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Factors influencing vaccination up-take among nomadic population in four regions of Ghana: a qualitative study

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Abstract

Background Vaccination has contributed to the reduction in vaccine preventable diseases. Despite, improved global coverage, vaccination among nomadic populations is still low especially in Africa. This study explored factors influencing vaccination uptake among pastoralist nomads in Ghana.

Methods We conducted key informant interviews (KII) in 11 districts across four regions of Ghana, using grounded theory qualitative research approach. One hundred and eighty-two KII were conducted among pastoralist nomads, community opinion leaders, community health volunteers, security services personnel, local government personnel and health workers. Guided by the WHO health systems building blocks, data was coded using Nvivo 12 and analysed thematically. Results were presented as narratives with excerpts to support the findings.

Results Community leaders support vaccination among pastoralist nomads as part of their leadership and governance responsibilities. Language barrier between health workers and pastoralist nomads affects service delivery. Also, healthcare providers fear being attacked by pastoralist nomads hence are hesitant to visit their settlements for vaccination. With regards to health workforce, healthcare providers' perceived use of derogatory words and discrimination against pastoralist nomads influence their vaccination uptake. On medical product, the lack of knowledge about diseases, severity and perceived negative effects about vaccines influence vaccination uptake. Inadequate funds and logistics at the district health directorates affects outreach to nomads during vaccinations. Leveraging existing partnership between the health services and community leaders, information centers, volunteers and butchers to send health information to pastoralist nomads influence vaccination uptake.

Conclusion Community leaders support vaccination among pastoralist nomads. Nomadic pastoralist miss vaccination dues to language barrier, feel discriminated against, and lack information about diseases and vaccinations. Strengthening Ghana Health Service collaboration with leaders of pastoralist nomads could build trust, create awareness and overcome language barrier between healthcare providers and pastoralist nomads.

Keywords Ghana, Nomadic population, Pastoralist nomads, Vaccination, Vaccination uptake

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Background

Vaccination is one of the important public health interventions for saving lives from vaccine-preventable diseases [1, 2]. Vaccination has contributed to reductions in illness, disability and death from diphtheria, tetanus, whooping cough and measles [3, 4]. Vaccination has also contributed to the eradication of smallpox and reduced the global burden of polio by 99%. Vaccination is therefore key to achieving the sustainable development goal 3, which aims to ensure healthy lives and promote well-being for all [2, 5]. Recently, the emergence of global public health challenges, such as COVID-19, further emphasised the importance of vaccination in preventing diseases and saving lives. In spite of the improvement in global vaccination coverage over the years, there are hard-to-reach populations such as nomads and migrants who are exposed to vaccine-preventable diseases especially in sub-Saharan Africa [6].

In Ghana, there has been a significant fall in morbidity rates of vaccine-preventable diseases such as measles and polio. In fact, since 2003, no measles-related death has been recorded in Ghana in spite of the recent outbreak due to vaccine shortage [7]. Similarly, Ghana attained elimination status for maternal and neonatal tetanus in 2011 [2]. The expanded programme of immunisation [2] has also helped reduce infant mortality in Ghana and other low and middle income countries [2]. Despite this significant progress, nomadic population remain underserved if not unreached at all during national immunisation programmes. For instance, during the recent yellow fever (YF) outbreak in Ghana, cases were reported mostly from nomadic populations who had moved from other African countries through the upper east and west regions into the forest reserve in Ghana's Savannah region. The upper east and west regions shares porous borders with Ivory Coast and Burkina Faso, highlighting the potential for spread within and outside Ghana [8–10]. As of April, 2022, a total of 71 confirmed cases were reported in 13 regions in Ghana with most of the cases recorded in the Savannah and Upper West [10]. There is a need for sustainable approaches to improving vaccination programme capacity to protect the underserved populations especially the nomads [6, 11].

This study therefore largely focuses on pastoralists nomads who are highly mobile, moving over large areas of remote territories with their herds of livestock in search of water, pastures, better livelihoods or simply to safer environments [6, 12]. Their movements contributes to the spread of diseases as they often cross national borders [3, 6, 9, 13]. Consequently, their nomadic lifestyle has been shown as an important determinant of low vaccination coverage especially in Africa [3, 6, 14].

Following the recent YF, UNICEF Ghana supported this study to explore factors influencing the uptake of

vaccination among pastoralist nomads in four regions of Ghana (Upper West, Savannah, Bono East, and Ashanti regions). Findings from this study are expected to contribute to designing strategies to improve on low vaccination coverage among nomadic population in Ghana and other Sub-Saharan African countries. Also, findings from this study will provide pointers for strategies to improve cross-border vaccination programmes.

Method

Study design

Grounded theory qualitative research approach was used to guide the conduct of this study. The grounded theory basically uses qualitative interviews to generate contextual data and make meaning from data collected. Analytically, the grounded theory provided guidelines on how to identify themes, make links between themes and to establish relationships between them [15]. This study was therefore an explorative study involving key informant interviews (KII) with relevant stakeholders.

Application of health system perspective

The WHO health systems building blocks were used to structure data collection guides (see supplementary file), and analysis. In addition, the health system perspective was applied to design a framework to improve vaccination among nomadic populations. This was done to ensure that specific aspects of the health system that needed to be strengthened to improve vaccination among the nomadic population were considered. The framework was designed around the WHO health system building blocks which includes leadership and governance, service delivery, health workforce, medicine and medical products, finance and health information. Leadership and governance involve in ensuring the existence of policy and legal frameworks combined with effective oversight. In this study we looked at existing District Health Management Team (DHMT) and community structures that supports vaccination among nomads. Service delivery involves the delivery of health services/interventions to those who need them through the maximum use of available resources. Health workforce refers to responsive and efficient ways to achieve the best health outcomes using appropriate health workforce. The health information refers to the use of reliable and timely information to improve on health services. A well-functioning health system ensures equitable access to essential medical products, vaccines and technologies. The health financing system raises adequate funds for health, in ways that ensure people can access and use the needed services, regardless of their socio-economic status [16, 17].

