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Anthropological Insights from DRC, Uganda and Tanzania

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Résumé de l'article

Avec l'augmentation de maladies infectieuses émergentes et le développement rapide des vaccins durant les épidémies et les pandémies, les responsables de la santé publique aux niveaux mondial et national ont fait part de leurs préoccupations concernant les hésitations à se faire vacciner, attribuant souvent cette hésitation à un problème de désinformation et de méconnaissance des risques. Cependant, les chercheurs en sciences sociales ont constaté que les perceptions de la vaccination sont complexes et multiformes. En nous concentrant sur les influences historiques, culturelles et politiques qui affectent l'acceptation des vaccins, ainsi que sur les questions de justice sociale qui portent sur la distribution équitable des vaccins, nous explorons les logiques politiques et communautaires du déploiement des vaccins à partir d'une étude de cas. Nous avons identifié des logiques différentes, selon le vaccin et le contexte, et nous soutenons que les logiques politiques et communautaires sont au premier plan lors des épidémies, lorsque des stratégies vaccinales sont souvent imposées – de différentes manières – par le Nord global. Nous estimons qu'avant de développer et de déployer de nouveaux vaccins contre les maladies émergentes dans les pays du Sud, il faut tenir compte du contexte politique et des logiques communautaires pour mieux les intégrer.

Political and Community Logics of Emergent Disease Vaccine Deployment

Anthropological Insights from DRC, Uganda and Tanzania

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Abstract: With a growing number of emerging infectious diseases and the rapid development of vaccines during epidemics and pandemics, public health officials at the global and national level have reported concerns about vaccine hesitancy, often attributing this to a problem of misinformation and poor understanding of risk. However, social scientists have found that vaccination perceptions are complex and multi-faceted. By focusing on the historical, cultural and political influences that affect vaccine acceptance, as well as social justice questions that examine the fair distribution of vaccines, we explore the political and community logics of vaccine deployment using a case study approach. We found differing logics depending on the vaccine and the context and argue that political and community logics come to the forefront during outbreaks as vaccine strategies often are imposed—in different ways—by the Global North. We suggest that, prior to the development and deployment of new vaccines for emergent diseases in the Global South, political level and community logics must be acknowledged and engaged with.

Keywords: Tanzania; DRC; Uganda; politics; One Health; vaccines; community; logics

Résumé : Avec l'augmentation de maladies infectieuses émergentes et le développement rapide des vaccins durant les épidémies et les pandémies, les responsables de la santé publique aux niveaux mondial et national ont fait part de leurs préoccupations concernant les hésitations à se faire vacciner, attribuant souvent cette hésitation à un problème de désinformation et de méconnaissance des risques. Cependant, les chercheurs en sciences sociales ont constaté que les perceptions de la vaccination sont complexes et multiformes. En nous concentrant sur les influences historiques, culturelles et politiques qui affectent l'acceptation des vaccins, ainsi que sur les questions de justice sociale qui portent sur la distribution équitable des vaccins, nous explorons les logiques politiques et communautaires du déploiement des vaccins à partir d'une étude de cas. Nous avons identifié des logiques différentes, selon le vaccin et le contexte, et nous soutenons que les logiques politiques et communautaires sont au premier plan lors des épidémies, lorsque des stratégies vaccinales sont souvent imposées – de différentes manières – par le Nord global. Nous estimons qu'avant de développer et de déployer de nouveaux vaccins contre les maladies émergentes dans les pays du Sud, il faut tenir compte du contexte politique et des logiques communautaires pour mieux les intégrer.

Mots-clés : Tanzanie ; RDC ; Ouganda ; politiques ; One Health ; vaccins ; communauté ; logique

Introduction

Recent disease outbreaks, including Ebola and the COVID-19 pandemic, have seen faster timelines of clinical research to develop and deploy safe and effective vaccines. This acceleration in development during a health emergency has, however, contributed to global debates about vaccine hesitancy, when someone is uncertain about vaccination, leading them to delay or refuse some or all vaccines (Dubé et al. 2021). Vaccine hesitancy has often been attributed to anti-vaccine activism (known as "anti-vax"), which reaches global populations through online means via media, social media and political influencers (Garett and Young 2021; Raballo et al. 2022). Leach et al. (2022) point out, that assuming that an "anti-vax" movement causes vaccine hesitancy suggests that people have a propensity to be susceptible and ready to absorb and act on any misinformation (see also Vanderslott et al. 2022). There is also a persistent assumption that vaccine hesitancy is due to a knowledge deficit, a claim challenged by Goldenberg (2016), amongst others. Vanderslott et al. (2022) have previously argued that the knowledge deficit approach suggests an association between hesitancy and ignorance "because this offers simpler

or more manageable explanations, deflecting political explanations and supporting prevailing views about vaccinating publics". They have suggested that this focus on lack of knowledge around vaccines drives vaccine attitudes and uptake in a way that deflects from the roles that governments and public health institutions take in engendering distrust and obscures the political salience of vaccination anxieties. Hesitancy is thus often used to scapegoat issues around equality and justice in access to vaccines (Vanderslott et al. 2022). In particular, this focus underplays socio-political influences on vaccine trust, including genuine and legitimate reasons for mistrust due to unethical practices by clinical trialists. For example, the unethical AZT trial in Zimbabwe in the 1990s, where a control group were given a placebo (and fully informed consent was not sought), rather than drugs known to be effective. This trial raised questions about exploitation, injustice and an ethical double standard between donor countries and resource-poor settings (Brewster 2011).

