

Awareness of the Importance of COVID-19 Vaccination in Wenchi Municipality: A Health Belief Model Perspective

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Abstract

The COVID-19 pandemic, caused by the novel coronavirus (SARS-CoV-2), has had unprecedented health, and economic impacts globally. Vaccination emerged as a cornerstone strategy for reducing morbidity, mortality, and transmission of the virus. However, in many low- and middle-income countries (LMICs), uptake has been suboptimal despite extensive awareness campaigns. In Wenchi Municipality, fully vaccinated coverage stood at 25.3% in July 2024; far below the WHO-recommended herd immunity threshold of 70%. This study examines awareness of the importance of COVID-19 vaccination, using Health Belief Model (HBM) to interpret findings and guide recommendations. A convergent mixed-method cross-sectional design was employed, targeting 288 adults aged 18 years and above, selected through probability proportional to size (PPS) sampling. Quantitative data were collected using a structured questionnaire and analyzed using descriptive and inferential statistics. Qualitative responses were obtained using open-ended questions and were analyzed through thematic analysis. While 82.7% of respondents believed vaccination could prevent COVID-19, gaps remained in understanding broader benefits such as reduction in severity, community protection, and facilitation of safe travel. About 17% perceived vaccination as a threat to life and 11.5% denied its preventive value. The study found that awareness was high in terms of perceived benefits but inconsistent in linking perceived susceptibility and cues to action. Safety concerns, misinformation, and distrust in vaccine efficacy were key barriers. Awareness alone is insufficient for vaccine uptake. Public health strategies must combine information dissemination with interventions that directly target barriers and strengthen cues to action, ultimately transforming knowledge into vaccination behavior.

Keywords: Awareness, COVID-19, Health Belief Model, Vaccination, Vaccine Uptake, Wenchi Municipality.

Introduction

The emergence of COVID-19 in late 2019 and its rapid spread globally represent one of the most significant public health crises in modern history. Originating in Wuhan, China, SARS-CoV-2 quickly evolved into a pandemic, affecting over 775 million people globally and causing more than 7 million deaths by January 2024 [1]. Transmission occurs primarily

through respiratory droplets and aerosols, with heightened risk in poorly ventilated environments [2]. While non-pharmaceutical interventions such as mask-wearing, physical distancing, and lockdowns mitigated early spread, vaccination emerged as the most sustainable long-term control measure [3, 26].

Globally, vaccine rollout began in late 2020, with the WHO recommending a minimum

coverage of 70% of the eligible population to achieve herd immunity [4]. However, disparities quickly emerged. By mid-March 2022, the global proportion of at least one-dose coverage was 63.69%, with lower-middle-income countries at 56.14%, and Ghana lagging at 24.85% [5]. As of July 2024, only 28.8% of Ghanaians were fully vaccinated, with the Bono Region recording just 27.9% coverage and Wenchi Municipality even lower at 25.3% [6]. These figures are far below levels required to effectively disrupt transmission chains.

The Role of Awareness in Vaccine Uptake

Awareness of the importance of vaccination; defined as an individual's understanding of

vaccine purpose, benefits, and necessity; is a critical determinant of uptake [7, 8]. The literature suggests that awareness influences health behaviour by shaping perceptions of susceptibility, disease severity, and perceived benefits, while also interacting with social norms and trust in health systems [9, 10]. In the context of COVID-19, awareness campaigns have been ubiquitous, yet disparities in uptake reveal a gap between knowledge and action.

The Health Belief Model as a Theoretical Lens

The Health Belief Model (HBM) offers a robust framework for examining the link between awareness and health behavior [11].

