

Assessing Preparedness of Ghanaians for Future Infectious Disease Outbreaks: COVID-19 Experience

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Abstract *The COVID-19 pandemic exposed preparedness gaps and reinforced the role of individual and household behaviours in preventing infectious disease transmission. This study assessed preparedness for future outbreaks among adults in Ghana, using lessons from the COVID-19 experience. A community-based cross-sectional mixed-method study was conducted among 1,307 adults in six districts across the Ashanti, Greater Accra, and Savannah regions, using purposive and cluster sampling. Data were collected with a semi-structured questionnaire covering socio-demographic characteristics, knowledge, attitudes, preventive practices, access to health services, and health information sources. Preparedness was measured using a composite knowledge, attitudes, and practices (KAP) score. Quantitative data were analysed using descriptive statistics, multivariate regression, and mediation analysis, while qualitative responses were examined using deductive thematic content analysis. Respondents demonstrated moderate preparedness, with preventive practices stronger than disease-specific knowledge. Reported behaviours included COVID-19 vaccination (70%), LLIN use among children (91%) and adults (87%), handwashing with soap and water (70%), rabies vaccination for dogs (94%), mask use and avoidance of sick people during outbreaks (60%), health facility visits when sick (75%) and keeping essential supplies for at least 72 hours (52%). Preparedness seemed associated with sex, residence, access to vaccines, LLINs and health facilities, and credible health information, which may have mediated socio-demographic influences. Persistent gaps included vaccine safety concerns, LLIN use, reporting of unusual health events, and access to hygiene facilities and preventive resources. Strengthening health literacy, trusted risk communication, community engagement, and equitable access to routine preventive services may improve preparedness for future infectious disease outbreaks.*

Keywords Attitude, Ghana, Household Preparedness, Knowledge, Outbreak, Practices.

Introduction

Infectious disease epidemics remain a challenge to health, economic stability, and social systems worldwide. In 2018, WHO warned that although the timing and location of the next pandemic could not be ascertained, its cost would likely be severe for both human life and the global economy [1]. This prediction was realized with the COVID-19 outbreak in 2020, resulting in a pandemic and exposing major weaknesses in health systems and preparedness strategies worldwide. Globally, at least 779 million confirmed COVID-19 cases and 7.1 million fatalities have been reported by March 2026 [2]. Africa was hit by over 9.5 million cases and more than 175,000 deaths, with Ghana recording 173,000 cases and 1,500 deaths during the same period [2].

The COVID-19 pandemic is frequently compared to the 1918 Spanish influenza pandemic because of its widespread health, social, and economic consequences [3]. Beyond its immediate impacts, the COVID-19 pandemic highlighted the critical importance of preparedness at the individual, community, and health system levels. While governments and international organizations implemented interventions such as surveillance, vaccination, physical distancing, hand hygiene, and mask use to control transmission [4], these measures depended largely on public acceptance and adherence [5-7].

Preparedness for infectious disease outbreaks extends beyond institutional readiness and includes individuals' capacity to recognize risk, adopt routine preventive behaviours, seek timely healthcare, and respond appropriately during health emergencies. In this study, preparedness refers to individual and household-level readiness reflected through knowledge, attitudes, preventive practices, and intended responses to future infectious disease outbreaks. Knowledge encompasses understanding of epidemic-prone diseases, symptoms, transmission, prevention, and reporting, while attitude reflects willingness to

vaccinate, report disease, follow restrictions, and trust health authorities. Preventive practices refer to actual preventive behaviours such as food and hand hygiene, vaccination, LLIN use, PPE use and reporting of strange events or when sick. This study focused on vaccination (humans and animals), LLIN use (vector-borne diseases), hand and food hygiene, infection control (use of PPEs, handwashing with soap and water), participation in community activities, and adherence to outbreak control measures.

Evidence from previous outbreaks shows that knowledge, risk perception, trust in health authorities, and access to credible information influence public compliance with health interventions [8-10]. In Sub-Saharan Africa, the COVID-19 pandemic contributed to greater adoption of preventive behaviours, including hand hygiene, mask use, and vaccination uptake. However, these behavioural gains have not always been translated into sustained improvements in disease knowledge or overall preparedness [11-13]. In Ghana, existing studies have largely examined public awareness, risk perceptions, vaccination acceptance, and behavioural responses during the COVID-19 pandemic, with limited attention to how these experiences have shaped preparedness for future outbreaks and the factors influencing it [14-17]. The Health Belief Model provides a useful framework for understanding preparedness behaviours [18]. The model proposes that individuals are more likely to adopt protective actions when they perceive themselves to be susceptible to a health threat, believe the consequences are serious, recognize the benefits of preventive actions, and receive cues that motivate behaviours [8-21]. Exposure to credible health information may therefore influence preparedness by improving knowledge, shaping risk perceptions, and encouraging preventive practices. The Learned Resourcefulness Theory [35], which postulates coping skills, self-control, and adaptive

behaviour following an experience, also provides useful constructs on individual preparedness behaviours.

Materials and Methods

Study Site

This study was carried out in two districts per the Savannah, Greater Accra, and Ashanti regions of Ghana. The Ashanti region is located in the tropical rain forest, the Savannah region in the Guinea Savannah, and the Greater Accra Region in the Coastal belt. We selected the districts with the highest and lowest confirmed cases for each area [22-25]. Thus, Ayawaso West Municipality and Ada East were chosen for Greater Accra. We selected West Gonja and North Gonja districts in the Savannah Region, and Kumasi Metropolitan and Adanse Akrofuom districts in the Ashanti Region.

Study Design and Population

A community-based cross-sectional survey using purposive selection of study districts and cluster sampling of households was conducted between August and September 2025 [26]. This follows five years after the COVID-19 pandemic and that all intensive preventive and control activities had waned down. The cross-sectional design was appropriate for assessing the levels of preparedness and associated factors at a single point in time. Interviews were conducted at the household level with 1307 individuals who were at least 18 years.

Inclusion and Exclusion Criteria

Eligible participants were adults aged 18 years and above who were resident in the selected communities during the COVID-19 pandemic and provided informed consent. Individuals who were unable to communicate effectively because of severe illness, or cognitive impairment or not present during the pandemic at the time of the survey were excluded.

Data Collection and Study Instruments

The semi-structured questionnaire was developed from published literature on knowledge, attitudes, and practices related to epidemic-prone diseases and outbreak preparedness. It was aligned with the study objectives and covered disease awareness, transmission, symptoms, preventive behaviours, care-seeking, vaccination, household readiness, health information sources, and willingness to follow public health measures during future outbreaks.

Public health and epidemiology experts assessed the questionnaire for face and content validity. The team pretested it with 30 adults from non-study communities to assess clarity, sequencing, translation, understanding, administration time, and field feasibility. Pretest findings informed revisions to wording, skip patterns, and question order before final data collection.

