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Published in:
Advances in Public Health

DOI:
[10.1155/2023/3626862](https://doi.org/10.1155/2023/3626862)

Publication date:
2023

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Document Version
Publisher's PDF, also known as Version of record

[Link to publication in Discovery Research Portal](#)

Citation for published version (APA):
Aberese-Ako, M., Ebelin, W., Doegah, P. T., Kuatewo, M., Kpodo, L., Kpordorlor, A. G., Alhassan, R. K., Baba, A. A., Djokoto, S., & Ansah, E. K. (2023). Promoting COVID-19 Vaccine Acceptance through Community Engagement: An Ethnographic Study in Ghana. *Advances in Public Health*, 2023, Article 3626862 .
<https://doi.org/10.1155/2023/3626862>

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Research Article

Promoting COVID-19 Vaccine Acceptance through Community Engagement: An Ethnographic Study in Ghana

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Received 4 October 2022; Revised 4 December 2022; Accepted 21 December 2022; Published 12 January 2023

Academic Editor: Dazhou Li

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Introduction. To successfully manage COVID-19 and to meet the target of vaccinating 22.9 million people in Ghana, the government has adopted community engagement as one of the strategies. Yet, the Volta Region continues to record the lowest rate of vaccine acceptance in Ghana. This study explored how government institutions engaged communities on COVID-19 vaccine preparedness and acceptance in two administrative municipalities in Ghana. **Methods.** This qualitative study employed face-to-face in-depth interviews among thirty-six respondents comprising of government officials and community leaders and ten focus group discussions among 87 people made up of men and women most of whom were natives and some migrants in two administrative municipalities in Ghana. Data were collected from June to September 2021. Audio interviews were transcribed and uploaded to Nvivo 12 to support triangulation, coding, and thematic analysis. Ethical approval was obtained from the requisite authority, and all COVID-19 restrictions were observed. **Results.** Government institutions focused on informing communities of vaccines and vaccination with little input from the communities. The Ghana Health Service carried out the most extensive engagement because they had more decentralized institutions. Successful engagement activities resulted in vaccine acceptance among some community members. Challenges in community engagement included insufficient logistics and myths and misconceptions about vaccines, which accounted for some community members' lack of trust in vaccines, resulting in their unwillingness to vaccinate. Government officials used innovative approaches such as comparing the safety of COVID-19 vaccines to vaccines designed for children under the age of five years to deal with misinformation. **Conclusion.** Government needs to provide more resources to institutions that are mandated to carry out engagement activities to enable them carry out their tasks. It is further recommended that government institutions should intensify community engagement in distant communities to support the country to meet the target.

1. Introduction

Vaccine hesitancy has increased steadily in over 90% of countries since 2014 [1], while it has been estimated that

countries need at least 60 to 70% of the population to have immunity to really break the chain of transmission, as a measure to contain the SARS-CoV-2 virus, which is a highly transmissible virus [2]. If allowed to occur naturally,

herd immunity will occur over an extended period of time, during which the health and economies of countries will have suffered extensively [2]. Therefore, to facilitate and attain the level of vaccination required to achieve early herd immunity, countries need to extensively engage citizens in order to build public trust, which could promote vaccine acceptance [3, 4]. Consequently, the WHO and other bodies have increasingly advocated for strong community engagement using available opportunities and creating more avenues to inform and prepare communities for acceptance of health interventions such as COVID-19 management as well as to promote vaccine acceptance [4–7].

There have been large-scale communication and engagement campaigns all over the world to raise awareness of the virus and its preventive measures. As of 1st October 2020, 90% of countries reported having a national risk communication and community engagement (RCCE) plan. This indicates that the crucial role of RCCE is understood and prioritized by many countries [7]. Ghana recorded its first case of COVID-19 in March 2020 [8] and by 1st September 2022, a cumulative figure of 168,580 cases had been confirmed, with 167,080 recoveries and 1,459 deaths and 41 active cases [9]. Since the advent of the virus, the government has instituted new structures, committees, advisory bodies, and lines of communication to promote COVID-19 vaccine acceptance and vaccination [8]. The government used the following strategies to engage the public on COVID-19 prevention, management, and vaccination: radio programmes, regular presidential address to the nation, and mass education. Four key government institutions that are mandated to carry out community engagement activities in Ghana are the Information Services Department (ISD) under the Ministry of Information [10], the National Commission for Civic Education (NCCE) (National Commission for Civic Education) [11], the district/municipal assemblies, and the Ghana Health Service (GHS). The ISD is mandated to disseminate government policies, programmes, and activities to the general public [10]. The NCCE was created to sustain societal awareness of the principles and objectives of the 1992 fourth Republican Constitution of Ghana, as the fundamental law of the people of Ghana (National Commission for Civic Education) [11]. The district or municipal assemblies were established to deepen decentralized governance and improve access to services at the district or municipal level [12]. The GHS, which is the health service delivery arm of the Ministry of Health, provides a majority of health services to the general public in Ghana [13].

Ghana was the first African country to receive 600,000 COVAX vaccines from the COVAX Facility in February 2021 as part of an initial tranche of deliveries of the AstraZeneca/Oxford vaccine licensed to the Serum Institute of India [14]. The vaccines were administered among key public figures including the Ghanaian president and vice president, chiefs, religious leaders, and essential workers (health workers and security personnel, among others) [15]. This strategy was aimed at promoting public acceptance of vaccination and also to ensure that essential workers were protected to promote the delivery of essential services.

Ghana's target is to vaccinate 22.9 million people and by 1st September 2022, only 36.1% (8,251,886) of the target population were fully vaccinated, while 49.8% (11,371,567) had received at least one vaccine dose [9]. The situation is direr in the Volta Region of Ghana, which registered the lowest rate of vaccine uptake of 18.2% as of the stated data. The country leveraged on the experience of its successful existing EPI vaccination programme such as the National Polio Immunization Day to establish a National COVID-19 Immunization Day [16]. The success of previous immunization programmes has been largely due to effective community engagement and risk communication programmes, so the COVID-19 programme adopted this strategy. The approach contributed to successfully administering 14,944,182 doses of COVID-19 vaccine as of 10th May 2022 [16].