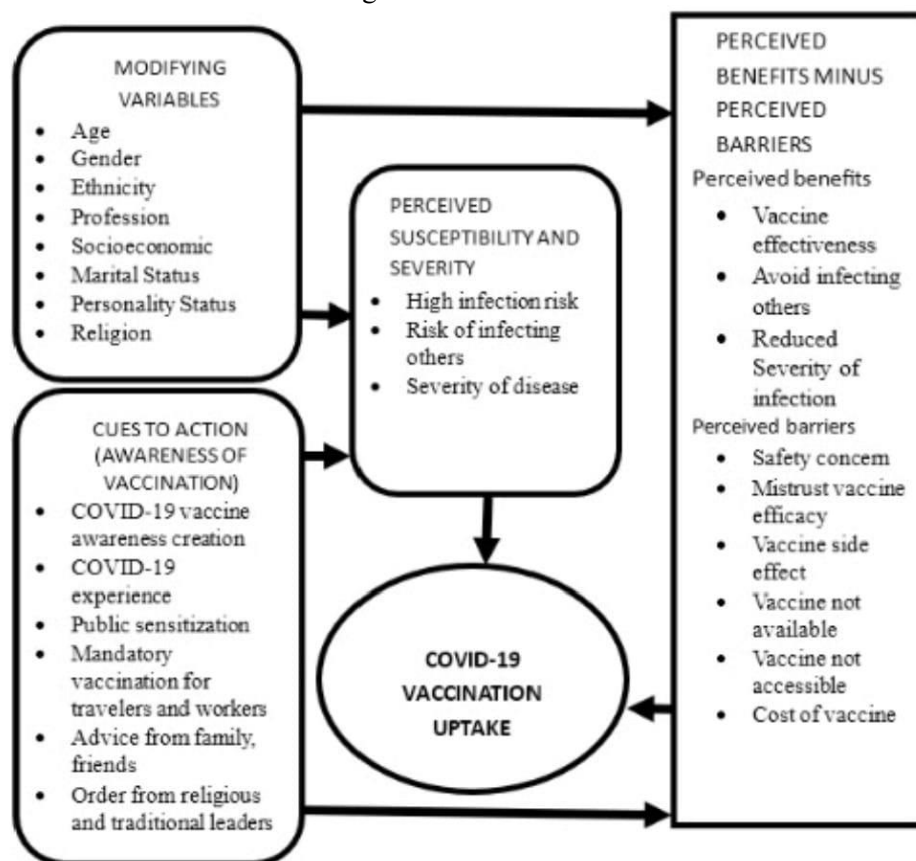


Figure 1. Conceptual Framework

Adopted from the Health Belief Model [12].

It has the constructs, as shown in figure 1 above, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and modifying variables. This allows for nuanced interpretation of why

awareness may or may not lead to behaviour change. For instance, an individual may acknowledge the benefits of vaccination but still abstain due to perceived safety concerns or mistrust in the health system [13, 14].

In Wenchi Municipality, where socio-economic diversity, rural-urban disparities, and cultural dynamics shape health behaviors, the HBM is well-suited for analyzing awareness of COVID-19 vaccination and guiding interventions that translate awareness into uptake.

Rationale for the Study

The COVID-19 pandemic has had unprecedented global health, social, and economic impacts, leading to the rapid development and deployment of vaccines as one of the most effective preventive measures against severe infection, hospitalization, and death. However, the success of vaccination programs is not determined solely by vaccine availability; it critically depends on public awareness, acceptance, and uptake. Awareness plays a central role in shaping individual perceptions of vaccine safety, efficacy, and necessity.

In many settings, misinformation, myths, and misconceptions about COVID-19 vaccines have influenced attitudes, creating hesitancy and resistance. Low levels of awareness regarding the benefits of vaccination, the mechanisms of vaccine action, and the potential consequences of non-vaccination have posed significant challenges to public health efforts. Thus, understanding awareness levels provides valuable insight into the barriers and enablers of vaccine uptake.

Assessing awareness of COVID-19 vaccination is important not only for identifying knowledge gaps but also for guiding the design of effective health communication strategies. It enables policymakers, healthcare providers, and stakeholders to tailor messages that address misconceptions, reinforce trust in vaccines, and improve health-seeking behaviors. Ultimately, strengthening awareness contributes to increased vaccine coverage, protection of communities, and the achievement of herd immunity, which are crucial for controlling the pandemic and preventing future outbreak.

Materials and Methods

The Study Area and Population

The study population comprised adults aged 18 years and above residing in Wenchi Municipality for at least one week during the past two years who were willing and able to provide informed consent. Adults were chosen because COVID-19 vaccines were targeted primarily at individuals aged 18 and above.

The Wenchi Municipality is located in the Bono Region of Ghana and covers an estimated land area of 7,619 km². According to the Ghana Statistical Service [15], the projected 2024 population of Wenchi Municipality was 135,165, with approximately 56% (75,693) aged 18 years or older and therefore eligible for COVID-19 vaccination.

Health infrastructure consists of three hospitals, two maternity homes, five health centers, three private clinics, and 19 Community-Based Health Planning and Services (CHPS) zones.

Geographical challenges include poor road conditions, particularly during the rainy season, and limited public transportation in rural zones. Socio-cultural diversity is evident, with ethnic groups with many residents engaged in subsistence farming and market trading.

Study Method

This study adopted a convergent mixed-method cross-sectional design to examine accessibility to COVID-19 vaccination in Wenchi Municipality, Bono Region, Ghana. The mixed-method approach was chosen in line with the pragmatist research philosophy, which emphasizes methodological pluralism to capture the complexity of real-world health phenomena. This approach allowed for simultaneous collection and analysis of quantitative and qualitative data, ensuring both numerical measurement of accessibility barriers and rich narrative accounts from participants.

A cross-sectional design was appropriate because the aim was to assess accessibility

factors at a specific point in time, rather than evaluate changes over time. This design also enabled the inclusion of diverse demographic and socio-economic groups within a limited data collection period.

Sample Size Determination

The sample size was calculated using Cochran's formula [16] for estimating proportions with a 95% confidence interval and a 5% margin of error.

The total population for Wenchi Municipality for 2024, a , is 135,165 [15]

The population of 18 years and above, b , is 56% [14] of the total population. Which is $= 56\% * a = 75,692$.