Anthropologists and other social scientists have contributed vital insights on vaccine logics, which involve critically examining the social, political and technological processes and practices behind vaccine development and deployment (see also Thiongane et al., this issue). Leach and Fairhead (2012), for example, have highlighted the relevance of socio-political economy approaches to understanding hesitancy, which reveals that vaccination perceptions do not neatly fit into typical supply and demand depictions but are complex and multi-faceted, with historical, cultural, and political influences. Furthermore, focusing on anxieties rather than only hesitancies acknowledges both fears and desires for vaccines. Leach et al. (2022) draw on a vaccine anxieties framework to argue that socially embedded reasoning for wanting or not wanting COVID-19 vaccines intersects with vaccine supply, access and distribution – highlighting connections and disconnections between the local or national and global settings. For Leach et al. (2022), anxieties are useful to explore both the negative sense of worry, unease or concern and the positive sense of a "focused desire for something" (Fairhead and Leach 2007, 2). This framework emphasizes agency, and how the ways in which people think, understand and influence action through "experiences of navigating access to a scarce resource, or perceptions of which vaccines are being made available by and for whom" (Leach et al. 2022, 2). The vaccine anxieties framework enabled Leach et al. (2022) to reveal these embedded logics in ways that give weight to people's own ideas and practices. Specific epidemics and vaccines, however, hold their own logics, which require different questions for anthropological enquiry.

Vaccine logics are both influenced by broader social experiences and interactions with the health system as well as the intersections between supply inequity and demand under distribution constraints (Enria et al. 2021; Heyerdahl et al. 2023; Leach et al. 2022). Health system perspectives are closely tied to cultural, policy, and historical developments in how provision is organized, as well as local systems to identify community perceptions surrounding vaccine use. Identifying inequities in access to vaccines and the global pharmaceutical industry's stranglehold on where and when vaccines are developed has been an important part of investigating the effect on trust and mistrust in vaccines (Ashraf et al. 2021; Graham, 2019). For example, in Sierra Leone, Enria et al (2021) found that fraught relations between citizens and their health service providers and a lack of dialogue to develop effective vaccine deployment strategies meant that borderland communities lacked access to vaccination, which in turn exacerbated mistrust in the health system.

Further to this, community experiences of exclusion and mistrust, and local constructions of knowledge around vaccines, are key to understanding concerns around vaccination (Enria et al. 2021). Similarly, ethnographic engagement with vaccine trials has highlighted both the place of vaccine development in the structures of global capitalism and how medical research projects become enmeshed in local dynamics, producing new social relations and identities (Dada et al. 2019; Enria et al. 2016; James et al. 2021; Lees and Enria 2020; Tengbeh 2018).

In addition, anthropological studies exploring humanitarian responses to disease outbreaks have also revealed that inadequate consideration of social, cultural, political, and religious factors in such responses has consequences on the effectiveness and community acceptance of response activities. Anthropological research during the West African Ebola epidemic of 2014 to 2016 revealed that approaches that did not take into account that social and religious factors negatively impacted response efforts, including vaccine development and roll-out. For example, Enria, Lees et al. (2016) revealed issues of power, fairness and trust surrounding the recruitment of participants into Ebola vaccine trials, which link to political and cultural concerns. Such research has identified primary issues of trust and legitimacy, in how acceptance of vaccination reflects social relationships, culture and values (Yaqubet al. 2014). Others have explored community knowledge of vaccines at the interface between animal and human health from the perspective of trust and social relationships (Krimsky and Golding 1994; Woods 2015; Wynne 1996). Issues

of trust have been further explored in relation to Zika, which linked these to concerns and rumours about MMR vaccines (Ministério da Saúde Brasil, 2016).

This article contributes to this body of knowledge by exploring the vaccine logics surrounding the deployment and preparation for deployment of different vaccines in different contexts.

The authors of this article were part of a large study entitled "Anthropology of Vaccine Deployment During Epidemics" (AViD). The study involved six anthropological case studies based in different contexts (Brazil, Democratic Republic of Congo (DRC), India, Sierra Leone, Tanzania, and Uganda) and focused on a range of vaccines that were being deployed or in preparation for deployment for different epidemics including Ebola, Zika, Measles-Rubella, Rift Valley Fever and COVID-19. The study explored the complex web of factors that determine the acceptability of vaccine deployment during an outbreak, and involved an in-depth analysis of context through political economy, health system, and community perspectives.

This paper draws on three case studies across sub-Saharan Africa to shed light on factors that determine vaccine logics of Ebola, COVID-19, and Rift Valley Fever vaccines from the perspective of communities, healthcare workers, community-based workers, and farmers in the DRC, Uganda and Tanzania.

Methods

Primary research was conducted across three countries to explore perceptions and experiences of vaccine deployment and administration with a range of stakeholders and community members, as described in detail below. Case Study 1 was conducted by LA, Case Study 2 was conducted by AB, and Case Study 3 was conducted by SL and MM. All of the authors have extensive research experience in each of the countries.

Case Study 1: Democratic Republic of Congo (DRC)—Ebola Vaccination

This longitudinal study of vaccine acceptability and hesitancy was conducted by LAS in both rural (Bikoro and Iboko territories) and urban (city and suburbs of Mbandaka) areas of Equateur Province, in three phases. The first phase of research was carried out in September 2018 in the immediate aftermath of the Ebola outbreak. The second phase was carried out six months later, in March 2019. The final phase was carried out one year after the vaccine roll-out, in July and August 2019.