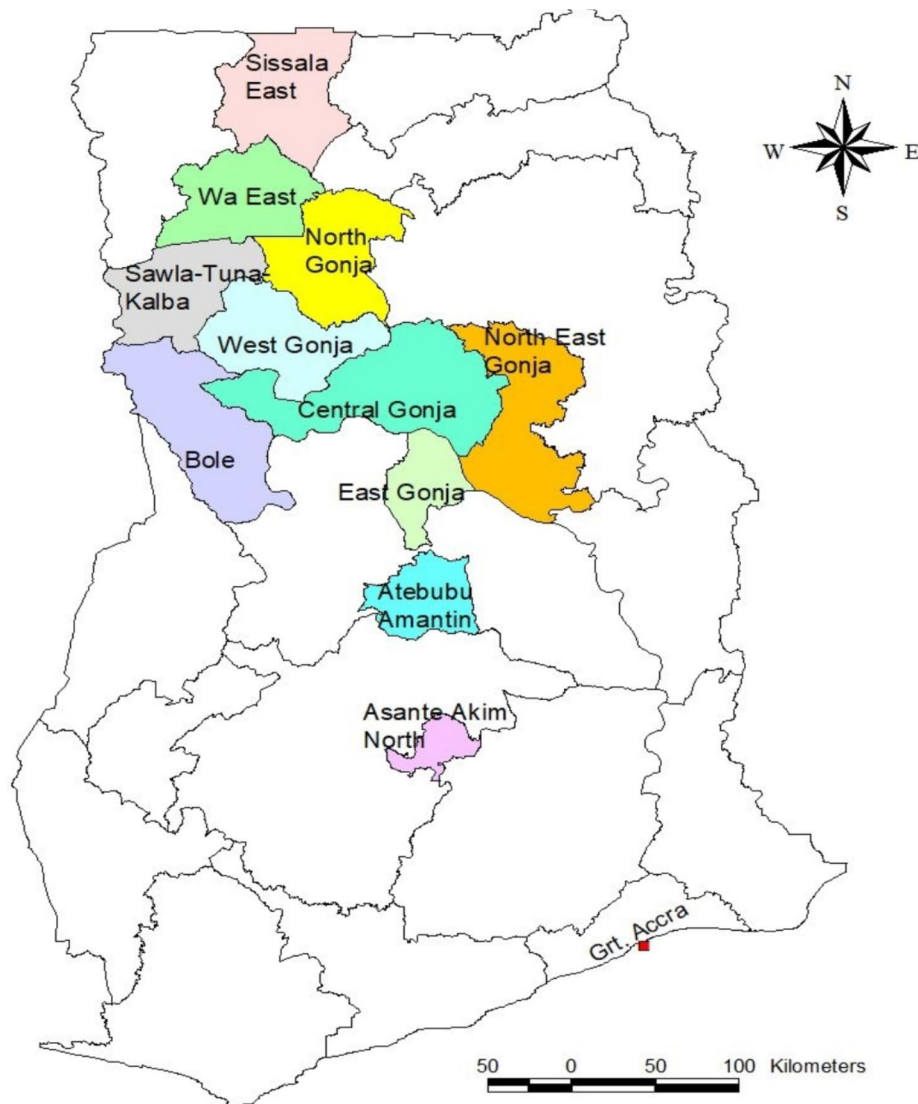


Fig. 1 Map of Ghana showing study districts

Study area

This study was conducted in the Upper West, Savannah, Bono East, and Ashanti Regions of Ghana. The nomadic population especially the herdsmen move mainly from the Sahel including Mali, Burkina Faso, Niger and Cote D’Ivoire into the Savannah Region of Ghana through the Upper East and West regions in response to changing environmental and climatic factors [18]. The herdsmen move further southwards beyond the Savannah into the humid tropical forest to find pastures for their animals. Typically, they move southwards to graze around the Volta basin i.e. from Yeji and Atebubu in the Bono East Region to Agogo in the Asante Akyem North district of Ashanti Region [19, 20]. Atebubu Amantin district is the main transitory route to Asante Akyem North District in Ashanti region. The Asante Akyem North district is a farming area and close to the Volta Lake which

Table 1 Study regions and districts

Regions	Districts
Savannah	Bole, Central Gonja, East Gongga, West Gonja, North Gonja, Sawla-Tuna-Kalba, Northeast Gonja
Upper West	Sissala East, Wa East
Bono East	Atebubu Amantin
Ashanti	Asante Akyem North

is a suitable grazing ground for nomadic herdsmen (see Fig. 1 for map of study districts below). Given that the YF cases were mostly reported among nomads in Savannah Region in Ghana, their migration to southern Ghana could spread the disease [10]. We therefore engaged key informants in eleven districts from four regions in Ghana (Savannah, Upper West, Bono East, and Ashanti) (see Table 1 below).

Data collection

Key informant interviews

Key informant interviews (KIIs) were conducted to understand the health seeking behaviors among nomadic populations. We also explored contextually appropriate social, and behaviour change communication approaches that are required to improve vaccination among nomadic populations. In all, 182 stakeholders were purposively selected and engaged for KIIs. KII engaged included community leaders (chiefs, assemblymember) (16), community health volunteers (15), cattle owners (14), staff of ministry of food and agriculture (16), staff of security services (19), butchers (22), and municipal/district assemblies' officials (26) (Table 2). In addition, 44 KIIs were conducted among nomads (leadership, household head, caregivers etc.) (23), community Health Officers (12) and district health management team members (19) (Table 2). These categories of respondents were selected

because they engage the nomadic populations in diverse ways (see Table 2 below).