Population 18 years and above who have received the COVID-19 vaccine in Wenchi Municipality [6], c , is 19,150.

The proportion of the population receiving the vaccine $= \frac{c}{b} * 100 = p = 25.3\%$ approximately 25%.

$$\text{Sample size} = n = \frac{z^2 pq}{d^2}$$

Where z = coefficient of reliability at 95% CI=1.9.

p : estimated proportion of the population receiving the vaccine $q = (1 - p)$ and d : deviation= 0.5.

then $n = \frac{(1.96)^2(0.25)(0.75)}{(0.05)^2} = \frac{0.7203}{0.0025} = 288.12$, approximately 288.

Therefore, the sample was estimated at 288.

Sampling Procedure

A Probability Proportional to Size (PPS) sampling method was applied to ensure each sub-municipality's representation matched its share of the eligible population. The six sub-municipalities were considered primary clusters.

For logistical feasibility, three clusters were selected using systematic random sampling from a randomly ordered list of sub-municipalities.

Within each selected cluster, systematic household sampling was employed to select a respondent.

Data Collection Instruments and Procedure

A structured questionnaire was developed to capture Demographic Information, Accessibility Factors and COVID-19 Vaccination Status. The questionnaire was pre-tested in three non-study communities in another district with similar characteristics.

Data collection was conducted by five trained National Service Personnel under the supervision of the principal investigator. Training covered Ethical research conduct. Administration of the questionnaire in both English and Akan, Strategies for minimizing bias (e.g., neutral phrasing, avoiding leading questions) and COVID-19 safety protocols during fieldwork. Enumerators visited households, introduced the study, obtained consent, and conducted face-to-face interviews. Where possible, vaccination cards were inspected to verify self-reported vaccination status.

Open-ended responses were recorded verbatim in the questionnaire forms. Where participants consented, interviews were audio-recorded to ensure accuracy of quotes. The qualitative component allowed deeper exploration of experiences, particularly around perceived barriers, cues to action, and social influences.

Data Management and Analysis

Quantitative Analysis

1. Data were entered into IBM SPSS Statistics v24.
2. Descriptive statistics (frequencies, percentages) summarized demographic variables and accessibility indicators.
3. Logistic regression examined associations between socio-demographic factors and vaccination uptake.
4. Statistical significance was set at $p < 0.05$.

Qualitative Analysis

Thematic analysis followed Braun and Clarke's [38] six-step framework:

1. Familiarization with data (reading and re-reading responses).
2. Initial coding (assigning labels to meaningful segments).
3. Searching for themes (grouping codes into patterns).
4. Reviewing themes (ensuring internal consistency and distinctiveness).
5. Defining and naming themes.
6. Producing the report with illustrative quotes.

Quantitative and qualitative findings were integrated at the interpretation stage, guided by the Health Belief Model.

Ethical Considerations

Ethical approval was obtained from:

1. Texila American University's Institutional Review Board (IRB).
2. Navrongo Health Research Centre IRB.
3. Bono Regional Health Directorate, Ghana Health Service.

Additional community entry protocols were observed, including:

1. Formal notification of municipal and sub-municipal health authorities.
2. Courtesy visits to traditional leaders.
3. Public announcements in selected communities.

Informed consent was obtained from all participants. Confidentiality was maintained by:

1. Assigning unique ID codes instead of names.
2. Storing data in password-protected files.
3. Restricting access to the principal investigator and authorized research assistants.

There were no anticipated physical risks to participants. COVID-19 preventive measures (mask-wearing, physical distancing, hand hygiene) were enforced during data collection.

Results

This section presents the findings of the study on awareness of COVID-19 vaccination among residents of the Wenchi Municipality. The results are organized according to respondents' socio-demographic characteristics, their level of awareness, sources of information, and perceptions regarding the COVID-19 vaccine.

The analysis provides insights into how knowledge and awareness of the vaccine are distributed across different age groups, genders, educational levels, and occupational categories. In addition, the section highlights the dominant sources of information such as mass media, health workers, and community platforms, that shaped public understanding of the vaccination program. These results serve as the basis for assessing the extent to which awareness influences vaccine acceptance and uptake in the municipality.

Table 1. Demographic Profile of Respondents

	Demographic Information	Frequency	percentages
Age groups of respondents	20 years and below	25	8.0
	21-30 years	105	33.7
	31-40 years	91	29.2
	41-50 years	55	17.6
	51-60 years	16	5.1
	Above 60 years	19	6.1
Sex	Male	142	45.5
	Female	169	54.2

Primary Occupation	Student/Pupil	52	16.7
	Apprentice	59	18.9
	Working at the formal sector	85	27.2
	Working at the informal sector	115	36.9
Ethnicity	Bono	129	41.3
	Other Akan	45	14.4
	Dagaati	70	22.4
	Ewe	7	2.2
	Other tribes	60	19.2
Educational background	None	26	8.3
	Pre school	9	2.9
	Primary	31	9.9
	JHS	106	34.0
	SHS/Tech/Voc	85	27.2
	Tertiary	54	17.3
Marital Status	Single	123	39.4
	Married	158	50.6
	Divorced	1	0.3
	Widow	11	3.5
	cohabiting	18	5.8
where do you live	Rural (pop<20000)	186	59.6
	Urban (Pop>20000)	118	37.8

Among the 292 respondents, as shown in table 1 above, 54.4% were female and 45.6% male. The most represented age group was 21–30 years (33.7%), followed by 31–40 years (29.2%). Educational attainment varied, 34% had completed Junior High School, 27.2%

Senior High School/Technical/Vocational, 17.3% tertiary education, while 8.3% had no formal education. Majority (59.6%) lived in rural areas, and 36.9% worked in the informal sector.

