



SCOWCROFT INSTITUTE OF INTERNATIONAL AFFAIRS • 2024

# EXAMINING COVID-19 VACCINE HESITANCY IN NIGERIA, KENYA, AND SOUTH AFRICA: A CROSS-NATIONAL STUDY



TEXAS A&M UNIVERSITY  
The Bush School  
of Government & Public Service

Scowcroft Institute  
of International Affairs

THE BUSH SCHOOL • TEXAS A&M UNIVERSITY



TEXAS A&M  
UNIVERSITY

The views expressed and opinions presented in this paper are those of the Scowcroft Institute of International Affairs and do not necessarily reflect the positions of The Bush School of Government & Public Service or Texas A&M University.



## **Scowcroft Institute of International Affairs**

THE BUSH SCHOOL • TEXAS A&M UNIVERSITY



TEXAS A&M UNIVERSITY  
**The Bush School**  
of Government & Public Service



**TEXAS A&M**  
UNIVERSITY.



# EXAMINING COVID-19 VACCINE HESITANCY IN NIGERIA, KENYA, AND SOUTH AFRICA: A CROSS-NATIONAL STUDY

Scowcroft Institute of International Affairs • 2024

Christine Crudo Blackburn,<sup>1,2</sup> Timothy Callaghan,<sup>3</sup> Brian Colwell,<sup>4</sup> Bernard Fatoye,<sup>5</sup> Jessica Hernandez,<sup>4</sup> Tasmiah Nuzhath,<sup>6</sup> Leyla Abdullahi,<sup>7</sup> Aneesa Moolla,<sup>8</sup> Candice Chetty-Makkan,<sup>8</sup> Akin Osibogun<sup>9</sup>

- <sup>1</sup>Department of Health Policy and Management, School of Public Health, Texas A&M University, USA
- <sup>2</sup>USA Center for Rural Public Health Preparedness, School of Public Health, Texas A&M University, USA
- <sup>3</sup>Department of Health Law, Policy, and Management, School of Public Health, Boston University, USA
- <sup>4</sup>Department of Health Behavior, School of Public Health, Texas A&M University, USA
- <sup>5</sup>Scowcroft Institute for International Affairs, Bush School of Government and Public Service, Texas A&M University, USA
- <sup>6</sup>Department of Global Health and Population, T.H. Chan School of Public Health, Harvard University, USA
- <sup>7</sup>African Institute for Development Policy, Kenya
- <sup>8</sup>Health Economics and Epidemiology Research Office, Wits Consortium, Witswatersrand University, South Africa
- <sup>9</sup>Department of Community Medicine, University of Lagos, Nigeria

**\*This research was funded by the Scowcroft Institute of International Affairs.**

Introduction.....	4
Vaccination Hesitancy in Nigeria, Kenya, and South Africa .....	5
COVID-19 Vaccine Hesitancy in Nigeria, Kenya, and South Africa .....	6
Health Implications of Low Vaccine Uptake .....	8
Data Collection and Methods.....	9
Findings: Survey Data .....	10
Findings: Interview Data.....	14
Discussion.....	18
References .....	20
The Scowcroft Vision .....	25
In Memoriam.....	26



## INTRODUCTION

Over 1 billion people, or roughly 15% of the world population lives in sub-Saharan Africa and by April 2023 only 30% of that population had been vaccinated against COVID-19<sup>1</sup>. While the reasons for low uptake are multifaceted and include supply and access challenges, vaccine hesitancy plays a notable role in this low uptake<sup>1</sup>. The COVID-19 pandemic has accelerated declines in vaccine confidence and perceptions of the importance of vaccines at a time when childhood immunizations are facing the largest backslide in acceptance in than 30 years<sup>2</sup>. This even though vaccines save an estimated 4.4 million lives every year<sup>2</sup>.

Vaccine hesitancy can be generally defined as a state of indecisiveness regarding a decision to vaccinate<sup>3,4</sup>. Vaccine-hesitant individuals are a highly heterogeneous group who may accept some vaccines, but not others; and/or delay or accept vaccines according to the recommended

schedule<sup>3</sup>. The spectrum of and motivations for vaccine hesitancy present challenges to policymakers when trying to understand attitudes towards vaccination at the population level. This challenge is compounded because hesitancy is not directly related to uptake<sup>5</sup>.

Historically, addressing widespread hesitancy toward childhood vaccinations in African countries has been an ongoing local, national, and international challenge. The motivations and circumstances surrounding hesitancy in these instances, however, were different from those of the COVID-19 vaccine. Globally, COVID-19 vaccine hesitancy was seen among groups who typically do not demonstrate hesitancy toward childhood vaccinations<sup>6</sup>. To further understand the motivations for hesitancy toward the COVID-19 vaccine, we administered a demographically representative survey and conducted one-on-one interviews in Kenya, Nigeria, and South



Africa. This study provides a deeper understanding of vaccine hesitancy in the three countries and represents one of the first mixed methods, cross-national studies of COVID-19 vaccine hesitancy in Africa that we are aware of. Understanding the drivers of vaccine hesitancy in these three countries provides an opportunity to create more effective communication strategies and public health policies that can increase vaccine uptake locally. Doing so can reduce the disease burden for each country and contribute to strengthened global health security.

The countries from which we draw empirical evidence for this white paper are in the sub-Saharan region of Africa. This region of Africa has 44 countries and a diverse population. The combined population of Kenya, South Africa, and Nigeria represents about 30% of this region's population and their cumulative disease burden (cases confirmed) of COVID-19 represents 50% of the region's cases<sup>7</sup>. Additionally, the three countries selected for study all demonstrated increasing COVID-19 vaccine hesitancy as the pandemic progressed<sup>8</sup>. This suggests that individuals in the three countries might have unique motivations for their vaccine hesitancy, providing an opportunity to understand why hesitancy grew in these countries during the pandemic. This study also provided an opportunity to understand the opinions and perceptions of individuals in each country with regards to their government's response to the COVID-19 pandemic. Examining these perceptions provides further insight into how governments can be effective in pandemic response and vaccination campaigns.

### **Vaccine Hesitancy in Nigeria, Kenya, and South Africa**

Vaccine hesitancy in Sub-Saharan Africa is influenced by a complex interplay of cultural, social, historical, political, and individual factors that shape people's behaviors toward vaccination. Not only do these factors include values, beliefs, and attitudes regarding vaccination, but also perceptions of risk, emotions, and knowledge about vaccination. Traditional medicine also acts as a barrier to vaccine uptake in many African countries, including the ones examined in this study<sup>9</sup>. The scale and impact of vaccine hesitancy in the three countries examined in this study vary. In South Africa, vaccine hesitancy is one of the biggest challenges for vaccination programs<sup>10</sup> and the increase in measles outbreaks in the country from

2003 to 2011 is largely attributed to vaccine hesitancy and the decline in vaccination rates. A qualitative study conducted in Cape Town investigated the perceived factors that contributed to vaccine hesitancy toward routine childhood vaccinations and found that the most common were religion, Internet misinformation, fear of pain in children, and confidence in natural immunity development, as well as worries of adverse effects after vaccination<sup>11,12</sup>.