Data were collected using the finalized semi-structured questionnaire, which captured both quantitative and qualitative information on individual and household preparedness for future infectious disease outbreaks. The 89-item tool included closed- and open-ended questions in three areas: socio-demographic and household characteristics; knowledge, attitudes, and practices on outbreak prevention and response; and mediating factors such as access to health information, vaccines, insecticide-treated nets, water and hygiene facilities, health services, and domestic animals or pets.

Household-level interviews were conducted with eligible adults aged 18 years and above in the selected communities. Trained data collectors administered the questionnaire face-to-face in a language understood by the respondent after explaining the purpose of the study, confirming eligibility, and obtaining informed consent. Open-ended responses were recorded verbatim or as closely as possible, particularly for COVID-19 experiences, vaccination concerns, household preparedness,

barriers to preventive behaviours, and intended actions during future outbreaks.

Statistical Analysis

Stata version 18 was used to enter, clean, and analyze the data (StataCorp, College Station, TX, USA). The socio-demographic characteristics were summarized using descriptive statistics, where continuous variables were shown as means and standard deviations and categorical variables as frequencies and percentages.

For each of the domains knowledge, attitudes, and practices, the respective questions were scored '0' for the wrong response and '1' for the appropriate one to questions about epidemic-prone diseases, risk perception, healthcare seeking behaviour, and preventive practices. The total score for each was obtained by summing the constituent responses/variables. The preparedness score was obtained by generating a composite sum of all three domains. These were converted to the percentage scale by dividing the total score obtained by the highest possible score after accounting for conditional totals where present. The mean scores (on the percentage scale) were then computed across the various sociodemographic and mediating variables, stratified by the regions. Pearson's chi-square tests were used in bivariate analyses to reveal

relationships between preparedness and sources of health information and socio-demographic characteristics. To identify the independent predictors of preparedness, variables score significant at $p < 0.05$ were added to a multivariate linear regression model. The results included 95% confidence intervals and adjusted regression coefficients. To determine if sources of health information (e.g. Ministry of Health, healthcare professionals, media platforms, and social media) affected the relationship between socio-demographic factors and preparedness, mediation analysis was further carried out. The threshold for statistical significance was established at $p < 0.05$. Deductive thematic content analysis using a framework approach was used for qualitative data and the findings were integrated with quantitative results to explain or contextualize the statistical findings.

Results

Socio-demographic Characteristics

About 55.7% of respondents were females, and the mean age of 31.9 (Std =11.3) and an average household size of 4.7 (Std=2.8) was reported. We observed 33.5% of respondents had attained tertiary education, 77.7% had an active National Health Insurance (NHIS) card and 32.4% sourced pipe-borne water (Table 1).

Table 1. Description of Socio-demographic Characteristics of Respondents across Study Areas

	Region, N (%)			
	Ashanti	G. Accra	Savannah	Total
	434 (33.2)	439 (33.6)	434 (33.2)	1,307 (100.0)
Heard of the COVID-19 outbreak				
No	2 (0.5)	8 (1.8)	8 (1.8)	18 (1.4)
Yes	432 (99.5)	431 (98.2)	425 (97.9)	1,288 (98.5)
Don't know	0 (0.0)	0 (0.0)	1 (0.2)	1 (0.1)
Sex				
Male	172 (39.6)	174 (39.6)	233 (53.7)	579 (44.3)
Female	262 (60.4)	265 (60.4)	201 (46.3)	728 (55.7)
Residence				

Urban	204 (47.0)	157 (35.8)	74 (17.1)	435 (33.3)
Peri-urban	66 (15.2)	43 (9.8)	2 (0.5)	111 (8.5)
Rural	164 (37.8)	239 (54.4)	358 (82.5)	761 (58.2)
Age (years)				
<20	28 (6.5)	43 (9.8)	8 (1.8)	79 (6.0)
20–29	195 (44.9)	233 (53.1)	136 (31.3)	564 (43.2)
30–39	103 (23.7)	107 (24.4)	166 (38.3)	376 (28.8)
40–49	67 (15.4)	37 (8.4)	81 (18.7)	185 (14.2)
50–59	26 (6.0)	11 (2.5)	19 (4.4)	56 (4.3)
60+	15 (3.5)	7 (1.6)	15 (3.5)	37 (2.8)
Marital Status				
No response	5 (1.2)	0 (0.0)	9 (2.1)	14 (1.1)
Single, Never Married				
living with family	198 (45.6)	177 (40.3)	72 (16.6)	447 (34.2)
not living with family	47 (10.8)	131 (29.8)	32 (7.4)	210 (16.1)
Married, living with a family with				
one spouse	139 (32.0)	106 (24.1)	254 (58.5)	499 (38.2)
more than one spouse	24 (5.5)	13 (3.0)	40 (9.2)	77 (5.9)
Divorced	9 (2.1)	2 (0.5)	8 (1.8)	19 (1.5)
Separated	6 (1.4)	7 (1.6)	10 (2.3)	23 (1.8)
Widowed	6 (1.4)	3 (0.7)	9 (2.1)	18 (1.4)
Religion				
No response	0 (0.0)	1 (0.2)	5 (1.2)	6 (0.5)
Christianity	398 (91.7)	396 (90.2)	102 (23.5)	896 (68.6)
Islam	34 (7.8)	38 (8.7)	325 (74.9)	397 (30.4)
Traditional religion	2 (0.5)	4 (0.9)	2 (0.5)	8 (0.6)
Highest education completed				
Never attended school	36 (8.3)	11 (2.5)	113 (26.0)	160 (12.2)
Primary	32 (7.4)	26 (5.9)	50 (11.5)	108 (8.3)
JHS/JSS	87 (20.0)	92 (21.0)	76 (17.5)	255 (19.5)
SHS/SSS	98 (22.6)	134 (30.5)	114 (26.3)	346 (26.5)
Tertiary	181 (41.7)	176 (40.1)	81 (18.7)	438 (33.5)
Mean (SD)				
Age (years)	32.3 (12.1)	28.6 (10.0)	34.9 (10.9)	31.9 (11.3)
No. of people living in household	4.4 (2.6)	4.3 (2.6)	5.3 (3.1)	4.7 (2.8)

Table 2 presents respondents' knowledge on diseases with epidemic potentials and symptoms. Majority of respondents indicated COVID-19 (79.3%) and cholera/diarrhoea (35%) as diseases with highest epidemic

potentials. While cough (56.4%) and fever 45.1%) as the most symptoms mentioned. Table 3 reveals respondents' knowledge on transmission and prevention of diseases.