Table 2. Frequency and Proportional Distribution of COVID-19 Vaccination Status by gender of Respondents

Gender	Freq. Vaccinated	Number not Vaccinated	Total	% Vaccinated
Male	93	43	136	68%
Female	113	46	159	71%
Total	206	89	295	

The table 2 above compares the intake of the COVID-19 vaccine with the gender of the participants. The males were 136 and the females were 159. In the males, 93 (68%) out

of 136 took the COVID-19 vaccine. With regards to the females, 113 (71%) out of the 159 females took the COVID-19 vaccine.

Table 3. Influence of Educational Level on Perception of Cause of COVID-19 Disease

Education	Infectious	Foreign	Dubious	Virus	Total
None	9	12	4	12	37
Preschool	3	6	7	6	22
Primary	20	22	3	11	56
JHS	82	51	5	45	183
SHS/Tech/Voc	69	48	7	38	162
Tertiary	45	26	2	27	100

This Multinomial Logistic Regression analysis examines how the level of education influences individuals' perceptions of the cause of COVID-19. As shown by the table 3 above, the dependent variable is the perception of the cause of the disease (with four categories: 'It is an infectious disease', 'Disease from foreign people', 'Created by people for dubious intentions', and 'Caused by a virus'). The independent variable is educational level. The aim was to assess whether educational level significantly predicts the perception of the causes of COVID-19.

The regression showed that educational level was a significant predictor of perception of

COVID-19 causes ($p < .05$). Respondents with lower education levels were more likely to perceive COVID-19 as a foreign disease or a disease created for dubious intentions. Those with tertiary education were more likely to perceive it as an infectious disease or a disease caused by a virus.

These findings suggest a strong association between educational level and misconceptions or accurate understanding of disease etiology. Therefore, public health interventions should tailor educational campaigns according to the target population's education level.

Table 4. Multiple-Response on Means of COVID-19 Infection Prevention

		Responses		Percent of Cases
		N	Percent	
Means of prevention	Wearing of protective clothing	201	28.8%	80.4%
	Social distancing	175	25.1%	70.0%
	Avoiding overcrowding	148	21.2%	59.2%
	Vaccination	146	20.9%	58.4%
	Chemoprophylaxis	11	1.6%	4.4%
	Local/traditional means	17	2.4%	6.8%
Total		698	100.0%	
a. Dichotomy group tabulated at value 1.				

Wearing of protective clothing attracted 201 people representing 28.8% of all responses, as depicts by table 4 above, and 80.4% of all respondents reported using this as a means to prevent COVID-19 infection.

Social distancing use was 175 respondents representing 25.1% of responses and 70.0% of respondents; Avoiding overcrowding was 148 respondents, representing 21.2% of responses, 59.2% of respondents; vaccination was 146

respondents representing 20.9% of responses, 58.4% of respondents; Chemoprophylaxis was only 11 representing 1.6% of responses, 4.4% of respondents; and Local/traditional means was 17 people representing 2.4% of responses and 6.8% of respondents.

The most common prevention strategy was wearing protective clothing (80.4%), followed by social distancing (70.0%). The least used method was chemoprophylaxis (4.4%). 40.7% correctly identified COVID-19 as an infectious disease, and 24.8% specifically recognized it as caused by a virus.

Table 5. Binary Logistics Regression Analysis on Beliefs about COVID-19 Vaccination

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP (B)	
							Lower	Upper
Do you think that the immunity acquired after contracting the disease is better than after vaccination	1.142	.330	12.001	1	.001	3.133	1.642	5.978
Do you think that it is better to wait for the next emerging vaccines than to get one of those developed in the first stage?	.893	.339	6.946	1	.008	2.443	1.257	4.746
Do you think the COVID-19 vaccine has the efficacy to prevent people from contracted COVID-19 infection?	-1.443	.389	13.752	1	.000	.236	.110	.506
Constant	-.448	.355	1.592	1	.207	.639		

Table 5 shows that, the belief that "Immunity after infection is better than after vaccination" a regression coefficient of 1.142 implying positive association, $p = 0.001$ that Statistically significant and are 3.13 times more likely not to take vaccine and $CI = [1.642, 5.978]$ making the belief significant. Believing that natural immunity is better than vaccine-acquired immunity significantly increases the odds of the vaccine uptake.