It has been reported that the vaccination momentum is subsiding in some parts of Ghana and the rest of the African continent [17]. A study in Ghana noted that 40.7% of radiologists, who were prioritized in the administration of the first consignment of vaccines, were unwilling to vaccinate [15]. Botwe et al. [15] noted that the reasons accounting for vaccine hesitancy include clinical safety concerns, lack of education or information, and religious beliefs among some that God will protect them, so they do not need to be vaccinated. A national survey of the sixteen regions of Ghana reported that about half (51%) of mostly urban adult Ghanaians over the age of 15 years were likely to take the COVID-19 vaccine, if made generally available [18]. The North East Region recorded the highest vaccine acceptance (65.10%), while the Volta Region recorded the lowest vaccine acceptance (32.50%) [18]. The high vaccine hesitancy in the Volta Region has created the urgent need to intensify and prolong community engagement. Yet, currently, there is no information on how the government institutions such as the Ghana Health Service, the district/municipal assemblies, the National Commission for Civic Education, and the Information Services Department are engaging communities in order to achieve the national goal. This qualitative study contributes to the literature by exploring and describing how government institutions engaged communities to facilitate vaccine acceptance and uptake in the Volta Region of Ghana. The findings will help to inform policy and intervention efforts.

1.1. Community Engagement Defined. This study adopted community engagement as has been defined by the World Health Organization as "...developing relationships that enable stakeholders to work together to address health-related issues and promote well-being to achieve positive health impact and outcomes" [19]. The World Health Organization's [19] definition presents three main components, which are actors/stakeholders, developing the process, and purpose of engagement. Stakeholders are perceived as different parties that have an interest in the process, which comprises multiple communities that could include community members, patients, health professionals, policy-makers, and other sectors [20]. The process suggests that the

different stakeholders strive to create a relationship that is based on respect, trust, and a sense of purpose [19]. The current study adopted the WHO's definition of community engagement to explore how government entities engaged communities in two Ghanaian municipalities in the management of COVID-19 and vaccine acceptance.

1.2. Study Design. The study used an ethnographic qualitative approach to explore and describe the Ghanaian government's community engagement efforts towards COVID-19 vaccine preparedness and acceptance in two municipalities in the Volta Region of Ghana. Using in-depth interviews (IDIs) and focus group discussions (FGDs), the study gained in-depth knowledge on the Ghanaian government's initiative through state institutions such as the municipal assembly, Ghana Health Service, Information Services Department, and the National Commission for Civic Education.

1.3. Study Areas. The Volta Region was chosen for the study because it recorded the lowest vaccine acceptance (32.50%) [18]. Historically, the region has been observed by the Ghana Health Service as the region with the top 20 districts with the highest number of unimmunized children in the country [21].

1.4. Selection of Study Sites. Two municipalities dubbed Municipality A* and Municipality B* were purposively selected for the study. Municipality A and Municipality B were selected because they are among the most urbanized municipalities in the region. The choice was aimed at understanding how urban populations engage with the healthcare system and other governmental entities in providing healthcare interventions. Both municipalities have a fair proportion of rural population, and Municipality B also has migrant settlements made up of mostly persons from the Republic of Togo, which it shares boundaries with.

The Ghana Health Service operates a decentralized administrative system with offices at the national, regional, municipal levels, sub-district offices, hospitals, health centres, and community-based health planning and service (CHPS) facilities in each region (Ghana Statistical Service [22]). To ensure that the study was reflective of the different levels of health service delivery, a multi-stage random sampling technique was used to select a sub-municipality, and a CHPS facility was selected for the study. In the first stage, the names of all the sub-municipal health directorates in each study municipality were obtained from the respective municipal health directorates. They were written on pieces of paper, which were folded and an observer was invited to select one sub-municipality for the study. In the second stage, all CHPS compounds under the selected sub-municipality were written on pieces of paper, which were folded and the observer randomly picked one. To ensure that community experiences were also captured in the study, a third stage was included, which included writing down the names of communities under each selected CHPS facility and folding it, and one was randomly selected to participate in the study.

1.5. Selection of Study Participants and Sampling. From each of the study sites, one municipal health service manager, one sub-municipal health manager, two health providers from the selected CHPS facility, one official from the municipal assembly, NCCE, and ISD, respectively, and some of the community elders were purposively sampled to participate in IDIs (Table 1). A cross section of women, men, and migrants from different age groups who were available and willing to participate in the study was conveniently sampled to participate in FGDs consisting of 6 to 13 participants. The interviews sought to understand how the municipal assembly, GHS, NCCE, and ISD engaged communities towards the COVID-19 vaccination rollout and uptake. Saturation was attained when no new information was obtained from study participants, which is in accordance with qualitative enquiry [23].

Participation was voluntary, and those who were not interested were automatically excluded, as well as those who were mentally challenged.

The three components of the WHO's definition of community engagement (categories of stakeholders, processes used to engage communities, and the purpose of the engagement) were used to guide the selection of the stakeholders, design the IDI and FGD guides, and determine the focus of the study, which was on COVID-19 interventions. This manuscript is drafted from a larger study, and the other aspects of the study have been reported in an upcoming paper.

1.6. Training of Data Collectors and Quality Control. Four graduate data collectors were trained by the first author, MA, a medical and organizational anthropologist, on qualitative data collection methods including interviewing and writing field notes and also seeking informed consent, which equipped them with the needed skills for data collection. The IDI and FGD guides for community members were translated into the native language Ewe during the training, and research assistants were trained in English and the local language.

To ensure rigour, the study guides were pretested among eligible participants from a municipality similar to the municipalities selected for the study. The pretesting process also guided in the revision of the guides to ensure its validity and reliability.

1.7. Data Collection, Management, and Analysis. In-person interviews were conducted in English with the government officials and in Ewe with the community members. Migrants were interviewed in French, as majority of them are from Togo and cannot speak English nor Ewe. Interviews were recorded using a digital audio recorder and later transcribed verbatim to preserve respondents' views and experiences. The average duration of IDIs was 50 minutes, and that of FGDs was one hour. Meetings were held between MA and the data collectors every week to ensure trustworthiness of data.