Table 2. Knowledge on Diseases with Epidemic Potential and Symptoms

	Region, N (%)			
	Ashanti	G. Accra	Savannah	Total
	434 (33.2)	439 (33.6)	434 (33.2)	1,307 (100.0)
Diseases or conditions with epidemic potential				
None	1 (0.2)	0 (0.0)	1 (0.2)	2 (0.2)
COVID-19	397 (91.5)	285 (64.9)	355 (81.8)	1,037 (79.3)
Cholera/Diarrhoea	139 (32.0)	166 (37.8)	153 (35.3)	458 (35.0)
Yellow Fever	38 (8.8)	21 (4.8)	91 (21.0)	150 (11.5)
Meningitis	35 (8.1)	13 (3.0)	78 (18.0)	126 (9.6)
Ebola	83 (19.1)	37 (8.4)	72 (16.6)	192 (14.7)
Influenza	22 (5.1)	7 (1.6)	24 (5.5)	53 (4.1)
Monkey Pox	89 (20.5)	24 (5.5)	49 (11.3)	162 (12.4)
Chicken Pox	48 (11.1)	21 (4.8)	41 (9.4)	110 (8.4)
Dengue fever	8 (1.8)	2 (0.5)	7 (1.6)	17 (1.3)
Measles	31 (7.1)	17 (3.9)	54 (12.4)	102 (7.8)
Polio	27 (6.2)	10 (2.3)	29 (6.7)	66 (5.0)
Anthrax	9 (2.1)	4 (0.9)	13 (3.0)	26 (2.0)
Rabies	15 (3.5)	5 (1.1)	2 (0.5)	22 (1.7)
Zika virus	8 (1.8)	4 (0.9)	0 (0.0)	12 (0.9)
Marburg	7 (1.6)	1 (0.2)	4 (0.9)	12 (0.9)
Chikungunya	0 (0.0)	2 (0.5)	1 (0.2)	3 (0.2)
Leishmaniasis	1 (0.2)	2 (0.5)	0 (0.0)	3 (0.2)
Don't know	9 (2.1)	72 (16.4)	29 (6.7)	110 (8.4)
Signs and symptoms diseases/conditions mentioned above normally present				
None	1 (0.3)	0 (0.0)	1 (0.3)	2 (0.2)
Fever	180 (57.5)	91 (27.1)	158 (52.1)	429 (45.1)
Cough	239 (76.4)	107 (31.8)	191 (63.0)	537 (56.4)
Shortness of breath	115 (36.7)	100 (29.8)	109 (36.0)	324 (34.0)
Difficulty breathing (severe)	108 (34.5)	84 (25.0)	120 (39.6)	312 (32.8)
Tiredness/fatigue	53 (16.9)	110 (32.7)	76 (25.1)	239 (25.1)
Loss of taste or smell	76 (24.3)	66 (19.6)	94 (31.0)	236 (24.8)
Vomiting	33 (10.5)	120 (35.7)	67 (22.1)	220 (23.1)
Jaundice	8 (2.6)	9 (2.7)	13 (4.3)	30 (3.2)
Runny or blocked nose	12 (3.8)	72 (21.4)	69 (22.8)	153 (16.1)
Sore throat	64 (20.4)	30 (8.9)	21 (6.9)	115 (12.1)
Aching body/muscle pain/myalgia	12 (3.8)	18 (5.4)	10 (3.3)	40 (4.2)
Itching body	11 (3.5)	13 (3.9)	8 (2.6)	32 (3.4)
Headache	83 (26.5)	69 (20.5)	64 (21.1)	216 (22.7)
Conjunctivitis	1 (0.3)	4 (1.2)	6 (2.0)	11 (1.2)
Diarrhoea	20 (6.4)	104 (31.0)	50 (16.5)	174 (18.3)
Bleeding from the nose, ears, mouth	19 (6.1)	6 (1.8)	29 (9.6)	54 (5.7)
Skin rashes	11 (3.5)	10 (3.0)	10 (3.3)	31 (3.3)

Sudden paralysis	3 (1.0)	3 (0.9)	0 (0.0)	6 (0.6)
Others	0 (0.0)	6 (1.8)	1 (0.3)	7 (0.7)
Don't know	4 (1.3)	5 (1.5)	7 (2.3)	16 (1.7)

Table 3. Knowledge on Spread and Prevention of Diseases with Epidemic Potential

	Region, N (%)			
	Ashanti	G. Accra	Savannah	Total
	434 (33.2)	439 (33.6)	434 (33.2)	1,307 (100.0)
<i>How disease of epidemic potential mentioned previously are spread/transmitted?</i>				
Coughing, sneezing, spitting or speaking	270 (86.3)	147 (43.8)	230 (75.9)	647 (68.0)
Drinking contaminated water	54 (17.3)	130 (38.7)	71 (23.4)	255 (26.8)
Eating contaminated food	46 (14.7)	117 (34.8)	69 (22.8)	232 (24.4)
Bite of animals like dogs, cats	7 (2.2)	13 (3.9)	14 (4.6)	34 (3.6)
Eating sick or dead animals	14 (4.5)	15 (4.5)	14 (4.6)	43 (4.5)
Contact with infected animals or its parts	29 (9.3)	21 (6.2)	34 (11.2)	84 (8.8)
Bite of mosquitoes	10 (3.2)	2 (0.6)	15 (5.0)	27 (2.8)
Through contaminated hands by touching contaminated surfaces	89 (28.4)	116 (34.5)	85 (28.1)	290 (30.5)
Through unprotected sexual intercourse	5 (1.6)	5 (1.5)	3 (1.0)	13 (1.4)
Transfusing contaminated blood	3 (1.0)	5 (1.5)	12 (4.0)	20 (2.1)
Other	0 (0.0)	4 (1.2)	5 (1.7)	9 (0.9)
Don't know	6 (1.9)	6 (1.8)	10 (3.3)	22 (2.3)
<i>How disease of epidemic potential mentioned previously is prevented in a community</i>				
Wash hands with soap and water before eating	245 (78.3)	232 (69.0)	187 (61.7)	664 (69.7)
Wash hands with soap and water after using the toilet	155 (49.5)	179 (53.3)	142 (46.9)	476 (50.0)
Wash hands with soap and water when you return to the house	145 (46.3)	166 (49.4)	122 (40.3)	433 (45.5)
Vaccinate people against diseases (vaccine preventable diseases)	152 (48.6)	123 (36.6)	107 (35.3)	382 (40.1)
Sleeping under LLINs/ITNs	18 (5.8)	6 (1.8)	17 (5.6)	41 (4.3)
Conducting residual spraying (outdoor and indoor)	15 (4.8)	8 (2.4)	7 (2.3)	30 (3.2)
Using window screens, door screens	12 (3.8)	2 (0.6)	4 (1.3)	18 (1.9)
Wear protective clothing-like nose mask	140 (44.7)	48 (14.3)	93 (30.7)	281 (29.5)
Drink safe (treated) water	30 (9.6)	63 (18.8)	22 (7.3)	115 (12.1)
Eat food prepared under hygienic condition	34 (10.9)	66 (19.6)	18 (5.9)	118 (12.4)
Avoid eating meat from dead or sick animals	17 (5.4)	17 (5.1)	7 (2.3)	41 (4.3)

Vaccinate animals (domestic and livestock) against diseases	11 (3.5)	11 (3.3)	6 (2.0)	28 (2.9)
Remove stagnant water to avoid breeding sources for mosquitoes	2 (0.6)	9 (2.7)	2 (0.7)	13 (1.4)
Wear protective clothes to avoid insect (mosquito) bites	12 (3.8)	7 (2.1)	4 (1.3)	23 (2.4)
Apply repellents to exposed skin	4 (1.3)	5 (1.5)	2 (0.7)	11 (1.2)
Clear bushes around dwellings	4 (1.3)	3 (0.9)	5 (1.7)	12 (1.3)
Practice personal hygiene (bathing, use washed clothes and beddings)	22 (7.0)	20 (6.0)	25 (8.3)	67 (7.0)
Others	1 (0.3)	4 (1.2)	3 (1.0)	8 (0.8)
Don't know	7 (2.2)	2 (0.6)	15 (5.0)	24 (2.5)

More than two-thirds of the respondents mentioned infectious disease spread through droplet nuclei and airborne like cough, sneezing, spitting and indicated handwashing, vaccination and wearing protective clothing as preventive measures.