The belief that " It is better to wait for next vaccine" has a regression coefficient of $B = 0.893$, $p = 0.008$, $Exp(B) = 2.443$. People who believe it is better to wait for future vaccines are 2.44 times more likely not to take the vaccine.

This belief is also a significant positive predictor that the respondents are not likely to take the vaccine.

The belief in "COVID-19 vaccine efficacy to prevent infection" had $B = -1.443$, $p = 0.000$, and $Exp(B) = 0.236$. Negative coefficient implies that those who believe in the vaccine's efficacy are less likely not to take the vaccine. Odds are reduced by 76.4% ($1 - 0.236$). Confidence in vaccine efficacy significantly reduces the vaccine hesitancy.

17.1% believed it was a "disease from foreigners," and 5% attributed it to deliberate creation for dubious intentions and 86.2% agreed COVID-19 could be fatal.

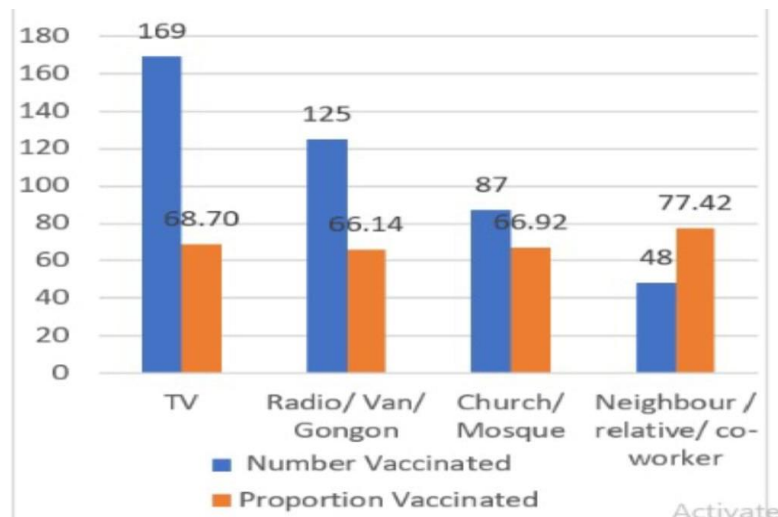


Figure 2. Frequency and Proportional Distribution of Media Sources for Information and COVID-19 Vaccination

Source: Field data.

Television (38.5%) and radio (29.9%) were the most cited sources, as shown by figure 2 above. Most of the respondents (247) heard about COVID-19 on the television. 169 (68.70%) out of the 247 who heard it on the television took the vaccine. 125 (66.14%) out of 189 respondents who heard the COVID-19 from the radio/Van/Gongon took the vaccine. Also 130 became aware of COVID-19 vaccination at the Church/Mosque and 87

(66.92%) of them got vaccinated. Those who heard from their neighbors/relatives/co-workers/direct from health workers were 62, and 48 (77.42%) of them took the vaccine. Churches/mosques accounted for 20.7%, and interpersonal networks (neighbors, relatives) for 10.9%. Social media platforms were mentioned in qualitative narratives as both information sources and channels for misinformation.

Table 6. Means of COVID-19 Prevention and Vaccine Uptake

Means of COVID-19 Prevention	Yes	No	Total
Wearing of protective clothing	147	46	193
Social distancing	129	42	171
Avoiding overcrowding	109	35	144
Vaccination	108	37	145
Chemoprophylaxis	9	1	10
Local/traditional means	10	4	14
Total	179	58	237

Table 6 shows that, among 237 respondents, 145 representing 61.18% know vaccination as a means of preventing COVID-19 infection. However, the means of prevention was higher in the wearing of protective clothing and social

distancing 193 (81.43%) and 171 (72.15%) respectively.

Among the 145 respondents who knew vaccination as means of preventing COVID-19 infection, 108 of them representing 74.48% took the vaccine. About 35.5% of those who

know vaccination as means of preventing COVID-19 infection, still did not take up the vaccine. 82.7% believed vaccination could prevent COVID-19 infection.

The open-ended responses were analyzed qualitatively to focus on meanings, patterns and themes. The aim of the responses was to determine participants view on COVID19 vaccination and how it could be improved to increase the vaccine up-take show that, even though people vaccinated against COVID-19, some believed that COVID-19 is not real. The participants wondered that “COVID-19 does not exist and it is not real and recommended that education on COVID-19 should be the key to make people be aware of the COVID-19 virus.

Majority of the participants recommended that education to create awareness was paramount, especially on the need for the vaccination and the side effects of the vaccine. They stressed on alternatives for prevention other than the vaccine.

The participants recommended, opportunities should be created for individuals

who have taken the vaccines to offer peer education to family and friends in the communities for people who not taken the vaccination to get the confidence to take it. They also wanted to see Health Workers and other service providers including people in authority taking the vaccines in the public. This would affirm the facts about the vaccine safety.

