 million new cases of COVID-19 were reported to the WHO, representing a 6% increase in infection rates compared with the previous week.[10] Also troubling is the emergence of new SARS-CoV-2 variants with the potential to alter factors relating to transmissibility and severity of infections and/or immunity developed from past exposures or vaccination, which could determine the future course of the pandemic.[11]

Quite rightly, an endemic state of COVID-19 characterised by low transmissibility and a mild disease profile that is easily managed by the health care systems, and which now seems possible with the availability of effective vaccines, seems the pandemic exit strategy favoured by most countries.[12,13] However, the proportion of fully vaccinated members of the population of many countries remains low due not only to the immerse logistical challenge and economic cost associated with vaccinating the entire population multiple times to achieve full vaccination status but also increasing vaccine hesitancy driven by vaccine and COVID-19 disinformation.[14-17] Until acceptable vaccination rates have been achieved, the interventions that have been crucial in reducing transmission rates in this pandemic and previous infectious respiratory disease outbreaks, such as social distancing, enhanced hygiene protocols, including handshake avoidance, regular hand washing, cough etiquettes, disinfection of surfaces, and regular and correct use of personal protective equipment, must continue to be practiced. The success of these interventions depends on public knowledge, attitudes and practices (KAP) about the disease, i.e., its transmission modes, at risk groups and preventive strategies.[18,19] For example, a study conducted in Nigeria about knowledge and behaviour of participants to COVID-19 found good correlation between COVID-19 knowledge and adherence to official government infection prevention and control measures (IPCM). On the other hand, participants who believed in the protection offered by their deity, or who imagined that they had a low infection risk, were less likely to adhere to the protocols.[20] A similar study in Ghana found a good association between educational status and knowledge of IPCM – poorly educated participants having the least knowledge.[21]

The early outbreaks of COVID-19 in Ghana were driven largely by transmission in the market places and public spaces within institutions.[2] Long-term control of outbreaks will therefore require an understanding of the potential drivers of outbreaks in these locations; understanding that may be obtained by examining the changing KAP to the evolving COVID-19 situation. In this study, we investigate the KAP of salespersons in the local markets of the Cape Coast metropolis of Ghana and sanitation workers of the University of Cape Coast.

METHODS

This study was a, cross-sectional survey conducted in the period of February to April 2022 at the Abura Market within the Cape Coast Metropolis and University of Cape Coast. The participants at the market were shopkeepers and petty traders ("salespersons"), while participants at the University were employees of the university engaged in janitorial services ("sanitation workers"). The survey instrument – a questionnaire designed according to the guidelines recommended for the awareness and prevention of COVID-19 in Ghana by the Ghana Centre for Disease Control and prevention, and from KAP of previous infectious disease outbreaks in Ghana – was administered by students of the University of Cape Coast, who were trained in data collection techniques and COVID-19 safety protocols.

The major outcome variables of this study were knowledge of COVID-19 and attitudes and practices towards COVID-19 prevention. Knowledge of COVID-19 was based on responses to 25 items testing knowledge of at-risk people, transmission modes, available treatments, and preventive measures against the disease. A total knowledge score for each participant was calculated by scoring every correct response as 1 and an incorrect response as 0, and then summing up the scores. Each participant was classified as possessing good knowledge if they scored ⩾ the mean knowledge score of all participants and as possessing poor knowledge if they scored less than the mean knowledge score of all participants. Attitude scores were computed from responses to 12 items testing appropriate attitude or practice towards COVID-19 prevention. An attitude score was computed in the manner of the knowledge score and participants grouped into good attitude or poor attitude on the same basis for classification as in the knowledge classes.

The responses offered by participants to various knowledge and attitude items on the questionnaire were described using frequencies. The predictors of good knowledge of COVID-19 and good attitudes towards its prevention were assessed using crude and adjusted odds ratios for various sociodemographic variables of the participants. Significance at 95% CIs was set at 0.05.

Informed written consent was obtained from each participant before recruiting them into this study. In addition, ethical clearance (BMS/IRB/2021/028) was obtained from the Department of Biomedical Sciences, University of Cape Coast, Review Committee before commencing this work.

RESULTS

A total of 206 individuals, comprising salespersons in selected markets in Cape Coast and sanitation workers of the University of Cape Coast participated in this study. The male to female ratio was 65.5% to 33.5% with a combined median age falling in the 31-45 age class. Most of the participants (57.3%) were married, illiterate or attained only basic school education (a combined 61.1%) and Christian (82.5%) (Table 1).

