Kenyans' Perceptions of the Risks of COVID-19 Vaccines: A Scoping Review

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Abstract

Background: Vaccination programs are critical in controlling the spread of viral diseases worldwide. The COVID-19 pandemic underscored the critical role of vaccines. Achieving widespread immunization is significantly challenged by vaccine hesitancy, particularly concerns regarding potential risks. The perceptions of Kenyans regarding the risks of COVID-19 vaccines were explored in this scoping review.

Methods: The Arksey and O'Malley framework and the Joanna Briggs Institute methodology were used. A search strategy was developed to identify peer-reviewed publications and relevant grey literature from electronic databases and Google. Identified articles were screened using inclusion and exclusion criteria. Data was extracted from and analyzed to identify themes.

Results: Twenty-eight articles were included in the scoping review. The most common themes leading to vaccine hesitancy among Kenyans were vaccine safety, vaccine side effects, and lack of knowledge about COVID-19 vaccines. Four other themes were identified and discussed.

Conclusion: This review adds to our understanding of the factors influencing vaccine hesitancy during public health emergencies in Kenya. Public health messaging should prioritize addressing these concerns while also advocating for equitable access to the benefits of vaccination.

Keywords: COVID-19, vaccine risk, vaccine hesitancy, Kenya, Scoping Review

Introduction

Vaccination programs have played a critical role in controlling the spread of viruses and other infectious diseases worldwide. Despite their effectiveness in eradicating diseases such as polio and rinderpest, as well as in largely managing the continued spread of yellow fever, measles, and influenza, refusal to receive vaccines remains a significant roadblock to achieving herd immunity and promoting public safety during public health emergencies. Understanding how people perceive vaccine risks is crucial for addressing hesitancy and promoting vaccine adoption.

Vaccine hesitancy in Kenya has a deep-rooted history of vaccine safety

concerns, particularly for the human papillomavirus (HPV) vaccine (Karanja-Chege, 2022). Previous controversies and misinformation campaigns related to the HPV vaccine have had a lasting impact on trust in vaccination. This hesitancy can significantly shape Kenyans' views on the risks associated with COVID-19 vaccines.

Despite the Kenyan government's efforts to increase COVID-19 vaccination rates, vaccine hesitancy has persisted among Kenyan residents. The reality of the situation is documented by Muchiri et al. (2022), who reported that by the end of December 2021, nearly 21 million adult Kenyans had not taken the vaccines and that over 17.2 million adults might not take the COVID-19 vaccines by the end of 2022. In Kenya, increased vaccine hesitancy has been linked to a lack of trust in the government's response to COVID-19 and recent internet use. In contrast, reduced vaccine hesitancy was associated with education beyond the primary level, knowing someone who had COVID-19, and recently having symptoms of COVID-19 (Rego et al., 2023).

Safety and side effects of new vaccines are top concerns during a public health emergency like a pandemic. With a novel virus, information is constantly evolving, leading to uncertainty. This can fuel anxieties about the safety of potential interventions such as vaccines. People bombarded with conflicting information from different sources might hesitate or refuse essential measures, such as vaccination, hindering efforts to control the outbreak.

Further research is required to understand Kenyans' perceptions of the risks related to COVID-19 vaccines better and their reluctance toward vaccination. Historically, unethical research studies, especially those conducted on ethnic minorities, have contributed to vaccine hesitancy (Hasanzad et al., 2022). Insights from this review can highlight alternative approaches to conducting research that addresses those issues that contribute to vaccine hesitancy. The findings may also suggest ethical communication strategies that address misinformation and promote more effective public health communication.

Literature Review

The COVID-19 pandemic underscored the critical role of vaccines in stopping the spread of the infecting virus. However, achieving widespread immunization and maintaining public health remains significantly challenged by vaccine hesitancy, particularly concerns about potential risks. Bodine (2021) revealed that these concerns are prevalent in Kenya. The study found that 40% of Kenyans expressed concerns about COVID-19 vaccine safety, while another 27% lacked basic knowledge of safety issues. Understanding these perceptions of risk is crucial for designing effective interventions and communication strategies to encourage vaccine uptake (Bodine, 2021).

Abdulle et al. (2022) investigated the reasons for COVID-19 vaccine

hesitancy among healthcare workers in Kenya. Their cross-sectional study revealed that vaccine safety concerns and potential side effects were the primary reasons for vaccine refusal. Some participants expressed suspicion that the vaccines were financially motivated, whereas others worried about the rapid development process compromising safety or the vaccine's ability to keep pace with mutations. Additionally, distrust in government and lack of access to clear information contributed to hesitancy. Several healthcare workers indicated a desire for more information about vaccines before making decisions.