The participants raised the concern on challenges they faced, such as severe side effects, long queues, and too many doses to be taken. They did not like the situation where one individual would be given vaccines from multiple manufacturers. They recommended that where it is necessary for multiple doses, each individual should be given the vaccine from one manufacturer.

For pain from injection, respondents/participants, recommended other route of administration, such as oral route, rather than the injection. They, however, suggested that, if the vaccine needs to be given only through injection, then it should be a single dose for a lifetime.

Table 7. Crosstabulation Primary Occupation and Reasons for Vaccination Uptake

Reasons for Vaccination Uptake	Primary Occupation				Total
	Student/Pupil	Apprentice	Working at formal sector	Working at informal sector	
To protect myself	29	32	63	71	195
I was earlier on infected	1	0	1	6	8
Someone i know was infected	1	1	9	3	14
It was required by my employer	3	3	12	8	26
It was a traveling requirement	5	2	7	22	36
Total	34	33	67	75	209

The table 7 shows that high proportion (93.30%) of respondents of all occupations who took the vaccine was because they wanted to prevent themselves from getting infected. It

ranges from 85.21% of students/people to as high as 97% of apprentices.

A cue to action, that is mandatory vaccination for travelers and workers was

higher after awareness of preventing COVID-19 infection. More (29.67%) of all occupations got vaccinated because of mandatory vaccination. However, this was higher (17.91%) among those at the formal sector than those at the informal sector (10.67%). Mandatory vaccination among students/pupils (8.82%) and apprentices (9.19%) was very low among students/pupils and apprentices respectively who got vaccinated.

However, cue to action as a result of COVID-19 experience due to infection on the respondents or someone known by the respondents, lead to only 10.53% of all occupations who took the vaccine. 81.1% recognized other benefits, including increased confidence in social interactions (16.9%) and the possession of a vaccination card for travel (noted in qualitative data).

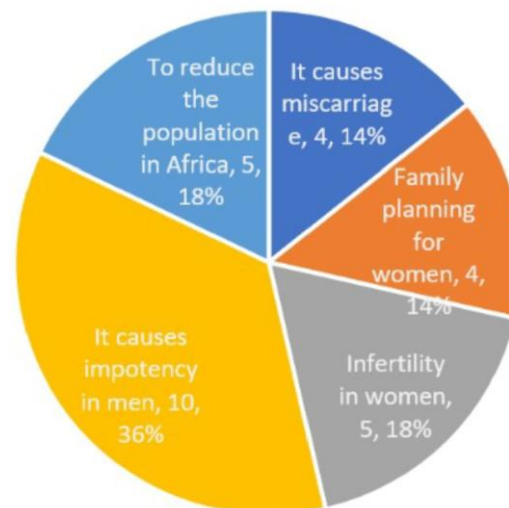


Figure 3. A Pie chart of Reasons of not Taking the COVID-19 Vaccine in Wenchi Municipality

Source: Field data.

The figure 3 above represents the reason why the participants did not take the COVID-19. In all the respondents, 36% believed that the vaccine will make to be impotent. 14% believed that the vaccine will cause miscarriages in women. While 18% of the participants believed that the vaccine will lead to infertility in women, 14% also believed that the vaccine is a family planning in women. Lastly, 18% believed the vaccine was created to reduce

African population. 17% considered the vaccine a threat to life, while 11.5% denied its preventive capacity. 65.1% felt their occupation increased their susceptibility, with health workers (35.1%), traders (26.5%), and commercial drivers (17.1%) most frequently mentioned. Respondents cited the elderly, health workers, and chronically ill individuals as most at risk.

Table 8. Infection During the Pandemic and Vaccination against COVID-19

		Did you take the COVID-19 vaccine during the time they were doing the vaccination?			Total
		Yes	No	21.00	
Infected during the outbreak	Yes	6	3	1	10
	No	185	80	0	265
Total		191	83	1	275

Among 275 respondents, as shown in table 8, 10 (3.6%) of them were infected during the COVID-19 pandemic. Also, 191 (69.46%) of these 275 respondents received the vaccine.

However, 6 (60%) of those who got infected also received the vaccine, though the number is small and statistically not reliable.

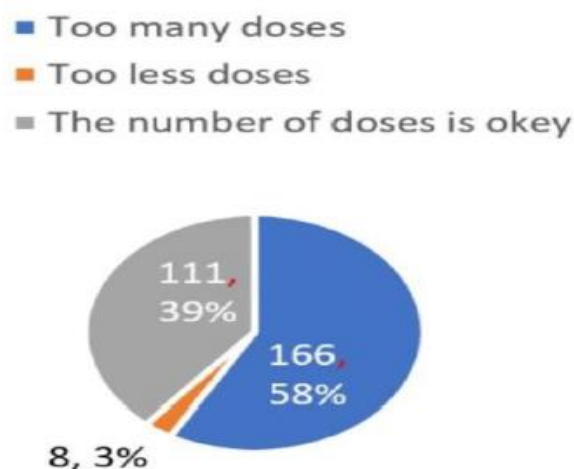


Figure 4. Respondents view about the number of doses of the vaccine that need to be taken.