Data collection procedures

Participants for the KIIs were informed about the purpose and procedures of the study. Before the KII, written informed consent were read to the potential participants. Participants who consented for the KII were provided with copies of written study information sheets and signed/ thumb printed consent forms. A witness chosen by the participant sat through each consenting process when the participant could not read and write. This was to ensure that information delivered by the interviewer was same as what was on the informed consent form and that it was properly communicated in the manner that the interviewee understands. Interviews were audio recorded and moderated by trained Social Scientists. Interviews were held in the language of participants using interpreters where possible. Each KII lasted for

Table 2 Summary of respondents for the KII

Targeted respondents/Key informants/institutions	Role in vaccination	Upper West	Savannah	Bono East	Ashanti	Number of participants
Community Leaders (i.e. Chief, Assembly members)	Community leaders support vaccinations through community governance structures	4	10	1	1	16
Community Health Volunteers	They work in collaboration with community Health officers in the delivery of health services including vaccinations	4	7	2	2	15
Cattle Owners	Cattle owners employ the services of some pastoralist nomads as shepherded of their cattle and influence their health seeking behaviours including vaccinations.	2	7	3	2	14
Ministry of Food and Agriculture/ Animal Healthcare Providers	They are usually veterinary service providers who vaccinate the cattle of nomads. Butchers are in a unique position to provide critical links between pastoralist nomads and health services	4	8	2	2	16
Security Service personnel (i.e. Police, Fire Service)	Security services frequently interacts with nomads because of the hostility between them and the communities; nomads sometimes require their interventions to seek healthcare including vaccinations	3	10	3	3	19
Butchers	Butchers interact frequently with nomads as they buy cattle from them. Butchers are sometimes engaged by the health services to support with the vaccination of nomads	4	14	2	2	22
Municipal/District assemblies staff	District assembly oversees the welfare of all inhabitants including nomads in their districts. Health care provides collaborate with the district assemblies during vaccinations	6	14	3	3	26
Nomadic Population (i.e. leadership, household heads)	Nomadic leaders are gate keepers in most matters that affects the life of nomads including healthcare and vaccinations	2	14	3	4	23
Community Health Officers	Community health officers are part of the core health staff who provide vaccination services to nomads including the pastoralist	2	6	2	2	12
District Health Management Team (District Director, Disease control officer/EPI coordinator)	Vaccination services are organized and coordinated by the district health management team	5	10	2	2	19
Total						182

about an hour. All sessions were brought to an end when the moderator had exhausted all questions on the interview guide and on other emerging issues. Geographical Positioning System (GPS) coordinates were taken during the interviews of the nomads as this provides geospatial distribution relative to the CHPS facilities in the studied districts.

Data management and analysis

Audio recordings of KII were transcribed into English language verbatim. The quality of translations and transcripts were checked for accuracy. The study team listened to the audio recordings to ensure that they reflected the transcripts and edited where necessary. Data was thematically analysed using the framework approach. First, the researchers led by the first author read transcripts and notes whilst identifying recurrent themes. Second, a thematic framework was developed based on a-prior and the recurrent themes identified during the familiarization process. Next, codes were built in Nvivo 12 qualitative data analysis software. Transcripts were then imported into Nvivo 12 and coding was deductively carried out. Emerging themes were inductively captured during coding. This was followed by an interpretive analysis of the collated codes whereby themes were combined, refined, separated, or discarded.

Results

The results section include demographic characteristics of key informants and sub-sections following the WHO building blocks. In this section, the authors presented the elements of the building blocks as they affect vaccinations and suggested pathways for improving vaccination among pastoralist nomads as summarized below in Fig. 2.

Demographic characteristics of key the informants

A total of 182 key informants were involved in this study out of which 152 (83.5%) were males. Majority 114 (62.64) of key informants were 31–50 years old. One hundred and ten (60.4%) were Muslims. The level of education of the key informants ranged from none 39 (21.4%) to tertiary 99 (54%) (See Table 3 below).

Leadership and governance

Vaccinations at the district and community levels were organised by the DHMT with the support of Community stakeholders (assembly members, chiefs and other community leaders, such as volunteers). Among many things, community leaders support the health workers with chairs and provision of sitting places for vaccinations activities. It emerged that the DHMT members and health workers rely on community volunteers who are

Summary of issues and pathways for improving vaccination among nomadic population

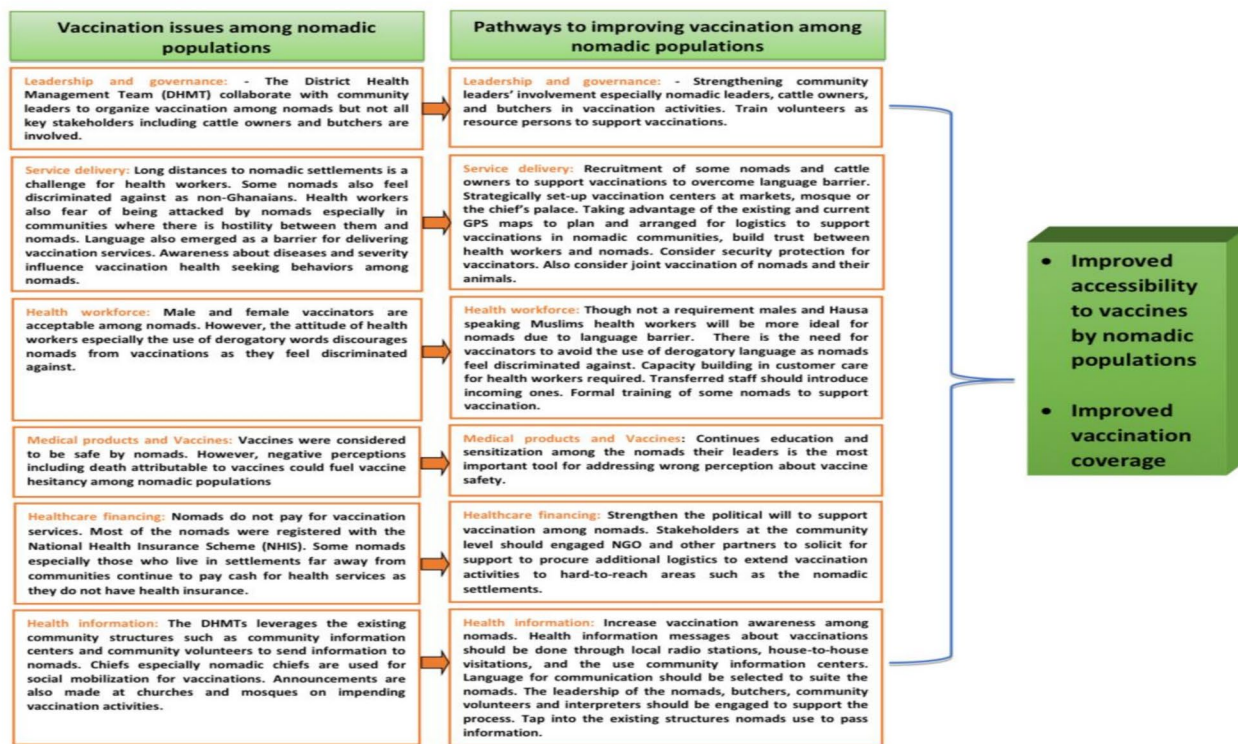


Fig. 2 Framework for improving vaccination among nomadic population

Table 3 Demographic characteristics of key informants (N= 182)