Table 1. Sociodemographic characteristics of the study participants

Variable	Categories	Frequency	Percentage (%)
Gender	Male	137	66.5
	Female	69	33.5
Age	15-30	69	33.5
	31-45	101	49.0
	≥46	36	17.5
Marital status	Married	118	57.3
	Divorced	2	1.0
	Never married	88	41.7
Education status	Uneducated	33	16.0
	Primary	34	16.5
	Middle/JHS/JSS	59	28.6
	O-Level/A-Level/SHS /Tech/Vocational	68	33.0
	Tertiary	12	5.8
Religious identity	Christian	170	82.5
	Muslim	28	13.6
	Animist	3	1.5
	Other	5	2.4

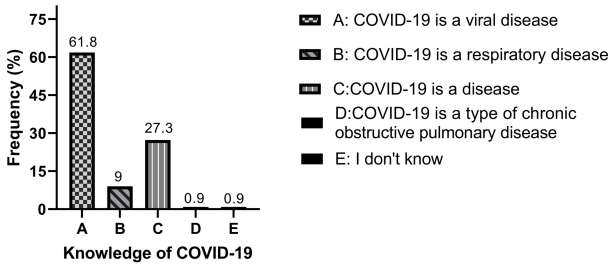

Figure 1.

Fig 1 presents responses to the question, "what is COVID-19" presented to 110 salespersons. Most of the participants (61.8%) identified COVID-19 as a viral disease. Nine percent (9%) of participants identified COVID-19 as a respiratory disease, while 27.3% identified it only as a disease. Only 0.9% identified COVID-19 as a type of chronic obstructive pulmonary disease, which indicates that participants had a high awareness of COVID-19 as a disease.

Table 2 presents knowledge of COVID-19 at risk population, transmission, symptoms, and current treatment options. A large majority of participants identified old age (96.1%) and having a history of chronic ailments (97.6%) as risk factors for contracting COVID-19. However, equally large majorities also identified 'being pregnant'(93.2%), 'being rich' (94.2%) and 'everybody is equally at risk' (98.1% of participants) as risk factors, indicating a general misunderstanding of risk factors for the disease.

With respect to the mode of COVID-19 transmission, all participants (100%) identified direct transmission through coughs and sneezes as a possible route. Large proportions of participants also identified transfer from contaminated surfaces (95.6%), close contact with infected persons (89.8%) and breathing contaminated air (96.6%) as other routes of transmission. Only 41 participants, representing 19.9% identified "eating expired foods" as a mode of transmitting COVID-19, indicating that participants had good knowledge of transmission modes of the disease.

When participants were asked about symptoms of COVID-19, 96.6% identified fever, dry cough and breathing difficulties as symptoms. About 70.9% of participants identified sore throat, blocked nose, and loss of the sense of smell as symptom. Only 9.7% of participants identified stomach upset as a symptom of COVID-19, indicating that participants were generally uninformed about the non-respiratory symptoms of the disease.

On knowledge of COVID-19 prevention, nearly all participants identified the five key prevention protocols, i.e., frequent handwashing under running water, wearing facemasks, abstaining from touching the face with unwashed hands, isolating infected persons, and maintaining social/physical distancing, as important. Frequent handwashing under running water was identified as important by 99% of participants. Abstaining from touching the eyes, mouth, and nose with unwashed hands as well as isolating persons infected with the disease were all identified as important by 99.5% of participants. All participants (100%) identified the wearing of facemask as important in COVID-19 prevention. Interestingly, 81.1% of participants stated that drinking and bathing herbal concoctions could protect against the disease, indicating that participants hold unproven beliefs about the efficacy of folk medicine in COVID-19 prevention.