Similarly, another cross-sectional study among subpopulations of adults in Kenya found that most participants (79.9%) would receive a vaccine to prevent COVID-19 (Shah et al., 2022). Despite this, 40.5% said they would be reluctant to do so because of the potential adverse effects. About 25.5% of the participants thought the COVID-19 vaccine had defects, whereas more than half of the participants (65.1%) thought the vaccines were created and approved quickly, compromising efficacy and safety. Over one-third of participants (37.6%) agreed that vaccines could result in medical problems down the road, and 26.8% said they thought the vaccines were being pushed for profit purposes.

A cross-sectional study providing an empirical evaluation of the variables affecting the uptake of the COVID-19 vaccine among people in Kenya and Hungary concluded that communication of reliable and valid information is important to reduce hesitancy, fear, disinterest, or dissatisfaction among people (Macharia et al., 2022).

To reduce fears and close information gaps around COVID-19 vaccines, ethical and accurate communication methods customized for a particular context are required, especially for socioeconomically disadvantaged and minority groups (Scientific Advisory Group for Emergencies, 2021). Incorporating culturally sensitive communications, employing local languages, engaging with community leaders, and utilizing trusted channels, such as religious institutions or traditional healers, to reach people can be effective (Mills et al., 2020).

Open and transparent communication about perceived risks, addressing concerns directly while emphasizing the robust safety monitoring mechanisms in place, can foster trust and empower individuals to make informed decisions about vaccines. Additionally, actively involving communities in vaccination campaigns and decision-making processes, as advocated by Shah et al. (2022), can create a sense of ownership and partnership, mitigate concerns about imposed interventions, and promote equitable access to immunization benefits.

Several groups still require targeted interventions to reduce vaccination refusal and increase vaccination equity. Such groups include those with lower educational attainment, those who have not had COVID-19 symptoms or have known others with COVID-19, those who did not take personal COVID-19 mitigation measures, and those who

did not trust the government (Rego et al., 2023). Research should focus on comprehending the obstacles to and drivers of vaccination, while policy and program efforts should focus on reducing vaccination hesitancy.

In the wake of the COVID-19 pandemic, the Kenyan government directed residents to show proof of COVID-19 vaccination by December 2021 to access public services. With this directive, only 8.8% of Kenyans willingly received the vaccine by the end of December 2021 (Fick, 2021). This directive sparked national and international criticisms. Leaders across various sectors condemned it as coercion. They argued that to protect public health, forcing residents to be vaccinated violated their right to autonomy, freedom of choice, and bodily integrity, making it unethical (Al Jazeera, 2021; Human Rights Watch, 2022). Restrictive or mandatory public health policies are sometimes enacted during public health emergencies. To ensure these are ethically justified, the principle of least restriction requires that the least restrictive approaches to policy are always preferable. Hence, mandates should only be used when there is proof that voluntary means are insufficient to achieve public health goals (Colgrove, 2023).

Objectives

This study aimed to identify research involving Kenyan participants during the COVID-19 pandemic to explore their perceptions of COVID-19 vaccine risks. The specific goals were (1) to analyze the factors that affect risk perceptions of COVID-19 vaccines among the Kenyan population and (2) to investigate how socioeconomic status, sources of information, and trust in healthcare providers shape these risk perceptions and their impact on vaccine uptake.

Methodology

The framework proposed by Arksey and O'Malley (Levac et al., 2010), along with the methodology delineated by the Joanna Briggs Institute, was employed to conduct this scoping review (Pollock et al., 2022). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) was also used to guide the search for relevant evidence and structure the reporting of the included research studies (Page et al., 2021). The review followed the guiding research protocol outlined as follows:

1. **Context and Rationale of the Review.** The review applied the PCC framework (Population, Concept, and Context) to elaborate on the context of the scoping review and provide a rationale for it. In defining the context, the scoping review was limited to studies conducted with participants from Kenya. Multi-site studies conducted within Africa or East Africa, with Kenya as a study site, were included if Kenyan data was separable from other sites. All settings within Kenya were considered. Vulnerable populations, such as persons with disabilities or refugees, were also included. Other populations included teachers, students, healthcare workers,

community health volunteers, senior persons (aged 58 years and above), and studies covering the general population.