Characteristics	No. of key informants	Percentage
Sex		
Male	152	83.5
Female	30	16.5
Age		
20–30	19	10.44
31–40	57	31.32
41–50	57	31.32
51–60	32	17.58
61–70	11	6.04
71 +	6	3.30
Religion		
Christians	72	39.6
Muslims	110	60.4
Level of education		
No education	39	21.4
Primary education	12	6.6
Junior High School	11	6.0
Senior High School	21	11.5
Tertiary	99	54.4

usually lay members of the community to support in vaccinating nomadic populations.

“During vaccination days, I (Community health volunteer) look for benches and table that would be used for setting up vaccination centre before the nurses come to start” (Community Health Volunteer, District #7).

“We have health volunteers in every community who assist us to locate these nomads; those who are settling closer to the communities. So when the community health officers are going for their vaccination activities, they pre-inform them so they also prepare these nomads. Usually that has been the structure to reach them for vaccinations” (A DHMT member, District #10).

“Yes, I beat ‘gong- gong’ to alert community’s members to gather for vaccination at the community centre” (Community Health Volunteer, District #7).

The DHMT works in collaboration with community leaders and the security services to identify where they live and where there are conflicts between nomads and community members. This information is useful for strategizing and providing targeted vaccination services among the nomads.

“...almost all the time when there is armed robbery, they say it is them (nomads), so we keep them under check such that we are able to know their numbers,

where they stay here and their activity. As they don’t interact with the community members it is difficult to know everything about them so what we do is that when we go for District Security meeting we request from the Immigration services an update on their (nomads) activity. They are always here on purpose, people bring them to take care of their animal. There are those who will register them with the immigration, when there are challenges, we will be able to identify and address them, because they are people who don’t mingle with us” (Fire Officer, District #8).

This notwithstanding, previous attempts by cattle owners to support health workers by inviting all their nomads for vaccination did not work hence the nomads do not come for vaccinations.

“Some time ago our cattle were closer to this town, we discussed this with the health workers that all the cattle owners had nomads in the same area, each one and the wife. We discussed that we (cattle owners) will call them [nomads] and bring them one day for the vaccination activities to be carried out for them, but that didn’t work because the health workers did not turn up. That made the nomads to think that they are not Ghanaians, so they won’t come at all for vaccinations” (A cattle owner, District #3).

Pathways to improve vaccination through leadership and governance

Beyond community leaders, an important pathway to improve vaccination among nomadic population is the use of the nomadic leaders to support vaccination activities.

“To the nomadic chiefs, yes, we know that anytime these nomads are coming in to settle, they first get permission from the chiefs; so the chiefs certainly will know their existence in the communities as well as the assemblymen (A DHMT member, District #5).

Service delivery and health seeking behavior

Health workers (male and females) conduct regular vaccination activities in the communities. It is however a challenge to conduct vaccination among nomads who move with their cattle in search of pastures. Beyond distance, they are also perceived as non-Ghanaians, and discriminated against in the process of vaccination.

“... some time ago we used to stay together in the same community with the nomads but when misunderstanding set in, they were sent off to live in

the bush. We have the nomads who are in the bush with the cattle where they stay with the cattle so we cannot send someone from here to go and vaccinate them over there (A cattle owner, District #11).

“...there was a time in this community where the nomads were being arrested when seen in town. So, if we tell them to come and be vaccinated, if you were the one, will you come? (A Butcher, District #11)

On the contrary, in districts where there is less hostility between communities and nomads, it emerged that health workers and vaccinators move to the nomadic settlements to deliver vaccination services.

“Those who are around here in our district and sub-districts, our nurses move from the facility level to those communities where they settle to vaccinate them [nomads]. They only come to the facility themselves for ANC and other healthcare services but for immunizations our nurses move directly to where they are staying for the services to be carried out’ (A DHMT member, District #5).

There is also the challenge of fear of being attacked by some of the nomads and this makes some of the health workers very hesitant to go for vaccinations in the nomadic settlements.

“From the perspectives of our nurses, several of them, as I said earlier, usually are afraid of being attacked, robbed and the fear to move alone to the isolated communities to conduct vaccination activities. The bad roads, coupled with thick forest and the fear of being attacked dwindles the morale of our health staff to continue and so security wise it is really challenging” (A DHMT member, District #5).

“The difficulty is that they live very far away from the communities, and the nurses too, either one or two people cannot enter into the territory of the nomads alone. So, if they meet those closer to the community, they are able to talk to them and vaccinate them” (A Butcher, District #11).

Language was one of the main barriers to delivering vaccination services among the nomadic population.

“Those of us who live here [close to the community] understand almost any language but those [nomads] who stay up there [name of settlement withheld] understand only Hausa. If you have to go there [for vaccination], the you have to get someone who speaks Hausa “(A pastoralist nomad, District #4).

“Language is a barrier, for some of the nomads; some understand Wale and Twi languages in district 11 and I find such people to help in order to speak to them [nomads]” (Community Health Volunteer, District #7).

“... some do not receive the vaccine, the reasons why I am saying this is that those who live town who understand Twi, English and Hausa will understand to vaccinate when you take your time to explain things to them. However, for those in the bush/settlements who don’t understand any of these languages and have always been treated with herbs since they were born don’t believe in vaccinations and it is difficult to convince them” (A Butcher, District #10).

Awareness about the disease and its severity influence vaccination among nomads. Nomads get involved in vaccinations when the disease is considered common and widespread like COVID-19. It emerged that nomads do not take other vaccinations including that of yellow fever seriously because they don’t consider it as severe, and they do not have enough information about the condition.