Source: Field data.

About 58% of respondents were not satisfied with the number doses during the vaccination period, indicates in table 4, and that the of doses was extremely many. However, 39% were satisfied with the number of doses whereas only 3% saw believe the number of doses to be too less.

While mass media campaigns were the primary driver of awareness, qualitative accounts revealed that personal experience with COVID-19, either infection or knowing someone affected, was a strong motivator for recognizing vaccination importance. However, limited direct engagement from healthcare workers in rural areas reduced the impact of these cues.

Despite high levels of stated awareness, Wenchi Municipality's full vaccination rate remained at 25.3%. Qualitative data highlighted persistent doubts about vaccine safety, side effects, and the necessity for younger, healthy individuals.

Discussion

This study examined awareness of the importance of COVID-19 vaccination in Wenchi Municipality, using the Health Belief

Model (HBM) as a framework to interpret findings. While awareness levels were generally high, particularly regarding the preventive potential of vaccines, uptake remained low. The gap between knowledge and behavior points to a complex interplay of psychological, social, and contextual factors.

Perceived Susceptibility

Perceived susceptibility refers to an individual's belief in their personal risk of contracting a disease [11]. In this study, 65.1% of respondents acknowledged occupational susceptibility, particularly among health workers, traders, and commercial drivers. However, qualitative data suggested that younger, healthy individuals often downplayed their personal risk, perceiving COVID-19 as a disease that primarily affects the elderly or chronically ill.

This pattern mirrors findings from [17], who observed that individuals under 30 were less likely to perceive themselves as at risk, contributing to lower vaccination intentions. Similarly, [7] found that Nigerian undergraduates, despite high awareness often believed their youth provided natural immunity.

Perceived Severity

Perceived severity reflects beliefs about the seriousness of the disease and its consequences. In this study, 86.2% recognized COVID-19's potential fatality, aligning with [18], who found that most Indian respondents acknowledged severe outcomes. Nevertheless, recognition of severity did not consistently translate into urgency to vaccinate. Some participants perceived infection as survivable with herbal treatments, echoing local health belief systems.

The persistence of such alternative treatment beliefs highlights the need to contextualize severity messages in culturally relevant ways to emphasize both individual and community-level risks [19].

Perceived Benefits

A majority (82.7%) believed vaccination could prevent infection, and 81.1% identified additional benefits such as protection for family members, enabling safe travel, and enhancing confidence in public spaces. These perceptions align with [20], who demonstrated a direct correlation between perceived benefits and vaccine uptake.

However, some respondents framed benefits primarily in instrumental terms (e.g., possessing a vaccination card for travel) rather than in health protection terms, suggesting that motivations for vaccination may not always stem from health-related awareness but from social or administrative incentives.

Perceived Barriers

Barriers emerged as the most significant disruptor between awareness and uptake. Despite high awareness, 17% viewed the vaccine as a threat to life; 11.5% doubted its preventive value; and concerns over side effects, vaccine safety, and efficacy persisted, with misinformation, particularly from social media, being a major contributor.

These findings parallel those of [21] in Sub-Saharan Africa, where mistrust in vaccine safety and source of information reduced

uptake. Additionally, [22] identified community-level misinformation channels, including radio broadcasts and anti-vaccine songs, as influential in sustaining hesitancy.

Cues to Action

Cues to action are triggers that prompt engagement in health behavior. In Wenchi, primary cues were mass media campaigns (TV, radio), advice from healthcare workers, which was more effective in urban settings, and personal experiences with COVID-19 infection.

However, qualitative responses revealed a lack of direct community engagement, particularly in rural areas. This gap diminished the impact of cues to action, suggesting that while mass media reaches a wide audience, localized, interpersonal cues are more effective in converting awareness to action [23].

Modifying Variables

The HBM recognizes demographic and socio-economic factors as shaping perceptions and responses. In this study, higher education correlated with better understanding of vaccine benefits. Formal sector employment was linked to greater awareness, possibly due to workplace sensitization programs. And rural residence correlated with greater exposure to misinformation and fewer direct cues from health workers. These patterns are consistent with [10], who noted that education, occupation, and residence type significantly affect vaccination behavior in LMICs.

Bridging the Awareness and Uptake Gap

The persistence of low uptake despite high awareness underscores a key insight that awareness is necessary but insufficient for vaccination behavior change. The HBM suggests that interventions must simultaneously increase perceived susceptibility and severity (risk communication). Also, reinforce perceived benefits while addressing barriers (myth-busting and evidence dissemination);

and enhance cues to action (localized, trusted messengers).

In practical terms, this means that campaigns must shift from information provision to behavioral persuasion, grounded in the socio-cultural realities of target populations.

Recommendations

The results of this study in Wenchi Municipality show that high awareness of COVID-19 vaccination does not automatically translate into high uptake. The gap between awareness and action can be bridged only through interventions that target perceived barriers, boost cues to action, and strengthen risk perception in culturally relevant ways. The recommendations are structured in alignment with the Health Belief Model.