2. **Review Question.** The guiding scoping review question was, *"How has risk perception of COVID-19 vaccines been captured within the Kenyan context, and what factors influence these perceptions?"*
3. **Criteria for Inclusion.**
   i. Studies exploring adult Kenyans' perceptions of the risks associated with COVID-19 vaccines.
   ii. Studies published in English.
   iii. Studies published from January 2021 to December 2023.

Exclusion Criteria:

i. Multi-site studies in which data from Kenyan participants could not be separated from other populations.
ii. Studies that do not address risk perception (e.g., studies focused on vaccine coverage only, or COVID-19 knowledge, attitude, and practice only).
iii. Studies with adults and adolescents if adult perceptions could not be separated.

4. **Review Team.** Two authors constituted the review team. The involvement of two reviewers, working independently at first, helped limit bias in the search and selection process to identify published research materials on the research question.
5. **Search Strategy.** Relevant electronic databases, including EBSCO, PubMed, and Google Scholar, were utilized to identify peer-reviewed journals. Searching grey literature sources, such as community surveys, institutional website reports, and media articles, was also conducted using Google. Table 1 provides examples of the electronic databases searched, including the combination of words and Boolean characters, as well as the initial results. Similar strategies were used for other searches.

Table 1

Search Strategy Results

Database	Search string words	Results
Pubmed	COVID-19 vaccines AND perception* AND Kenya	16 results
	"COVID-19 vaccine*" AND perception* AND Kenya	14 results
	COVID-19 vaccine risk AND perception* AND Kenya	7 results
Google Scholar	"COVID-19 vaccin*" AND perception* AND Kenya	34 results
	COVID-19 vaccines AND perception* AND Kenya	100 results
EBSCO	"COVID-19 vaccines*" AND perception* AND Kenya	13 results

6. **Screening Process.** A two-stage screening process was used to select studies. This involved title and abstract screening independently by the two reviewers. The inclusion and exclusion criteria were applied to determine eligibility while carefully documenting the process of inclusion and exclusion and identifying reasons for exclusion.
7. **Full-text Screening.** This was performed by the two reviewers based on the inclusion criteria and specific objectives, resolving disagreements through Zoom discussions after each person reviewed the full text independently.
8. **Data Extraction**. A data extraction form was developed to capture key information from each study included, as follows:
   i. The author, article title, methodology, geographical location, study population, main results, common reasons for hesitancy, study limitations, and future directions.
   ii. Dominant concerns and influencing factors were noted.
   iii. Information sources, trusted voices, and communication strategies were captured.
   iv. Key findings and recommendations made.

   The extracted data were organized into an Excel spreadsheet for analysis, as described in step 10 below.
9. **Resolving Emerging Discrepancies**. This was an ongoing process through consultation between the two reviewers, especially regarding the inclusion and exclusion criteria. This helped avoid unnecessary bias by following the research protocol and documenting steps.
10. **Themes Identified after data extraction.** Studies were read repeatedly to identify the reasons for vaccine hesitancy. Reading the extracted data allowed for the identification of recurring reasons that were grouped into themes. This

allowed for categorizing repeatedly mentioned reasons into common themes that contribute to vaccine hesitancy in Kenya.