“Mostly it is difficult, but nomads take part in some vaccination activities that are common, especially the COVID-19, because that was common. However, for the others like the yellow fever, they don’t take it seriously, because they don’t have information and they are not educated about the importance of the vaccine” (A Butcher, District #9).

Pathways to improve vaccination through service delivery

An important approach to overcoming the language barrier to improving vaccination services among the nomadic populations is “using one of their own” and cattle owners.

“...if you get some of their people who had some form of education to sit them [nomads] down and to explain to them [nomads], they will understand. If you get one of them-a female and a male-to support you, it will help them to understand. Otherwise it will be very difficult for those in the bush to come to town...(A Butcher, District #10).

“What will help is that we [cattle owners] will put in measures to know vaccination days for the nomads. We will talk to them and bring them, but if we say you should go to the bush to vaccinate them it will not be possible” (A cattle owner, District #11).

Another route to delivering service among nomadic population is strategically setting up vaccination centres at market centres, mosque, or the chief's palace.

"It would be better if vaccination centres are stationed at the market centre, mosque or chiefs palace. This is because they [nomads] normally come to such places" (A Veterinary Officer, District#2).

"Targeting them on market days and mosque is good. The caretakers mostly come home but the nomads are always in the bush and that makes it difficult to get them vaccinated because they cannot leave the cattle to come down. When the Health workers inform us, the masters, on market days, we will go and pick the rest of the nomads who are in the bush with the cattle to come for the vaccines" (A cattle owner, District#11).

Some DHMTs have also mapped the nomadic settlements in their districts following the recent yellow fever outbreak. The recent population and housing census will help in the estimation of vaccines that will be required to be able to vaccinate the nomads in addition to community members in the districts. The GHS and other relevant stakeholders should take advantage of the existing and current GPS maps to plan and arrange for the necessary logistics to support vaccinations in nomadic communities.

"Yes, so, over the years we didn't have their [nomads] population in our books but with the current yellow fever outbreak we were tasked by the regional health directorate and we mapped them; we went round to actually get their population. By this it means that we will update our estimations going forward. However, with the 2021 Ghana Statistical service housing and population census, I believe that they were also captured..." (A DHMT member, District #2).

Health workforce

It was revealed that the use of both male and female vaccinators is preferred during vaccination among nomads. Nomads prefer male vaccinators to attend to male nomads and female vaccinators attend to female nomads during vaccination. This was typically echoed in the words of a cattle owner who works with nomads;

"A mixture of male and female is preferred because most nomads especially the [ethnic name] men would not agree to allow his wife to be vaccinated by men. Female nurses will attend to females whiles men will attend to men to avoid inconveniences.

Religion and age don't matter in providing vaccination services (A cattle owner, Central Gonja District).

"If you send one particular gender it will be very difficult because I don't know where they are going to inject the person but if you are going you can get a male and a female health care North East Gonja providers, if they reach there and they want to do the ladies the woman can do that" (A butcher, District #7).

On the contrary, it is interesting to note that, a wife of a nomad revealed that female nomads prefer male vaccinators as they make jokes with them and they (HCPs) make them feel comfortable during vaccination.

"We prefer the male healthcare providers because, they play jokes with us that make us feel comfortable with them. They also have the energy to cover long distances to look for us" (A pastoralist Nomad, District #7).

Similarly, some respondents who work with nomads, mentioned that the personal characteristics of health workers or vaccinators such as gender and religion were not considered by nomads during vaccination so long as the person is qualified to do the work.

"Gender, religion, age and ethnicity doesn't matter in vaccination among nomads" (A Veterinary Officer, District #2).

"They [Health care Providers] should be patient in talking to them [nomads] and they will accept the vaccination. Religion, age and gender, they [nomads] don't care about such things. They accept everyone who comes to them" (Community Health Volunteer, District #7).

Attitude of health workers or vaccinators serves as a deterrent or push away nomads from vaccination activities. It emerged that health workers use derogatory words on nomads and this makes them feel discriminated against.

"The health care providers giving the vaccination should have a nice way of communicating with the Nomads. This is because, the nomads may find every excuse not to participate in vaccination activities, so if you [vaccinators] don't communicate very well, they may not cooperate and will walk away from taking the vaccine. Sometimes they insult the nomads that they are dirty which does not go well

with them because the person came because of the vaccine so let him get the jab and leave” (A cattle owner, District #11).

Pathways to improve vaccination through health workforce

Though personal characteristics of vaccinators are not a barrier to vaccination among nomads, males and some ethnic speaking Muslims healthcare providers will be more acceptable to the nomads because most of the nomads understand Hausa. Also, male healthcare providers are ideal as vaccinators may have to ride long distances to nomadic settlements.

“I think that the health worker should be a male, and a Muslim who understands the Hausa language, this makes the work a little bit easy, because 99% of the Nomads are Muslims so we have to get someone who understand their language (Hausa) and who can easily work with them. They will accept such a person easily” (A cattle owner, District #11).

Capacity building for health workers in the area of customer care i.e. treating all patients and clients without discrimination as this is one of the barriers to vaccination among nomads. The need for building the capacity of health workers could be seen in the response below;

“Oh I cannot say they have not been trained well; but mostly some of them need additional training. You have to love people or have time for people or care about them” (A butcher, District #11).

Another interesting pathway to improving vaccination among nomads is training some of the nomads to do the vaccination. This is an interesting option that could be explored.

“...since some of them can treat their cattle, if we teach them how to vaccinate they will know. So if we want to vaccinate them [nomads], we can package the vaccines and know the number of them living in the communities and give it to them [nomads] to vaccinate their children or we give it to their chief to send there and he will wait for them to do the vaccination and he will bring you the report. I think this is the best way to get them” (A butcher, District #11).

Doing joint vaccination among nomads and their animals also emerged as an important pathway for improving vaccination among nomads. It emerged that veterinary officers vaccinate the animals of nomads from time to time. Consequently, the health workers could partner with the veterinary officers to do a joint vaccination.

“During the vaccinations, we normally make announcements with the mass media [radio] to inform the community members to be aware of the program that is to take place so that everyone will be available and also make sure their animals are vaccinated” (An agricultural extension officer, District #8).

