

BMJ Open Confronting 'chaos': a qualitative study assessing public health officials' perceptions of the factors affecting Tanzania's COVID-19 vaccine rollout

Thespina Yamanis ¹, Ruth Carlitz,² Olivia Gonyea,³ Sophia Skaff,¹ Nelson Kisanga,⁴ Henry Mollel⁴

To cite: Yamanis T, Carlitz R, Gonyea O, *et al.* Confronting 'chaos': a qualitative study assessing public health officials' perceptions of the factors affecting Tanzania's COVID-19 vaccine rollout. *BMJ Open* 2023;**13**:e065081. doi:10.1136/bmjopen-2022-065081

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-065081>).

Received 27 May 2022

Accepted 13 January 2023



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¹School of International Service, American University, Washington, DC, USA

²Department of Political Science, University of Amsterdam, Amsterdam, Netherlands

³Department of Health Studies, American University, Washington, DC, USA

⁴Department of Health Systems Management, Mzumbe University, Mzumbe, Tanzania

Correspondence to

Dr Thespina Yamanis;
nina.yamanis@gmail.com

ABSTRACT

Objectives Mass COVID-19 vaccination in Africa is required to end the pandemic. In low-income settings, street-level bureaucrats (SLBs), or public officials who interact directly with citizens, are typically responsible for carrying out vaccination plans and earning community confidence in vaccines. The study interviewed SLBs to assess their perceptions of the factors affecting COVID-19 vaccination rollout in Tanzania.

Methods We interviewed 50 SLBs (19 rural; 31 urban) responsible for implementing COVID-19 vaccination microplans across four diverse regions and districts of Tanzania in September 2021. Moreover, we conducted six in-depth interviews with non-governmental organisation representatives and seven focus group discussions with health facility governing committees. We asked for their perceptions of factors facilitating and challenging vaccine rollout according to three preidentified domains: political, health system and community. We analysed translated transcripts using a thematic analysis approach.

Results Political factors facilitating mass vaccination included the executive leadership change from a denialist president to a president who accepted vaccines and promoted transparency. Global integration, commercially and politically, also motivated vaccine acceptance. Political challenges included community confusion that emerged from the consecutive presidents' divergent communications and messaging by prominent religious antivaccination leaders. Health system factors facilitating vaccination included scaling up of immunisation sites and campaigns. Urban district officials reported greater access to vaccination sites, compared with rural officials. Limited financial resources for paying healthcare workers and for transport fuel and a lack of COVID-19 testing compromised mass vaccination. Furthermore, SLBs reported being inadequately trained on COVID-19 vaccine benefits and side effects. Having community sources of accurate information was critical to mass vaccination. Challenges at the community level included patriarchal gender dynamics, low risk perception, disinformation that the vaccine has satanic elements, and lack of trust in coronavirus vaccines.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Qualitative interviews with public health officials provide an in-depth look at officials' perceptions of the factors that facilitated and challenged mass COVID-19 vaccination in Tanzania.
- ⇒ We interviewed 50 public officials and conducted focus group discussions with six health facility governing committees across urban and rural districts in Tanzania.
- ⇒ We did not investigate community perceptions to corroborate public officials' perceptions.
- ⇒ Given the dynamic nature of the COVID-19 response, the findings cannot be generalised beyond the study's time period, September 2021.

Conclusion Mass COVID-19 vaccination in Tanzania will require greater resources and investment in training SLBs to mitigate mistrust, overcome misinformation, and engage communities.

INTRODUCTION

The end of the COVID-19 pandemic will require mass vaccination in Africa.^{1,2} As of 23 January 2023, Africa recorded 12.49 million cases and 257 532 deaths due to COVID-19.^{3,4} The actual numbers are likely much higher; WHO estimated that 1.25 million excess deaths associated with COVID-19 occurred in Africa between January 2020 and December 2021.² Highly transmissible variants, including the Omicron variant, first detected by genomic surveillance teams in Africa, caused more deaths than during the previous Delta surge.^{5,6} As of February 2022, it was estimated that the vaccination rate in Africa needed to increase six times (requiring 36 million people to be vaccinated weekly) in order to achieve the 70% fully vaccinated global target.⁷