Transcribed data (IDIs and FGDs) were uploaded onto a computer and transferred onto a qualitative software NVivo 12, to support data coding. The data were

TABLE 1: List of data collection methods and categories of respondents.

| | Municipality A | Municipality B |
|---|----------------|----------------|
| Study participants who participated in IDIs | | |
| District health officials (1 municipality and 1 sub-district) | 2 | 2 |
| Frontline workers in CHPS compounds | 2 | 2 |
| District assembly officials | 1 | 1 |
| National Commission for Civic Education | 1 | 1 |
| Information Services Department | 1 | 1 |
| Chiefs and queen mothers | 2 | 2 |
| Elders | 2 | 2 |
| Religious leaders (Christian, Moslem, and Traditionalist) | 2 | 2 |
| Herbalists | 2 | 2 |
| Assembly persons | 1 | 1 |
| Community healthcare volunteers | 2 | 2 |
| Total | 18 | 18 |
| Study participants for FGDs | | |
| Women below 30 years | 8 | 8 |
| Women above 30 years | 10 | 8 |
| Men below 30 years | 9 | 9 |
| Men above 30 years | 9 | 8 |
| *Migrant men | 0 | 7 |
| Migrant women | 0 | 7 |
| Total | 36 | 47 |

*Municipality A does not have migrant settler communities; thus, no interviews were conducted for such a category.

triangulated and analysed thematically, which formed the basis for reporting study results. This article reports on how government institutions conducted engagement activities in the two study municipalities, challenges, gaps, and future plans. Other aspects of the study have been reported in a forthcoming paper.

2. Results

The study used the WHO definition of community engagement to understand how government institutions engaged communities in the two study municipalities. The study found that government institutions engaged communities through public educational programmes and radio talk shows. They held meetings with chiefs and community elders, opinion leaders, and religious bodies. They also held community durbars with a cross section of community members. Another approach utilized was to meet pressure groups and occupational groups such as drivers' unions and traders' associations to educate them and encourage them to get vaccinated. Health officials also used routine programmes such as Child Welfare, Antenatal, and Postnatal clinics and Reproductive and Child Welfare clinics as platforms to educate community members about COVID-19 vaccines and the vaccination process. Such initiatives contributed to the acceptance of vaccines and helped to prepare some communities towards the vaccine rollout.

2.1. How Government Institutions Engaged Communities in the Vaccine Rollout. The health directorate of Municipality A reported that they engaged the communities through radio discussions focusing on vaccines and their benefits. They also used the community centres (most communities

have specially designed places within the community installed with communication equipment for important announcements) to announce COVID-19 activities and to educate community members. The community members accepted the message and were willing to take the vaccine. This helped to reduce vaccine hesitancy among the community members. A health manager stated:

Municipality B health directorate reported that it had engaged the various communities within its catchment area by holding community durbars (open air meetings) with chiefs and community members (in spite of the existence of COVID-19, which discouraged large gatherings). They informed the community of the COVID-19 vaccine availability and benefits. So, the chiefs agreed, took the first dose, and several of the community members also took the dose.

"... we used the radio stations to propagate information about the vaccine, and we also did community engagements such as organizing durbars even though we are in COVID-19 era. We met the chiefs. We gathered about five chiefs together and told them the vaccine was available and we needed to take it to help prevent the disease and they agreed to it and came out to have the first dose" (Health manager, Municipality B).

Municipality B's Information Services Department reported that it had engaged and educated communities within the municipality. This had resulted in the acceptance of the vaccine and the communities were waiting to take the vaccine, whenever it was made available. *"For us, we have educated them about the vaccine. So, what they are waiting for is for the vaccine to come, so that they will go and take it"* (ISD official, Municipality B).

The Municipality B CHPS facility reported sensitizing the community members within its catchment area through community durbars, prior to the arrival of the first vaccine into the country. They also used routine healthcare programmes such as child welfare clinic (CWC), antenatal care (ANC), and reproductive and child health (RCH), to educate clients on the vaccine. A nurse explained: *“We educated our community members (on COVID-19 vaccines), especially those who came for community durbars and CWC, ANC, and RCH*

2.2. How Government Institutions Addressed Myths, Misconceptions, Misinformation, and Rumours. All government officials interviewed in the two municipalities reported that there were myths, misconceptions, and misinformation in the communities about COVID-19 vaccines. Some of the community members believed that the vaccine was manufactured to kill Africans; others believed that it is intended to cause sterility in African men and infertility in women in order to reduce the African population and wipe out the current generation of Africans, so that western countries can take Africa’s natural resources. Other misconceptions were the vaccine will shorten the lives of those who will be vaccinated and the belief that COVID-19 vaccines are a new sort of 666 mark (666 mark refers to the mark of the devil) on those who get vaccinated. Thus, some refused to take the vaccine; others delayed in taking it and were waiting for others to get vaccinated first and if nothing happened to them, then they will get vaccinated.

One strategy that was adopted by the government officials was to take the COVID-19 vaccines in the full view of community members. Others filmed the process of taking the vaccine and showed it to others from nearby communities. They explained to the communities that since they are the frontline health workers and they know the vaccine is safe, they were the first to take it. Officials from the district assembly reported that they allayed the fears of community members with regard to the myths and referred them to some of the staff of the GHS for information and education. Such initiatives helped to dispel fears and myths about the vaccine.

“From the information given to us by the health experts and government itself, we have to go to the field telling them the truth and that if it were true that the vaccine is made to kill Africans, then government officials will not take it. Big men will not take it. So, they have to take it to protect themselves” (ISD official, Municipality B).

“When I took my jab, I had to make a video and show it to the elders to show that I myself have taken my jab” (Health worker, Municipality A CHPS facility).

“Some people who had fears and came to me in this office that they heard that if they take the vaccine, their manhood would not work. I allayed their fears and again, and I referred them to the Municipal Director [of health] to talk to them” (Municipality B Assembly official).

Another strategy adopted by health workers in CHPS facilities in both municipalities in dealing with

misinformation was to hold meetings with community elders including chiefs and queen mothers to refute misinformation. They also took advantage of routine health programmes such as child welfare clinics (CWCs) to educate parents who brought their children for CWCs. They countered false information by comparing the vaccine to the existing childhood vaccines such as polio and measles among others given to children under five years, which are more widely known and accepted in Ghana. They also compared the COVID-19 vaccines to the history of successful childhood vaccination programmes in Ghana in order to assure adults that it was safe. They refuted misconceptions about COVID-19 to community members by educating them on the importance of the vaccine and vaccination. Also, health workers who had taken the vaccine took videos of the process, which they showed to their clients in order to allay their fears and to build trust.