Sources of Health Information

Almost two-thirds of respondents reported receiving health education during the COVID-

19 pandemic and continue to receive an average of three times yearly. The mass media (TV, Radio) accounted for 59.8%, followed by doctors or healthcare workers (43.2%) and social media (31.5%) (Figure 1). Moreover, respondents reported that the knowledge they received helped them secure their families and themselves.

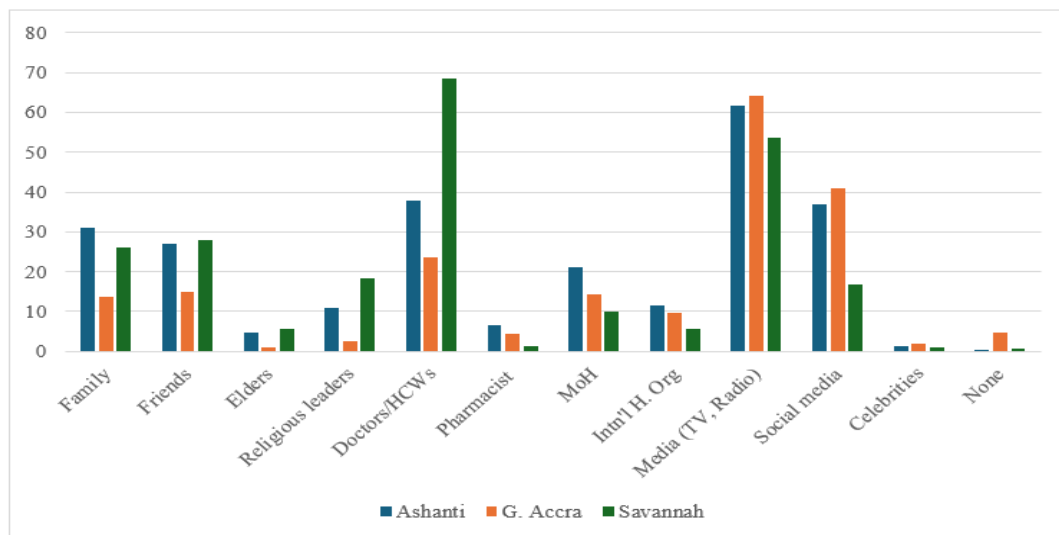


Figure 1. Sources of Respondents COVID-19 Health Education across the Study Areas

Key: Ministry of Health (MoH); Healthcare workers (HCWs); International Health Organization (Intn'l Org).

Concerns and Actions towards Potential Future Epidemic

Respondents demonstrated moderate concern and readiness towards a future outbreak. About 50.4% expressed concern about themselves or family members

contracting a disease, and majority (79.3%) were comfortable visiting health facilities for care. Mask-wearing (53.2%), keeping a physical distance (46.6%), staying indoors (44.4%), and staying away from infected people (39.8%), among others. One participant

summed his concern as “During that time there was no gatherings even if a relative passed on you couldn’t bury and even if you’re allowed to bury your dead you cannot perform the funeral”. Based on knowledge gained during COVID-19, nearly 50% of respondents said they were confident in their ability to protect themselves. Nonetheless, 22.8% of respondents said that purchasing precautionary supplies was

costly. Respondents mentioned community-level actions such as alerting local authority (34.7%), staying indoors (20%), as well as minimizing contact with ill people (20.1%) to prevent the spread of the disease. Even though 43.4% of respondents said they were prepared to report instances of unusual events, a comparable proportion (43.9%) were uncertain on what to do (see Table 4) below.

Table 4. Community Risk to Potential Future Outbreaks across Regions

	Region, N (%)			
	Ashanti	G. Accra	Savannah	Total
	434 (33.2)	439 (33.6)	434 (33.2)	1,307 (100.0)
Action that will be taken if a strange disease/condition among people or animals in the community is suspected				
Stay at home	92 (21.2)	138 (31.4)	32 (7.4)	262 (20.0)
Keep away from people or warn people against the strange disease	62 (14.3)	138 (31.4)	63 (14.5)	263 (20.1)
Inform the local health authority	94 (21.7)	155 (35.3)	205 (47.2)	454 (34.7)
Inform the local government or traditional authorities	23 (5.3)	74 (16.9)	43 (9.9)	140 (10.7)
Go to a hospital or health centre	298 (68.7)	140 (31.9)	265 (61.1)	703 (53.8)
Contact the state health hotline (Surveillance unit)	34 (7.8)	32 (7.3)	25 (5.8)	91 (7.0)
Pray or go to my religious leader for prayers	11 (2.5)	15 (3.4)	10 (2.3)	36 (2.8)
Other	0 (0.0)	13 (3.0)	0 (0.0)	13 (1.0)
Don't know	24 (5.5)	27 (6.2)	13 (3.0)	64 (4.9)
Readiness of people in community to share information about strange diseases/conditions with authorities				
No	63 (14.5)	49 (11.2)	54 (12.4)	166 (12.7)
Yes	201 (46.3)	159 (36.2)	207 (47.7)	567 (43.4)
Don't know	170 (39.2)	231 (52.6)	173 (39.9)	574 (43.9)

Individual Infectious Disease Preventive Practices

With 69.6% of adults vaccinated against COVID-19 and 50.7% against yellow fever, respondents indicated moderate routine vaccination uptake among adult population. However, a worrying expression of vaccination-related problems were noted, such as beliefs regarding infertility 38%, fear and

anxiety 10.6%, and side effects concerns 22.2%, and could be the reasons for vaccine refusal. One respondent expressed the following “People were having misconceptions about the covid-19 vaccine, that you can't conceive, men might be impotent when they take the vaccine”. Another respondent also said this “I remember people saying they didn't believe covid-19 existed, and that the vaccine was brought to harm us”.