Troublingly, the African continent has experienced obstacles with rolling out COVID-19 vaccines. Obstructions to vaccine



procurement include high-income country hoarding and lack of local vaccine manufacturing.⁸ As of February 2022, Africa received more than 587 million vaccine doses, 58% through the COVID-19 Vaccines Global Access (COVAX) Facility, 36% from bilateral deals including from China and Russia and 6% through Africa Vaccines Acquisition Trust of the African Union.^{6 8} African countries were among the first to sign up for and receive vaccine doses through COVAX.⁹ Nevertheless, some African countries have been slow to vaccinate the majority of their populations. As of October 2022, eleven African countries had between 10% and 19% of their population fully vaccinated with their last dose of their primary series, while five countries had less than 10% fully vaccinated.¹⁰

The monumental logistical task of mass COVID-19 vaccination in Africa relies heavily on street-level bureaucrats (SLBs)—the ‘public service workers who interact directly with citizens in the course of their jobs’.¹¹ These include doctors, nurses and other public health officials such as regional or local immunisation officers. In the low-income settings that characterise much of Africa, there is often considerable distance between the policies made in capital cities and actual implementation on the ground. As a result, the logistical tasks of SLBs, which include microplanning, surveillance of adverse events, management of data and earning community trust and confidence in vaccination, have an outsize impact on outcomes.^{12 13} Despite their relative importance in mass vaccination efforts, few studies have interviewed SLBs in Africa to assess their perceptions of the factors affecting their vaccination work.

SLBs in Africa likely encounter diverse facilitating and challenging factors in vaccinating people in their communities. Some factors like challenges with vaccine supply may be similar across Africa, while others likely depend on context. Recent research on COVID-19 vaccine rollout in Africa by WHO and others suggests that these factors may be grouped into three types: political, health system and community.^{8 12 14 15}

The United Republic of Tanzania merits particular attention when it comes to *political* factors that affect COVID-19 vaccine rollout. Tanzania is one of few countries that experienced a reversal of high-level political support for vaccination. The country’s first year of the pandemic was characterised by a minimal official response, encouragement of the use of prayer and traditional remedies to prevent SARS-CoV-2 spread and outright denial by former President John Magufuli,¹⁶ who died in March 2021, just months after winning a landslide re-election. President Magufuli was succeeded by his vice president, Samia Suluhu Hassan, who was publicly vaccinated in July 2021. In June 2021 the country joined COVAX, and in July 2021 the government issued a revised national COVID-19 response plan with vaccination as a central pillar.¹⁷

As of January 2023, COVAX shipped 41.46 million out of 42.25 million allocated COVID-19 vaccine doses to Tanzania and the USA donated over 7.00 million vaccines,

which was enough to fully vaccinate between 40–59% of Tanzania’s population of over 60 million people.^{10 18} As of August 2022, it appears, according to the International Monetary Fund, that Tanzania has secured or expected commitments to vaccinate 84% of its population from all types of delivery mechanisms.¹⁹ Nevertheless, the latest statistics indicate that 44.69% of the Tanzanian population has completed the initial vaccination protocol and 2.93% of people are partially vaccinated.⁴ Thus, research is needed to identify the barriers and facilitators to COVID-19 vaccination in Tanzania.

One barrier to vaccination in Tanzania is likely the differences in the two recent presidents’ approaches, which engendered confusion and mistrust of health officials.¹³ For example, in February 2021, under President Magufuli, the Minister of Health appeared at a press conference where she drank herbal remedies and stated that the government had no plans to import vaccines.²⁰ Just a few months later, under President Hassan, the same minister received the first shipments of COVAX vaccines at a fanfare event during which she assured the public that the vaccines were safe.²¹

While a number of challenges with vaccinating the Tanzanian population against COVID-19 likely reflect the country’s particular governance context, others are likely common to the Global South. *Health system* challenges for mass COVID-19 vaccination in Africa, according to WHO and the World Bank, include: limited training of vaccination workers, inadequate funds, disorganised planning, inadequate medical infrastructure, vaccine hesitancy and in-country regulatory hurdles.²² Moreover, several commentaries forecasted that health system barriers would include difficulties transporting vaccines to remote locations, inadequate health information and communication systems and shortages of healthcare workers.^{12 15} Few studies have assessed SLBs’ assessments of these potential challenges.