“. . . We also showed them our cards, which showed that we have also been vaccinated and that anytime the vaccine comes, they should champion their members to take it up” (Health manager, Municipality B).

“We first engaged the opinion leaders and gave them education. Vaccines that are coming are just like vaccines given to children. So, during CWC, we compare what has been given to us [COVID-19 vaccines] and what has been given to children [vaccines for under five-year-old]. We hold the bottles and show them the origin of the vaccine. So, if India is giving this to your children and you accept it, then it should be easy for you to accept what is going to be given to you, as you are even mature and you can withstand some of the things. So when I took my jab, I took a video and showed it to the elders” (Health official, Municipality A CHPS facility).

2.3. Challenges and Gaps in Government-Community Engagement. Interactions with the government officials revealed that some community members continued to have reservations about COVID-19 vaccines and were unwilling to take it, despite the government institutions having provided information.

The NCCE officials in the two municipalities attributed vaccine hesitancy to late initiation of community education due to having to wait for directives from their superiors before they could embark on community education. Another crucial challenge was that the agency lacked logistics such as vehicles and funds from the central government to carry out engagement activities.

The GHS, which carried out more engagement activities in comparison to the other government entities, reported vaccine stockouts at the onset of the vaccination exercise as an obstacle to their engagement process. Health officials in Municipality A and officials from Municipality A assembly reported that they had informed and prepared communities for the first consignment of vaccines, unknowing that it was meant for government leaders, essential workers, the aged, and persons with underlying health conditions. As a result, community members were disappointed. The Municipality A health directorate on the other hand reported that it

engaged only essential workers such as health workers and the security services because the initial vaccines were meant for them.

“We did a lot of work, so by the time we started, people were ready to take it. When some even got to know that the first dose was only for health workers, they were not too happy” (Health manager, Municipality A).

“... the first batch that came was for targeted institutions, the health personnel, and the security. So, the first engagement was directed towards those institutions. So, the health personnel, security, and banks were engaged before the vaccine was rolled out. But for the general public, no such engagement has been done yet” (Municipality A assembly official).

The unavailability of the second dosage of the COVID-19 vaccine after the community had accepted the first dose was another challenge experienced by the Municipality B health directorate during the community engagement on the vaccine. The district directorate reported that the second dosage had delayed, but they had remained in contact with the communities, and currently, the chiefs who took the first dose are making calls to the directorate for the second dosage of the vaccination.

“We met the chiefs...and they agreed to it and came out to have the first dose. They are even worrying me about the second dose. Some of the chiefs keep calling me every now and then. The interval between the first dose and now is over twelve weeks. We told them from the onset that twelve weeks is the longest period to receive... the second dose and they were calculating it themselves and started calling me when it was twelve weeks. They keep calling me every now and then to ask about the second dose” (Health manager, Municipality B).

The ISD in Municipality B indicated that it had informed and educated communities in the Municipality B township, which is the municipal capital, but they were yet to develop a plan to engage the various communities outside the municipal capital, due to the unavailability of vehicles. The Municipality B ISD equally reported that they had been trained in disseminating information on the vaccine; however, they lacked a vehicle to carry out community engagement activities. An interview with an ISD staff revealed the following.

ISD official: We were trained. We had a workshop on the vaccines. But for the vaccines, we have not been able to go to the communities. We mostly do that in Municipality A itself [only carried out in the capital of the municipality].

Interviewer: Why not the other communities?

ISD official: “It is our information van because that is our biggest tool. You know, our work is not an office work. We need to be on the field 24/7 giving information to the public

on all aspects of government information. But our main challenge is information van, they are all broken down. ... if we have at least the information van, we can go to the community for at least education. ... But our main challenge, especially during this COVID is our van” (ISD official, Municipality B).

The NCCE offices in the two municipalities reported that they are not well-resourced, so they experienced financial challenges, such as inadequate funding, vehicles, and fuel to visit the various communities within their catchment area on a regular basis. The NCCE offices in Municipality A reported that community members expected them to visit the communities frequently. Municipality B office added that the community members expected them to provide them with COVID-19 protective materials such as nose masks and sanitizers, which they lacked. Municipality A NCCE rated their community engagement performance as bad because the lack of resources contributed to the delay in community engagement towards the vaccination rollout. They attributed the proliferation of misinformation such as the belief that the vaccine is meant to kill Africans and community refusal to take the vaccine was due to their inability to provide information and education early.

“We did our best here in Municipality A, but if I want to rate our performance in engaging with communities on vaccines, it is not good because we should have started this education earlier, before the vaccine came. But because the resources are not available, we were not able to carry out any serious public education before the vaccine came in. So, it created a lot of problems. If you listen to radio, you would hear people saying they would not take the vaccine because it is a plan by the western world to kill Africans and they’ll never take it and they are urging the public never to get vaccinated” (NCCE official, Municipality A).

Another gap identified by Municipality B health directorate was community members’ consistent demand for snacks and transportation because they believed the directorate was fully resourced by the government. However, the directorate did not have the financial resources to fund such demands. So, the directorate began to experience low turnout whenever they called for community engagement on the COVID-19 vaccine. Municipality B municipal health directorate also reported that community members demanded items such as nose masks and sanitizers from them whenever they visit the communities to carry out educational activities. They indicated that since they do not have funds to purchase such items, they were unable to visit the communities frequently.

“The community members see us as people who are getting all the monies for the job. They see us as people who are government’s people. There is a detachment. They see us as people who are the government’s people who have the monies and things like that. And in engaging the community, money is involved. When you call meeting once and you don’t serve them snacks during the first one, they

would not come for the second one when you call them. So, from the initial stages, the enthusiasm was there and they were very smart. When the money was not there for snacks, you call them and they don't come but if you call for a meeting and you tell them there would be snacks and refund of T&T, they'll come in numbers" (Health manager, Municipality B).