Table 2. Knowledge of COVID-19 transmission routes, symptoms, prevention, and treatment

Knowledge	Answer categories	Frequency	Percentage (%)
Knowledge of at-risk people			
Old people	Yes	198	96.1
	No	8	3.9
Pregnant women	Yes	192	93.2
	No	14	6.8
Rich people	Yes	194	94.2
	No	12	5.8
People with pre-existing diseases such as cancer and diabetes	Yes	201	97.6
	No	5	2.4
All people are equally at risk	Yes	202	98.1
	No	4	1.9
Knowledge of COVID-19 transmission route			
Transfer through Coughs and sneezes	Yes	206	100
Transfer from contaminated surfaces	Yes	197	95.6
	No	9	4.4
Eating expired foods	Yes	41	19.9
	No	165	80.1
Close contact with infected persons	Yes	185	89.8
	No	21	10.2
Breathing contaminated air	Yes	199	96.6
	No	7	3.4
Knowledge of COVID-19 symptoms			
Fever, dry cough, breathing difficulty	Yes	199	96.6
	No	7	3.4
Sore throat, blocked nose, loss of smell	Yes	146	70.9
	No	60	29.1
Stomach upset	Yes	20	9.7
	No	186	90.3
Knowledge of COVID-19 prevention			
Frequent handwashing	Yes	204	99.0
	No	2	1.0
Not touching eyes/nose/mouth with unwashed hands	Yes	205	99.5
	No	1	0.5
Wearing face/nose mask	Yes	206	100
	No	-	-
Isolating infected persons	Yes	205	99.5
	No	1	0.5
Keeping physical/social distancing	Yes	202	98.1
	No	4	1.9
Daily drinking and bathing herbal concoctions	Yes	167	81.1
	No	39	18.9
Knowledge of treatment options for COVID-19			
Medical treatment	Yes	199	96.6
	No	7	3.4
Vaccine treatment	Yes	197	95.6

Knowledge	Answer categories	Frequency	Percentage (%)
	No	9	4.4
Spiritual healing	Yes	63	30.6
	No	143	69.4
Herbal treatment/Heat inhalation	Yes	163	79.1
	No	43	20.9
Certain death for infected persons	Yes	54	26.2
	No	152	73.8
Overall Knowledge Score	Good	123	59.7
	Poor	83	40.3

On knowledge of COVID-19 treatment options, a large proportion of participants (96.6%) identified medical treatment or a vaccine (95.6% of participants) as possible treatment options, indicating a misunderstanding of the preventive function of vaccines. About 79.1% of participants identified herbal treatment or heat inhalation as a treatment option, while 30.1% stated spiritual healing as a possible treatment option, indicating greater support for folk and traditional remedies over spiritual interventions in COVID-19 treatment. About 26.2% indicated that COVID-19 was untreatable and always resulted in death of infected persons, indicating that more than a quarter of participants misunderstood the course and resolution of the disease.

A threshold of "good knowledge of COVID-19" was set arbitrarily at a knowledge score, exceeding the mean score for all participants, found to be 16.7 (standard deviation, SD±1.52). Based on this, 59.7% of participants were grouped as possessing good knowledge of COVID-19 while the remaining 40.3% possessed poor knowledge.

Taken together, the results of COVID-19 knowledge among participants suggests that although participants had general awareness of the disease, its transmission, prevention and treatment, their knowledge was also tainted by inaccuracies and a belief in the efficacy of folk medicine in COVID-19 prevention and treatment.

Next, participants were asked about COVID-19 preventive measures initiated at home or workplace (Table 3). Most participants reported temporary self-isolation (93.2%), cleaning surfaces with disposable paper towels or napkins (94.2%), placement of hand disinfection items at the entrance to their homes or workplaces (94.2%) and disinfecting door handles (91.7%) as measures they initiated during the outbreak. Additionally, 61.2% of participants reported wearing facemasks all the time or some of the time (83.0% of participants) whereas 3.4% of participants indicated not wearing them at all during the outbreak. Most participants also reported washing hands with soap under running water (92.7%), avoiding handshakes (84.0% of participants) and eating more healthy foods (95.1%) as preventive measures initiated since the outbreak began.

The mean score for good attitude and practices towards COVID-19 was 10.7 (SD±1.71) out of the total 12 questions posed. Participants were classified as possessing good attitude and practices if their total attitude score was 11 or 12, and poor attitude if they attained a total score less than 11. Overall, 68.4% of participants who reached the threshold demonstrated good attitude and practices to disease prevention, while the remaining 31.6% failed to reach the threshold score and were grouped as having poor attitude and practices.

Together, the results of "good COVID-19 preventive attitudes" indicates that the participants initiated good preventive measures during the previous outbreak.