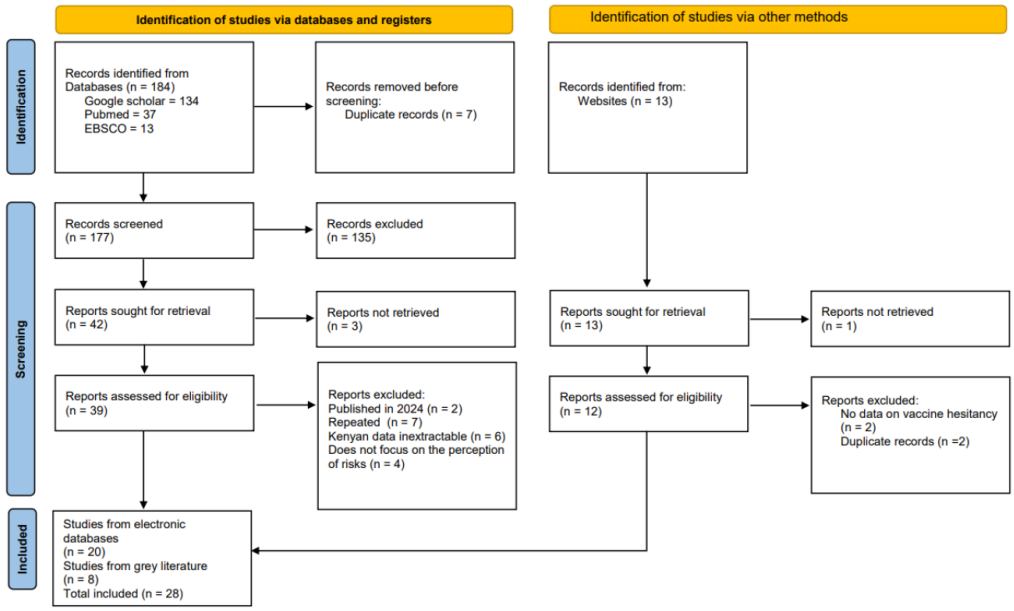
Results

Screening and Selection of Articles

A search of the electronic databases yielded 184 articles, which were reduced to 177 after removing duplicates. Title and abstract screening of these articles identified 39 as eligible for full-text screening. Subsequently, 20 articles from electronic databases met the inclusion criteria. A search of grey literature on Google yielded 13 articles. One article was not retrievable, leaving 12 articles assessed for eligibility. Eight articles (grey literature) met the inclusion criteria and were included, giving a total of 28 eligible articles analyzed. Figure 1 provides a visual demonstration of the article screening and selection process.

Figure 1

PRISMA Flow Diagram.



Characteristics of Studies Included

A total of 28 articles published between January 2021 and December 2023 were included in the scoping review. These included cross-sectional studies (n=7), qualitative studies (n=4), longitudinal studies (n=1), a convergent parallel mixed method study (n=1), a mixed qualitative and quantitative study (n=1), a mixed method study employing a cross-sectional survey and FGD (n=1), an exploratory study (n=1), surveys (n=4), Parliament of Kenya report (n=1), media interview (n=1), and institutional reports from the World Health Organization (WHO), Devex, University of Michigan, UNICEF, REUTERS, Path Kenya, and World Bank (n=6).

The reviewed articles encompassed a diverse range of participants targeting urban and rural populations. Within urban areas, participants came from five informal settlements in Nairobi County. One study included refugee and non-refugee participants, while another focused on individuals with disabilities. Healthcare workers were involved in two studies; another included community health volunteers, teachers, and senior citizens over 58 years old. Students from three public universities in the Kilifi, Eldoret, and Nairobi counties also participated. One study recruited participants seeking healthcare services from both public and private facilities.

The following variables emerged as common themes contributing to vaccine hesitancy.

Table 2

Reasons for Vaccine Hesitancy

#	Themes: Common reasons for hesitancy	Number of times cited
1.	Vaccine safety	10
2.	Fears about COVID-19 vaccine side effects	10
3.	Lack of knowledge about COVID-19 vaccines	10
4.	Sources of health information on COVID-19 vaccine	8
5.	Myths and misconceptions around COVID-19 vaccines	4
6.	Lack of trust in government	4
7.	Time taken to develop vaccines	1

Discussion of Common Themes

Vaccine Safety appeared 10 times in the 28 articles reviewed (Mutua et al., 2021; Njoki & Motari, 2021; Orangi et al., 2021; Dena, 2022; Muinga et al., 2022; Nasimiyu et al., 2022; Osur et al., 2022; Bosire et al., 2023; Anino et al., 2023; Rajshekhar et al., 2023). Concerns about vaccine safety were strongly linked to an individual's decision to get vaccinated. These concerns acted as significant barriers to vaccine uptake and contributed to COVID-19 vaccine hesitancy, as witnessed by one participant's statement in Bosire et al. (2023, p. 9).

> *A 38-year-old man noted that there was information circulating on social media that the vaccines being given to African countries were of poor quality or were already expired: 'The safety? I doubt the safety. I doubt the safety especially the one, this AstraZeneca, the one that is coming to Kenya and Africa. In my own opinion, I think AstraZeneca is of lower quality.'*

Similarly, teachers between the ages of 23 and 59 expressed varied reservations regarding the safety of COVID-19 vaccines (Mutua et al., 2021). Of 380 respondents participating in the study, 12.9% agreed that the vaccine was safe, 40.8% disagreed, and 46.3% remained neutral. These results correspond with the general sentiments of Eldoret residents, where the survey results revealed significant vaccine hesitancy, with nearly one-third of respondents unwilling and an additional eighth unsure about taking the COVID-19 vaccine. This hesitancy stemmed from concerns about vaccine safety and the accelerated development timeframe (Bosire et al., 2023). Students also expressed heightened concerns regarding vaccine safety (Dena, 2022).