Municipality B, which shares boundaries with Togo reported that they faced a challenge in carrying out community engagement in migrant communities. The migrant community is made up of persons from Togo and Nigeria, among others, some of who come from different religious backgrounds such as Christianity and Islam. The cultural differences among the migrants and the Ghanaian officials and language barrier contributed to the difficulty in the engagement process.

"... the cultural difference is one of the big gaps. You know, it is a mixed breed of Muslims, Nigerians, and a whole lot of people who have inhabited the border community. ...It is difficult to actually convince them because of their cultural differences..., language is also another gap" (Health manager, Municipality B).

2.4. Community Experiences in Government Engagement Process on Vaccination. IDIs with community leaders and FGDs with community members in Municipality A and B revealed that government officials had provided them with information and had been educated on COVID-19 prevention, management, and the need to take COVID-19 vaccines. They reported that most of the information that they received was from health professionals at the CHPS facilities. Majority of the study participants noted that the health workers provided them with information and education on COVID-19 but made little effort to promote other components of community engagement such as planning, collaborating, consulting, and empowering the community members to deal with COVID-19. Study participants further reported that another important source of information to them was the traditional media such as the radio. Migrants reported that announcements were made through the radio and the information van; however, it was in the native language of the area, which is Ewe, which they did not understand, so they were not well informed on COVID-19 issues. Community members further attested that they believed in information provided through the radio and believed that that was the truth. About half of the community members confirmed that they believed in the misconceptions and rumours that were spreading and that the vaccine was not right and indicated that they were not willing to take the vaccine. Others also reported that those who had taken the vaccine had become ill, so they were afraid to get vaccinated.

2.5. Government Institutions' Plans towards Engaging Communities with regard to COVID-19 Vaccines. The study sought to find out the plans that the institutions had towards

future community engagement efforts concerning vaccine acceptance in the two study municipalities.

Municipality B reported that based on the directive from the central government, they had included COVID-19 activities in the municipality's immediate and medium-term plans and they were partnering with the municipal health directorate to carry out community engagement activities. The municipal assembly reported that previous engagement with migrant communities suggested that they did not have pipe-borne water to enable them to observe hand washing and other forms of hygiene, so as part of the plan they had started drilling a borehole in the migrant community. Municipality A assembly further indicated that the Public Health Emergency Management Committee (PHEMC) planned to engage community members in the municipality through existing community structures such as traditional leaders, traders, and drivers' associations. However, they are waiting for permission from the central government to start.

Municipality A health directorate indicated that they planned to continue education on COVID-19 to prepare the communities towards vaccination and to maintain community enthusiasm, as the vaccine was currently not available. However, Municipality A CHPS facility revealed that there was no plan to engage the communities towards the vaccine rollout in their catchment area.

"We will continue with the education and make sure the information gets down well and we will maintain their enthusiasm in how to be able to counteract some information that contributes to the hesitancy. So the education will continue until we make sure everybody gets the vaccine. Of course, the vaccine is not available, but we will do our part to make sure they are ready when it comes" (Health manager, Municipality A).

Municipality A sub-district health directorate reported that they did not intend to carry out education prior to the availability of vaccines. They planned to carry out education to communities once vaccines became available for the communities. They believed that constant announcement during such periods would facilitate acceptance and willingness to get vaccinated. A manager explained that his plan for Municipality B was that the health directorate will begin to announce to communities the importance of getting vaccinated, whenever the directorate received vaccines to vaccinate them.

Municipality B health directorate revealed that it had stopped its engagement activities because the community members who had the first dose of the vaccine but not the second dose had started mounting pressure and demanding for the second dose, which was unavailable. They did not want to raise community members' expectation, since there was currently no vaccine to meet the demand. They added that once the health directorate receives doses of the vaccine, they will inform the communities to come for it. Similarly, Municipality B NCCE indicated that they started community engagement but had stopped, awaiting further instructions to proceed with the second phase of COVID-19 vaccination campaigns to the various communities.

Municipality A NCCE reported that they had planned to continue carrying out community education; however, they were facing financial constraints. Thus, they were praying that they will get the needed funds to continue with the educational activities. *“Our plan is to continue education. We are praying to get the funds, so that we can continue”* (NCCE Official, Municipality A).

Municipality A ISD indicated that they had engaged and educated the various communities within the municipality; however, they were yet to draw an itinerary to carry out engagement activities in the communities outside the capital of Municipality A township *“We have planned to draw an itinerary, so that we can also get outside Municipality A [the municipal capital]. To tell them the benefits that they will derive when they take the vaccine”* (ISD official, Municipality A). Similarly, Municipality B CHPS facility revealed that they were yet to educate the communities about the safety and benefits of the COVID-19 vaccines.

Municipality A NCCE indicated that they intended to continue educating communities on vaccine acceptance, despite not having the needed funds. Consequently, they were considering an alternative plan of collaborating with the Ghana Health Service in the municipality to carry out community engagement activities.

3. Discussion

This qualitative research study used a focused ethnographic approach to explore how government institutions engaged communities to prepare them for COVID-19 vaccine acceptance and uptake. The results suggest that all the government institutions carried out community engagement activities in the two municipalities. The Ghana Health Service, which has a decentralized health system, was better positioned in terms of having more structures and opportunities to carry out community engagement at various levels of society compared to the other agencies (the municipal assembly, ISD, and NCCE) in vaccine preparedness. It is therefore not surprising that the community members identified them as a key source of information and education.

The government institutions used existing resources such as chiefs and elders, community information centres, and durbars as well as radio stations to engage communities on vaccine acceptance and uptake. Specifically, in Municipality B, chiefs were encouraged to take the vaccine in public in order to build trust in communities to motivate them to access vaccination opportunities. Such measures contributed to some community members developing trust in the vaccination process leading to acceptance and willingness to take the vaccine. The positive outcome suggests that when community trust in leadership and institutions is high, the fear of COVID-19 and vaccine hesitancy could lessen. However, when there is distrust of leaders and institutions, the fear of COVID-19 and vaccine hesitancy could be high [24]. Similarly, Adhikari et al.’s [25] review of literature found that community structures such as existing organizations, physical infrastructure, and health service centres as well

as human resources such as health workers boosted community engagement efforts in Asian and African countries. Also, other studies have noted that community trust in government institutions and health service delivery promotes the acceptance of healthcare interventions [3, 26, 27]. Additionally, another study reported that trusted sources of information are crucial for community acceptance of vaccines [28].