Another set of factors associated with COVID-19 vaccination in Africa relates to *community* demand for vaccines. For example, a 15-country study of African countries (not including Tanzania) showed that willingness to accept a COVID-19 vaccine was highly variable, with significant regional disparities.²³ In other studies, vaccine hesitancy, defined as delaying acceptance or refusal of vaccines despite availability of vaccine services, ranged anywhere from 36.5% among Kenyans to 84.6% among Cameroonians.^{24 25} Among this literature, common reasons for vaccine hesitancy included concerns about the source of vaccinations^{25 26} and vaccine safety.^{23 26–29} When asked which entities would need to provide approval to engender trust in a COVID-19 vaccine, citizens in the 15-country study reported that the entities least trusted were community organisations (7%) and ‘foreign Western’ governments (7%).²³ Respondents viewed new COVID-19 vaccines to be less safe than vaccines in general. Moreover, over half of people surveyed in the 15 countries considered themselves either ‘not very well’ or ‘not at all’ informed about COVID-19 vaccine development.²³

Misinformation (inaccurate, but not necessarily with bad intentions) and disinformation (inaccurate, with intention to deceive) are also likely obstacles to vaccine rollout in Tanzania.²³ In the 15-country survey in Africa, 66% of respondents reported having seen or heard ‘some rumors’ about COVID-19, with 42% reporting being exposed to ‘a lot of disinformation’. Common rumours included: Africans are being used as guinea pigs in vaccine trials, vaccine trials have led to the death of several children and the spread of COVID-19 is linked to 5G.²³

In the present study, we explored the perceptions of public health SLBs on challenges and facilitators to COVID-19 vaccination rollout in Tanzania. We asked SLBs about political, health system and community factors affecting vaccine rollout. Given the importance of vaccination as part of global pandemic control, our ultimate goal was to come up with a set of recommendations for scaling up COVID-19 vaccination.

METHODS

Background

Tanzania issued *Guidelines for COVID-19 Vaccination* in July 2021.³⁰ Consistent with Tanzania’s policy since the 1990s of decentralising primary healthcare,^{31 32} key roles for vaccination were devolved to the local government level. Tanzania is currently divided into 31 regions, which are further subdivided into districts, wards and villages. The guidelines tasked each of the 172 district councils with developing a ‘comprehensive Council COVID-19 micro plan’.³⁰ Furthermore, health facilities within each district—through health facility governing committees (HFGCs) and community healthcare workers—were made responsible for mobilising targeted groups for vaccination, implementing vaccination activities, documenting doses provided and vaccine stocks and supervising vaccination activities.³⁰

Setting

Interviews were conducted in September 2021 in four purposefully selected regions: Dodoma, Dar es Salaam, Mbeya and Kigoma. We purposively selected one urban

and one rural district within each region. We selected districts that were diverse with respect to the characteristics presented in [table 1](#) (population, geography and healthcare infrastructure).

Participants

We purposively selected different types of local officials to interview at each level of government: (1) *regional*-level officers, including members of Regional Health and Regional Referral Hospital Management Teams who were involved in the implementation of response to COVID-19; (2) *district*-level officers, including social welfare and medical officers; and (3) *local* officials at ward, village (rural) and *mtaa* (‘street’; ie, urban equivalent of village) levels who were involved in the implementing COVID-19 vaccination activities. We planned to interview at least two officials of each type per district (2 officials × 3 types × 2 districts) for a total of 12 officials per region (total of 48 interviews). Focus group discussions (FGDs) were solely conducted with HFGC members.

Patient and public involvement

It was not appropriate to involve patients or the public in the design, or conduct, or reporting or dissemination plans of our research.

Procedures

We developed an interview guide (see online supplemental file 1) based on prior experience, including previous interviews with Tanzanian local officials about the country’s COVID-19 response in July 2020,^{13 16} and review of the revised COVID-19 response plan. Participants meeting our selection criteria were approached for an interview. Interviewees were asked about their roles and responsibilities, guidelines received under President Hassan, perceptions about whether and how things have changed since the new president took office, scope of activities related to COVID-19 and challenges in implementing those activities. We also asked about their activities related to the COVID-19 vaccine (including production, distribution, overcoming reluctance), and about the development and implementation of COVID-19

Table 1 Characteristics of districts selected for the study

District	Region	Hospitals available in the region (n)	Urban/rural	Population (region, 2020 projection, Tanzania census)	Population (district, 2017 projection, Tanzania census)	Area (km ²)	Population density (people per km ²)
Dodoma MC	Dodoma	15	Urban	2 647 410	456 035	2611	175
Chemba DC	Dodoma	15	Rural	2 647 410	261 567	7299	36
Kigoma Ujiji MC	Kigoma	12	Urban	2 800 919	242 917	93	2615
Kakonko DC	Kigoma	12	Rural	2 800 919	188 909	2204	86
Ilala MC	Dar es Salaam	65	Urban	5 401 814	1 616 901	369	4383
Kigamboni MC	Dar es Salaam	65	Rural	5 401 814	215 830	69 490	3087
Mbeya CC	Mbeya	21	Urban	2 204 543	435 072	252	1724
Rungwe DC	Mbeya	21	Rural	2 204 543	274 189	2154	127

CC, City Council; DC, District Council; MC, Municipal Council.

vaccination microplans. We describe how we meet the Consolidated Criteria for Reporting Qualitative Research in online supplemental file 2.