In Nigeria, vaccine hesitancy also contributes to low vaccine uptake, but the reasons for vaccine hesitancy are narrower than in South Africa. For Nigeria, the universal childhood vaccination coverage rate rose to its peak of 81.5% in the 1990s before dropping to 13% in 2003, with the highest drop in polio vaccine coverage<sup>13</sup>. Childhood vaccination coverage declined most significantly in northern Nigeria as the result of the Pfizer Trovan<sup>®</sup> Trail<sup>14</sup>. The trial led to the deaths of 11 children and was found to be both illegal and unethical<sup>15</sup>. It also contributed substantially to the boycott of the polio vaccine in the region<sup>15</sup>. Previous studies on vaccine hesitancy in Nigeria have been disease specific. Historical injustices, perceptions of government neglect, and conspiracy theories continue to fuel skepticism toward vaccines and the delivery of healthcare services<sup>16-20</sup>.

Vaccine hesitancy in Nigeria varies significantly by region and community. Historically, vaccine hesitancy has been an individual or community-level issue, which has allowed health officials to create effective, targeted communication strategies for each region and community to reduce fears and address hesitancy<sup>21</sup>. Marked differences in vaccination coverage have emerged across geopolitical zones, with vaccination completion rates ranging from about 50% in the South-West and South-South to 27%, 14%, and 10%, respectively, in the North-Central, North-East, and North-West<sup>22</sup>.

As noted, previous studies addressing the drivers of vaccine hesitancy also find that historical, religious, and political contexts in northern Nigeria play a role<sup>23</sup>. People in this region have high levels of distrust in government, which has contributed to skepticism about childhood vaccinations<sup>23</sup>. Previous community experiences also reinforced concerns of safety and distrust of Western pharmaceutical companies and Western medicine<sup>24</sup>.

Like the differences in South Africa and Nigeria, Kenya also struggles with vaccine hesitancy. Studies on vaccine

hesitancy prior to the COVID-19 pandemic in Kenya are scarce, but a limited number of studies were conducted that examined hesitancy toward specific vaccinations, such as routine childhood and Human Papillomavirus (HPV) vaccinations. One such study found that routine childhood vaccination coverage among children was 69.21% across all of East Africa<sup>25</sup> (Tesema et al., 2020) but this coverage varied across countries due to inequalities in access to immunization programs, political instability, and vaccine hesitancy.

Another study evaluated the acceptability and adoption of an HPV vaccination program in Eldoret, Kenya<sup>26</sup>. The study revealed that a lack of information and fear of side effects were significant obstacles. Additionally, organizational factors such as inadequate promotion, mistrust in the new vaccines, and reluctance to discuss cervical cancer hindered the acceptance of the vaccine. Safety concerns, cultural and religious factors, and misinformation have also influenced the landscape of HPV vaccination in Kenya<sup>26</sup>. Kolek et al<sup>27</sup> found that most parents in Kenya were willing to vaccinate their children against HPV, but they lacked knowledge about the vaccine and had safety concerns. Njuguna et al<sup>28</sup> discovered strong opposition to HPV vaccination among parents and the community at large, while teachers, health workers, and community leaders were supportive.

This review indicates that vaccine hesitancy varies by level and motivation across the three countries in this study. The COVID-19 pandemic and the vaccines that were developed to protect against the SARS-CoV-2 virus, brought additional challenges in the realm of hesitancy and vaccine uptake.

### **COVID-19 Vaccine Hesitancy in Nigeria, Kenya, and South Africa**

With considerable vaccine hesitancy in each country prior to the COVID-19 pandemic, it is perhaps unsurprising that this hesitancy carried over in limiting the uptake of COVID-19 vaccines. The COVID-19 vaccine was introduced in South Africa for the first time in February 2021. To reach its vaccination goal by the end of that year, the government of South Africa set a target of fully vaccinating 67% of the population<sup>29</sup>. As of this writing, however, only 46% of the population was fully vaccinated, according to WHO. Researchers have identified several factors that contribute to COVID-19 vaccine hesitancy

in South Africa, including concerns about side effects, mistrust of the government, misinformation, and safety and development concerns regarding COVID-19 vaccines<sup>30,31</sup>. Engelbrecht et al<sup>31</sup> used a cross-sectional, anonymous online survey to collect data from a representative sample of the South African adult population and found that 60% of respondents who had not received the COVID-19 vaccine expressed concerns about side effects, with 26% explicitly citing side effects as the reason for not vaccinating. This finding suggests that concerns about side effects are a significant barrier to COVID-19 vaccine uptake in South Africa. Steenberg et al<sup>32</sup> conducted an exploratory study in towns in South Africa populated mainly by low-income Black-African communities in August 2020 and found that the focus on the biomedical aspect of the COVID-19 pandemic (e.g., scientific research, medical treatments) may have unintentionally caused some people to resist vaccination against the virus for a variety of reasons, including the existence of diverse medical practices and beliefs within diverse cultures and spiritual practices within certain communities that may influence people's vaccination decisions.

In Nigeria, vaccine hesitancy has been a long-standing concern. Despite this, the country has made significant strides towards achieving broad immunity against COVID-19, with 36.9% of the population fully vaccinated as of this writing<sup>33</sup>. According to a review of studies conducted in December 2021 that assessed the acceptance of the COVID-19 vaccine in Nigeria (mainly in the southeast of the country), COVID-19 vaccine acceptance rates varied significantly across different population subgroups, but when compared over time, certain trends emerged<sup>34</sup>. Among healthcare workers, the acceptance rate was 55.5% in October 2020, 32.5% in January 2021, and 45.6% in March 2021, and among adults, the acceptance rate was 20.0% in May 2020, 58.2% in July 2020, 50.2% in August 2020, 51.1% in February 2021, and 45.6% in March 2021<sup>34</sup>.

Furthermore, the study investigated the reasons respondents refused to accept COVID-19 vaccination, with conspiracy theories, disbelief in the effectiveness of the vaccine, questions about vaccination safety, side effects, and fear of the unknown being the most stated reasons<sup>34</sup>. Chutiya et al<sup>35</sup> identified several factors that contribute to negative perceptions of the vaccine. One of the





significant themes was the concern about the vaccine's adverse effects on the body, including side effects, and its efficacy<sup>35</sup>. The study highlighted the need to address any fears and misinformation about the vaccine's safety and effectiveness. Lastly, Adigwe found that over half (52.9%) of participants were concerned about potential side effects associated with COVID-19 vaccination<sup>36</sup>. The findings highlight the need for targeted efforts to address vaccine hesitancy and misinformation in Nigeria to achieve greater vaccination coverage against COVID-19.