Concerning challenges participants faced in implementing COVID-19 preventive protocols or awareness creation, 65.5% identified COVID-19 denialism and denial of COVID-19 severity as problems faced in implementing preventive protocols (Table 4). Also, refusal to wear facemasks by other salespersons as well as shoppers constituted a challenge in implementing the preventive protocols for 65% of participants. Only 2.9% of participants reported unaffordability of facemasks as constituting a reason for refusal to use facemasks, while 45.1% of participants reported discomfort associated with wearing facemasks as accounting for the refusal. About 68.9% of participants reported no challenges in COVID-19 awareness creation.

Together, the results of challenges faced in implementing COVID-19 preventive measures indicate that poor attitudes or knowledge of COVID-19 by salespersons and shoppers alike constituted a problem.

Next, the factors that predicted good COVID-19 knowledge as well as good attitudes to COVID-19 prevention among participants were assessed. Good knowledge of COVID-19 mode of transmission, symptoms, preventive measures, and current treatment options were found to be significantly predicted by gender, age, and educational level when odd ratios were unadjusted. After adjustment of the odds ratios, gender and educational level remained as significant predictors (Table 5). Female participants were found to be 6.19 times more likely to possess good knowledge of COVID-19 than males (adjusted odds ratio, aOR=6.19, 95% confidence inerval, CI=2.76-13.56). Also, participants in Group 2 educational level, which included O'Level, A'Level, Senior High School and Technical or Vocational Education levels, were about 0.3 times less likely to possess poor COVID-19 knowledge than participants with no formal education (aOR=0.25, 95% CI=0.09-0.71). Marital

Table 3. COVID-19 preventive behaviours/practices initiated at home or workplace

Behaviour	Answer categories	Frequency	Percentage (%)
Temporary self-isolation	Yes	192	93.2
	No	14	6.8
Cleaning surfaces with disposable paper towels	Yes	194	94.2
	No	12	5.8
Placement of handwashing/disinfection items at entrance	Yes	194	94.2
	No	12	5.8
Cleaning surfaces with napkins	Yes	194	94.2
	No	12	5.8
Disinfecting door handles	Yes	189	91.7
	No	17	8.3
Being more conscious about protecting the hands, eyes/mouth/nose at work	Agree	185	89.8
	Disagree	10	4.9
	Disagree	11	5.3
Regular use of facemask	Agree	126	61.2
	Undecided	22	10.7
	Disagree	58	28.2
Occasional use of facemask	Agree	171	83.0
	Undecided	12	5.8
	Disagree	23	11.2
Never use facemask	Agree	7	3.4
	Undecided	5	94.2
	Disagree	194	94.2
Coughing or sneezing in a tissue or handkerchief	Agree	174	84.5
	Undecided	12	5.8
	Disagree	20	9.7
Regular washing of hands with soap under running water	Agree	191	92.7
	Undecided	4	1.9
	Disagree	11	5.3
Avoiding handshakes	Agree	173	84.0
	Undecided	16	7.8
	Disagree	17	8.3
Eating healthily	Agree	196	95.1
	Undecided	3	1.5
	Disagree	7	3.4
Overall Attitude Score	Good Attitude	141	68.4
	Poor attitude	65	31.6

status and religious affiliation did not significantly impact COVID-19 knowledge scores.

Both "Age Group" and "Educational Level" were found to significantly predict good attitude towards COVID-19 prevention when both the unadjusted odds ratios and adjusted odd ratios of association were considered. Participants in the 15-30 age group were 6.91 times less likely to possess good attitude to COVID-19 prevention compared with participants in the ⩾46 age group (aOR=6.91, 95% CI=1.94-24.62). Also, participants in the Group 2 level of education, which included O′Level, A′Level, Senior High School and Technical or Vocational education levels, were 0.11 times less likely to possess poor attitude to COVID-19 prevention (aOR=0.11, 95% CI=0.04-0.36) than participants who had no formal education. Gender of participants, marital status and religious affiliation did not significantly predict attitude to COVID-19 prevention.