Strengthen Perceived Susceptibility and Severity

1. **Localized Risk Communication:** Public health campaigns should emphasize that *everyone*, including the young and healthy, is at risk of infection and can transmit the virus. Campaigns must include real-life testimonies from local residents who experienced severe illness.
2. **Context-Specific Messaging:** In rural communities where herbal remedies are popular, health educators should acknowledge traditional beliefs but provide evidence on COVID-19's complications and the limits of non-medical treatments [19].
3. **Data Visualization:** Use infographics showing local infection rates, hospitalizations, and deaths to make the risk tangible [7].

Enhance Perceived Benefits

1. **Health Protection Emphasis:** Shift messaging from *instrumental benefits* (e.g., vaccination card for travel) to *health and community protection benefits*.
2. **Family-Centered Messaging:** Highlight that vaccination protects loved ones,

especially the elderly and those with chronic illnesses [20].

3. **Post-Vaccination Quality-of-Life Stories:** Share accounts of vaccinated individuals who remained symptom-free or experienced milder illness after exposure.

Reduce Perceived Barriers

1. **Address Misinformation:** Establish rapid response teams to counteract myths circulating in communities and on social media. For example, fact-checking radio programs can directly respond to local rumors identified by surveillance teams [22].
2. **Transparent Safety Information:** Communicate openly about vaccine side effects, their frequency, and their management, drawing from both Ghana Health Service data and international evidence.
3. **Mobile Vaccination Units:** Reduce geographic and logistical barriers by bringing vaccines to remote settlements, as transportation costs were cited as an obstacle [23].
4. **Engage Religious and Traditional Leaders:** Provide leaders with accurate vaccine information so they can act as trusted intermediaries in countering fear and suspicion.

Strengthen Cues to Action

1. **Community Health Outreach:** Deploy trained health workers and volunteers to conduct door-to-door sensitization, especially in rural areas. This should supplement mass media campaigns to provide direct, interpersonal engagement [24].
2. **Integration with Existing Health Services:** Offer COVID-19 vaccination alongside child immunization days, antenatal clinics, and other routine services to normalize uptake.

3. Event-Based Mobilization: Link vaccination drives to market days, festivals, and religious gatherings, maximizing foot traffic and community participation.

Leverage Modifying Variables

1. Targeted Education by Demographics:
 - Younger adults: Focus on social responsibility and preventing economic disruptions due to illness.
 - Lower education groups: Use simple, visual communication tools rather than text-heavy materials.
 - Informal sector workers: Partner with market associations and transport unions to deliver workplace sensitization.
2. Gender-Sensitive Approaches: Acknowledge higher hesitancy among women in certain contexts [25] by creating safe spaces for women to discuss vaccine concerns with female health workers.

Policy and System-Level Actions

1. Continuous Monitoring of Vaccine Sentiment: Implement routine surveys to detect shifts in public opinion and respond proactively.
2. Sustainable Funding for Communication Campaigns: Ensure that public awareness efforts are not episodic but maintained as part of broader pandemic preparedness strategies.
3. Inclusion in Emergency Preparedness Plans: Position COVID-19 vaccination awareness programs as a model for addressing future vaccine-preventable outbreaks.

Conclusion

This study in Wenchi Municipality of Bono Region, Ghana, reveals that awareness of the importance of COVID-19 vaccination is relatively high but does not consistently translate into vaccine uptake. While the majority of respondents recognized the

preventive role of vaccination and its broader benefits, a significant portion still expressed doubts about vaccine safety and efficacy. Misconceptions, safety concerns, and low perceived susceptibility—particularly among younger adults; emerged as persistent barriers.

Applying the Health Belief Model provided a deeper understanding of this awareness–behavior gap. High awareness of vaccine benefits was often overshadowed by perceived barriers, weak cues to action in rural areas, and independent variables such as educational level, occupation, and sex. The model’s constructs highlighted that successful vaccination campaigns must do more than disseminate information; they must shift perceptions, address fears, and activate community-level triggers for action.

In practical terms, this means localizing risk communication, leveraging trusted community influencers, countering misinformation, and improving accessibility through mobile services and integration with routine healthcare. These strategies, if implemented systematically, can increase vaccine uptake not only for COVID-19 but also for future public health emergencies requiring rapid mass immunization.

The findings underscore an important public health lesson: awareness is necessary, but insufficient, for behavior change. Interventions must be multifaceted, addressing the cognitive, emotional, and structural determinants of health behavior. By aligning vaccination strategies with the principles of the Health Belief Model, health systems in Ghana and similar contexts can better transform knowledge into protective action, safeguard communities, and strengthen pandemic preparedness.

Clearly state the research question or objectives. Let readers see you are collecting the data needed to answer the question, analysis done to bring out the issues, discussion centered on the problem, as well as the conclusion. The conclusion should also relate directly to the research question and objectives.

Conflict of Interest

The author hereby declares that, there is no conflict of interest in this manuscript.

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