Medicine and medical products

Generally, vaccines were considered to be safe and good for protection against vaccine preventable diseases.

“Vaccines helps a lot; I did not take the Covid-19 vaccine because I was pregnant then but the health workers have gone to vaccinate our brothers/sisters especially those who in the settlements (A pastoralist nomad, District #6).

“Yes, vaccines are safe, sometime it is about the side effect but vaccinations are safe. It's just the side effect which is an issue. For instance the Covid 19 vaccine, someone will take and run diarrhoea for a whole week, vomiting and loss of appetite but at least is always safe” (A butcher, District #11).

However, there were interesting perceptions including death attributable to vaccines which could fuel vaccine hesitancy among the nomadic populations;

“Yes, many people have perceptions about vaccines, some say that you will die when you take it. Others say they fell sick after the vaccination and some say after taking paracetamol after the vaccination he is feeling fine. You know we are human; if one person report something bad, the rest become afraid” (Butcher, District #7).

“Like the COVID- 19 they were saying that if you take the vaccine, you cannot give birth” (A butcher, District #9).

“During covid-19 era, I took the vaccine. After the vaccination my colleague's nomads came to me to ask why I took the vaccine because they heard that when you take the vaccine you will die. I explained to them that is not like that even ours [Nomads] leadership in Accra has taken the vaccine and have produce a video on whapsap to campaign for those of us in bushes to follow. ” (A Pastoralist Nomad, District #2).

Pathways to improve vaccination through medicine and medical products

Important pathways to address perceptions about vaccines include continuous education and sensitization through the leadership of the Nomads;

“Many nomads have some doubts about vaccinations but I think constant education from knowledgeable persons responsible for explaining what vaccine does, will help” (A Pastoralist Nomad, District #2).

“We should use their leaders to educate the nomads because if we use them, even if the nomads are hiding somewhere, when we open our mouth that they should come because the vaccine will help them, they listen to us in all events. While I am a cattle owner and he is the leader of the nomad, whatever we say, they will listen than outsider, a person they don’t know” (A cattle owner, District #11).

Health finance

It emerged that most of the nomads were registered with the National Health Insurance Scheme (NHIS)

“In this settlement, all have national health insurance except one person who don’t have.” (Nomad, District #7)

“We have registered with national health insurance but we still have to pay for some drugs; some time ago one of our brothers went to the hospital and paid additional monies for care but he still died” (Nomad, District #4).

“...So I can say that about 65 to 75% of nomads have National health insurance, the rest without Health insurance pay for their health services” (A Veterinary Officer, District #2).

On the contrary it was revealed that nomads who are registered with health insurance are the once staying close to the communities. Nomads who live in settlements in the bush continue to pay cash for health services because most of them do not have health insurance cover;

Most of nomads have still not registered with the national health insurance because they stay far away and we don’t have a registration/district office here. Usually we make announcement before the insurance people come but the nomads always come to meet a long queue and never get registered. When

they return to their settlements they feel lazy to come back (A pastoralist nomad, District #5).

“They pay for health services; for the insurance, mostly they [insurance officers] say they [nomads] are not from Ghana. I have some of them that I sent to do the insurance, they didn’t do it for them. So, for the nomads that is their main challenge. I can say that the nomads with health insurance are the ones staying in the towns; apart from that those in the bush none of them has insurance because they are classified as non-Ghanaians (he is not a Ghanaian” (A cattle owner, District #11).

For vaccinations, it was generally indicated that both community members and nomads do not pay for vaccines as summarized in the excerpt below;

“For vaccinations no, no one pays for vaccinations” (A DHMT member, District #5).

“We do not pay for vaccinations” (A pastoralist Nomad, District #2).

Pathways to improve vaccination through health finance

DHMTs solicit for financial and logistic support from other government institutions and non-governmental organizations to extend vaccination service to hard-to-reach communities such as the Nomadic settlements.

“...when we think that the funding from the national level is not adequate, we try to write for support from the district assembly and some NGO’s that we are working with. The support is not for funding alone, sometimes we request for vehicular support. When the campaign/exercise is over we discuss it in our management meetings and discuss especially the coverages and we hold a review meeting with all the stakeholders again to share with them our performance for the activity” (A DHMT member, District #8).

Health information and social and behaviour change communication (SBCC)

The health promotion units of the DHMTs are primarily responsible for mobilizing people for health activities including vaccinations. The DHMTs leverage the existing community structures such as community information centers, community, and volunteers to send information to the nomads;

“The health promotion department of the district health directorate, although they are not many, are doing their best. They usually go to the community information centres, use the volunteers, and the butchers and other stakeholders who have access to them [nomads] to send information to them. Sometimes, the health promotion officers place a phone call to a member of the community but in areas where there is no network, it is difficult to reach out to them” (A DHMT member, District #5).

“...ok the process of providing information to the nomads are through us, the cattle owners. In this community, I m a master and I have given my cattle to a caretaker who is taking care of the cattle in the bush so it's the masters and the nomads chief who can provide information on any announcement about vaccination. We go to them to give them information about the new disease and the vaccination” (A cattle owner, District #11).

Also, vaccinators visit the residence of community members and to encourage them to go for vaccinations. Gong-gong [local announcement by an individual/the official communication and information manager within a chief-taincy structure] is beaten to alert communities about vaccination.

“Ok, we go round house to house, speak to them, and encourage them to go for vaccination. I myself beat gong -gong to inform how vaccines work to protect them” (A community health volunteer, District #7).

“The chief informs the gong-gong beater to make announcements inform people about upcoming vaccinations and to ask people not to go to their farms; on that day we all go the vaccination center to take the vaccine (A nomad, District #6).

Another mode of social mobilization is the use of the chiefs who know and are able to locate the nomads. Emphasis was placed on nomadic chiefs who lead the nomadic communities.

“The leaders of nomads are used to communicate information on vaccinations. Anything we hear from our leaders is the truth and we cannot disobey them.” (A nomad, District #7).

“Yes, with their chiefs know where the others are located within their communities, so sending information through their chief is the main medium we are using” (A DHMT, District #5).