A total of 285 people participated in the research either through individual interviews or focus group discussions (FGDs). These were conducted in French or Lingala by LAS (who has conducted ethnographic fieldwork in this region since 2012), with a small number of the interviews also being conducted by a Congolese research assistant from Mbandaka. Participants included national and international responders and partners, government officials, administrators and local leaders, local health workers and administrators, traditional healers and community midwives, Ebola survivors and their families, and members of affected communities from several ethnic groups. Observations and informal conversations were also conducted with community members and health workers. It should be noted that, initially, access to interview participants was organized in collaboration with local health workers, and this may have created a sample bias, due to the fact that health workers primarily had access to certain members of the community, namely those who were more comfortable with these settings. The researchers attempted to broaden the sample by working with more community leaders: leaders from ethnic minority groups, and leaders of women's groups in particular.

Case Study 2: Uganda—Rift Valley Fever Vaccination

This study was conducted by AB to explore the acceptability of a novel One Health vaccine for Rift Valley Fever prior to phase II/III trials in two rural Ugandan cohorts between January to June 2020. Ninety-six semi-structured interviews were conducted with farmers representing 1,421 livestock animals in Bwindi Impenetrable National Park (BINP) and Kyamulibwa, Kalungu District, in Southern Uganda. Participants were selected using census data and from lists of subsistence livestock farmers provided by community mobilizers. A list of participants was provided by the data manager and community mobilizers, and farmers were selected using snowball sampling. Each interview was facilitated by local research assistants. In Bwindi, the research assistants were also accompanied by veterinarians and veterinary technicians who took samples from livestock, provided healthcare advice and administered treatment when required. A visual picture of a vaccine was provided as a prompt to ensure clarity and to prevent confusion regarding what a vaccine was.

Case Study 3: Tanzania—COVID-19 Vaccination

The research was conducted by MM and SL as part of a collaboration between the London School of Hygiene and Tropical Medicine (LSHTM), the National Institute for Medical Research (NIMR) in Dar es Salaam, and the Ifakara

Health Institute (IHI) in Bagamoyo. SL has lived and worked in Tanzania for 30 years and MM for 10 years, both speak fluent Swahili and have conducted participatory approaches to research. The Tanzanian colleagues from NIMR and IHI have extensive experience in social science research and community engagement. In discussion with colleagues at both institutions and district health officials, three community health worker teams were identified in Dar es Salaam (Kinondoni District), Pwani (Bagamoyo District), and Kigoma (Kigoma and Buhigwe Districts) Regions for training in citizen social science techniques.

MM trained 22 community health workers (CHWs) on social science methods and research ethics for one week in October 2021 and April 2022. Fieldwork was conducted over eight weeks between October 2021 and April 2022 of the CHWs in Dar es Salaam and Pwani (n=11), and CHWs in Kigoma (n=11) recorded such data for one week in April 2022. They interacted with groups and individuals in clinics and in social spaces, including markets, motorbike stands, churches and mosques on a daily basis. They were trained to prompt conversations about COVID-19 vaccines. Every evening, they wrote a journal entry recording conversations related to COVID-19 vaccines. The journals were collected weekly by trained research assistants, who provided feedback on data quality, and then transcribed and translated the weekly journals for analysis.

Ethics and Consent

Informed consent was obtained from each individual study participant prior to commencing the interview or FGD in DRC and Uganda. In Tanzania, community consent was sought from Regional and District leaders and health officials. All projects received ethical approval from the London School of Hygiene and Tropical Medicine under the AViD study protocol (Case study 1 16356/RR/13129, Case study 2 16244/RR/24519, Case study 3 21237/RR/17949.) Case Study 1 received ethical approval from the Kinshasa University (UNIKIN) School of Public Health in DRC. Case Study 2 received ethical approval from the Uganda National Council for Science and Technology (UNCST) and the Uganda Virus Research Institute (UVRI) in Uganda. Case Study 3 received ethical approval in Tanzania from the National Health Research Ethics Committee (NatHREC) at the National Institute for Medical Research.

Case Studies

As described above, these case studies were conducted as part of a larger study exploring vaccine deployment during epidemics from an anthropological perspective. Each case study highlights how global vaccine logics interact across

community, political, and national levels. Case Study 1 explores the vaccine development of Ebola vaccines and community-level confidence and hesitancy, including marginalized groups. Case Study 2 centres on Rift Valley vaccine development and community acceptance with animal human entanglements. Case Study 3 is concerned with the development of COVID-19 vaccines, the political dynamics of COVID-19 vaccine denial and community anxieties in the light of denialism.

Case Study One: Community Engagement During the First Deployment of the Merck Ebola Vaccine

The Democratic Republic of Congo (DRC) has experienced nearly a dozen Ebola outbreaks in the last 20 years, and they are increasing in frequency. The first 2018 DRC Ebola outbreak emerged simultaneously in two rural health zones in Equateur and quickly reached the provincial capital of Mbandaka, a city of more than 1.2 million inhabitants located on the banks of the Congo River. Following an epidemiological investigation, the Ministry of Public Health (MPH) and its international partners (including WHO, MSF, UNICEF, IFRC and ALIMA)[1] rapidly deployed to the region and worked closely with national and local partners (Ministry of Health as well as international and local, well-established NGOs). The outbreak was declared over on 24 July 2018 (a total of 38 probable and confirmed cases and 14 deaths) (Nkengasong and Onyebujoh, 2018).