Interviews and focus groups were conducted in person in participants' offices during the month of September 2021; no other individuals were present during the interviews. Data were collected by two male and two female Tanzanian research assistants who have a minimum of a bachelor's degree. The research assistants were supervised and trained by study researchers. Research assistants did not have a relationship to participants prior to the study; they maintained 6-foot distance from participants and wore a mask during the interviews. Research assistants explained the purpose of the study; verbal informed consent was obtained and participants' names were not recorded. All interviews and FGDs were audio recorded, conducted in Swahili and translated to English for analysis. Interviews lasted between 20 and 30 min and focus groups lasted between 48 and 55 min; interviewers wrote field notes after each interview or FGD. Data are available on reasonable request.

Data analysis

We analysed the data using a thematic analysis approach. We first generated codes deductively from our interview guide. Codes were grouped into six overarching categories; example codes for each category are provided in parentheses: (1) training (eg, work role); (2) COVID-19 guidelines (eg, access/availability); (3) response to COVID-19 (eg, president's beliefs); (4) activities against COVID-19 (eg, local adaptations); (5) COVID-19 vaccine (eg, access); (6) comprehensive COVID-19 plan (eg, implementation); (7) coordination (eg, government monitoring); (8) activities not engaged in to combat COVID-19 (activities that participants would have liked to do but were not able to do because of some barrier); (9) hindrance to implementation (eg, political, social and economic factors); (10) resource availability (eg, sources). During our data analysis, we inductively added two codes that emerged as themes: (1) decentralisation and (2) working with partners such as non-governmental organisations (NGOs). The four research assistants coded all the translated interviews and FGDs using Dedoose version 6.2.2. Please see more information on the role of the local data analysts in our reflexivity statement, included as online supplemental file 3. We went through several rounds of blind coding (where each coder codes the same document but is blind to the other coders' work) and then resolved coding discrepancies during a group meeting. This process helped clarify each code's meaning and to ensure that coders were applying the codes in the same way. After several rounds of blind coding, we were confident that the coders were applying the codes similarly. Then, each coder was assigned an equivalent share of transcripts to code. Finally, a lead research assistant

reviewed the coding of randomly selected transcripts. After reaching data saturation, we compared and contrasted quotes based on respondents' region and the government level at which they operated.

RESULTS

Sample characteristics

We completed 50 interviews with officials responsible for implementing COVID-19 vaccination microplans. These included 12 regional officials (eg, regional health secretary, regional medical officer, regional immunisation and vaccine officer), 23 district-level officials (eg, council/district immunisation and vaccine officer (CIVO/DIVO), district medical officer, district/town council health secretary) and 9 officials at the level of ward or village (eg, village or ward executive officer). We interviewed a total of 19 officials in rural areas and 31 officials in urban areas. In addition, we conducted six in-depth interviews with NGO representatives (eg, programme officer, project manager). Finally, we conducted seven FGDs (four in urban areas and three in rural areas) with HFGCs and a hospital management team. Below we describe respondents' perceptions of factors facilitating and challenging vaccine rollout according to our three preidentified domains: political, health system and community.

Political factors facilitating vaccination

Respondents universally reported that the change in executive leadership from President Magufuli to President Hassan was critical to facilitating vaccine uptake. The key difference between the two leaders was President Hassan's embrace of the COVID-19 vaccine. Many noted President Hassan's broader acceptance of 'science'. As an urban health secretary stated, 'In the previous regime of President Magufuli, people were strongly encouraged to follow traditional methods... but in this phase of President Hassan we follow what science says.' FGD participants at an urban dispensary echoed this sentiment: 'every day our leaders are... urging us to follow modern methods, different from the previous phase.'

Several respondents also noted increased transparency under Hassan's government—both in terms of sharing the findings of scientific studies and disclosing statistics on COVID-19 infections. A district medical officer noted the 'great effort' of President Hassan's efforts to fight COVID-19 'by allowing scientific research and accepting the results of those studies' and went on to say that 'the biggest difference [between Hassan's and Magufuli's respective governments] is the availability of COVID-19 information'. As a member of an HFGC in an urban district put it, 'Lack of accurate COVID-19 information is no longer a government problem.'