The study noted that the government institutions used an instrumental engagement approach, and they focused on informing communities on vaccines and vaccination with little input from the communities. They did not engage communities much in planning and empowering them to deal with COVID-19. Similarly, other studies on health and development interventions have noted that governments in other contexts tend to do more of instrumental engagement such as providing information to communities but do not engage them in planning and empowering them to participate in the engagement processes [29]. Also, Afolabi and Ilesanmi [30] noted that community involvement was lacking in African governments’ decision and implementation of COVID-19 interventions. Ojikutu et al. [31] suggested that efforts to end the pandemic through vaccination will be hampered because of an overemphasis on short-term strategies, such as community outreach, delayed community engagement, and absent investment in at-risk communities.

Government agencies especially the ISD and the NCCE faced challenges such as lack of funds and transport to travel to distant communities to carry out engagement activities; thus, they limited their engagement activities to the municipal capital and did not carry out engagement activities in distant communities, most of which are rural. The GHS on the other hand was able to carry out engagement activities in both the capital of their municipalities and in distant rural communities. This is not surprising, since the GHS has a decentralized structure, with CHPS facilities situated in rural communities. The concentration of community engagement activities in the capital towns starves rural communities of crucial information, which can hamper vaccine acceptance, as earlier surveys in Ghana suggest that rural communities and the uneducated were less likely to vaccinate [18, 32].

The GHS indicated that they had not received adequate doses of vaccines, yet they had aroused community interest in the vaccination and had successfully facilitated chiefs to take the AstraZeneca vaccine. Yet, they were not able to get the second dose to them in time, which had led to disappointment for some. Thus, some of the institutions had chosen to wait till vaccines were available before they resumed engagement efforts. Similarly, a study in Somalia reported that challenges to the rollout of the vaccine included limited supply of vaccines, logistical and security challenges, lack of adequate awareness, and limited community mobilization and outreach services [33]. Another study found that in the early stages of vaccine discovery, optimism around rapid vaccine delivery in some European countries turned to distrust among some people when vaccine delivery was delayed [34]. Thus, it is important to

manage expectation considering that new variants of COVID-19 are increasingly being identified and campaigns for vaccine booster doses are being carried out [34]. Similarly, Nacheha et al. [6] reported that challenges in vaccine acquisition are not limited to Ghana, and the whole African continent is suffering from insufficient supply and distribution within countries.

Some of the institutions admitted that delays in carrying out community engagement had resulted in communities depending on informal sources such as the radio, some of which had contributed to the spread of misinformation about COVID-19 vaccines, leading to vaccine hesitancy. Similarly, another study has reported that one of the factors accounting for public distrust in the COVID-19 outbreak response on the African continent is the delayed response by many African governments and public health experts [30]. Also a study in France reported that earlier public health engagement with the French public on diseases, such as mumps and measles, helped them to build confidence in the French public health system, which made it easy for the public to accept COVID-19 vaccines [34].

Earlier studies in two other districts in Ghana equally revealed that misconceptions, myths, and lack of trust in the government's effort towards managing the pandemic contributed to poor attitudes towards COVID-19 prevention and management [35, 36]. Other studies have noted that the problem of COVID-19 vaccine hesitancy is not limited to the Ghanaian population but to African populations [37, 38]. The hesitancy in COVID-19 vaccine uptake among African populations has been attributed to the history of colonial medical and vaccine research abuse in Africa and among persons of African origin. Recent comments attributed to two French doctors in early April 2020 with regard to conducting COVID-19 vaccine trials in Africa further increased the level of distrust for vaccines being brought to Africa from the West [37]. Additionally, an absence of nuanced and culturally informed understanding of vaccine hesitancy and misinformation are major contributing factors to vaccine hesitancy in the continent. Other studies have reported that factors contributing to vaccine hesitancy in Africa include the lack of political will and firm commitment from the government on vaccine rollout. Others are the concern about vaccine safety, misinformation, religious myths and beliefs, myths about the vaccines, and the lack of information and education [15, 30, 32, 37, 39]. A study in Cameroon also noted that inconsistent information and anti-vaccine campaigns warning Africans to refuse COVID-19 vaccines on social media and concerns about the reliability or source of vaccines served as barriers to COVID-19 vaccine acceptance [6].

Government institutions designed messages that countered myths and misconceptions such as taking their vaccines in public for the community members to see and recorded their vaccination process to share with distant communities, comparing COVID-19 vaccination to the under-five vaccinations as well as touting the benefits of COVID-19 vaccination. Most of the institutions made efforts to counter myths and misinformation through

strategies such as workers taking the vaccine in public and capturing it on video to share it with communities. Also, health workers assured community members of the safety of the COVID-19 vaccines by comparing them to the child vaccinations that Ghana has been embarking on for decades. Municipality B health directorate also ensured that chiefs set examples by taking the vaccine in public. Such measures helped to improve public trust and willingness to be vaccinated. Other studies have found that interventions are taken when there is public trust in vaccines and government information sources [30]. The WHO has equally noted that while COVID-19 is the first pandemic in history in which technology and social media are being used on a massive scale to keep people safe, informed, productive, and connected, the same tools are being used to amplify infodemic that continues to undermine the global response and jeopardize measures to control the pandemic [40]. It has consequently initiated the formation of the Africa Infodemic Response Alliance (AIRA) to coordinate infodemic response, conduct research, and to prevent misinformation among others [41].

While some community members believed and cooperated with the government institutions who engaged them and were willing to vaccinate, others distrusted them and continued to believe in misinformation and myths about COVID-19 and vaccination, which contributed to vaccine hesitancy. Similarly, Lazarus et al. [42] found that respondents who reported higher levels of trust in information from government sources were more likely to accept a vaccine and take their employer's advice to do so compared to those who were distrustful of government sources. A study on Twitter users equally revealed that more Twitter users in London and New York perceived high risk of getting COVID-19 which indicated a lack of confidence in vaccine safety, distrust in governments and experts, and belief in widespread misinformation or rumours. Their counterparts in Mumbai, Sao Paulo, and Beijing rather worried more about vaccine production [43]. Our finding confirms the earlier study which found that the Volta Region recorded the lowest rate of COVID-19 vaccine acceptance (32.50%) in Ghana [18].