Kenya falls into the category of countries surveyed which are more likely to believe that a COVID-19 vaccine would be safe and effective<sup>37</sup> though COVID-19 vaccine hesitancy remains a persistent problem in Kenya<sup>38</sup> (Rego et al., 2023). Despite limited access to COVID-19 vaccines in the region, hesitancy toward the vaccine may be influenced by cultural beliefs, health system structure, and misinformation on social media<sup>39</sup>. It is pertinent to note that Kenya's healthcare system is composed of a mixture of public, private, and faith-based sectors, all of which provide different resources in varying ways, including access to COVID-19 vaccines<sup>40</sup>. According

to Shah et al, approximately 68.8% of the participants reported being vaccinated with at least one dose and vaccinated individuals reported that they believed that vaccines administered at private facilities were safer than those administered at faith-based or government facilities<sup>39</sup>. Additionally, a study by the Africa CDC (2021) observed that 1 in 7 Kenyans would not take the COVID-19 vaccine and almost 47% of the Kenyan population reported that they believed that African people are being used as test subjects for vaccine trials<sup>37</sup>.

A study published in 2023 found that confidence in vaccines, including by not limited to the COVID-19 vaccine, had declined across sub-Saharan Africa throughout the course of the COVID-19 pandemic<sup>41</sup>. Interestingly, this study did not find any social and demographic associations for lower or higher levels of vaccine confidence<sup>41</sup>. The findings raise concern about the broad decline in vaccine confidence and raise questions about how we can better understand the trend.

The COVID-19 pandemic created new challenges with vaccine uptake and new motivations from individuals to become vaccine-hesitant. As we previously noted, there

is some literature on the level of vaccine uptake in South Africa, Nigeria, and Kenya, with regard to childhood vaccines and vaccine uptake data from the three countries regarding the COVID-19 vaccine. There are, however, fewer studies on the underlying motivations of COVID-19 vaccine hesitancy, or how hesitancy toward the COVID-19 vaccine might influence hesitancy toward routine childhood vaccinations. Additionally, there is no study that we are aware of that provides a cross-national comparison of drivers of vaccine hesitancy in Africa. This study provides greater knowledge of drivers of vaccine hesitancy within each country and adds to the existing literature through this cross-national comparison.

### Health Implications of Low Vaccine Uptake

Prevention and control of vaccine-preventable diseases (VPDs) require high immunization uptake<sup>42,43</sup>. Besides offering direct protection to vaccinated individuals, high vaccination rates also confer herd immunity by reducing community transmission of the disease<sup>42,43</sup>. Thus, low immunization coverage reduces community protection

against infectious diseases, leading to increased risks of infectious disease outbreaks<sup>44</sup>. The recent occurrences of vaccine-preventable diseases (VPDs) such as measles, poliomyelitis, and pertussis in various parts of the world have been attributed primarily to communities with low vaccination rates<sup>45-52</sup>. A global polio outbreak in 2003 in twenty countries across Africa, the Middle East, and Southeast Asia, including previously polio-free countries, was attributed to low vaccination coverage in Nigeria<sup>50,53</sup>. This resulted in an estimated 1,266 cases of paralysis in children and cost almost US \$500 million to control<sup>53</sup>. Furthermore, low vaccination uptake increased the disease burden of measles in South Africa. Between 2003 and 2005, the measles outbreak resulted in 1,700 cases, and between 2009 and 2011, over 18,000 cases were reported<sup>54</sup>.

In addition to causing an increased disease burden, these outbreaks have other detrimental impacts on children. Infections can adversely impact children's physical growth, their cognitive abilities, and school attendance, which can hinder disadvantaged children from breaking the poverty cycle<sup>55</sup>. Similarly, communities with low COVID-19 vaccination coverage commonly experience higher COVID-19-related morbidity and mortality rates, highlighting the importance of widespread vaccination efforts<sup>56,57,58</sup>. The ongoing transmission provides a chance for the virus to mutate further and create new variants with increased transmissibility and infectivity<sup>59</sup>. This undermines public health efforts to control COVID-19 transmission, prolonging the social and economic consequences of the pandemic on individuals and communities<sup>60-62</sup>. This also poses additional challenges for strained, ill-equipped health systems in African countries, which could increase the risk of disease transmission of other diseases such as Bird flu, Malaria, and Ebola.

In addition, the pandemic disrupted children's routine vaccination uptake globally, with 23 million children missing routine immunization services as health systems focused on responding to the pandemic<sup>63</sup>. This has, in turn, resulted in outbreaks of measles in Nigeria, Kenya, and South Africa, further exacerbating the public health crises in these countries<sup>64</sup>.







## DATA COLLECTION AND METHODS

This research project relies on a mixed methods approach, including both qualitative interviews and quantitative survey data collection. To conduct the qualitative analysis required for this project, our research team collaborated with in-country research partners for all three countries of study. In Nigeria, our partners were based at the University of Lagos, in Kenya, our partner was a researcher at the African Institute for Development Policy (AFIDEP), and in South Africa, we partnered with a research team from Wits Health Consortium at the University of Witwatersrand. Our U.S.-based research team worked with the in-country partners to develop interview questions to determine the drivers of vaccine hesitancy in culturally appropriate ways. We also worked with in-country partners regarding sample make-up and any required training for conducting the interviews.

An interview guide was developed and agreed upon by all parties, and the in-country partners conducted the interviews, which were done in a semi-structured format and averaged 10-15 minutes in length. Thirty-

three interviews were conducted in Nairobi, Kenya, 20 interviews were conducted in Lagos, Nigeria, and 30 interviews were conducted in Johannesburg, South Africa for a total of 83 interviews. All interviews were audio recorded and transcribed by the in-country partners to ensure accurate translation of the audio in cases where English was not the language in which the interview was conducted.

Following completion of the transcripts, the audio and transcript data were provided to the U.S.-based research team in agreement with data use contracts. These contracts ensured proper data ownership and secure transfer. Upon receipt of the transcripts, the U.S.-based research team performed a thematic analysis to determine the primary drivers of COVID-19 vaccine hesitancy in each country. The following sections of this report provide country-specific background and detail the country-specific findings from these interviews. The interview guide and the code systems can be found in Appendix A of this document.

In addition to the in-depth interviews, we utilized the survey service Forthright and their partner Bovitz to administer a nationally representative survey in each of the three study countries. The survey was conducted from August 2 through August 25, 2023, and was administered using Qualtrics. A total of 4,700 individuals participated in the survey: 1,545 respondents in Kenya, 1,557 respondents in Nigeria, and 1,588 respondents in South Africa. Forthright relied on quota sampling to

deliver samples in each country that were balanced based on age and gender. We additionally worked closely with Forthright to ensure good representation of participants across levels of education. For the purposes of this white paper, we will be discussing the survey results related to vaccination status, the most common COVID-19 vaccines administered, and respondent's perceptions of their government's response to the COVID-19 pandemic.