On the positive side, many Community Health Volunteers (CHVs) from Trans Nzoia expressed no safety concerns regarding the COVID-19 vaccine (Osur et al., 2022). This group had the second-highest intention to get vaccinated, following Nairobi CHVs. Mombasa had the largest proportion of CHVs with no safety concerns, but Nairobi had the highest number of CHVs who were both unconcerned and intended to be vaccinated.

Fears of COVID-19 Vaccine Side Effects were identified in 10 of the 28 articles reviewed (Bosire et al., 2023; Eriksson et al., 2023; Fick, 2021; Josphat et al., 2023; Muinga et al., 2022; Njoki & Motari, 2021; Orangi et al., 2021; Osur et al., 2022; Orangi et al., 2021; Rajshekhar et al., 2023). Personal experiences and societal rumors fueled anxieties surrounding potential side effects, representing the leading cause of COVID-19 vaccine hesitancy for nearly one-third of the respondents from Pwani University (Eriksson et al., 2023).

Multiple studies found that individuals expressing anxieties regarding COVID-19's side effects were more susceptible to vaccine hesitancy. Orangi et al. (2021) investigated the vaccine-specific factors influencing COVID-19 vaccine hesitancy.

Their findings revealed that individuals concerned about side effects were significantly more likely to be hesitant (odds ratio, 3.38; 95% confidence interval: 2.81–4.07). A sense of dissatisfaction also arose due to the perceived lack of government transparency about the potential side effects of vaccines (Fick, 2021).

Lack of knowledge about COVID-19 Vaccines: a lack of clear information about COVID-19 vaccines can erode public trust in vaccines being rolled out, as identified in 10 articles (Anino et al., 2023; Bosire et al., 2023; Josphat et al., 2023; Kilima et al., 2023; Mutua et al., 2021; Muturi, 2022; Muinga et al., 2022; Nasimiyu et al., 2022; Njoki & Motari, 2021; Shah et al., 2022). This can fuel vaccine hesitancy. People feeling overwhelmed by information or unsure due to unclear information may experience decision paralysis, which can lead to delays or refusal of vaccination.

A survey by Njoki & Motari (2021) stated that most respondents (74.2%) had an average knowledge level about the COVID-19 vaccine source and its side effects. A smaller portion (19.4%) indicated low knowledge, while 6.4% of the respondents demonstrated high knowledge.

Similarly, inadequate information about the COVID-19 vaccine, particularly concerning its safety, side effects, and availability, emerged as a major driver of vaccine hesitancy among young people**,** healthcare workers, and the general population**.** Mutua et al. (2021) noted that insufficient, clear, and reliable information on the COVID-19 vaccine created uncertainty among the teachers interviewed.

A cross-sectional survey conducted in Siaya County (specifically in Asembo rural town) and Nairobi County (specifically Kibera informal settlement) revealed a higher proportion of residents in Asembo lacking adequate information about the COVID-19 vaccine compared to Kibera (Nasimiyu et al., 2022). When people do not have sufficient information about vaccines, they may hesitate to get vaccinated due to uncertainty or unfounded concerns.

Sources of Health Information on COVID-19 Vaccines: An analysis of eight studies found that preferred sources of COVID-19 vaccine information vary depending on several factors (Anino et al., 2023; Aswani et al., 2021; Bosire et al., 2023; Josphat et al., 2023; Muinga et al., 2022; Muturi, 2022; Nasimiyu et al., 2022; Shah et al., 2022). These factors included the location of the interview (urban or rural areas), the sociodemographic characteristics of participants (such as education level, marital status, and employment), and the study population, as discussed in the eight articles.

A study conducted by Muturi (2022) in three densely populated central Kenyan towns found a preference for media sources over interpersonal sources such as health professionals, community leaders, and influencers for people seeking information about COVID-19 vaccines. The study, which employed a street intercept method in which

participants were interviewed in the streets or marketplaces, also revealed that the internet, including social media, was the most popular source of general health information.