4. Limitations of the Study

The study, as is typical of qualitative research studies, selected government officials, community leaders, and a cross section of community members, who had knowledge of the matters of discussion. This introduces some level of subjectivity into the study and thus cannot be generalized.

5. Conclusion

This qualitative study is one of the few studies or the first in Ghana to the best of our knowledge to focus on government engagement with communities on COVID-19 vaccine preparedness and acceptance. The findings suggest that government institutions' engagement activities were centred in the urban communities, which are municipal capitals. Challenges and gaps that hampered extensive engagement in

the municipalities included limited funding, bureaucracy that contributed to late initiation of engagement efforts, and proliferation of infodemic, among others. For the country to achieve the target of vaccinating 20 million people, recommendations have been suggested.

Government institutions need to continue to devise strategies to counter the spread of infodemic in order to maximize the impact of community engagement efforts. Different government organizations need to improve on collaboration in sharing information, logistics, and other resources to enable them reach rural and distant communities with the needed information and education to boost vaccine acceptance.

The circulation of infodemic is still high in urban and rural communities, and the main source of such information is the social media. Government institutions need to be ahead of time to counter misinformation. Leveraging on existing community resources would help counter the spread of myths and misconceptions as well as promote the acceptance of COVID-19 vaccines.

The government needs to devote more resources in the engagement effort such as providing the NCCE, the ISD, and the GHS with adequate funds to enable them to carry out their constitutional duty of engaging communities in distant communities. The use of existing platforms such as the CHPS facilities and routine health programmes such as child welfare clinics to inform and encourage community members to accept COVID-19 vaccination is commendable. However, majority of community members who attend such programmes are women and children, so to reach out to men, the elderly, and the youth, health workers need to carry out more community outreach programmes.

Data Availability

The datasets used during the current study are available from the corresponding author or from the Institute of Health Research (ihr@uhas.edu.gh) on reasonable request.

Ethical Approval

The protocol was submitted to the University of Health and Allied Sciences' Research Ethics Committee for approval (UHAS-REC A.5 [51 20-21]).

Consent

Selection and participation in the study was purely voluntary and written informed consent was sought and obtained from all study participants. Participants who met the inclusion criteria and agreed to participate were taken through the consenting process such as the objectives, the study procedures, voluntariness, risks, benefits, and confidentiality of the ethical process.

Disclosure

COVID-19-related protocols were strictly observed throughout the study. Data collectors used face masks and sanitizers in all field activities. They observed social distancing at all times. Each study participant was provided with a face mask and their hands were sanitized before and after the consenting process.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

MA and WE contributed equally to the paper. MA and EA conceptualized the study. PD, WE, MK, LK, and AK collected, coded, and analysed the data. MA, PD, and WE drafted the manuscript. PD, MK, LK, AK, RA, AB, SD, and EA reviewed the manuscript critically.

Acknowledgments

The authors thank the officials of the two municipalities, the participating District Health Management Teams, health facilities, and staff for their support and cooperation. The authors are grateful to community leaders and community members for their cooperation and support. This study was funded by the Royal Society of Tropical Medicine and Hygiene's Small Grants Programme.

References

- [1] J. French, S. Deshpande, W. Evans, and R. Obregon, "Key guidelines in developing a pre-emptive COVID-19 vaccination uptake promotion strategy," *International Journal of Environmental Research and Public Health*, vol. 17, 2020.
- [2] Who, "Herd immunity," in *Coronavirus Disease (COVID-19)*, S. SWAMINATHAN, Ed., WHO, Geneva, Switzerland, 2020.
- [3] B. Adhikari, P. Y. Cheah, and L. V. Seidlein, "Trust is the common denominator for COVID-19 vaccine acceptance: a literature review," *Vaccine: X*, vol. 12, 2022.
- [4] U. N. I. C. E. F. Who &, *Conducting Community Engagement for COVID-19 Vaccines Interim Guidance*, WHO, Geneva, Switzerland, 2021.
- [5] B. Adhikari, C. Pell, and P. Y. Cheah, "Community engagement and ethical global health research," *Global Bioethics*, vol. 31, pp. 1-12, 2019.
- [6] J. B. Nachega, N. A. Sam-Agudu, R. Masekela et al., "Addressing challenges to rolling out COVID-19 vaccines in African countries," *The Lancet*, 2021.
- [7] Who, *COVID-19 Global Risk Communication And Community Engagement Strategy* WHO, Geneva, Switzerland, 2021.
- [8] R. E. Hinson, W. Hein, L. N. Tettey et al., "Critical prerequisites for Covid-19 vaccine acceleration: a developing economy perspective," *Journal of Public Affairs*, Article ID e2723, 2021.