High levels of malaria prevention practices were observed as 91.7% of respondents reported that their children slept under insecticide bed nets and 86.1% of adults slept under the insecticide bed net the previous night. One respondent was emphatic about the need to sleep under mosquito net. *“Sleeping under LLIN will prevent us from malaria, keeping our surroundings clean will also prevent us from sickness”* The research revealed that mosquito repellent 55.5%, spray 60.5% and protective gear 44.8% were additional preventive measures. Respondents also demonstrated good knowledge of proper maintenance of insecticide bed nets. Hand hygiene practices

were high among the respondents (84% generally practice handwashing with soap and water and 89% wash their hands with soap and water before eating) 60% of the participants use hand sanitizer. Moderate observations on water and food hygiene practices were revealed: 59% drink treated water, 60% avoid eating undercooked food and 72% wash fruits and vegetables before eating. Among the 258 dog-owning participants, 95% had vaccinated their dogs against rabies. About 50% of the respondents have essential supplies for at least 72 hours to keep them going should there be a crisis (outbreaks/pandemic) as shown in Table 5.

Table 5. Infectious Disease Preventive Practices

	Region, N (%)			
	Ashanti	G. Accra	Savannah	Total
	434 (33.2)	439 (33.6)	434 (33.2)	1,307 (100.0)
COVID-19 vaccination	258 (59.4)	292 (66.5)	359 (82.7)	909 (69.5)
Yellow Fever vaccination	176 (40.6)	135 (31.1)	333 (76.7)	647 (49.5)
Sleep under treated bed nets (LLINs)-Adults	353 (81.3)	384 (87.5)	388 (89.4)	1,125 (86.1)
Sleep under treated bed nets (LLINs)- Children	365 (84.1)	421 (95.9)	411 (94.7)	1,197 (91.6)
Wash hands with soap and water before eating	381 (87.8)	418 (95.2)	365 (84.1)	1,164 (89.1)
Practice hand washing with soap and water	401 (92.4)	330 (75.2)	375 (86.4)	1,106 (84.6)
Often practice the use of hand sanitizer	335 (77.2)	240 (54.7)	212 (48.8)	787 (60.2)
Drink safe and portable (treated water)	254 (58.5)	273 (62.2)	239 (55.1)	766 (58.6)
Avoid eating under cooked food or meat	273 (62.9)	271 (61.7)	241 (55.5)	785 (60.1)
Wash fruits and vegetables before eating	313 (72.1)	354 (80.6)	275 (63.4)	942 (72.1)
Vet Vaccination (Dog)*	48 (78.6)	124 (99.2)	72(100)	244 (94.5)
Have essential supplies for at least 72 hours against a crisis (outbreaks/pandemic)	263 (60.6)	232 (52.8)	179 (41.2)	674 (51.6)

Dog owners (N=258)

Preparedness Concerning Future Outbreaks based on Knowledge, Attitudes, and Practices

The levels of knowledge, attitudes, practices and preparedness are presented in Figure 2

below. Knowledge score was generally poor, but Attitudes showed modest change, with Practices showing far greater improvement, as a result of their COVID-19 experiences. Preparedness which is a composite of all the KAP domains is however not the best.

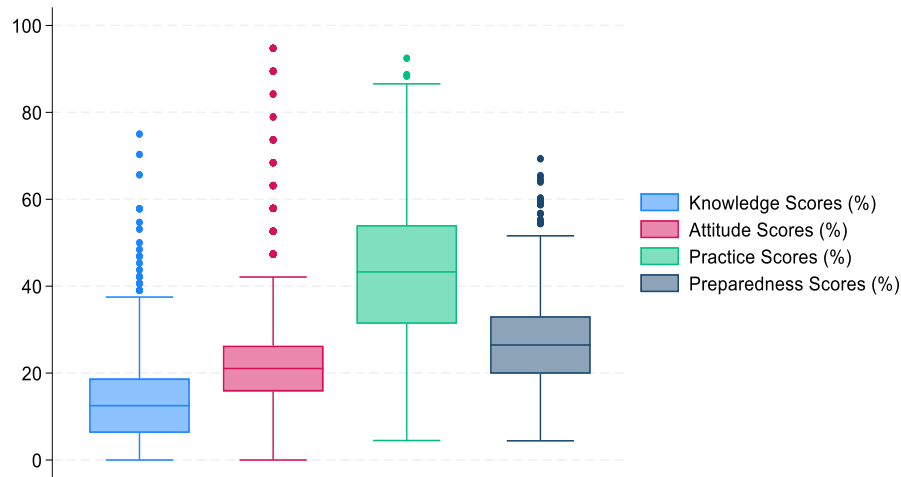


Figure 2. Knowledge, Attitudes, Practices and Preparedness Scores for Future Outbreaks

The study found that age, sex, and sources of health information were identified by the Linear regression analysis as important predictors of preparedness. In the crude model, older age was associated to decline in preparedness ($\beta = -0.06$, 95% CI: -0.11 , -0.01 ; $p = 0.015$), but this relationship was not significant after adjustment. Again, women preparedness scores were considerably higher than men's, with a crude difference of 2.35%. This difference remained after adjustment (1.15%, $p = 0.015$) as present in Table 5.

Among those who reported the Ministry of Health as their regular source of health information, they showed stronger preparedness scores compared to others (Crude $\beta = 10.75$, 95% CI: 9.27, 12.23; $p < 0.001$). After adjustment, this effect became significant, highlighting the importance of sources of information as a mediating factor and a major determinant of preparedness (Table 6).

Table 6. Bivariate and Multivariate Regression Analysis on Socio-demographic Factors and Preparedness

Socio-demographic factors	Crude		Adjusted	
	β (95% CI)	p-value	β (95% CI)	p-value
Age (years)	-0.06 (-0.11, -0.01)	0.015	-0.02 (-0.07, 0.04)	0.548
Sex		<0.001		0.015
Male	Ref.		Ref.	
Female	2.35 (1.21, 3.49)		1.15 (0.22, 2.08)	
Residence		<0.001		<0.001
Urban	Ref.		Ref.	
Peri-urban	2.65 (0.47, 4.83)		3.76 (1.95, 5.56)	
Rural	2.86 (1.63, 4.10)		2.33 (1.14, 3.52)	
Marital status		0.002		0.895
Single	Ref.		Ref.	
Married	-2.03 (-3.21, -0.86)		-0.17 (-1.32, 0.99)	
Div/Sep/Wid/Unk	-2.35 (-4.87, 0.18)		-0.52 (-2.74, 1.70)	
Religion		0.174		
Christian	Ref.			
Moslem	0.74 (-0.50, 1.99)			