Beyond the change in executive leadership, global integration was cited by some respondents as a motivating factor for embracing the vaccine. Several noted that 'Tanzania is not an island', and highlighted the importance of maintaining good foreign relations. A rural

health secretary suggested the government is influenced by interactions with ‘countries around us, because we are commercially related...we cannot separate ourselves and follow our own ways to fight COVID-19, because we will lack support’. A regional medical officer stated: ‘The COVID-19 conflict is a permanent agenda here in our region, especially considering the strong interaction along the borders of Tanzania.’

Global integration also means Tanzanians received information from sources beyond the country’s borders. Some respondents described how this generated a kind of bottom-up pressure that motivated the government to act. As a ward executive officer stated, ‘It is no longer possible to hide from the Tanzanian the real truth of the matter. [It is as] if we are two steps ahead of a different understanding from the Government’s intentions.’

In addition, many respondents noted that Tanzania is part of the international community and thus has certain obligations. As an urban ward executive officer reported: ‘The whole world is following the WHO guidelines ... we are not an island to stay separate from other nations.’ Some respondents cited pressure from foreign donors. An NGO official suggested that rejecting the vaccine would mean losing foreign aid:

President Samia [Hassan] has seen that if she did not accept the vaccine, she would miss many [sources of] aid internationally. Tanzania is also a member of various international organizations, so by continuing to reject the vaccine she would be violating the agreements.

A regional immunisation and vaccine officer put the vaccine in terms of conditionalities: ‘Tanzania is part of the world and again a dependent country; there is no option other than accepting the conditions.’

Political factors challenging vaccination

While most respondents praised President Hassan’s government as facilitating vaccination, respondents noted that divergent approaches between Presidents Magufuli and Hassan have engendered confusion and mistrust. For instance, a rural district health secretary noted, ‘the community is still embracing the guidelines of the previous phase, that is why the response towards the issue of vaccination is still low.’ A district health secretary in a different rural district further highlighted ‘the impact of political statements and statements especially in [Magufuli’s] government has made the community distrust the security of the vaccine’. Similarly, a member of an urban HFGC highlighted a ‘lack of information and trust in the reporting authorities’ as pervasive in their community. The project manager of a rural NGO put it even more forcefully:

The same government 4 months ago rejected the vaccine and accused it [of being] a plan by the imperialists to want to kill Africans. Today... the same leaders are encouraging young people [to get vaccinated].

This is a waste of time, society does not understand at all.

Some respondents reported mistrusting the mass vaccination campaign because they felt it was politically motivated. One member of an HFGC noted:

We do not see the success of scientific methods because the nation believes in the natural methods that [Magufuli] emphasized. Vaccination campaigns are political and rural people at first do not have time for them and do not expect to accept vaccinations.

Another participant explained, ‘Magufuli was a true patriot again and he rejected the pressure from outside.’ Conversely, President Hassan was seen by some respondents as being influenced by external pressures, supporting the belief that local officials encouraging vaccinations were promoting a foreign agenda. As noted by another participant in this FGD, ‘We have a very difficult time in the community in promoting vaccinations; we are called white puppets.’

Moreover, some respondents perceived the divergent messaging from the central government as a cause of people not engaging in COVID-19 preventive behaviours. A municipal immunisation and vaccine officer noted that people

are still in a dilemma to understand why this government has approved the vaccine even though the government initially rejected the use of the vaccine. This has led to chaos and made people not even follow the ways to protect themselves from this disease for example washing their hands and wearing masks.

Respondents also cited government conflict as making it difficult to carry out vaccination and other activities related to COVID-19 containment. As a ward executive officer noted, ‘politicians themselves do not have a formal position in the fight against the disease... [within] the same government some are encouraging vaccines [while] others are still opposed... [it] is making chaos.’

Respondents further highlighted a conflict between government statements and prominent religious leaders. A member of an urban HFGC cited recent statements by a Pentecostal bishop heading the Ufufuo Na Uzima (Glory of Christ Tanzania Church) ministry and a member of parliament from the ruling party who made public statements against the vaccine. Hassan’s government ordered the police and Prevention and Combating of Corruption Bureau to arrest and interrogate him. The bishop was questioned before parliament in August 2021.³³ Multiple respondents mentioned the bishop and the challenge he posed because of his wide following and antivaccine rhetoric. An urban HFGC respondent cited ‘the danger’ of ‘ongoing conflicts between religious leaders, especially religious ones’. This respondent further noted: ‘Religious beliefs have great power and space...the government must come up with satisfying answers.’ Another rural respondent referred to the bishop’s influence and



noted that ‘There are two catastrophes - the COVID-19 pandemic and the catastrophe of information’.