- [9] Ghana Health Service, "COVID-19: Ghana's disease outbreak response management updates," 2022, <https://www.ghs.gov.gh/covid19/>.
- [10] Ministry Of Information, "Information Services Department," 2022, <https://isd.gov.gh/about-isd/>.
- [11] National Commission For Civic Education (Ncce), "National Commission for Civic Education," 2022, <https://www.nccegh.org/>.
- [12] Ministry Of Local Government Decentralisation And Rural Development, "Ghana Districts: A Resource Base to All Local Assemblies In Ghana," 2022, <http://www.mlgrd.gov.gh/index.php/the-ministry/about>.
- [13] Ministry Of Health, "Ghana Health Service," 2022, <https://www.moh.gov.gh/ghana-health-service/>.
- [14] Who, "Ghana becomes recipient of historic first shipment of COVAX vaccines," 2021, <https://www.afro.who.int/news/ghana-becomes-recipient-historic-first-shipment-covax-vaccines>.
- [15] B. O. Botwe, W. K. Antwi, J. A. Adusei, R. N. Mayeden, T. N. Akudjedu, and D. Sules, "COVID-19 Vaccine Hesitancy Concerns: Findings from a Ghana Clinical Radiography Workforce Survey," *Radiography*, vol. 28, 2021.
- [16] Ghana health service, "COVID-19: Ghana's outbreak response management updates," 2022, <https://www.ghs.gov.gh/covid19/archive.php>.
- [17] I. O. Ayenigbara, J. S. Adegboro, G. O. Ayenigbara, O. R. Adeleke, and O. O. Olofintuyi, "The challenges to a successful COVID-19 vaccination programme in Africa," *Review*, vol. 11, 2021.
- [18] T. Acheampong, E. A. Akorsikumah, J. Osaekwapong, M. Khalid, A. Appiah, and J. H. Amuasi, "Examining vaccine hesitancy in sub-saharan Africa: a survey of the knowledge and attitudes among adults to receive COVID-19 vaccines in Ghana," *Vaccines*, vol. 9, 2021.
- [19] World Health Organization, *WHO Community Engagement Framework for Quality, People-Centred and Resilient Health Services*, WHO, Geneva, Switzerland, 2017.
- [20] A. Lübbecke, A. J. Carr, and P. Hoffmeyer, "Registry stakeholders," *General Orthopaedics: Effort Open Reviews*, vol. 4, 2019.
- [21] D. D. Tchoualeu, B. Harvey, M. Nyaku et al., "Evaluation of the impact of immunization second year of life training interventions on health care workers in Ghana," *Globalization and Health: Science and Practice*, vol. 9, 2021.
- [22] Ghana Statistical Service (Gss), Ministry Of Health & Orc Macro, *Ghana Service Provision Assessment Survey 2002*, Ghana Statistical Service (GSS), Ministry of Health, ORC Macro, Ghana, West Africa, 2003.
- [23] K. Charmaz, *Constructing Grounded Theory*, SAGE, London, UK, 2012.
- [24] L. Zhou, S. Ampon-Wirekoi, X. Xu, P. E. Quansah, and E. Larnyo, "Media attention and Vaccine Hesitancy: examining the mediating effects of Fear of COVID-19 and the moderating role of Trust in leadership," *PLoS One*, vol. 17, 2022.
- [25] B. Adhikari, N. James, G. Newby et al., "Community engagement and population coverage in mass anti-malarial administrations: a systematic literature review," *Malaria Journal*, vol. 15, 2016.
- [26] J. Goudge and L. Gilson, "How can trust be investigated? Drawing lessons from past experience," *Social Science & Medicine*, vol. 61, pp. 1439–1451, 2005.
- [27] D. R. O. Okello and L. Gilson, "Exploring the influence of trust relationships on motivation in the health sector: a systematic review," *Resources for Health*, vol. 13, pp. 1–18, 2015.
- [28] T. Dzinamarira, B. Nachipo, B. Phiri, and G. Musuka, "COVID-19 Vaccine Roll-Out in South Africa and Zimbabwe: Urgent Need to Address Community Preparedness, Fears and Hesitancy," *Vaccines*, vol. 9, 2021.
- [29] C. King and M. Cruickshank, "Building Capacity to Engage: Community Engagement or Government Engagement?" *Community Development Journal*, vol. 45, 2010.
- [30] A. A. Afolabi and O. S. Ilesanmi, "Dealing with vaccine hesitancy in Africa: the prospective COVID-19 vaccine context," *Pan African Medical Journal*, vol. 38, 2021.
- [31] B. O. Ojikutu, K. E. Stephenson, K. H. Mayer, and K. M. Emmons, "Building trust in COVID-19 vaccines and beyond through authentic community investment," *American Journal of Public Health: Pinions, Ideas, and Practice*, vol. 111, 2021.
- [32] R. K. Alhassan, M. Aberese-Ako, P. T. Doegah et al., "COVID-19 vaccine hesitancy among the adult population in Ghana: evidence from a pre-vaccination rollout survey," *Tropical Medicine and Health*, vol. 49, 2021.
- [33] A. S. Mohamoud, M. A. Ali, M. M. Abdulkadir, S. A. Bile, and A. J. Mohmud, *COVID-19 Vaccine Rollout in Somalia: Experience and Challenges in Fragile Context*, Somalia Somali Institute for Development Research and Analysis, Garowe, Somalia, 2021.
- [34] M. A. Chia and P. A. Keane, "COVID-19 in Europe: new challenges for addressing vaccine hesitancy," *The Lancet*, vol. 399, 2022.
- [35] M. Aberese-Ako, M. Immurana, M. A. Dalaba, F. Anumu, A. Ofosu, and M. Gyapong, "The socio-economic and health effects of COVID-19 among rural and urban-slum dwellers in Ghana: a mixed method approach," *PLoS One*, vol. 17, 2022.
- [36] M. Aberese-Ako, M. Immurana, M. A. Dalaba, F. E. Y. Anumu, A. Ofosu, and M. Gyapong, "An ethnographic study of multiple factors influencing perceptions, attitudes, and observance of COVID-19 preventive measures in vulnerable communities in Ghana," *Hindawi Journal of Environmental and Public Health*.
- [37] P. N. Mutombo, M. P. Fallah, D. Munodawafa et al., "COVID-19 vaccine hesitancy in Africa: a call to action," *Lancet Global Health*, vol. 10, 2022.
- [38] R. Rosman, "Racism row as French doctors suggest virus vaccine test in Africa: two doctors spark criticism for discussing in a TV show the idea of testing a vaccine for the coronavirus in Africa," 2020, <https://www.aljazeera.com/news/2020/4/4/racism-row-as-french-doctors-suggest-virus-vaccine-test-in-africa>.
- [39] R. Forman, S. Shah, P. Jeurissen, M. Jit, and E. Mossialos, "COVID-19 vaccine challenges: what have we learned so far

and what remains to be done?" *Health Policy*, vol. 125, pp. 553–567, 2021.

- [40] Who, "Managing the COVID-19 infodemic: promoting healthy behaviours and mitigating the harm from misinformation and disinformation," 2020, <https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation>.
- [41] Who, "The Africa infodemic response alliance (AIRA)," 2022, <https://www.afro.who.int/aira>.
- [42] J. V. Lazarus, S. C. Ratzan, A. Palayew et al., "A global survey of potential acceptance of a COVID-19 vaccine," *Nature Medicine*, vol. 27, 2021.
- [43] Z. Hou, Y. Tong, F. Du et al., "Assessing COVID-19 vaccine hesitancy, confidence, and public engagement: a global social listening study," *Journal of Medical Internet Research*, vol. 23, 2021.