## FINDINGS: SURVEY DATA

Of the 1,557 survey respondents in Nigeria, 15.9% reported that they were unvaccinated at the time that the survey was administered. Regarding the COVID-19 vaccine most frequently administered in Nigeria, 30.7% received the Moderna vaccine and the second most common vaccine in Nigeria was Pfizer-BioNTech with 20.7%. It should be noted, however, that only 12.7% of

respondents in Nigeria reported that they received both doses of a two-dose vaccine, whereas 42.3% reported that they received one dose of a two-dose vaccine. Therefore, the number of individuals who are not fully vaccinated is much higher than is suggested by the unvaccinated rate of about 15%.

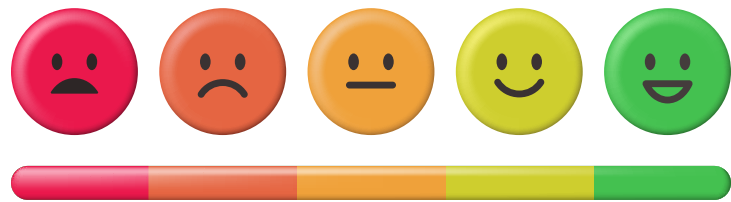
In Kenya, 20.8% of the 1,545 survey respondents



reported that they were unvaccinated. Additionally, 14.5% of respondents reported that they had only received one dose of a two-dose vaccine. The most common vaccine administered in Kenya was AstraZeneca, which 36.3% of vaccinated respondents reported that they had received that vaccine. The second most common vaccine in Kenya was the Johnson & Johnson vaccine, with 28.0% of vaccinated respondents reporting they had received it.

Of the 1,588 respondents to our survey in South Africa, 28.9% reported that they were not vaccinated. This put the level of unvaccinated individuals in South Africa at almost double that of the other two study countries. However, the number of individuals in South Africa who were only partially vaccinated (received only one dose of a two-dose vaccine) was lower than in both Kenya and Nigeria. In South Africa, the number of respondents who said they had only received one dose of a two-dose vaccine was 10.9%. The most frequently administered vaccine in South Africa in our sample was the Pfizer-BioNTech vaccine with 50.8% of respondents saying they had received it. The second most common vaccine in our South African sample was the Johnson & Johnson vaccine, with 42.0% of vaccinated respondents saying that they received it.

In addition to the findings regarding the rate of unvaccinated individuals and the most common vaccine given, the survey obtained information related to respondent’s perceptions of the COVID-19 response, specifically to the following: 1) my country’s government



is a good source of information on the COVID-19 pandemic; 2) my country’s government has done a good job of communicating with the public about the COVID-19 pandemic; 3) my country’s government has done a good job of educating the public about the need to get vaccinated against COVID-19; and 4) my country’s government has done a good job of letting the public know where and how to get vaccinated against COVID-19. Respondents answered based on a Likert Scale that included the following answer choices: “Strongly agree,” “Somewhat agree,” “Neither agree nor disagree,” “Somewhat disagree,” and “Strongly disagree.”

Regarding whether respondents felt that their government is a good source of information about the COVID-19 pandemic, 66.5% responded that they either strongly agree or somewhat agree with this statement. There were, however, country level differences with more Kenyans strongly agreeing and more South Africans strongly disagreeing. The fully detailed, country-level results are shown in Table 1.

**Table 1. Perceptions of Government as a Good Source of Information about the COVID-19 Pandemic**

My country’s government is a good source for information on the COVID-19 Pandemic	Kenya	Nigeria	South Africa
Strongly agree	48.9	18.5	31.0
Somewhat agree	32.7	39.5	28.7
Neither agree nor disagree	10.0	24.2	20.1
Somewhat disagree	4.9	10.5	10.9
Strongly disagree	3.2	7.2	9.1

Most respondents also believed that their government had done a good job of communicating with the public about the COVID-19 pandemic. Of the total number of respondents from all three countries, 71.1% strongly or somewhat agreed with that statement. Again, there were differences at the country level with many more Kenyans

strongly agreeing that their government had done a good job of communicating with the public about the COVID-19 pandemic, and a higher percentage of Nigerians and South Africans strongly disagreeing. The full country-level results are detailed in Table 2.

**Table 2. Perceptions of Government Communication with the Public About the COVID-19 Pandemic**

My country's government has done a good job of communicating with the public about the COVID-19 Pandemic	Kenya	Nigeria	South Africa
Strongly agree	55.8	27.2	43.0
Somewhat agree	28.8	30.9	27.3
Neither agree nor disagree	8.6	21.2	14.6
Somewhat disagree	3.8	13.6	8.0
Strongly disagree	2.7	6.9	6.9

Our survey also asked respondents how they felt their government had done in communicating the importance of getting vaccinated against COVID-19 and where and how to get the vaccine. Regarding government communication about the importance of the COVID-19 vaccine, 70.24 of respondents strongly or somewhat

agreed that their government had done a good job of communicating this. Kenya had the highest percentage of respondents who strongly agreed, whereas Nigeria had the highest percentage of respondents who disagreed (strongly or somewhat). The country-level results are shown in Table 3 below.

**Table 3. Perceptions of Government's Effectiveness on Educating the Public – Need to Get Vaccinate**

My country's government has done a good job of educating the public about the need to get vaccinated against COVID-19	Kenya	Nigeria	South Africa
Strongly agree	56.2	25.3	45.9
Somewhat agree	26.5	30.9	25.8
Neither agree nor disagree	9.0	23.0	15.3
Somewhat disagree	5.5	14.1	6.9
Strongly disagree	2.5	6.5	5.9



Most respondents also felt that their government had done a good job of letting the public know where and how to get the COVID-19 vaccine. Kenya, again, had the highest percentage of respondents who agreed with this statement, whereas Nigeria had the highest percentage of respondents who disagreed with this statement. Overall,

75.7% of respondents across the three countries either strongly or somewhat agreed that their government had done a good job of letting the public know where and how to get vaccinated against COVID-19. The detailed, country-level results are shown in Table 4.

**Table 4. Perceptions of Government’s Effectiveness on Educating the Public – Where and How to Get Vaccinated**

My country’s government has done a good job of letting the public know where and how to get vaccinated against COVID-19	Kenya	Nigeria	South Africa
Strongly agree	63.1	26.4	58.0
Somewhat agree	24.1	31.0	24.2
Neither agree nor disagree	7.8	23.2	10.3
Somewhat disagree	3.3	12.6	3.9
Strongly disagree	1.5	6.6	3.3





Patients receive oxygen outside the Infectious Disease Hospital (IDH) ward, amid the coronavirus disease (COVID-19) pandemic, in Yaba, Lagos, Nigeria. Credit: REUTERS/Seun Sanni

## FINDINGS: INTERVIEW DATA

Interviews with healthcare professionals and laypeople were conducted in all three countries to gain a deeper understanding of the perceptions and opinions that individuals had regarding their country's COVID-19 response and the COVID-19 vaccine. As noted, 33 interviews were conducted in Nairobi, 20 in Lagos, and 30 in Johannesburg. Based on those interviews, we have outlined the most prevalent themes for each country. The themes outlined are the concepts that came repeatedly across interviews. This section has been structured to examine the themes from the interviews in Nigeria first, Kenya second, and South Africa third. It should be noted that fewer themes were identified in the interview data from Nigeria. This is partly because the interviews in Nigeria were shorter than in the other two countries due to the environment in which they were conducted. Specifically, many interviews in Nigeria were conducted in the participant's place of employment, which inhibited the ability to perform lengthy interviews. The truncated interviews allowed less data to be gathered from each of the participants. The shortened nature of the interviews

in Nigeria is a limitation of the study in understanding the perceptions of individuals interviewed.