Health system factors facilitating vaccination

In terms of health system factors associated with mass COVID-19 vaccination, many respondents mentioned that the number of immunisation centres had increased and that vaccines were free and available for those who wanted them. A rural health supervisor said that vaccines were ‘available at three centers, but after seeing the need, seven more centers were added’. A regional officer said, ‘currently we have 52 COVID-19 vaccine centers, and next week we will expand the coverage to 358 facilities all over X region [anonymized for confidentiality].’

More urban than rural respondents cited the ease of vaccine access. An urban ward officer said that ‘access to immunization is not a problem at all. There are adequate immunization centers as well as mobile clinics that operate in crowded places such as markets, government meetings, worship meetings and conferences’. An urban district officer declared that ‘people can easily get vaccinated free of charge. The city has set up a friendly and simple procedure to coordinate the immunization exercise including increasing the number of immunization centers from the previous 6 centers to the current 112’. They also mentioned ‘immunization campaigns especially in collaboration with development partners such as Red Cross’, and mobile clinics with which ‘the city coordinates immunization by visiting various venues such as markets, where more education is provided on the importance of immunization’. An urban health secretary also mentioned ‘visiting various religious or political rallies, including parliamentary meetings and markets, where education is provided on the importance of immunization’.

Health system factors challenging vaccination

On the other hand, respondents repeatedly mentioned challenges to vaccination. Many participants cited the lack of financial resources for paying employees, for medical equipment and for fuel for transportation and mobile vaccination vehicles. For example, a rural health secretary stated: ‘when we planned the budget we lack the funds to implement and achieve the goals.’ Another respondent noted a ‘shortage of staff’ and ‘resources, especially to pay the vaccine providers’ who work 7 days/week. A rural medical officer mentioned the ‘lack of financial resources especially to cover the cost of motor fuel’.

Relatedly, respondents mentioned that the distance from rural villages to immunisation centres was a significant challenge. A ward officer said that ‘access to immunization is still a big problem’ because there are not enough facilities and most are far from rural communities. A rural district health secretary confirmed that they had 10 immunisation centres, ‘although villages like X are still very far away’.

Another issue was lack of testing capacity for COVID-19. An urban health secretary stated: ‘we don’t have a laboratory that can detect COVID-19, so the health provider

only measures temperature, heart rate and blood pressure...so they may vaccinate a person who is infected.’ Several respondents mentioned this challenge, saying they knew people who died *after* receiving the vaccine, suggesting that the deceased were likely infected prior to vaccination.

A common concern among respondents was lack of training for medical providers. A rural village officer stated that they lacked ‘experts to provide education on this disease’. An urban ward officer explained that no training was given to them on COVID-19 nor the vaccines and their side effects, making it difficult to answer the public’s questions. Officers in another urban area reported receiving what they described as unofficial training on COVID-19 organised by WHO and the government, on ‘immunization and vaccine storage’. Respondents reported that inadequate training led to healthcare providers’ misconceptions, including whether or not pregnant and breast-feeding women can be vaccinated.

Community factors facilitating vaccination

In terms of community-level factors that facilitated vaccination rollout, respondents agreed that having community sources of accurate information on the COVID-19 vaccine was critical. Respondents described dispersing health information about the COVID-19 vaccine through community meetings, church leaders, healthcare providers and various forms of media such as radio, news and television. A rural CIVO said that health workers were using media to ‘send reliable information to the society’ through ‘megaphones’ on public transportation and ‘flyers in different open areas’. An urban health secretary mentioned using media to spread vaccination information, holding meetings ‘summoning all religious leaders and traditional elders like chiefs’ and giving them leaflets to distribute to the community. They also provided flash drives with information on COVID-19 to bus drivers to play to their passengers.

Community factors challenging vaccination

Respondents reported several community-level factors challenging COVID-19 vaccination rollout including patriarchal gender dynamics, low risk perception, misinformation, disinformation that the vaccine has satanic elements, and a general lack of trust in vaccines. As an example of challenging gender dynamics, a district officer in an urban area said that due to the patriarchal society, women ‘are not allowed to vaccinate without the consent of their husbands’.