The 2018 Equateur outbreak was the first to occur following vaccine development in the wake of the 2014 to 2016 West African Ebola crisis. In a clinical trial in Guinea in 2015, Merck's rVSV-ZEBOV-GP trial vaccine had been shown to be safe and highly protective (Henao-Restrepo et al., 2017). The vaccine was approved for use by the WHO's Strategic Advisory Group of Experts on Immunization (SAGE) under an expanded access/compassionate use protocol. The vaccines were donated by Merck, while Gavi, the Vaccine Alliance, contributed towards operational costs. The Congolese Ministry of Health, in partnership with WHO, Médecins Sans Frontières (MSF), and UNICEF, implemented a ring vaccination strategy, whereby the contacts of confirmed cases and the contacts of contacts were offered vaccination. This strategy relied on tracing all the contacts and contacts of contacts of a confirmed case as quickly as possible.

The rapid response, the active participation of the community, and the use of the rVSV-ZEBOV-GP trial vaccine were all credited with the swift containment of the epidemic. However, despite the positive trajectory of the vaccine deployment overall, there was little information about how the vaccine

was perceived by different communities in rural and urban areas, and a limited understanding of attitudes towards the vaccination from those both inside and outside the ring. Both are important considerations when looking to increase the acceptability of vaccination in an outbreak context.

The ring vaccination was well understood by those who were targeted for vaccination, but poorly understood by those outside the ring, because many of those people believed that they had not been vaccinated because the stock had run out:

> When I went there, they said: "That vaccine has run out, there was only a little and it ran out." It would have been better if there had been more doses, so that we could get some too! (Unvaccinated man)

Some sick and elderly people who considered themselves at risk (due to having close contacts who were unwell) were physically unable to make it to vaccination centres. Similarly, widows, in a period of seclusion following the death of their spouse, were also unable to be vaccinated.

> Given that they secluded me in the house in mourning following the death, it was impossible for me to travel over there to be vaccinated. (Unvaccinated woman, widow)

Those vaccinated were largely satisfied with the follow-up in the immediate aftermath of the vaccination. Nonetheless, many had real concerns when they first experienced the vaccine side effects. Rumours that the vaccine was being deployed to kill, sterilize or infect people increased when the first wave of contacts began to experience side effects, such as fever, headaches, joint pain, and malaise. These fears caused great anxiety to both those who had been vaccinated and those who had not. In certain villages, where MSF used a retractable needle, people were also afraid that the needle had been left in their arm, increasing rumours that vaccination would lead to further side effects.

> When they gave me that vaccine, I felt as if the needle was left there inside my arm… after two days I was beaten badly by a strong fever, my eyes were hot and in pain, exactly as if I was suffering from Ebola! At the time, I said wow, that vaccine does give you Ebola, the rumours are true… (Vaccinated man)

It appears that there were differences between vaccination teams and between the provision to rural and urban communities in terms of the ways in which informed consent was sought, with people in smaller and more isolated villages feeling that they had not been fully informed about the vaccine's experimental

status and side effects. This finding reflects something that social scientists working in epidemic contexts have long been critical of—namely, the fact that African actors, particularly rural people with limited education, are often assumed to be ignorant and unable to make decisions about their health and are, therefore, excluded from decision-making processes. What these authors have also emphasized is that this very exclusion often perpetuates structural inequality, suffering, and vulnerability to epidemic spread (Farmer 2020; Richards 2016; Richardson 2021).

Indeed, these issues were compounded not only in small villages but among women, who are often assumed by health workers as less educated, and, therefore, less capable of making decisions than men. This caused particular problems in the case of pregnant women, because communication around pregnant women was not clear or consistent.

> At the beginning [...] they said that pregnant women [...] should be vaccinated. So [...] we all allowed ourselves to be vaccinated. But then afterwards, they came and called me: and suddenly they said that pregnant women could not be vaccinated! [...] Right until the day I gave birth, I had so much anxiety and pain in my heart because of that. *(*Vaccinated woman*)*

Prejudice against Batwa people, a marginalized ethnic group, may have led to their exclusion from decision-making processes. Early in the epidemic, Batwa were more likely to refuse vaccination. Many people were skeptical of the benefits of vaccination due to the fact that they had experienced a lot of marginalization and exclusion at biomedical health facilities in the past, and that these facilities were often difficult to access. Many Batwa people felt frustrated that they were not consulted directly, but that people from ethnic groups that had marginalized them in the past were used as mediators.

> If they want to talk with us, it would be better if they got some of our own community health workers and leaders and employed them to do that mediation work. (Unvaccinated Batwa man)

It should also be noted that there were also many cases of vaccination refusal by educated people, doctors, and those in touch with relatives in Kinshasa or abroad, who were suspicious of the experimental vaccine. These cases make clear that assumptions about people's gender, ethnic group, or level of education should not be used as justification for limiting their access to information, decision-making processes, and giving informed consent.

> My uncle in Kinshasa, he called, he said, "You see that vaccine which will arrive tomorrow? Tell the whole family that you must not be the first to be vaccinated [...] Wait to see what happens to other people who are vaccinated, so we can see what kind of reaction they have before you decide whether to go or not." (Unvaccinated man)

Case Study Two: Human-Animal Entanglements and the Rift Valley Fever Vaccine in Uganda

Rift Valley Fever (RVF) is a neglected re-emerging zoonotic viral infection associated with up to 90 percent mortality in livestock and 30 percent mortality in humans (Madani et al., 2003; Mohamed et al., 2010). It is spread by several species of mosquito found across sub-Saharan Africa and the Arabian Peninsula. RVF outbreaks are infrequent, but when they occur, they can be unpredictable, causing overwhelming human and cattle morbidity and mortality.