Other	-3.90 (-9.46, 1.66)			
Highest education completed		<0.001		0.168
None	Ref.		Ref.	
Primary	-2.20 (-4.71, 0.31)		-1.23 (-3.28, 0.82)	
JHS/JSS	-1.24 (-3.27, 0.79)		-1.51 (-3.24, 0.22)	
SHS/SSS	-0.26 (-2.19, 1.66)		-1.92 (-3.65, -0.18)	
Tertiary	4.16 (2.30, 6.02)		-0.83 (-2.67, 1.00)	
No. of people living in household	0.48 (0.28, 0.68)	<0.001	0.23 (0.06, 0.41)	0.008
Household category		<0.001		<0.001
Not enough money, even for food	Ref.		Ref.	
Can buy foods, purchasing of clothes a serious problem	-0.02 (-3.55, 3.50)		-3.16 (-6.04, -0.28)	
Can buy food and clothes, difficult buying gadgets (e.g. TV, fridge)	3.48 (0.26, 6.69)		-0.46 (-3.12, 2.20)	
Can afford main household gadgets, can't buy a car	5.89 (2.79, 8.98)		2.12 (-0.51, 4.76)	
Earnings sufficient to purchase anything except expensive items (e.g. a house or apartment)	7.38 (3.85, 10.91)		0.26 (-2.72, 3.25)	
Can buy apartment or a house if necessary	9.56 (5.57, 13.55)		0.85 (-2.51, 4.22)	
Don't know	-0.63 (-4.32, 3.06)		-2.61 (-5.59, 0.38)	
Have health difficulties	-1.64 (-3.42, 0.13)	0.070		
Have chronic conditions	-1.26 (-2.73, 0.20)	0.091		
Other mediating factors	β (95% CI)	p-value	β (95% CI)	p-value
Regular source(s) of health information *				
Family	3.71 (2.38, 5.05)	<0.001	0.85 (-0.49, 2.19)	0.215
Friends	3.91 (2.57, 5.25)	<0.001	0.53 (-0.81, 1.87)	0.437
Elders	5.30 (2.33, 8.26)	<0.001	0.94 (-1.58, 3.45)	0.464
Religious Leaders	3.78 (1.93, 5.64)	<0.001	-1.17 (-2.81, 0.47)	0.161
Doctors or health practitioners in the country/community	4.67 (3.54, 5.79)	<0.001	2.07 (1.08, 3.07)	<0.001
Pharmacist	9.41 (6.59, 12.24)	<0.001	1.45 (-1.08, 3.97)	0.261
Ministry of Health	10.75 (9.27, 12.23)	<0.001	6.37 (4.82, 7.92)	<0.001
International health organization	10.38 (8.46, 12.30)	<0.001	3.46 (1.56, 5.36)	<0.001

Media Sources (TV, Radio (FM), etc)	4.05 (2.90, 5.19)	<0.001	1.87 (0.87, 2.88)	<0.001
Social media	6.96 (5.79, 8.13)	<0.001	4.01 (2.92, 5.09)	<0.001
Celebrities	6.86 (1.97, 11.75)	0.006	-0.41 (-4.37, 3.55)	0.839
Traditional healer	2.15 (-3.61, 7.91)	0.464		
Other	2.36 (-2.54, 7.26)	0.345		
Practice hand washing with soap and water	5.29 (3.73, 6.85)	<0.001	1.64 (0.28, 3.01)	0.019
Face challenges practicing frequent hand washing with soap and water	0.68 (-0.87, 2.22)	0.389		
Often practice the use of hand sanitizer	4.81 (3.67, 5.94)	<0.001	4.27 (3.27, 5.27)	<0.001
Use LLIN	3.99 (1.74, 6.23)	0.001	4.37 (2.58, 6.15)	<0.001
Have vaccine access (humans)	8.58 (7.05, 10.11)	<0.001	5.73 (4.25, 7.20)	<0.001
Have domestic animals	4.49 (3.37, 5.61)	<0.001	3.32 (2.36, 4.27)	<0.001
Have vaccine access (animals)	7.28 (5.03, 9.53)	<0.001		

Outcome: Preparedness score (0 = Lowest, 100 = Highest). Ref: Reference category (N = 618)

Mediation Analysis

The data revealed that with differing effects of health information sources, the mediation analysis showed a strong relationship between preparedness and sex, place of residence, and household socioeconomic status. Females had a higher preparedness score compared to males (1.49%, $p = 0.005$). However, doctors or health practitioners exhibited a negative mediating effect on this relationship (-0.14% , $p = 0.070$). Similarly, peri-urban residence demonstrated

higher preparedness score compared to urban residence (2.96%, $p = 0.003$). The Ministry of Health showed a significant negative mediating effect (-1.24% , $p = 0.033$), with the adjusted effect of other factors increasing further (4.20% , $p < 0.001$).

It was observed that as household conditions improved, so did preparedness for household socioeconomic status. Again, the relationship between better household status and higher preparedness scores was reinforced by social media's beneficial mediation effect (Table 7).

Table 7. Mediating Effects of Regular Health Information Sources on Preparedness

	Doc		MOH		IHO		MS		SM	
	Effect	p	Effect	p	Effect	p	Effect	p	Effect	p
Sex										
<i>Indirect effect</i>										
Male	Ref.		Ref.		Ref.		Ref.		Ref.	
Female	-0.14	0.070	0.31	0.138	0.17	0.253	0.00	<0.001	0.05	0.748
<i>Direct effect</i>										
Male	Ref.		Ref.		Ref.		Ref.		Ref.	
Female	1.50	0.004	1.16	0.018	1.26	0.012	1.24	0.016	1.25	0.011
<i>Total effect</i>										

Male	Ref.		Ref.		Ref.		Ref.		Ref.	
Female	1.36	0.009	1.47	0.005	1.43	0.006	1.24	0.016	1.30	0.013
Residence										
<i>Indirect effect</i>										
Urban	Ref.		Ref.		Ref.		Ref.		Ref.	
Peri-urban	-0.63	0.115	-1.24	0.033	-2.76	<0.001	0.80	0.135	0.30	0.282
Rural	0.32	0.006	-1.33	<0.001	-0.80	0.001	0.68	<0.001	-0.82	<0.001
<i>Direct effect</i>										
Urban	Ref.		Ref.		Ref.		Ref.		Ref.	
Peri-urban	3.93	<0.001	4.20	<0.001	5.57	<0.001	2.85	0.007	3.07	0.001
Rural	0.06	0.928	1.66	0.009	0.79	0.203	-0.28	0.657	1.18	0.052
<i>Total effect</i>										
Urban	Ref.		Ref.		Ref.		Ref.		Ref.	
Peri-urban	3.30	0.001	2.96	0.003	2.81	0.005	3.65	<0.001	3.37	0.001
Rural	0.37	0.553	0.33	0.591	-0.01	0.990	0.39	0.529	0.36	0.561
Household Category										
<i>Indirect effect</i>										
Not enough money, even for food	Ref.		Ref.		Ref.		Ref.		Ref.	
Can afford food, purchasing of clothes a serious problem	0.38	0.271	-0.60	0.359	-0.26	0.463	0.80	0.266	0.31	0.579
Can afford food and clothes, difficult purchasing durables (e.g. TV, fridge)	0.34	0.148	-0.25	0.697	0.13	0.735	1.42	0.003	0.83	0.041
Can afford main household appliances, purchasing a car is beyond means	0.02	0.783	-0.64	0.235	-0.44	0.346	-0.03	0.923	0.97	0.001
Earnings sufficient to buy anything except expensive ones (e.g. house)	1.01	0.079	0.79	0.287	0.48	0.499	1.52	0.029	2.39	0.002
Can afford apartment or a house if necessary	2.21	0.032	1.90	0.047	0.11	0.857	2.34	0.049	2.65	0.037
Don't know	0.56	0.457	-0.11	0.848	-1.35	0.222	0.54	0.452	0.81	0.211
<i>Direct effect</i>										
Not enough money, even for food	Ref.		Ref.		Ref.		Ref.		Ref.	
Can afford food, purchasing of clothes a serious problem	-2.57	0.140	-2.00	0.208	-2.50	0.128	-3.07	0.064	-2.93	0.075
Can afford food and clothes, difficult	1.22	0.445	1.17	0.407	0.62	0.683	0.05	0.976	0.24	0.878