Table 4. Challenges to implementing COVID-19 prevention measures at home and workplace

Variable	Answer categories	Frequency	Percentage (%)
COVID-19 denialism	Yes	135	65.5
	No	71	34.5
Denial of COVID-19 severity	Yes	135	65.5
	No	71	34.5
Refusal to use facemasks	Yes	134	65
	No	72	35.0
Unaffordability of facemasks	Agree	6	2.9
	Undecided	7	3.4
	Disagree	193	93.7
Discomfort of facemask use	Agree	93	45.1
	Undecided	14	6.8
	Disagree	99	48.1
No problems encountered in awareness creation	Yes	142	68.9
	No	64	31.1

Table 5. Predictors of COVID-19 knowledge

Variable		COR[1]	95% CI for COR		p-value[3]	AOR[2]	95% CI for AOR[2]		p-value[4]
			Lower	Upper			Lower	Upper	
Gender	Female	5.84	2.82	12.08	**<0.001**	6.19	2.68	13.56	**<0.001**
	Male	1							
Age					**0.005**				0.591
	15-30	1.40	0.57	3.48	0.464	2.46	0.74	8.17	0.141
	31-45	3.18	1.36	7.44	**0.008**	2.01	0.80	5.36	0.134
	≥46	1				1			
Marital status					0.403				0.903
	Divorced	1.87	0.11	30.91	0.663	0.66	0.02	28.17	0.822
	Married	1.47	0.83	2.61	0.187	1.17	0.50	2.73	0.745
	Never married	1				1			
Educational status					**0.002**				**0.013**
	Group 1	0.74	0.32	1.74	0.493	0.68	0.25	1.86	0.683
	Group 2	0.31	0.13	0.75	**0.009**	0.25	0.09	0.71	**0.009**
	Group 3	1.52	0.58	4.02	0.398	1.29	0.42	3.94	0.653
	Group 4	0.19	0.04	0.99	**0.049**	0.36	0.06	2.30	0.279
	Group 5	1				1			
Religion					0.655				0.991
	Christian	0.33	0.03	3.66	0.36	0.76	0.06	9.59	0.829
	Muslim	0.32	0.03	4.01	0.380	0.70	0.05	9.91	0.793
	Other	0.75	0.04	14.97	0.851	0.60	0.02	20.16	0.777
	Animist	1				1			

1COR, crude odds ratio; 2AOR, adjusted odds ratio; 3P-value, significance level of COR; 4P-value, significance level for AOR; Group 1, Middle/JHS/JSS educational level; Group 2, O'Level/A'Level/SHS/Technical/Vocational Educational Level; Group 3, Primary School level; Group 4, Tertiary educational level; Group 5, no formal education

DISCUSSION

This study assessed the predictors of correct knowledge, attitudes, and practices of salespersons in the markets of the Cape Coast Metropolis and sanitation workers of the University of Cape Coast. The major findings included that participants' knowledge of COVID-19 was found to be tainted with inaccuracies, and that participants' attitudes and practices to COVID-19 prevention were generally good. Also,

poor knowledge and attitude by other shoppers constituted a challenge for initiating good preventive practices or awareness creation, and that the demographic variables such as gender, age group and educational level significantly predicted correct COVID-19 knowledge and good attitude towards COVID-19 prevention.

When COVID-19 was confirmed in Ghana among a pair of travellers from Norway and Turkey on March 12, 2020, the government launched a raft of interventions that included heightened surveillance, contact-tracing, border closures and quarantine of arrivals in the country, which together with a massive public campaign in the media launched to provide the petrified citizenry information on preventing community spread of the disease, has been declared responsible for the relatively low case count and case fatality rate (CFR) for the country.[22,23] However, the unmitigated spread of the disease has ruled out any initial expectations of defeating COVID-19 by containment and elimination alone, and thus evolution to an endemic status now appears inevitable.[12,13] But living with COVID-19 in the long-term could be challenged by high infectivity of SARS-CoV2, the rapid emergence of newer vaccine resistant strains and high vaccine attrition rate. In the meanwhile, containment measures will be strongly aided by public understanding of preventive measures.

This study has found that despite the enormous efforts and resources put into COVID-19 education, misunderstanding of the transmission mode, poor knowledge of risk factors, prevention and treatment of the disease persists among a significant proportion of participants (Table 2). The proportion of participants with good knowledge of COVID-19, found in this study to be 59.7%, was higher than the value of 52.3% reported among Ethiopians in August 2021[24] but lower than figures reported from Afghanistan (approximately 72%)[25] and from Nigeria (99.5%)[20] recorded earlier in the pandemic. High socioeconomic status, including high educational level, has been previously established to be positively associated with high knowledge of COVID-19.[20,24-27] The participants of this study consisted of salespersons and sanitation workers, most with a high school education or lower, and many belonged in the lower socioeconomic class, which may account for the reduced knowledge score. Additionally, public educational campaigns on COVID-19 in the media have tended to be oversimplified in efforts to reach out to a universal population with diverse educational levels, resulting in confused and polarised discourse on the disease.[28] For example, stomach upset as a symptom of COVID-19 is rarely included in public announcements in Ghana, perhaps, because gastrointestinal symptoms have been rarely reported among COVID-19 cases in the country.[29]