### **Lagos, Nigeria**

#### **Theme 1: Misinformation related to the COVID-19 Vaccine**

Misinformation about COVID-19 and the COVID-19 vaccine was the most prevalent and consistent theme among study participants in Lagos. Rumors were numerous and included beliefs that the COVID-19 vaccine kills people, that the government was trying to enrich itself financially from the COVID-19 pandemic, that the COVID-19 vaccine gives people malaria, that the booster vaccines available were expired, and that the COVID-19 vaccine was the anti-Christ. Several participants also commented that the COVID-19 vaccine was magnetic. One participant spoke to the beliefs many held, stating:

*"Well, I know a lot of people where you are sure this is not the government passing down sickness or the mark of the anti-Christ to people. So, there is a lot of speculation."*



Notably, among participants who did believe the vaccine was safe, many were still scared to get vaccinated. This fear was largely the result of hearing from friends, family members, and acquaintances about the severity of the side effects of the vaccine. As one participant explained:

*“At first when they started taking it, I saw some people coming back to complain that their hands were swollen, headache, and other mild complaints. So, I was actually scared at first to take the first dose...”*

Participants who were vaccinated at the time of the interviews said that fears about the side effects had led them to delay getting the vaccine.

### **Theme 2: High Levels of Trust in COVID-19 Information Sources**

The second theme that emerged from the Lagos interviews is that most participants expressed high levels of trust in their COVID-19 information sources. The primary sources of COVID-19 information varied among the study participants, but some of the most common sources included social media, television news, radio, and search engines. This finding supports the findings from the survey that demonstrate that most Nigerians surveyed believed that their government had done a good job communicating about COVID-19. This is demonstrated by one participant, who stated:

*“[The] Government wants good for the citizens. They know it is important. If not, they wouldn't advise us to take the vaccine.”*

Trust in government sources, however, did not always reflect how individuals felt the government was performing in the response. Many participants qualified their perceptions of their government's response actions by saying that “the government really tried.” Statements like these demonstrate a feeling of insufficiency in the government's response.

These sentiments are also reflected in the survey data, as a substantially lower percentage of Nigerian respondents stated that they strongly agree or somewhat agree that their government had done a good job educating the public on the necessity of the COVID-19

vaccine and how and where to get it. The number of respondents who strongly agreed with this statement in Nigeria was almost half the number that strongly agreed with the statement in both Kenya and South Africa. Thus, the survey data confirm the overall feeling that there was effective communication, but that did not translate into helping people understand and receive the vaccine.

Understanding if individuals trust their government can provide insights into how to address vaccine hesitancy or what role (mis)trust in government plays in exacerbating vaccine hesitant beliefs. Overall trust in information about COVID-19 that came from the Nigerian government may provide an opportunity to address some of the misinformation identified in the first theme.

### **Nairobi, Kenya**

#### **Theme 1: Lack of COVID-19 Vaccine Options**

The first primary theme that emerged from the interviews in Nairobi was that the vaccine many participants wished to take was not available when they went to receive their vaccination. For this reason, some participants commented that they were not able to get the vaccine that they had wanted to get. One participant expressed frustration with the lack of vaccine options by saying:

*“I wanted J&J or Pfizer, the one that you could just be given one jab [the Pfizer vaccine actually requires 2 doses]. But at the time, they were not there. They were not available. So, I had to use AstraZeneca because it was available at the time.”*

Other participants noted that there was a lack of vaccine options, but that the available option was the one that they had hoped to get. For many participants in the study, the lack of choice in vaccines was a frustration but it did not prevent them from getting vaccinated against COVID-19.

#### **Theme 2: TV and Radio News was the Primary Source of COVID-19 Information**

Another theme in the Kenyan interviews was that most study participants in Kenya received their COVID-19 information primarily through television and radio news and that the main source of those news reports was the Kenyan government. Most participants had high levels of trust in COVID-19 information from the government. One participant explained:

*"We trust the government sources...As you know, the government was at the forefront to protect its people from the adverse effects of COVID-19. So, we trust these sources because the government is trying its best to protect citizens from being affected."*

Another stated that they trusted information from the government because "the information is correct and clear." There was a general belief among participants that the government wanted what was best for the people in Kenya and, therefore, they could largely be trusted to provide accurate information.

The high trust in government sources that was found in the interview data is also reflected in the larger survey of Kenya. As previously discussed, more than two-thirds of Kenyan respondents felt that their government was a good source of information on COVID-19 and that they had done a good job communicating about the pandemic. Similar to the data from Nigeria, high trust in government in Kenya could provide an avenue for increasing vaccine uptake even further.

### **Theme 3: Primary Reason for Vaccination was Work Requirements**

The third theme from the study in Kenya was that, among vaccinated participants, the primary reason for vaccination was for employment purposes. As one participant explained:

*"So, from where I work, it's like we were being forced by the HR to get the job. Therefore, it did not require me to know much about it. I just needed to adhere to the policy."*

Many vaccinated participants expressed that if it had not been for the government vaccination requirements, they would not have received the COVID-19 vaccine. This sentiment was exemplified by one participant who responded "nothing else" when asked if anything other than government regulation influenced them to get vaccinated.

Regardless of whether participants received primary series vaccines because it was required by their employer or because they felt it would make them more competitive in the job market, many vaccination participants did not receive the vaccine because they wanted to. Interestingly, many stated that they would not

have gotten vaccinated if they did not feel that they had to or risk unemployment.

These findings suggest that, in Kenya, vaccine mandates were especially effective. Data from the nationally representative, cross-national survey shows that Kenya had the highest vaccination rates of the three countries studied. The high vaccination rates combined with the interview data suggest that this level of uptake was achieved at least in part because of vaccine work requirements.

### **Theme 4: Participants Do Not Plan to Get COVID-19 Booster**

The final theme that emerged from the Kenyan interview data was that most participants did not plan to receive their booster vaccine. The primary reason participants expressed for their unwillingness to receive the booster was that the side effects of the primary series were painful or uncomfortable. Many expressed the belief that the benefit of the booster did not outweigh the known side effects and the booster was not required to maintain or seek employment. One participant expressed this general sentiment by saying: *"...why should I be given a lot of medicine in my body while I can do without?"*

## **Johannesburg, South Africa**

### **Theme 1: Fear of the COVID-19 Vaccine**

The most consistent theme in interviews with study participants from South Africa was fear of the COVID-19 vaccine. Specifically, many participants said that they believed that the COVID-19 vaccine kills people. A few of the participants reported concerns about other side effects of the COVID-19 vaccine, including the possibility of experiencing disability, heart attack, cramps, and headache. The following quotes are examples of comments related to the belief that the vaccine killed people:

*"I ended up not going because they were saying after vaccinating you pass away. If it did not sit well in your body, you die. So, that is why I never went to get vaccinated."*

*"They started with Johnson and Johnson. It was the popular one...but most people didn't survive."*

Interestingly, this belief held true even among those





who had received the vaccine. Several vaccinated participants stated that, even though they had been vaccinated, they thought that it was possible the vaccine would kill them.