Although RVF vaccines for livestock have existed for decades, they have poor efficacy (Dungu et al. 2018; Ikegami 2017). There has been even less progress in a human vaccine. ChAdOx1 RVF, a novel One Health vaccine, the first RVF vaccine in co-development for humans and livestock, has undergone field trials in livestock in Kenya (Stedman et al. 2019; Warimwe et al., 2016). Prior to the trials, this case study explored community perceptions of using the same vaccine for both humans and animals to identify potential barriers to deployment. Nearly half of those interviewed were willing to receive a vaccine that was the same for humans and animals, whilst nearly half said they would not be willing to receive such a vaccine. Awareness of vaccination as a way to provide prophylactic and therapeutic care for human and animal health was reported by all those interviewed.

A prominent theme that emerged when farmers were asked how they would feel about receiving the same vaccine as their animals was fear related to the novelty of such a vaccine and the need for clear licensing, labelling and safety information. One farmer stated:

> I would participate if many other people have participated too, but with fear, but for you, the health workers, it seems you have some ideas about it, but for us, we are afraid... because we don't know which one is meant for people. We are afraid, because why we are saying so, on the bottle or tin of the animal drugs they indicate the cows, the goats the pigs and the other animals I don't know, why don't they put the picture of the person there? (KY 17032034)

A number of livestock farmers in Bwindi expressed more specific concerns regarding their fears of receiving such a vaccine, with one farmer stating:

> It will result into death of humans when they are given animal vaccines… (BW. 001)

Similar thoughts were also shared by livestock farmers in the same area who discussed their fears regarding the strength of a vaccine, the intention of such a vaccine, and their concerns that they were being treated as animals themselves. Examples included:

> I have never heard of that; I would be scared because they say after injecting the goat or cow and it dies people are not even supposed to eat it. If you cannot eat the dead animal after treatment, then would give the same drug to humans. (BW. 0012)

Fears surrounding the One Health vaccine being a new technology, the intentions of the developers, and the belief that animal vaccines should be stronger than human vaccines provoked resistance.

Uncertainty about safety was a prominent narrative to explain hesitation to a vaccine administered to both humans and animals, as one farmer stated:

> It cannot be the same; it has to be prepared differently, because you cannot inject me with that. I know of one thing, there is a spray for wounds which can be used on animals as well as [on] the people, but it's wrong to be used by people on their wounds, but because it's effective and you cannot compare the animals to the people, so in my case I do not agree to use it on me! No, no, no… (KY. 17199012)

Another farmer added their uncertainties regarding the comparability of human and animal testing, a sentiment shared by many participants. Farmers were particularly concerned that a vaccine for both humans and animals contradicted previous advice they had been given about using animal drugs for humans and vice versa—with worries that these vaccines would make them, their children and/or animals sterile:

> How can I prove that it is both useful for animals and human beings? I don't think I can believe it; I deny it because treatment and drugs for animals are not the drugs for human beings. There must be a difference. Veterinary is not matching with human drugs. (BW. 0011)

Previous experiences with vaccines did, however, positively and negatively affect attitudes towards a One Health vaccine:

> I don't have any objection to that because, let me give an example of the children, when they are vaccinated and every infection that they vaccinate them against, the children suffer from measles, but the child who is vaccinated is not affected by it, therefore when they come up with the vaccine that is meant to prevent such infections from being transmitted to the people, I don't have any problem with it.... (KY 01107021)

However, experiences were not always positively associated with the quality of vaccines supplied. For example:

> To take you back a bit, when we were told to vaccinate our children, and we vaccinated them, but later, after that, they started suffering from very many infections, and many people said that the vaccines that were used were not up to the required standards, and I for one, my children experienced the same thing because I was admitted to the health centre several times, so because we are skeptical of the vaccines that are brought now, we don't know how it is transported and what they have put in them... (KY. 07466070)

Pragmatism, however, did emerge, where many farmers considered the benefits of a single One Health vaccine for humans and animals:

> If that kind of vaccine comes, it would be good, because if you have bought it or when it is given to you, and you vaccinate the animals as well as vaccinating your people and yourself, because you may vaccinate the animals whereas the infectious germs have remained somewhere near you, and some may be spread through the air, and infect you. So, if you vaccinate yourself that means the infection may not affect you as a person and the animal too may not get infected, it could be a good vaccine, because there is the bird flu, if it can infect a person and kill him, then when you vaccinate yourself against those infections, you are sure that you are safe. (KY. 12952021)

Farmers who were more willing to accept the vaccine typically had more contact with human and animal healthcare workers, and had greater access to vaccines that were supplied by veterinary technicians or community-health workers, or were sold in local drug stores or had attended workshops on animal husbandry. These farmers possessed a greater awareness of disease transmission pathways and saw value in a vaccine that could prevent the onset of disease in both their animals and themselves.