purchasing durables (e.g. TV, fridge)										
Can afford main household appliances, purchasing a car is beyond means	3.48	0.031	3.42	0.016	3.00	0.045	3.47	0.038	2.06	0.180
Earnings sufficient to buy anything except expensive ones (e.g. house)	2.73	0.129	2.27	0.145	2.30	0.165	2.09	0.251	0.78	0.647
Can afford apartment or a house if necessary	3.32	0.081	3.15	0.079	4.62	0.018	3.09	0.179	2.37	0.297
Don't know	-2.93	0.077	-2.58	0.120	-1.50	0.385	-2.86	0.103	-3.20	0.065
<i>Total effect</i>										
Not enough money, even for food	Ref.		Ref.		Ref.		Ref.		Ref.	
Can afford food, purchasing of clothes a serious problem	-2.19	0.224	-2.60	0.130	-2.76	0.106	-2.27	0.205	-2.62	0.132
Can afford food and clothes, difficult purchasing durables (e.g. TV, fridge)	1.56	0.349	0.92	0.560	0.75	0.636	1.47	0.375	1.07	0.502
Can afford main household appliances, purchasing a car is beyond means	3.50	0.034	2.78	0.075	2.56	0.102	3.44	0.036	3.03	0.054
Earnings sufficient to buy anything except expensive ones (e.g. a house)	3.74	0.043	3.07	0.084	2.78	0.116	3.61	0.049	3.17	0.076
Can afford apartment or a house if needed	5.53	0.009	5.04	0.014	4.74	0.022	5.43	0.010	5.02	0.015
Don't know	-2.37	0.212	-2.69	0.135	-2.86	0.113	-2.31	0.219	-2.39	0.191

Doc: Doctors or health practitioners in the country/community, MOH: Ministry of Health, IHO: International health organization, MS: Media Sources (TV, Radio (FM), etc), SM: social media, p: p-value

Discussion

This study assessed the preparedness of individuals in Ghana for future infectious disease outbreaks based on the COVID-19 pandemic experiences. The present study found moderate preparedness for future infectious disease outbreaks among Ghanaian adults, characterized by relatively strong preventive

practices but lower levels of disease-specific knowledge. Similar findings have been reported in Ghana and other Africa countries during and after the COVID-19 pandemic, where compliance with preventive measures often exceeded underlying knowledge of disease transmission [7, 27, 28]. Studies from Nigeria, Kenya, South Korea, and other lower- and middle-income countries have similarly

reported that public adherence to preventive behaviours was strongly influenced by risk perception and public health messaging rather than comprehensive disease knowledge [29-32]. These findings suggest that behavioural adaptations acquired during public health emergencies may persist and perhaps strengthen routine preventive practices even when detailed understanding of outbreak risks remains limited. This gap suggests that even in the absence of a minimum set of knowledge of disease transmission, people may respond to perceived risk and public health education and adopt recommended preventive practices, stressing the use of risk communication in health emergency situations and, an essential requirement for ongoing health education following a crisis [11, 33, 34]. This underscores the need to make reliable health information accessible for outbreak preparedness at the individual and household level.

Generally, findings on attitude towards disease prevention were encouraging. Most respondents said they were worried about future epidemics and were willing to take precautions including mask use, avoiding contact with infected individuals, and getting medical help when needed and would report a strange health event to the authorities. These results imply that COVID-19 pandemic increased people's perception of risks and emphasized the importance of preventive health behaviours, which are critical for compliance under public health emergencies. Many research works conducted during the pandemic reveal comparable changes in public perceptions, with greater risk perception leading to a rise in preventive measures and confidence in healthcare systems [7, 27, 28].

On preventive practices, the study sought to determine if COVID-19 pandemic experience served as a wakeup call on infectious disease preventive practices among individuals to be better prepared for future outbreaks. Preventive practices were relatively strong, reflected in COVID-19 vaccine uptake (70%), LLIN use

among children (91%) and adults (87%), handwashing with soap and water (67%), drinking treated water (59%), avoiding undercooked foods (60%), wash fruits and vegetables before eating (72%), and dog vaccination against rabies (95%). It was noteworthy that about 52% of the respondents have essential supplies that will sustain them for at least 72 hours should there be a crisis (outbreaks/pandemic). These patterns suggest potential long-term behavioural change, likely influenced by the pandemic's intensive public health efforts, and align with Learned Resourcefulness Theory, which emphasizes learned skills for managing health risks [35]. Although LLIN use, dog vaccination, food and water hygiene and others are not directly linked to COVID-19 prevention, the high uptake might indicate strong epidemic-prone disease prevention habits among individuals and thus, efforts should encourage and sustain the positive practices.

The study revealed that access to credible health information could be associated with higher preparedness scores. This goes to stress the need of effective, transparent communication systems in shaping public behaviours and more especially, reducing misinformation during disease outbreaks [27, 28].

The observed association between preparedness and information sources is conceivable because trusted information channels may improve awareness of disease risks, increase confidence in public health recommendations, and facilitate timely adoption of preventive behaviours. Information provided by healthcare professionals, ministries of health, and international health organizations may also be perceived as more credible than informal sources, reducing susceptibility to misinformation. Similar observations reported during the COVID-19 pandemic, where trust in public institutions and access to accurate information were associated with greater compliance with public health

recommendations [7, 27, 28]. Preparedness may also be associated with sociodemographic factors. Women were more prepared than men to engage in health-seeking behaviours and household health management [36]. Regarding residency, peri-urban residents were better prepared compared to their urban counterparts. This could be explained to a more robust community engagement initiative and local communication frameworks that promote interpersonal communication and adherence to behavioural norms in the peri-urban areas. The significance of integrating continuous community-based communication into national preparedness strategies is underscored by evidence from prior epidemics in West Africa [37, 38]. This underlines the necessity of involving the community and improving local communication systems for public health practices.

The relationship between preparedness and socio-economic indicators seemed inconsistent. Higher-income households were initially more prepared, but this was likely due to easier access to preventive services. The observation was decreased after adjustment, indicating that access to reliable information may be as crucial as financial resources. Similar associations between socioeconomic status and preventive health behaviour have been reported by other research works examining household resilience during epidemics [11]. Consequently, ensuring equitable access to health information for all demographic groups is key to enhance outbreak preparedness.