There were a variety of explanations for how the vaccine killed people, ranging from “the injection didn’t treat them well and they passed away” to “the whites want to kill us [so] they brought us this.” Despite these differences in misinformation, the belief that the COVID-19 vaccine was not only unsafe, but deadly, was prominently and consistently held among participants.

### **Theme 2: Some COVID-19 Vaccines are Safer than Others**

The second theme that emerged from the Johannesburg interviews was that many participants in South Africa stated that they believed that some COVID-19 vaccines were safer than others. As one participant explained, “Pfizer is better because I also took Pfizer. The one for Johnson and Johnson, I refused it.” While another participant had the opposite opinion, stating, “I see Johnson maybe, because Johnson, we trust them for kids’ things [so] maybe it was the better one.”

It should be noted that there was no single vaccine that people thought was safer. For example, many participants

did not believe Pfizer was safer than Johnson & Johnson or vice versa. Instead, there were strong beliefs that one vaccine was safer than the other, but which vaccine was safest varied widely among the participants.

### **Theme 3: No Spillover Between COVID-19 Vaccine Hesitancy and Hesitancy Toward Routine Vaccinations**

The final theme that emerged among South African participants was a lack of carryover in vaccine hesitancy. Specifically, despite fears and concerns about the COVID-19 vaccine, most participants expressed strong trust in other vaccines, such as those that are part of the routine childhood vaccination schedule. When asked whether the COVID-19 vaccines affected their trust in other vaccines, one participant stated, “I will be lying if I say that I am looking at them [vaccines] a different way.”

This sentiment was echoed repeatedly by participants. The primary reason that participants still trusted other vaccines was that other vaccines were proven effective. This was expressed by one participant when they said, “Children get happy from it [childhood vaccines], the COVID one, it came with stories that are different.”



## DISCUSSION

These findings show that the primary reason for not vaccinating against COVID-19 varied between the three countries. While many participants in Nigeria cited misinformation as a common reason for not vaccinating, participants in South Africa believed more extreme misinformation, specifically that the vaccine was deadly. Kenyan participants did not report any strong or widespread reasons for not vaccinating, but interview data revealed that many participants would not have vaccinated if it were not for the work requirements implemented in their country. The wide range of concerns raised by participants in these three countries demonstrates the need for more comprehensive, context-specific, and targeted strategies.

In the Nigerian context, the prevailing misinformation narratives shared by respondents were claims that vaccines result in fatalities, cause malaria, and even possess magnetic properties. These unfounded claims act as a significant impediment to the effective dissemination of health education and indicate existing approaches to public health messaging centered on vaccination efficacy

may be inadequate. Notably, participants expressed trust in governmental sources for accurate COVID-19 information, which presents an opportunity for the government to identify prevalent misinformation trends and develop counter-messaging strategies.

Similar sentiments were shared among participants in South Africa. Most unvaccinated and vaccinated individuals during interviews felt that the COVID-19 vaccine is unsafe, while others stated that they were not getting vaccinated because of the side effects associated with the COVID-19 vaccine. Such concerns are founded, as studies have shown that a few healthy individuals developed serious side effects, such as myocarditis, following COVID-19 vaccination<sup>65</sup>. However, there are reports that support the benefits of the vaccine over the risk of developing side effects<sup>66,67</sup>. Such concerns thus necessitate targeted and consistent messaging regarding the effectiveness of vaccines and that the benefits of the vaccines are greater than the risks associated with them. Interestingly, participants believed that some vaccines were safer than others, underscoring a notable gap in



their understanding of the types of COVID-19 vaccines and how the vaccines work. As most participants said that they trust information from the government while displaying a lower degree of confidence in content from social media platforms, it appears that the government is well-positioned to communicate reliable vaccine-related information. Importantly, there was a lack of carryover in vaccine hesitancy, meaning that hesitancy toward the COVID-19 vaccine is not increasing hesitancy toward routine vaccinations. This could be because other vaccines have been available for a long time, fostering a sense of familiarity and trust among the participants. However, further investigation is warranted to explore the depth of this phenomenon to see if this holds true for the population.

In Kenya, a lack of COVID-19 vaccine choice was stated as a primary reason for vaccine hesitancy, though most participants received the COVID-19 vaccine anyway. Further exacerbating the issue was the temporary halt to administration of certain vaccines due to concerns about side effects<sup>68</sup>.

While COVID-19 vaccine uptake in Kenya was the highest of all countries studied, the reduced availability of COVID-19 vaccine options will make it challenging for the Kenyan government to efficiently vaccinate their population, leading to potential delays and increased hesitancy. The resulting scarcity can breed mistrust, as individuals might perceive these vaccines as reserved for certain segments of the population or question their effectiveness due to the disparities in access. Overcoming these challenges necessitates a concerted effort to ensure equitable access to multiple vaccine options and effective communication strategies that promote transparency and trust.

### Policy Recommendations

Based on the findings of the study and general knowledge about addressing vaccine hesitancy, we propose that governments and stakeholders in the public health sector of the study countries consider the following recommendations:

- **Actively Address Misinformation:** Conspiracy theories and misinformation surrounding the COVID-19 vaccine are a significant obstacle in countries throughout the world. This study found that

misinformation continues to be a barrier to vaccination in all three countries, but particularly in South Africa and Nigeria. It is important that governments and the public health sector in each country develop strategies to counter misinformation that are sensitive to the unique context of their country and the country-specific COVID-19 misinformation that is spreading. Due to the context and country-specific nature of addressing misinformation, we do not provide specific recommendations here. Rather, we suggest that countries study the most prominent misinformation spreading in discourse, determine how and where it is spreading, and develop a country-specific plan to fight COVID-19 misinformation. Such plans should also consider the best practices for fighting vaccine misinformation discussed in the academic literature while acknowledging that much of the literature focuses on misinformation and vaccine hesitancy in the Western world. Thus, not all lessons and best practices may be applicable.