Another factor that may have accounted for the reduced knowledge scores among participants of this study was the widespread belief in the efficacy of traditional medicine to both prevent and treat COVID-19. Drinking herbal concoctions or adding them to bath water was cited as an effective COVID-19 preventive method by 81.1% of participants, and a similar number indicated that these home remedies could treat the disease as well (Table 2). At the start of the pandemic, the efficacy of herbal preparations, steam inhalation and other unorthodox treatments for the disease was vigorously defended by desperate members of the public and even national governments, even though little to no scientific support for their efficacy was adduced.[30-32] In countries with weak health infrastructure and poor access to quality healthcare, or where patients' alternative treatment choices are uncritically promoted, unorthodox treatments and quackery are also common.[33-35] The danger of holding such beliefs is that they can impair public education on correct preventive practices and delay medical treatment for people infected by the disease. It is recommended that education campaigns on COVID-19 consider the impact of such beliefs on campaign efficacy.

Overall, participants initiated good COVID-19 preventive practices during the last outbreak, scoring a mean score of 10.69 (SD±1.71) out of 12. The proportion of participants crossing the threshold for classification as possessing positive COVID-19 preventive attitude was 68.4%, a figure lower than reported figures in China at the height of the global pandemic in 2020[36] or in Ethiopia a year later.[24] The reason for the lower figures may be due not only to the relatively lower level of COVID-19 knowledge among the participants but also the reported low level of fear of the disease or its outcomes among Ghanaians.[37] The case fatality rate (CFR) for Ghana at the height of the pandemic in June 2020 was reported to be 0.66%[2] compared with CFR of between 9-12% in North America and 14-19% in West and North Europe.[38] Hence, COVID-19 denialism or denialism of severity of the disease may be an underlying factor in negative attitudes to prevention. Indeed, 65.5% of participants in this study cited these factors as constituting challenges to implementing COVID-19 prevention measures in their homes or workplaces.

High educational status predicted good COVID-19 preventive practices (Table 6), possibly linked with good knowledge of COVID-19 mode of transmission, symptoms, preventive measures, and current treatment options (Table 5). Participants with a Senior High School or Vocational and Technical education were about 9 times significantly more likely to possess a positive attitude and good practices to COVID-19 prevention than participants who were not educated. This finding is in line with previous reports, which likewise found that high educational status significantly predicted positive COVID-19 preventive attitudes.[24-26,36,37,39,40] Respondents with a tertiary education qualification did not show this effect, although the small sample size of respondents in that category (5.8% of the total sample size) could make the analysis liable to type II error (i.e., false negative). Unsurprisingly, it is uncommon to find university-educated people engaged in janitorial services or employed as salespersons in local markets. However, the KAP of front office managers, receptionists, office assistants and similar portfolios, who also regularly interact with people may be recruited into future studies of this kind.

Interestingly, this study found that participants who were in the 15-30 age group were about 7 times significantly less likely to have a positive attitude to COVID-19 preventive measures than participants in the ⩾46 age

Table 6. Challenges to implementing COVID-19 prevention measures at home and workplace

Variable		COR[1]	95% CI for COR		p-value[3]	AOR[2]	95% CI for AOR		p-value[4]
			Lower	Upper			Lower	Upper	
Gender	Female	0.98	0.53	1.82	0.94	1.70	0.79	3.58	0.178
	Male	1				1			
Age					**0.004**				**0.006**
	15-30	4.32	1.60	11.71	**0.004**	6.91	1.94	24.62	**0.003**
	31-45	1.82	0.68	4.87	0.230	1.88	0.63	5.55	0.257
	≥46	1				1			
Marital status					0.072				0.642
	Divorced	0.001	0.001	-	0.999	0.56	<0.01	-	1.000
	Married	0.50	0.27	0.90	0.022	0.65	0.27	1.57	0.336
	Never married	1				1			
Educational status					0.118				**0.001**
	Group 1	0.70	0.29	1.67	0.417	0.37	0.13	1.02	0.055
	Group 2	0.35	0.14	0.87	**0.024**	0.11	0.04	0.36	**<0.001**
	Group 3	0.65	0.24	1.76	0.395	0.57	0.19	1.77	0.334
	Group 4	1.36	0.36	5.11	0.652	1.39	0.30	6.51	0.675
	Group 5	1				1			
Religion					0.976				0.661
	Christian	0.98	0.09	11.07	0.989	2.32	0.14	37.35	0.554
	Muslim	0.80	0.06	10.11	0.863	1.29	0.07	22.85	0.864
	Other	<0.01	<0.01	-	0.999	<0.01	<0.01	-	0.999
	Animist	1				1			