Case Study Three: Political Denialism and the COVID-19 Vaccine in Tanzania

On 16 March 2020, Tanzania's Ministry of Health announced the country's first case of COVID-19. The Prime Minister called for a suite of policies to slow the spread of infections: a ban on public gatherings, school closures, suspension of football matches and international flights (The Citizen Reporter, 2020). On the 16 March 2020, the Ministry of Health of Tanzania announced the first case of COVID-19; however, a state of emergency was never declared. Instead, by 23 March, the President, John Magufuli, was criticized internationally for encouraging people to continue attending places of worship. Whilst he encouraged Tanzanians to take precautions, he suggested that "We are not closing places of worship, that's where there is true healing. Corona is the devil, and it cannot survive" (Edwards 2021; Tarimo and Wu 2020). The Prime Minister, though, did call for a ban on all public gatherings and closed schools, suspended football matches and all international flights (The Citizen Reporter, 2020). However, public transportation continued to run, and despite the government's call to avoid unnecessary handshaking, concerns emerged that these limited measures would not contain the epidemic, and the virus would rapidly spread in the densely populated cities (Edwards, 2021). By April 2020, all public health measures were stopped, and schools were opened. Further to this, President Magufuli publicly rejected foreign scientific expertise, which continued a history of distrust in foreign involvement in medical research (Lees and Enria, 2020). The President further entrenched distrust in science by claiming that National Health Laboratory (NHL) COVID-19 test kits were faulty because he said they had returned positive results on samples taken from a goat and a papaya (Citizen Newspaper, 2020). He described NHL scientists as "bribed by the imperialists" (Magufuli, 2020). By the end of May 2020, President Magufuli publicly declared that COVID-19 had been defeated in Tanzania, and no cases were officially reported from May 2020 until June 2021 (WHO 2023).

In February 2021, the health minister announced that Tanzania would not accept COVID-19 vaccines, followed by the president's announcement he did not trust vaccines sourced from abroad, without certification by Tanzanian experts. At this televised meeting, unmasked officials instead drank "COVID Organics"—a tonic drink made from a medicinal plant used in traditional medicines—promoting natural methods for prevention and treatment. The president, in a number of speeches, extended his distrust to other vaccines and questioned the ability of the "white man to develop vaccines if they had not been able to develop them for HIV" (Makoni, 2021). When President Magufuli

suddenly stopped appearing in public after 27 February 2021, rumours quickly emerged that he was ill with COVID-19. Secrecy surrounded his disappearance until 17 March 2021, when his death from a heart condition was announced. The new president, Samia Suluhu Hassan, immediately set up a COVID-19 expert taskforce and rolled out vaccines in May 2021.

This case study was commenced at the beginning of the roll-out of the COVID-19 vaccines, when five percent of Tanzanians had been vaccinated (Africa CDC 2023). The first data was collected in an urban site (Dar es Salaam) and peri-urban and rural site (Bagamoyo) both on the Eastern coast and in rural sites in Kigoma in Western Tanzania on the border of the DRC at the request of the Ministry of Health, six months following the roll-out of the vaccines due to low uptake in this region. The case study describes community knowledge and perceptions around COVID-19 disease and vaccines in these sites influenced by national political discourses surrounding COVID-19 vaccines.

The reports by the CHWs revealed mixed views about COVID-19 vaccines, reflecting either President Magufuli's anti-imperialist stance or President Samia's pro-vaccine stance. These debates reflected some distrust in government and also in international actors. For example, in line with President Magufuli's COVID-19 denial, a number of CHW reports conformed to this message:

> In Tanzania there is no Corona (COVID-19). If it would have been there, I would have been vaccinated. How would I run to vaccinate while I don't see people dying of Corona? (CHW17 W9)

Support for Magufuli's stance was reiterated by some community members, who agreed that he had successfully challenged Western Science:

> Magufuli trapped them; he mixed the samples—I don't know, goat, papaya—at the end of the day had COVID. White people are playing with our mind so that they could come to colonize us as before. (CHW11 W1)

Further to this, some community members agreed with the former president that there was no need for a vaccine for a disease that does not exist in Tanzania. As one person asked the CHW, "What vaccine is that when the former president refused that vaccine, he even told us that disease is not in our country?" (CHW11 W5). The lack of government prevention messaging and the insistence that life was continuing "as normal" reinforced doubt about COVID-19's existence in Tanzania:

> Don't you see, the government nowadays doesn't announce like before as the number of infected people, number of dead people and the

> people who are in isolation. There is no disease, this curse is over. God has forgiven us through the prayers of Magufuli as he wanted people to pray. (CHW11 W1)

Alongside the use of local products, as described above, President Magufuli conducted public prayers at the beginning of the pandemic to heal the disease. He continued public prayers throughout the pandemic until he died, reinforcing an anti-vaccine stance.

> The community trust that the only person who was fighting against the disease was the late Honourable Magufuli. He fought and told everyone to pray. (CHW01 W5)

The case study was conducted after President Magufuli died, and some community members challenged COVID-19 denialism, by drawing on their own experiences of people they knew who suffered from the disease. These encounters with relatives who were ill influenced their views and intentions around vaccination:

> I witnessed relatives' and friends' deaths and I once got a chronic flu, which left me with a lot of suspicion of being infected with COVID, so to vaccinate is important to all of us. (CHW03 W1)

Immediately after her inauguration, the new President, Hassan, was televised wearing a mask and started a COVID-19 vaccination drive through house-to-house visits. The change of government stance was discussed in the communities using a gendered discourse with President Magufuli as a "strong man," who had stood up to foreign "meddling" in Tanzanian affairs in contrast to the country's first woman president, whose stance was seen to explicitly court foreign donors and investment and was thus vulnerable to manipulation by foreign powers.