- **Strengthen Trust in Government:** Information gained from the survey and interviews demonstrated that individuals in all three countries maintained a high level of trust in their government regarding communication about COVID-19 and the vaccine. It is likely that this trust in government is partly responsible for the high levels of vaccine uptake in each country. To maintain public trust, it is crucial to emphasize transparency, accountability, and responsiveness in government institutions, particularly in the context of public health. This can be achieved through various measures such as creating opportunities for public dialogue, sharing timely updates on vaccination progress, and openly addressing concerns or criticisms. By involving community representatives and key stakeholders in decision-making processes, inclusivity can be promoted, and public confidence can be gained in areas related to public health, including vaccination programs. Maintaining this trust in the years after the COVID-19 pandemic could also have implications for increased uptake of other vaccines and greater community commitment to future disease responses.

# REFERENCES

1. Wollburg P., Markhof Y., Kanyanda S., Zezza A. Assessing COVID-19 Vaccine Hesitancy and Barriers to Uptake in Sub-Saharan Africa. *Comm Med*. 2023;3(121). doi:10.1038/s43856-023-00330-9.
2. UNICEF. The State of the World's Children 2023. UNICEF. Published April 2023. Accessed April 2023. <https://www.unicef.org/reports/state-worlds-children-2023#SOWC>.
3. Bussink-Voorend D., Hautvast J.L., Vandeberg L., Visser O., Hulscher M.E. A systematic literature review to clarify the concept of vaccine hesitancy. *Nat Hum Behav*. 2022;1-15. doi:10.1038/s41562-022-01431-6.
4. MacDonald N.E. Vaccine hesitancy: definition, scope and determinants. *Vaccine*. 2015;33(34):4161-4164. doi:10.1016/j.vaccine.2015.04.036.
5. Edwards K.M., Hackell J.M.; AAP The Committee on Infectious Diseases, The Committee on Practice and Ambulatory Medicine. Countering Vaccine Hesitancy. *Pediatrics*. 2016;138(3):e20162146. doi:10.1542/peds.2016-2146.
6. Abubakari S.W., Workneh F., Asante K.P., et al. Determinants of COVID-19 vaccine readiness and hesitancy among adults in sub-Saharan Africa. *PLOS Glob Public Health*. 2023;3(7):e0000713. doi:10.1371/journal.pgph.0000713.
7. CRC. Coronavirus COVID-19 global cases by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University [Data set]. 2020. Accessed April 2023. <https://coronavirus.jhu.edu/map.html>.
8. Meneze N.P., Simuzingili M., Debebe Z.Y., Pivodic F., Massiah E. What is driving COVID-19 vaccine hesitancy in Sub-Saharan Africa? *World Bank Blogs*. Published August 11, 2021. Accessed April 2023. <https://blogs.worldbank.org/africacan/what-driving-covid-19-vaccine-hesitancy-sub-saharan-africa>.
9. Tobin-West C.I., Alex-Hart B.A. Identifying barriers and sustainable solution to childhood immunization in Khana local government areas of Rivers State, Nigeria. *Int Q Community Health Educ*. 2012;32(2):149-158.
10. Cooper S., van Rooyen H., Wiysonge C.S. COVID-19 vaccine hesitancy in South Africa: how can we maximize uptake of COVID-19 vaccines? *Expert Rev Vaccines*. 2021;20(8):921-933. doi:10.1080/14760584.2021.1949291.
11. Oduwole E.O., Mahomed H., Laurenzi C.A., Larson H.J., Wiysonge C.S. Point-of-care vaccinators' perceptions of vaccine hesitancy drivers: A qualitative study from the Cape Metropolitan District, South Africa. *Vaccine*. 2021;39(39):5506-5512. doi:10.1016/j.vaccine.2021.08.054.
12. Burnett R.J., von Gogh L.J., Moloi M.H., François G. A profile of anti-vaccination lobbying on the South African internet, 2011-2013. *S Afr Med J*. 2015;105(11):922. doi:10.7196/samj.2015.v105i11.9654.
13. Ophori E.A., Tula M.Y., Azih A.V., Okojie R., Ikpo P.E. Current trends of immunization in Nigeria: Prospect and challenges. *Trop Med Health*. 2014;42(2):67-75. doi:10.2149/tmh.2013-13.
14. Ahmad K. Drug company sued over research trial in Nigeria. *Lancet*. 2001;358(9284):815.

15. Jegede A.S. What led to the Nigerian boycott of the polio vaccination campaign? *PLoS Med.* 2007;4(3):e73. doi:10.1371/journal.pmed.0040073.
16. Mutombo P.N., Fallah M.P., Munodawafa D., et al. COVID-19 Vaccine Hesitancy in Africa: A Call to Action. *Lancet Glob Health.* 2022;10(3):E320-E321.
17. Matos C.C.S.A., Gonçalves B.A., Couto M.T. Vaccine hesitancy in the global south: Towards a critical perspective on global health. *Glob Public Health.* 2022;17(6):1087-1098. doi:10.1080/17441692.2021.1912138.
18. Tilley H. COVID-19 across Africa: Colonial hangovers, racial hierarchies, and medical histories. *J West Afr Hist.* 2020;6(2):155-179.
19. James M.V., Lees S.S. "Are You Sure It's Not the Corona Vaccine?" An Ebola Vaccine Trial During COVID-19 in DRC. *Med Anthro.* 2022;41(5):503-517. doi:10.1080/01459740.2022.2097908.
20. Lowes S., Montero E. The legacy of colonial medicine in Central Africa. *Amer Econ Rev.* 2021;111(4):1284-1314.
21. Singh P., Dhalaria P., Kashyap S., et al. Strategies to overcome vaccine hesitancy: a systematic review. *Systematic Reviews.* 2022;11(78). doi:10.1186/s13643-022-01941-4.
22. Akwataghibe N.N., Ogunsola E.A., Broerse J.E.W., et al. Exploring factors influencing immunization utilization in Nigeria—A mixed methods study. *Front Public Health.* 2019;7. doi:10.3389/fpubh.2019.00392.
23. Obadare E. A crisis of trust: History, politics, religion and the polio controversy in Northern Nigeria. *Patterns Prejudice.* 2005;39(3):265-284. doi:10.1080/00313220500198185.
24. Lenzer J. Secret report surfaces showing that Pfizer was at fault in Nigerian drug tests. *BMJ.* 2006;332(7552):1233. doi:10.1136/bmj.332.7552.1233-a.
25. Tesema G.A., Tessema Z.T., Tamirat K.S., et al. Complete basic childhood vaccination and associated factors among children aged 12–23 months in East Africa: A multilevel analysis of recent demographic and health surveys. *BMC Public Health.* 2020;20:1837. doi:10.1186/s12889-020-09965-y.
26. Vermandere H., Naanyu V., Mabeya H., et al. Determinants of Acceptance and Subsequent Uptake of the HPV Vaccine in a Cohort in Eldoret, Kenya. *PLoS ONE.* 2014;9(10):e109353. doi:10.1371/journal.pone.0109353.
27. Kolek C.O., Opanga S.A., Okalebo F., et al. Impact of parental knowledge and beliefs on HPV vaccine hesitancy in Kenya-Findings and implications. *Vaccines.* 2022;10(8):1185. doi:10.3390/vaccines10081185.
28. Njuguna D.W., Mahrouseh N., Isowamwen O.V., Varga O. Knowledge, attitude and practice of main stakeholders towards human papillomavirus infection and vaccination in Mombasa and Tana-River counties in Kenya: A qualitative study. *Vaccines.* 2021;9(10):1099. doi:10.3390/vaccines9101099.
29. Reddy K.P., Fitzmaurice K.P., Scott J.A., et al. Clinical outcomes and cost-effectiveness of COVID-19 vaccination in South Africa. *Nat Commun.* 2021;12(6238). doi:10.1038/s41467-021-26557-5.