1COR, crude odds ratio; 2AOR, adjusted odds ratio; 3P-value, significance level of COR; 4P-value, significance level for AOR; Group 1, Middle/JHs/JSS educational level; Group 2, O'Level/A'Level/SHS/Technical/Vocational Educational Level; Group 3, Primary School level; Group 4, Tertiary educational level; Group 5, no formal education

group. Public awareness campaigns on COVID-19 often identify advanced age and pre-existing health conditions as risk factors for severe COVID-19. Individuals within the youthful age categories may feel immune to the disease and thus engage in negligent attitudes, which could promote spread of COVID-19. A study conducted in Nigeria reported that participants who were 50 years or younger were less likely to practice handwashing (a key positive attitude to COVID-19 prevention) than participants who were older than 50 years,[39] indicating that younger people were generally less concerned about observing the safety protocols than older people. Unfortunately, the evolving SARS-CoV2 might mutate to select younger members of the population, especially as early vaccines were offered only to people in older age groups and vaccine uptake by the younger population has been low. Recent figures by the Ghana Health Service indicates that the country may well be in its 5th wave of infections, and only time will tell if the country's infection profile is not substantially altered by the differences in attitude to preventive measures and vaccine uptake among the old and young population.

CONCLUSIONS

COVID-19 has wreaked grave health and economic havoc and disrupted the ordinary way of life of people across the globe, and the effects may continue to live with us for many years to come. A "new normal" way of living based on the knowledge that COVID-19 may never go away has shifted the global response to the disease from containment and elimination to reducing transmissibility, disease severity and CFR using a combination of vaccination, enhanced hygiene protocols and increased public awareness.

This study has shown that knowledge and attitudes, which inform practice of COVID-19 prevention protocols, remain low among critical sections of the Ghanaian population. In the previous outbreaks of the disease, the marketplaces were identified as common sources of infection. Thus, improved knowledge and attitude scores among salespersons in the markets and sanitation workers in public spaces are desired for effective transmission control. COVID-19 information for people with low or no formal education should be tailored to their level of understanding, while stressing the harm caused by misinformation and medical quackery. Greater efforts should be made towards awareness creation for members of the population younger than 30 years of age to improve both their knowledge and attitude scores. This is important because while it appears that the risk of symptomatic infection and serious disease and death remains low in people younger than 30 years, this age group could be a reservoir of infections for people in more vulnerable groups.

ACKNOWLEDGEMENTS

We thank the executive members of the Abura Market Women Association and of the University of Cape Coast Sanitary Workers Association for giving us permission to contact their members for data collection at their respective workplaces. We also thank all the participants who took part in this research work.

ETHICS STATEMENT

This study received clearance (BMS/IRB/2021/028) from the Department of Biomedical Sciences, University of Cape Coast Ethical Review Committee. Informed consent was obtained from all participants involved in the study.

FUNDING

There was no external funding for this work.

AUTHORSHIP CONTRIBUTIONS

AMU: conception, data collection, data analysis and manuscript writing
DLE: data collection, data processing and manuscript editing
JDK: data collection, methodology design, manuscript drafting
PQ: data collection, methodology design, manuscript drafting
IB: data analysis, manuscript editing
MBU: data processing and analysis, manuscript drafting and editing
KOA: data analysis, manuscript drafting and editing
FTD (Principal Investigator): conception, data collection, data analysis, manuscript writing

DISCLOSURE OF INTEREST

The authors completed the ICMJE Disclosure of Interest Form (available upon request from the corresponding author) and disclose no relevant interests.

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Submitted: November 14, 2022 GMT, Accepted: April 15, 2023 GMT

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