The CHW reports in Kigoma were collected at least six months after the roll-out of COVID-19 vaccines, initiated by President Hassan. These CHWs reported both trust and mistrust of vaccines in their communities, linked to fears about Western countries' intentions (population elimination and seizure of land and resources), as well as suspicion around the new President's intentions (self-interest, seeking aid from the West):

> Why is this vaccine given for free? It's because of the agreement between [President] Samia and whites. Before we started getting this vaccine, this Mama Samia was given money so that they will begin testing this vaccine on our bodies, us Tanzanians. (CHW12 W9)

However, mistrust was often contested. One young woman was overheard by a CHW saying:

> Mama Samia[2] has brought COVID-19 vaccines—don't you see she loves the country's citizens and wants us to be safe? These vaccines are protection for the body against the corona disease. You don't see that she has reduced life's hardship by bringing us free protection?' (CHW14 W9)

Vaccine anxieties were also discussed in the community. There were questions about how the vaccines work, about safety and levels of protection they offered against infection, severe disease, or death. Many were concerned that the vaccines did not offer full protection: "Even if you're vaccinated, you will still get COVID-19. Now what is the point of vaccination?" (CHW04 W1). Many thought that the COVID-19 vaccines were not safe because of their short development time: "There is a vaccine but it's not safe because its research has been done in a short time period" (CHW06 W1). Others were concerned the vaccines were still experimental and the consent form stated that the government would not be responsible for any side effects:

> The government has already abandoned us. If anything happens the government will not be responsible. Is that a real government? It's the government which makes us lose trust in vaccines. First, there are a lot of vaccines from different countries, then how will I know which one is safe for my health? (CHW03 W1)

Alongside these anxieties, contradictory political discourse from one president to another exacerbated fears:

> Our comrade, late JPM[3], the President of Tanzania, told us the pandemic for Tanzania is not serious, so it was important to take precautionary measures, and he even disagreed on the vaccine to be brought in Tanzania, worrying for their safety. Today, Madam President insists that we vaccinate, arguing publicly that the pandemic is persisting, then we don't understand which is which… I think Madam has her own interest with white people. (CHW03 W1)

As a consequence of these opposing political stances, some people told the CHWs that they were vaccinated in secret to avoid censure from family members, friends, or neighbours. One woman told a CHW that she had been vaccinated but did not tell her children: "They do not even want to hear it."

(CHW 07 W1). This suggests that such political contestations were played out in communities and within families.

Discussion

These case studies provide insights into different diseases and vaccines that reveal cross-cutting concerns about global vaccine logics, whilst providing specific contextual insights from the Global South. Specifically, the deployment of Ebola and COVID-19 vaccines during an epidemic/pandemic and discussions about a novel One Health vaccine, in these Global South contexts, was marred by mistrust and poor communication, leading to fear, anxiety and uncertainty.

All case studies are emblematic of unequal power flows, especially in terms of knowledge production and dissemination. The default position in not attending to how global vaccine logics are transferred to community and national levels is tantamount to assuming public ignorance – that African actors are unknowledgeable – when this is explicitly not the case (Vanderslott et al. 2022). Furthermore, global vaccine logics materialize in different ways at community and national levels, depending on the country context. Our case studies highlight key differences but also factor in important considerations for vaccine development based on structural inequality, historical ideas about animal-human relations, and anti-imperialist views, which provide insights into different vaccine logics between the Global North and Global South. As Richardson (2021) argues, the Ebola epidemic was "propagated by the coloniality of knowledge production," in which the Global North set the public health agenda, especially in how the causal pathways utilized by epidemiologists to understand disease transmission tend to not include historical or structural variables. In each of our case studies, the vaccination programs were set by the public health agenda of the Global North.

The Ebola epidemic, emerging and re-emerging in Africa, raises questions of neo-colonial approaches to epidemic response, and the "tyranny of urgency" that involves rapid and short-term responses rather than investment in health structures and preparedness mechanisms. The case study highlights structural inequality in how ring vaccination was introduced (and the use of retractable needles) with limited communication as to the rationale, especially towards women and rural groups, who were less informed. Also, with access difficulties (for the elderly and widows who were deemed less educated and therefore unable to understand) display differing perceptions of minoritized groups and their unequal treatment in vaccination programs have been noted by Kasstan

(2021). Kasstan has argued that the will of the government to have compliance in vaccination policies often ignores grievances by minority groups, who may resist government enforcement due to historical treatment and mistrust.

Rift Valley Fever (RVF) outbreaks, involving entangled relations between humans and animals, reveal a requirement to address the more-than-human burdens of disease and their social dynamics. Animal-human health and relations shown in the Uganda case study, as Hui Lee (2021) has pointed out, are dependent on ideas that are imbued upon animals and the difference emphasized between animals and humans. Also, the influence on views about the quality of existing vaccines for humans was a concern, as was an openness to a single animal-human vaccine that may be influenced by close everyday contact with animals.

The Tanzania case study is more explicitly related to anti-imperial views (Haruyama 2023). As Meek (2023) has pointed out, the response to the coloniality of global health is exemplified by the attitudes of President Magufuli. Meek (2023) contrasted the international media portrayal of the president's continued church attendance during the COVID-19 pandemic as irrational, with an argument that this approach was an act of defiance against the Global North by drawing on black counter-knowledge through religious and spiritual ideas. With the implementation of a new approach by President Hassan after the death of President Magufuli, many Tanzanians were initially skeptical of the shift in COVID-19 policy, still believing the late President Magufuli's claims and seeing the new president's vaccine deployment as a self-interested endeavour to court foreign donors and investors. The change in leadership from one president to another (from the same ruling party since independence) was reflected in differences in identity (gender, religion, region of origin) and politics (isolationist versus courting international investment), revealing how national (presidential) politics impact vaccine logics.