Nasimiyu et al. (2022) showed differences between two Kenyan communities in the sources trusted for COVID-19 information. In Asembo (rural context), religious leaders enjoyed the highest trust (97.1%), followed by healthcare workers (95.2%) and government officials (90.7%). Kibera (urban informal settlement) residents, on the other hand, placed their trust in the WHO (90.7%), scientists (86.7%), and healthcare workers (83.8%). Politicians were the least trusted source in both communities, with only 56.6% trust in Asembo and 46.3% in Kibera.

A qualitative study with persons living with disabilities also highlighted healthcare workers as trusted sources of information, as recounted by a physically impaired focus group participant from Mbeere North, Embu County (Josphat et al., 2023, p. 11):

> *If I hear this information from a medical person, I would believe [it] because they have knowledge in the field. I would trust them [healthcare providers], but if I get it [information] from people around here, I would not trust the vaccine since people have so many things going on. If [information] comes from a religious leader, I will accept, but not believe, since that is not their area of specialty.*

Myths and Misconceptions about COVID-19 Vaccines were identified as a theme in the included studies by Bosire et al. (2023), Fick (2021), Path Kenya (2022), and the WHO (2021). These four studies documented that myths and misconceptions about COVID-19 fueled vaccine hesitancy, eroding public trust. Misconceptions about the vaccine were prevalent among some participants. These included claims about unusual side effects, with some believing the vaccine could alter their physical state or reproductive health (Bosire et al., 2023, p. 9).

> *'I have heard people discourage the Astra Zeneca vaccine, some people have argued that it causes infertility in women, [and] headaches', [37-year-old woman] and for men, concerns over low libido were noted, 'first, I have heard people talk about reduced libido in men if one gets the vaccine' [25-year-old man]. And a few others believe that vaccination was a plot to get microchips into people's bodies.*

The abundance of conflicting information surrounding COVID-19 vaccines also led to myths and misconceptions. Segments of the population firmly opposed vaccination believing it was harmful, as described by a nurse from Turkana in a Path, Kenya report (2022, p. 29).

> *I heard with the vaccine they want to reduce the population*

> *of Africa, when parents bring their children to hospital they tell us 'Msidunge mtoto wangu coronavirus'.*

The Swahili phrase means 'do not inject my child with coronavirus' and was stated in reference to the COVID-19 vaccine. This misconception that the vaccine could cause COVID-19 or even death-fueled conspiracy theories that the vaccine could have been a population control measure targeting Kenyans and the larger African continent. Misconceptions within the community have created a significant barrier to acceptance of the COVID-19 vaccine.

Additionally, Fick (2021) narrates how a physician was teased by nurses working with her at a hospital in Nairobi after receiving a COVID-19 vaccine. They claimed that she would begin speaking in foreign languages. The physician disclosed that some of her colleagues refused vaccination for several months because of such misconceptions. A report by the WHO in Kisumu and Siaya counties corroborates these fears as narrated in the myths and misconceptions that communities held against COVID-19 vaccines, with one participant stating, "*When the COVID-19 vaccination was introduced, I heard people say it will kill older people. I was afraid*" (World Health Organization, 2021).

A Lack of Trust in Government can make people less likely to believe information about the vaccine's safety when disseminated through official channels. This can lead to skepticism towards the entire vaccination program, as observed in the **c**oncerns that emerged regarding the prioritization of COVID-19 vaccination, particularly among certain groups of Kenyans. Four articles noted a lack of trust in the Kenyan government (Orangi et al., 2021; Osur et al., 2022; Rego et al., 2023; Wasike, 2021). People distrustful of the government were hesitant to receive the COVID-19 vaccines because the government recommended them. Wasike (2021) reported an individual who stated:

> *I won't let them inject me or my kids. With our corrupt government, whatever they may inject us might not even be a vaccine, my husband is a medic and he has also cautioned us about this.*

A distrustful environment can breed conspiracy theories, and people who distrust the government might be more susceptible to believing false information about the motives behind vaccine development or its potential dangers. Another person reported (Wasike, 2021):

> *I am not going to take the injection, none of our top government officials have taken the injection. They are just waiting for us to take it so that they can use us as experiments.*

Observing what is perceived as unclear or contradictory policies can erode confidence in the government's ability to make sound public health decisions. This can make individuals less likely to

follow public health recommendations, including vaccination.

Different messages from the government were confusing. Some people questioned why those who received the vaccine had to continue adhering to social distancing guidelines and wearing masks (Wasike, 2021). This was based on the inaccurate belief that once someone was vaccinated, they could not become infected or spread the illness. This misunderstanding and the resulting apparent inconsistency in public policy can fuel skepticism and make people question the overall trustworthiness of government pronouncements regarding vaccines.