Respondents cited a general low-risk perception among community members likely because COVID-19 cases were not acknowledged under the previous president. As one rural DIVO stated: ‘The response of the people to the vaccine is still very low because this is one of the councils that has not brought any cases of COVID-19, from the first wave to the third wave... [people] do not believe in the existence of the disease.’

Several interviewees discussed the spreading of fake news on vaccines through social media. Some misconceptions include that the vaccine causes infertility and death. A rural chief executive officer respondent mentioned hearing misinformation that the vaccine would be used to track individuals.

Several respondents mentioned religious beliefs as a major challenge. A vaccine officer in an urban area said, 'when a religious leader in the community speaks or opposes an issue related to the spread of corona virus, it brings negative consequences to society.' Others mentioned that COVID-19 was linked to an antichrist symbol. A respondent from an urban HFGC said that 'the community believes that vaccination is an antichrist plan to use the mark of the beast number 666 [a satanic symbol]'.

Several respondents reported mistrust in vaccines. They said that pastoral communities used traditional medicine to treat COVID-19 and do not trust 'hospital medication'. An urban health secretary mentioned that there is 'a negative attitude towards the Johnson & Johnson vaccine'. This mistrust affected delivery of other health services, as a regional medical officer explained, 'The region has experienced a great drop out from clinical attendances due to the fear created among parents that when they attend the clinics, they will be vaccinated.' Another community officer described an incident they observed: 'students saw a car and the doctors dressed in white. Then some of them panicked and ran to their homes thinking they were getting a corona vaccine.'

CONCLUSION

Our study is the first to reveal public health SLBs' perceptions of the factors that challenged and facilitated mass COVID-19 vaccination in Tanzania. Similar to other studies based on surveys of African citizens,^{23–26} our findings revealed that community perceptions, particularly misinformation/disinformation, and inadequate health system investments were significant challenges to COVID-19 vaccine uptake. Adding to this, we found that the persistence of the denialist views of Tanzania's deceased president was a significant obstacle. On the other hand, facilitating factors included executive branch endorsement of vaccination, greater transparency regarding COVID-19 information, global and regional integration, the availability of mobile clinics and community-based campaigns to disseminate health information. In light of the need to scale up COVID-19 vaccination in Africa and our findings, below we present recommendations for improving vaccine uptake.

The Tanzanian case illustrates the challenges associated with overcoming the legacy of a charismatic executive leader. More generally, comparative research suggests that in presidential systems such as Tanzania's there is more scope for populist leaders to exert their will—for good or for ill.³⁴ The successors to such leaders are incentivised to continue their predecessors' policies in order

to legitimise their authority.³⁵ Charting a new course—*as President Hassan did with respect to COVID-19 vaccination*—has the potential to undermine both legitimacy and effective public health implementation. While the pandemic has threatened the legitimacy of leaders in a range of settings,³⁴ the challenge facing President Hassan is particularly acute in light of the extreme course charted by her predecessor, who went beyond denialism to claim that COVID-19 had been fully eradicated.³⁶

At the same time, our findings highlight the limits of executive leadership to influence vaccination outcomes. In part, this reflects the broader challenge of policy implementation in low-capacity states such as Tanzania. As noted above, given the distance between the policies crafted by elites and actual implementation on the ground, the daily activities of SLBs are critically important to determine outcomes. However, SLBs in such settings (including front-line health workers) frequently face profound resource constraints³⁷; moreover, factors such as their sociopolitical context, working environments and personal beliefs may cause them to take an unsupportive stance towards centrally or externally directed policy initiatives.³⁸ In particular, several respondents mentioned being seen as 'white puppets', consistent with other reports on Africans' mistrust of Western donors' role in distributing COVID-19 vaccines.²³

Our findings highlight the importance of mitigating mistrust through community engagement.³⁹ In a campaign alongside an Ebola vaccine trial in Sierra Leone, successful community-engaged strategies for overcoming vaccine hesitancy included: reciprocal communication (eg, allowing community issues to be heard and addressed through community meetings); relatability (eg, gathering community input on the design and distribution of health education materials); relationships (eg, working with local leaders who have credibility in communities); and respect (eg, accommodating and responding to community concerns, venerating local norms).⁴⁰ Likewise, a recent WHO/World Bank report recommends engaging communities to build trust.²² Community health workers may be uniquely positioned to combat misinformation, fear and mistrust and may be helpful in collecting data on community preferences for vaccination strategy and sites.⁴¹ Furthermore, given the strain on healthcare systems during the pandemic, WHO/World Bank recommend that countries prioritise adequate training and remuneration of healthcare workers to increase vaccination rates.