Misconception about vaccine remains a challenge. Several respondents expressed concerns about vaccination safety and misconceptions. One respondent expressed the following “People were having misconceptions about the covid-19 vaccine, that you can't conceive, men might be impotent when they take the vaccine”. Another respondent also said this “I remember people saying they didn't believe covid-19 existed, and that the vaccine was brought to harm us”.

These findings reflect broader global patterns of vaccine skepticism influenced by misinformation and mistrust, [12, 13] and call for clear, focused risk communication and community involvement in tackling vaccine hesitancy elements to boost vaccine confidence. Individuals with access to vaccination services may also be more connected to healthcare systems and preventive health programs, which could contribute to higher preparedness scores. Vaccination uptake may therefore serve as an indicator of broader engagement with preventive health behaviours rather than preparedness alone.

Overall, the findings show that there are still differences in preparedness for future epidemics even though the COVID-19 pandemic might have reinforced preventative behaviours. Access to credible health information, gender, residential environment, and socioeconomic factors might explain the higher preparedness score. The practices observed tend to be stronger than underlying knowledge of preparedness. Building resilient communities that can effectively respond to future infectious disease emergencies requires strengthening health literacy, improving risk communication systems, and removing structural obstacles to preventive practices.

Policy Implications

The findings have important implications for epidemic preparedness policy in Ghana. First, preparedness plans should explicitly include individual, household, and community-level readiness, alongside surveillance, laboratory capacity, and emergency response systems. Policies should build on preventive behaviours reinforced during COVID-19, including hand hygiene, vaccination, LLIN use, healthcare seeking, and household readiness, while addressing knowledge gaps and uncertainty about reporting unusual health events.

Second, risk communication and community engagement should be routine preparedness functions before, during, and after outbreaks.

Trusted channels such as health workers, mass media, community leaders, and appropriate digital platforms should deliver clear, culturally relevant messages and support misinformation management, community feedback, and timely reporting.

Third, preparedness policy should link health promotion with equitable access to essential preventive services and commodities, including vaccination, LLINs, safe water, handwashing facilities, hygiene materials, health services, and basic household emergency supplies. Particular attention is needed for rural and underserved populations, and preparedness education should be integrated into primary healthcare, community health systems, schools, and local government structures.

Fourth, community-based surveillance and early warning systems should be strengthened by improving public knowledge of reportable events and clarifying reporting pathways. Simplified and well-publicized mechanisms, including local health authority contacts, community surveillance volunteers, hotlines, and local government channels, should be promoted alongside a One Health approach for zoonotic and vector-borne threats such as rabies, yellow fever, dengue, and malaria.

Finally, routine monitoring of individual and household preparedness indicators should be incorporated into broader health security assessments. A composite KAP-based preparedness measure could help identify less-prepared groups and assess communication, vaccination, WASH, vector control, and community engagement interventions. Overall, Ghana's preparedness policies should invest in sustained, community-centred systems that improve knowledge, build trust, reduce misinformation, and support prompt household action during future outbreaks.

Strengths and Limitations

This study provides important evidence on individual and household preparedness for future infectious disease outbreaks across

diverse ecological settings in Ghana. Despite its limitations, the findings offer valuable insights into factors that may be associated with outbreak preparedness. The use of multivariable and mediation analyses strengthened the exploration of potential determinants of preparedness. However, the cross-sectional design precludes causal interpretation of the observed associations. In addition, preventive practices, including vaccination history, use of LLINs, dog vaccination, and hand and food hygiene, were self-reported and may therefore be subject to recall and social desirability biases. The purposive selection of study districts may also limit the generalizability of the findings to the broader Ghanaian population. Data were collected several years after the peak of the COVID-19 pandemic, and changing public perceptions and experiences may have influenced reported preparedness levels. Residual confounding from unmeasured factors, including previous outbreak experiences, health literacy, contemporary health issues during the period of data collection, and trust in public institutions, cannot be excluded. Finally, internal consistency reliability was not assessed using Cronbach's alpha in the current study. Although the questionnaire was reviewed by experts and pretested before implementation, the absence of a formal reliability assessment may limit confidence in the consistency of the measured constructs.

Developing an index for optimal individual KAP could support a more systematic assessment of outbreak preparedness. Longitudinal research is also needed to better understand how preparedness changes over time and how routine community-based interventions can strengthen resilience. Future studies should further refine the concept of disease outbreak preparedness at the individual and household levels and identify factors that support sustained preventive practices.

Conclusion

This study demonstrates that experiences from the COVID-19 pandemic may have contributed to improved preventive practices and moderate individual and household preparedness for future infectious disease outbreaks among adults in Ghana. Respondents reported strong adoption of several routine protective behaviours, including hand hygiene, use of LLINs, vaccination, healthcare seeking, and maintenance of basic household supplies. However, these behavioural gains were not matched by consistently high knowledge of epidemic-prone diseases, transmission routes, early warning signs, or appropriate reporting actions. This suggests that while the pandemic may have strengthened some preventive habits, important gaps remain in outbreak literacy, risk recognition, and response readiness.

The findings further show that preparedness is shaped by socio-demographic characteristics, access to preventive services, and exposure to credible health information. Health information sources appear to play an important mediating role by influencing knowledge, attitudes, and adoption of protective practices. Persistent concerns about vaccine safety, uncertainty about reporting unusual health events, and barriers to hygiene and preventive resources highlight the need for sustained, trusted, and context-specific health communication. Strengthening health literacy, risk communication, community engagement, and equitable access to vaccination, LLINs, hygiene facilities, and health services should therefore be central to preparedness planning.

Overall, the study underscores the importance of moving preparedness beyond health-system response capacity to include individual, household, and community-level resilience. Future outbreak preparedness strategies in Ghana should build on the preventive behaviours reinforced during COVID-19 while addressing misinformation, knowledge gaps, and inequities in access to essential preventive tools. Continued

investment in community-centred preparedness, trusted communication channels, and routine preventive services will be critical for sustaining protective behaviours and improving readiness for future infectious disease threats.

Conflict of Interest

I hereby state that there is no conflict of interest in conducting the research, authorship and publication.

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Ethical Approval

Ethical approval for this study was obtained from the Ghana Health Service Ethics Review Committee (Approval No. GHS-ERC 006/03/25) in June 2025 before commencement of data collection. Permission to conduct the study was also obtained from relevant regional, district, and community authorities in the selected study areas. Participation in the study was entirely voluntary. Eligible participants were informed about the objectives, procedures, potential risks, and benefits of the study before enrolment. Written informed consent was obtained from all participants prior to data collection. Participants were assured that their responses would be treated confidentially, anonymized during analysis, and used solely for research purposes. No personal identifiers were included in the analytical dataset. Participants were informed of their right to decline participation or withdraw from the study at any stage without any consequences or loss of benefits to which they were otherwise entitled.

Data Availability

The corresponding author will make the data available upon request.

Author Contributions

MOA conceptualized the study. The methodology, data collection and analysis, initial draft, and write up including editing,

were done by MoA and DG. Supervision, review, and editing were done by DG and SOS. The final draft was done by MOA; review and approval were done and accepted by all authors.

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