Power and Marginalization at Global, National and Community Levels

These case studies thus highlight the problem with Global North institutions leading the imperative to deploy vaccines for emergent diseases during an epidemic or pandemic, even when working with national governments and health services. This has resulted in longstanding issues of trust and continued suspicion surrounding the intentions of the foreign countries that develop vaccines (Ozawa and Stack, 2013). This mistrust of the intentions of the Global North permeates many vaccine anxiety narratives in these communities. Many of these concerns were expressed together with broader narratives of

marginalization in each context; for example, that white people designed the vaccines to depopulate Africa and gain resources (Gagliardone et al. 2021). As we have seen from the Tanzanian context, the late President's speeches about white people's malevolent intentions were documented in community conversations, demonstrating the pervasiveness of misinformation when a populist leader aligns anti-vaccine claims with anti-colonial sentiment that resonates with lived experiences of exploitation and neglect (Mtani and Ngohengo 2023).

Mistrust was also engendered by poor communication about how vaccine science works. In Tanzania, in addition to political influence on hesitancy, there were concerns about safety and efficacy due to the short period of time taken to develop and deploy COVID-19 vaccines. These concerns were shared by people in studies in the Global North, such as in a UK study (Roberts et al. 2021). The novel One Health RVF vaccine for animals and humans also raised concerns around safety for both humans and animals. Much of the concern discussed amongst farmers related to previous recommendations not to mix human and animal medicines and different doses needed for humans and animals (Bowmer et al. 2023). Such wide-spanning fears spanning side-effects, long-term safety, and bodily integrity have been found in similar vaccine hesitancy studies (Larson et al. 2011, 2014, 2018). Communication failings not only centred on the vaccine development but the process of deployment. During vaccination in DRC, the ring vaccination approach was not well understood by those outside the ring, who believed that they had not been vaccinated because the stock had run out. Uncertainty about the experimental process left many community members unsure if the vaccine had ever been tested on others before them. Also, communication surrounding side effects such as fever and malaise was especially lacking, sparking rumours that the vaccine was being deployed to infect, sterilize or kill Africans. Further to this, communication proved to be a less successful tactic with marginalized ethnic groups, such as the Batwa, who were more likely to refuse vaccination due to their experiences of brutality in DRC (Forest Peoples Programme, 2022).

Addressing Complex Logics

These findings suggest that, prior to the development and deployment of new vaccines for emergent diseases, political and community logics must be acknowledged and engaged with. Strategies to increase the acceptability of vaccines should address misinformation, rumours and misconceptions (Bowmer, Lees et al. 2020; Burns et al. 2020). However**, an acknowledgement**

of vaccine logics also involves addressing the complex factors that influence the acceptability and uptake of new vaccines, as discussed above (Biasio 2017; Thomson et al. 2018). Vaccine logics come to the forefront during outbreaks in different ways in the Global South, but with an overriding impression of coming from the outside. There is thus a need for the involvement of all stakeholders, from communities to political leaders, where everyone plays a role in global vaccination decision-making.

Trust is an intrinsic and potentially modifiable component of successful vaccine uptake (Lazarus et al. 2021; Siegrist and Zingg 2014). Trust in community and formal healthcare providers, in those attending to both human and animal health, is strongly associated with increased acceptability of vaccines. Political leadership on vaccines can dramatically influence individual and community perceptions of vaccines, as we have seen in Tanzania. However, vaccine decisions are multifaceted and can change over time, as demonstrated by the new President's promotion of COVID-19 vaccines (Lazarus et al. 2021).

One approach, taken in Tanzania (also see Enria 2022), is to train citizen social scientists to conduct rapid data collection and responsive engagement during deployment. Community health workers and others, such as veterinary health workers, embedded in communities and health systems, are through their daily routine work, first-hand witnesses to the information that policymakers need in responding to emergent disease outbreaks. Other critical stakeholders include local, district, regional, and national leaders, and religious and influential community members. Training should be offered to health workers, health policy workers and health promotion teams working in vaccine deployment and other clinical care. This training should include not just technical information about vaccines, but responsive information to support health workers and others to respond to the concerns documented in community-engaged research.

To optimize vaccine deployment and address the barriers to uptake, effective community engagement should be conducted as a dialogue. This will ensure that community views and experiences are incorporated into messaging about vaccination strategies. Finally, those working in a response context should make a commitment to inclusivity by appreciating that "communities" are not homogenous and should therefore prioritize the engagement of marginalized and vulnerable populations.

Conclusion

This paper has shown the positioning of communities within global vaccine logics constituted by the research politics between the Global North and the Global South and cross-country frameworks of clinical trials and the deployment of new vaccines. The introduction of new vaccines has a legacy of extraction, engendering continued suspicion and anxiety. Across the three countries, we explored the perceptions and experiences of vaccine deployment and administration with a range of stakeholders and community members. We aimed to intercept the political economies, constituting ethnic and socio-economic differences with various epidemiological contexts of vaccination, where different kinds of knowing were shaped by informational ecologies. While these contexts are different, the crosscutting factors we identified in mistrust and miscommunication produce ongoing community issues around vaccination. Addressing anxieties around experimentation, safety concerns, and public-government relations can also play a part in addressing global inequalities in research.

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Notes

1 World Health Organisation, Médecins Sans Frontières, United Nations Children's Fund, The International Federation of Red Cross and Red Crescent Societies and The Alliance for International Medical Action.

2 President Hassan's nickname.

3 President Magufuli's nickname (John Pombe Magufuli).

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