At present, however, our study suggests that SLBs involved in the vaccine rollout had limited resources and training with which to combat mistrust and improve vaccination rates. This illustrates the broader challenges that SLBs face in responding to crises, which can render their specialised knowledge, skills and judgement obsolete.⁴² For example, some respondents reported not knowing that vaccination could occur during pregnancy, a perception that could easily be clarified during training. At a minimum, training should be provided to street-level

immunisation officers to learn about the risks and benefits of the vaccine so that they may explain it to their communities and patients.

One approach towards addressing resource constraints faced by SLBs is to integrate the COVID-19 vaccine into existing healthcare services. A horizontal system approach, whereby the COVID-19 vaccine is integrated into primary healthcare, may help minimise the need for additional resources.⁴³ Furthermore, integration would minimise costs to citizens for accessing immunisation-specific sites (eg, transportation, waiting time).⁴³

Integration of COVID-19 vaccination into primary healthcare will require more investment, as only 5 out of 47 countries in the African region have adult vaccination programmes.^{44 45} We note that mass vaccination is possible when resources permit—over the past decade, with resources for healthcare provider training and vaccine distribution, Tanzania achieved over 95% vaccination coverage for 9 out of 22 vaccine packages tracked by WHO.¹⁰ Beginning in 1975, Tanzania's Expanded Program on Immunization included tetanus vaccines for adult women of childbearing age.⁴⁶ A study from similar contexts showed that supplementary immunisation activities, mass vaccination campaigns that include outreach and door-to-door vaccination, have increased vaccination rates and reduce inequities in vaccine access.⁴⁷ These efforts suggest that, if resources and financing are available, it is possible to scale up COVID-19 vaccination in Africa.

That said, our study affirmed that, in addition to improving the health system infrastructure for vaccination, African countries will need to address misinformation and disinformation. Social science research is critical to uncovering rumours and community perceptions during outbreak response and vaccination efforts.^{40 48} These rumours and community perceptions can then be addressed in targeted educational campaigns by local leaders.⁴⁰

Limitations of our study include that we did not investigate community perceptions of the COVID-19 vaccine, and thus cannot corroborate SLBs' perceptions of community members' views. In a different design we might have collected data from community members to assess their perspectives on misinformation and trust, for example. In addition, many SLBs receive funding from the central government and thus may have been less open to offering critical comments about the government. Furthermore, we interviewed only a subsample of SLBs and thus cannot guarantee that our findings are generalisable to all of Tanzania; nevertheless, we attempted to interview SLBs representing districts with demographic and geographic variability. Finally, Tanzania may be a unique context because of its denialist former president, and thus our findings on the political factors are likely not generalisable to other countries in Africa. However, the health system and community-level challenges reported here are consistent with findings from elsewhere in Africa.

Recently, there are promising developments in scaling up COVID-19 vaccine distribution in Africa. With WHO's support, African countries will develop six mRNA technology hubs to build capacity to manufacture vaccines locally.⁴⁹ While this is good news for confronting vaccine supply, the role of SLBs is critical in convincing people to vaccinate and in overcoming other access barriers, especially in low-income countries. We must continue to do research that acknowledges their roles in current and future pandemics.

Twitter Ruth Carlitz @ruthcarlitz

Acknowledgements We acknowledge Kwalya Bilson, Grace Cassius and Yonah Stanley for their vital role in interviewing Tanzanian officials and coding the data. We also acknowledge the valuable feedback from participants in the inaugural 2022 Vaccine Acceptance Research Network conference and participants of the Colloquium in Health Services Research from Yale University's Department of Health Policy and Management.

Contributors TY, RC, NK and HM designed the study, including the interview guides, sampling and analysis plan. NK led the data collection. TY, RC, NK, HM and SS analysed the data. TY, RC, HM, SS and OG wrote the final draft. TY, the guarantor, was responsible for the overall leadership of the team (setting the direction and planning) and the review of every part of the manuscript. All authors reviewed the final draft before submission.

Funding Funding for this study came from faculty research funds from the School of Liberal Arts at Tulane University, the American University Library, and the School of International Service at American University.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Tanzania President's Office of Regional Administration and Local Government (PO-RALG) following a request through Mzumbe University (Ref No AB.307/323/01/128). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Data are available upon reasonable request. The deidentified participant data from Tanzanian officials are available from the lead author. The data are in the form of transcripts. The interview guide and study protocol is also available.

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ORCID iD

Thespina Yamanis <http://orcid.org/0000-0001-9611-1714>

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