The Time Taken to Develop the Vaccines raised concerns, specifically regarding the expedited development of the COVID-19 vaccines. The exceptional speed of vaccine development raised concerns about whether proper safety protocols were followed. The lack of a lengthy development timeline, often associated with rigorous testing, created doubts about potential side effects with some participants noting (Bosire et al., 2023, p. 9):

> *I think that the vaccines have been developed within a very short time which is making many people question the safety of the vaccines.*
>
> *…for a vaccine to be considered safe for use it has to be tested for some time, and it cannot be less than a year.*

Discussion

The themes identified in this scoping review showed several reasons for COVID-19 vaccine hesitancy in Kenya. Building trust in COVID-19 vaccines in Kenya requires a multi-faceted approach. Easy access to reliable information is crucial, with Kenyans trusting sources such as social media, religious leaders, the World Health Organization, scientists, and healthcare workers. However, different groups of people trust other sources of information. Social media emerged as a prominent platform for accessing vaccine information. Therefore, ensuring that key community figures, such as male family members, leaders, and policymakers, have access to accurate information is vital.

Addressing these specific concerns is essential. This review found safety and side effects to be the main reasons for vaccine hesitancy, particularly among young adults. Public health messaging should prioritize addressing these concerns directly. One study revealed a generally positive perception of vaccination among university students, possibly due to their exposure to social media platforms and the internet. This suggests that targeted educational efforts can effectively mitigate vaccine hesitancy in this demographic. Community health volunteers from three counties also expressed confidence in the vaccines, likely due to exposure to the Ministry of Health's communication efforts.

Rural communities, however, require extra focus. The review found a higher likelihood of vaccine hesitancy in rural

areas, which was largely attributed to the fact that they received limited information about COVID-19 vaccines and had no proper channel to forward their concerns about vaccine side effects or ask questions about vaccine safety.

Ultimately, ensuring widespread COVID-19 vaccination in Kenya requires a nuanced approach that addresses both information access and specific concerns in different communities. Public health authorities can achieve this by combining clear communication through trusted channels, with targeted efforts to address these concerns. This approach builds trust and aligns with core ethical principles.

One fundamental principle is justice. By prioritizing clear and accessible information delivery through trusted sources, such as religious leaders, social media influencers, and healthcare workers, equitable access to knowledge can be promoted across urban and rural populations. This can empower Kenyans to make informed decisions about vaccination.

Additionally, this approach respects the ethical principle of autonomy. Addressing specific concerns, like vaccine safety and side effects, fosters trust and empowers Kenyans to make well-informed health choices based on a foundation of understanding rather than fear or misinformation. Ultimately, this multi-faceted strategy can promote ethical vaccine uptake in Kenya.

Conclusion and Recommendations

A significant portion of Kenyans expressed a willingness to be vaccinated, but only if their concerns were addressed. These concerns include vaccine safety, vaccine side effects, vaccine development, and dispelling myths.

Effective communication is the cornerstone of such an approach. The Ministry of Health, healthcare workers, and community leaders should prioritize clear and consistent messaging through social media, the internet, religious leaders, healthcare workers, and scientists, as these are the most trusted sources of health information for Kenyans. Public health messages must be comprehensive (covering all aspects of the vaccine), targeted to specific audiences, adaptable to changing circumstances, transparent, and consistent over time.

Building trust requires transparency. Kenyan authorities can emphasize the rigorous testing and evaluation processes that vaccines undergo, from clinical trials to licensure. Additionally, providing easy access to real-time safety data and using data-driven risk assessments to guide vaccination decisions demonstrate a commitment to public health and safety.

Interventions such as vaccination programs may be implemented during public health emergencies. For these interventions to be ethical, individuals must be able to make informed decisions about their participation. Building trust through open communication is essential for ensuring people can access accurate

information and make choices based on their understanding of risks and benefits.

Finally, fostering inclusive community engagement is essential. Disseminating information through various channels, including social media, trusted healthcare providers, and religious leaders, allows culturally appropriate messaging that addresses the specific concerns of different populations. This ensures fair access to information and promotes inclusive public-health efforts. By prioritizing clear communication, transparency, and inclusive engagement, Kenyan authorities can build public trust in COVID-19 vaccines and encourage their uptake.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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