“Very perfectly, if you don't include their leaders, it will be very difficult to get to them, so always include their leaders” (A butcher, District #9).

Again, announcements are also made at churches and mosques on impending vaccination activities as part of the mobilisation process.

“For pastors and imams, letters are given to them to announce at their churches and mosques to inform their members about an impending vaccinations exercise” (A community health volunteer, District #7).

Pathway for health information and SBCC

SBCC approaches could help improve sending information on vaccination activities to the nomadic population including the use of local radio stations and community information centres. These approaches are already used but could be improved. The use of school pupils was also indicated as possible route that information on vaccination activities could be transmitted. Specifically, information could pass from teachers to their pupils and to parents in various homes

“Most people watch this [information on vaccination activities] on TV and those without TV but have radio could listen from the information centres; lots of the children also get the information from their teachers in school and they inform their parents back at home” (A butcher, District #10).

Furthermore, specific days such as Fridays were indicated as days that most community members including nomads come to 'town' so could be days that vaccination activities could be scheduled;

“We have days such as Friday that most of them [nomadic] come to town and could be used for such services” (A community health volunteer, Sawla-Tuna-Kalba Districts).

“... In this town they [nomadic] use to come on Fridays to the mosque” (A butcher, District #10).

A typical example was cited by a butcher to substantiate the use of Fridays for vaccinations among nomads who are usually Muslims. Chiefs and Aassemblymen could also liase with butchers to inform nomads about vaccination when they come to town on Fridayss

“For instance, if they announce that there will be vaccination activities on Fridays for us [we the Muslims]; all the time when they say Friday, all those in the bush come and get vaccinated...” (A butcher, District #11).

The chief in the community should first be informed, then the chief will also inform the butchers so that when the nomads come to town they can be informed (A pastoralist nomad, District#6),

Generally, Hausa and Mosi emerged as languages that could improve social and behavior change communication about vaccination among the nomadic population in the study sites.

“For language that can be used to give them [nomads] information, I know that about 95% of the nomads understand Hausa, then Mosi; as for these two languages they understand” (A cattle owner, District #11).

Discussion

This study used qualitative approach to explore factors that influence uptake of vaccination among pastoralist nomads in four regions of Ghana. Using existing community structures, discrimination against nomads as non-Ghanaians, language barrier, use of derogatory words by health workers, and inadequate resources were the main factors that influence the uptake of vaccination among pastoralist nomads. These findings provide evidence for designing strategies to improve low vaccination coverage among nomadic population in Ghana and other Sub-Saharan African countries.

Generally, the health system leverages existing community structures especially community leaders to implement vaccination activities. The use of existing community structures and linkages works efficiently, especially among non-nomads, who are very stable in their communities. It is, however, challenging dealing with pastoralist nomads using traditional community leaders (i.e., host community leaders); the most promising approach is to use nomadic leaders. Like traditional societies, the leaders of the nomads exert great influence over pastoralist nomads in a particular settlement. This is largely based on trust the nomads have reposed in their leaders over a period. The health system and vaccinators could therefore take advantage of the existing nomadic leadership structures for organising pastoralist nomads for vaccinations and to improve uptake. For example, nomadic community leaders played a major role in identifying and mobilizing nomads for vaccination during polio outbreak response in 2014 in Chad and this

contributed to an improved coverage [21]. Beyond the recruitment of nomadic leaders, government appointees in the animal sector were brought on board to support with awareness campaign and to convince nomads to accept vaccinations [21].

The fact that nomads feel they are perceived as non-Ghanaians and discriminated against makes it difficult for pastoralist nomads to make themselves available for vaccination. Discrimination against nomads in many sectors including health is well documented across the world and requires global as well as context specific strategies to address it [22]. In Ghana, this is more common in districts where there is a hostile relationship between indigenous community members and pastoralist nomads. A typical example is the Asante Akyem North District in the Ashanti region of Ghana where there are several reports of confrontation between community members and pastoralist nomads [19]. Consequently, beyond distance, vaccinators are unable to visit nomadic communities for vaccination activities for fear of being attacked. It is important to note that, the notion of being attacked by pastoralist nomads has become common throughout Ghana especially where they are found. Linked to issues around discrimination is the use of derogatory words on pastoralist nomads who seek health care at local health facilities. It is alleged that pastoralist nomads are often insulted by health workers. However, this could be a perception among the nomads due to language barrier and the fact that they already feel discriminated against. This notwithstanding, health workers should be trained in the area of interpersonal communication skills and the need to show empathy to improve health services provision, especially among nomads.

Language is an important factor that influences vaccination among pastoralist nomads in Ghana and other African countries. Pastoralist nomads in Ghana are usually from Burkina Faso, Niger, Nigeria and Mali and do not understand the Ghanaian local languages [18]. Health workers therefore find it very challenging communicating with pastoralist nomads during service delivery (e.g., vaccinations). This challenge is not peculiar to Ghana. As reported in both less developed and developed countries, migrant populations who are less likely to speak the same language as health care providers, face challenges accessing health services [23, 24]. During the COVID-19 pandemic era in Uganda, language was a major barrier for effective public health education about vaccination among refugee population. This challenge was overcome by refugee-led organisations that conducted awareness campaigns using communicators among the refugees [25]. It is therefore very important for Ghana Health Service to use pastoralist nomads to support health workers in engaging the nomads to break the language barrier and ease vaccination uptake.

Generally, pastoralist nomads prefer that male health workers will vaccinate male nomads and female health workers will vaccinate their female counterparts during vaccination in nomadic communities. This finding could be due to the fact that most pastoralist nomads who are men are on field with their cattle and may not be comfortable with males attending to female nomads in their absence. The mention of Hausa speaking male vaccinators for vaccination could be due to the fact that pastoralist nomads live at the outskirts of communities. Male vaccinators will therefore be able to ride motor bikes for long distances to engage them for vaccinations. Also Hausa speaking vaccinators will be more accepted by the nomads as most of them in the study area speak Hausa. Alternatively, some pastoralist nomads could be trained and supervised to carry out vaccinations among themselves. These suggestions are worth considering, however, it requires further discussions and feasibility assessment in the Ghanaian context.

There is also an opportunity for Ghana Health Service to explore doing a joint vaccination with veterinary officers who visit nomadic settlements to vaccinate their cattle. In effect, as pastoralist nomads get vaccinated by health workers, their animals also get vaccinated by veterinary officers in the spirit of one health. The veterinary officers have established rapport and trust with nomads and could facilitate for health workers to gain the trust and support of nomads. Harmonising vaccination activities of the veterinary and public health vaccination services was a major outbreak response approach implemented in Chad in 2011 to 2012. As part of this strategy, personnel from the veterinary services were recruited to work with human vaccinators as the veterinary staff were well known among nomadic communities and had established rapport with the nomads [21, 26, 27].

Vaccine hesitancy among pastoralist nomads is also influenced by the negative perceptions about vaccines. It is perceived that vaccines could cause negative side effects including death. Vaccine hesitance due to perceived side effects is a challenge not only among nomads but general populations. This requires intensive public health education to deal with the misinformation about vaccines. Targeted awareness creation and leveraging the existing mechanism nomads use to pass information is important in this regard. Active community involvement and leveraging the support of local religious and non-religious leaders in social behavioural change and communication (SBCC) could increase vaccine acceptance as revealed in Pakistan and other Low Middle Income Countries (LMICs) [28]. Channels, such as electronic voice recordings and short videos in the preferred language of nomads could also be explored [28, 29].

Though availability of vaccines was not a barrier, inadequate resources partly constrain the health services

directorates in the various districts from reaching out to nomads. Nomads stay in settlements outside communities and requires logistics such as motorbikes and sufficient fuel to be able to reach them. Programme funds that usually come from the headquarters (GHS, Accra) to district health directorates for immunizations are inadequate to be able to reach the nomads. Insufficient resources for vaccinations in LMIC is well documented as governments largely depend on donor funding [30]. Considering that donor support keeps dwindling, there is the need for political will to allocate more funding for vaccinations among citizens and migrant pastoralist. Unvaccinated nomadic pastoralists are a potential threat for disease outbreak as they are always on the move in country and across borders.

SBCC for vaccination should continue to use existing community structures to be able to reach out to all community members. This notwithstanding, special strategies should be adopted to be able to reach out to the nomads who stay in settlements outside the communities and are usually unvaccinated. The use of existing structures for sending information among nomads is key, as the nomads trust these channels. Like the traditional communities, directives from nomadic leadership are trusted and complied with. Nomadic leaders could therefore be engaged to encourage their people to be vaccinated. The use of specific days such as Fridays is worth mentioning, as many nomads visit the town mosque for prayer and social interaction with the general population. This could potentially serve as an opportunity to engage them, provide health education and other public health service. As revealed in other studies, community engagement is most effective in rural and hard-to-reach areas when community health workers are skilled in interpersonal communication and understand context specific approaches that should be used to for social mobilization [29].

Strength

This study engaged diverse and multiple stakeholders/key informants in eleven districts across four regions of Ghana. This allowed for the diversity of perspectives, contextual variations, and cultural sensitivity that was revealed in our findings and could be useful for a more inclusive and representative policies to improve vaccination among pastoralist nomads. The use of the WHO health systems building blocks provided a structured approach to the conduct of this study, allowing for a comprehensive analysis. The WHO health systems building blocks were used to structure the study design, data collection guides (see supplementary file), and analysis. This helped us to be able to holistically explore and analyse the issues that influence vaccination among pastoralist nomads.

Limitation

This was a qualitative study, as such, findings from this study cannot be generalised. However, the findings could provide insight into designing strategies to improve vaccination among nomadic populations in Ghana and similar context. In addition, KII could have been triangulated with FGD among pastoralist but only KII were conducted because of the rapid nature of data collection and time constraints in organizing FGD. This notwithstanding, KII with different categories of stakeholders/respondents revealed the nuances i.e. similarities and differences in the thematic areas.

Conclusion and recommendations

Vaccination among pastoralist nomads is fraught with challenges due to their way of life. Pastoralist nomads miss vaccinations because they are unstable, live far from communities, often do not understand local Ghanaian languages, feel discriminated against as non-Ghanaians, and lack information about vaccinations. There is therefore the need to study their movement patterns and prepare health systems along their pathways in-country and across international borders to provide health services to them including vaccinations. The involvement of community leaders, especially nomadic leaders, should be strengthened to engender trust; some nomads and cattle owners could be engaged to support vaccinations in order to overcome language barrier. Capacity building in interpersonal communication skills for health workers is highly recommended. Continuous public health education and sensitisation among nomads and their leaders could be one of the most important tools for addressing wrong perception about vaccine safety.

Abbreviations

CHPS	Community based Health Planning and Services
DHMT	District Health Management Team
GHS	Ghana Health Service
GPS	Geographical Positioning System
KII	Key informant interviews
KHRC	Kintampo Health Research Centre
LMIC	Low and Middle Income Countries
SBC	Social and Behaviour Change Communication
UNICEF	United Nation Childeren's Fund
YF	Yellow Fever

Supplementary Information

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Supplementary Material 1

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Author contributions

SAA, LGF, KPA, PGK, MS and CT contributed to study conception, design, and proposal development. Data collection was carried out by CK, EAA and AA. Data analysis was conducted by SAA, LGF, CT, KPA, PGK and SO. SAA, LGF, KPA, PGK, MS, CT, SO, CK, EAA, AA, POA, FOS, AZ, CK and AAO contributed to interpretation of findings and reviewed the manuscript. All authors read and approved the final manuscript.

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Data availability

Data are available from the authors upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from the Kintampo Health Research Center (KHRC) Institutional Ethics Committee (FWA 00011103 / IRB Registration 0004854). Written informed consent was obtained from all participants after the objectives of the study was explained. Illiterate participants who provided their consent through a thumbprint were endorsed by the signature of literate witnesses who were not members of the study team. Prospective participants were given copies of the informed consent forms bearing their signature/ thumbprint and the signature of the researchers or a designated persons. Anonymity and confidentiality of identity and information provided by respondents were assured.

Consent to publish

Not applicable.

Competing interests

The authors declare no competing interests.

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