30. Burger R., Kohler T., Golos A.M., et al. Longitudinal changes in COVID-19 vaccination intent among South African adults: evidence from the NIDS-CRAM panel survey, February to May 2021. *BMC Public Health*. 2022;22(422). doi:10.1186/s12889-022-12826-5.
31. Engelbrecht M., Heunis C., Kigozi G. COVID-19 vaccine hesitancy in South Africa: Lessons for future pandemics. *Int J Environ Res Public Health*. 2022;19:6694. doi:10.3390/ijerph19126694.
32. Steenberg B., Sokani A., Myburgh N., Mutevedzi P., Madhi S.A. COVID-19 vaccination rollout: Aspects of hesitancy in South Africa. *Vaccines*. 2023;11(2):407. doi:10.3390/vaccines11020407.
33. Africa Centers for Disease Control and Prevention. COVID-19 Vaccination. Published 2023. Accessed April 2023. <https://africacdc.org/covid-19-vaccination/>.
34. Oluwatosin O.A., Abiodun O., Okafor N. COVID-19 vaccination in Nigeria: A rapid review of vaccine acceptance rate and the associated factors. *PLoS ONE*. 2022;17(5):e0267691. doi:10.1371/journal.pone.0267691.
35. Chutiyami M., Cheong A.M.Y., Salihu D., et al. COVID-19 pandemic and overall mental health of healthcare professionals globally: A meta-review of systematic reviews. *Front Psychiatry*. 2022;12:804525. doi:10.3389/fpsy.2021.804525.
36. Adigwe O.P. COVID-19 vaccine hesitancy and willingness to pay: Emergent factors from a cross-sectional study in Nigeria. *Vaccine:X*. 2021;9:100112. doi:10.1016/j.jvax.2021.100112.
37. Africa Centers for Disease Control and Prevention. COVID-19 Vaccine Perceptions: A 15-Country Study. Published February 2021. Accessed April 2023. <https://africacdc.org/download/covid-19-vaccine-perceptions-a-15-country-study/>.
38. Rego T.R., Kenney B., Ngugi A.K., et al. COVID-19 vaccination refusal trends in Kenya over 2021. *Vaccine*. 2023;41(5):1161-1168. doi:10.1016/j.vaccine.2022.12.014.
39. Shah J., Abeid A., Sharma K., et al. Perceptions and Knowledge towards COVID-19 vaccine hesitancy among a subpopulation of adults in Kenya: An English survey at six healthcare facilities. *Vaccines*. 2022;19(5):705. doi:10.3390/vaccines19050705.
40. Mohiddin A., Temmerman M. COVID-19 exposes weaknesses in Kenya's healthcare system. And what can be done. *The Conversation*. Published 2020. Accessed April 2023. <https://theconversation.com/covid-19-exposes-weaknesses-in-kenyas-healthcare-system-and-what-can-be-done-141573>.
41. de Figueiredo A., Temfack E., Tajudeen R., Larson H.J. Declining trends in vaccine confidence across sub-Saharan Africa: A large-scale cross-sectional modeling study. *Hum Vaccin Immunother*. 2023;19(1). doi:10.1080/21645515.2023.2213117.
42. World Health Organization. Immunization Agenda 2030: A Global Strategy to Leave No One Behind. WHO. Published 2020. Accessed April 2023. <https://www.who.int/teams/immunization-vaccines-and-biologicals/strategies/ia2030>.

43. Fine P., Eames K., Heymann D.L. "Herd immunity": A rough guide. *Clin Infect Dis*. 2011;52(7):911-916. doi:10.1093/cid/cir007.
44. Dubé E., Laberge C., Guay M., et al. Vaccine hesitancy. *Hum Vaccin Immunother*. 2013;9(8):1763-1773. doi:10.4161/hv.24657.
45. Parent du Châtelet I., Antona D., Freymuth F., et al. Spotlight on measles 2010: Update on the ongoing measles outbreak in France, 2008-2010. *Euro Surveill*. 2010;15(36):19644.
46. De Serres G., Markowski F., Toth E., et al. Largest measles epidemic in North America in a decade—Quebec, Canada, 2011: Contribution of susceptibility, serendipity, and superspreading events. *J Infect Dis*. 2013;207(6):990-998. doi:10.1093/infdis/jit004.
47. Falagas M.E., Zarkadoulia E. Factors associated with suboptimal compliance to vaccinations in children in developed countries: A systematic review. *Curr Med Res Opin*. 2008;24(6):1719-1741. doi:10.1185/03007990802136254.
48. Schoub B.D. Lessons from the 2009 measles epidemic in South Africa. *S Afr Med J*. 2011;101(8):519.
49. Siegfried N., Wiysonge C.S., Pienaar D. Too little, too late: Measles epidemic in South Africa. *Lancet*. 2010;376(9736):160. doi:10.1016/S0140-6736(10)61050-5.
50. Ghinai I., Willott C., Dadari I., Larson H.J. Listening to the rumours: What the northern Nigeria polio vaccine boycott can tell us ten years on. *Glob Public Health*. 2013;8(10):1138-1150. doi:10.1080/17441692.2013.859720.
51. Tanne J.H. Polio emergency declared in New York State over virus found in wastewater. *BMJ*. 2022;378:o2211. doi:10.1136/bmj.o2211.
52. Abbasi J. Amid Ohio measles outbreak, new global report warns of decreased vaccination during COVID-19 pandemic. *JAMA*. 2023;329(1):9-11. doi:10.1001/jama.2022.24003.
53. Kaufmann J.R., Feldbaum H. Diplomacy and the polio immunization boycott in Northern Nigeria. *Health Aff (Millwood)*. 2009;28(4):1091-1101. doi:10.1377/hlthaff.28.4.1091.
54. Sartorius B., Cohen C., Chirwa T., et al. Identifying high-risk areas for sporadic measles outbreaks: Lessons from South Africa. *Bull World Health Organ*. 2013;91:174-183. doi:10.2471/BLT.12.109421.
55. Dimitrova A., Carrasco-Escobar G., Richardson R., Benmarhnia T. Essential childhood immunization in 43 low- and middle-income countries: Analysis of spatial trends and socioeconomic inequalities in vaccine coverage. *PLoS Med*. 2023;20(1):e1004166. doi:10.1371/journal.pmed.1004166.
56. Krause P.R., Fleming T.R., Peto R., et al. Considerations in boosting COVID-19 vaccine immune responses. *Lancet*. 2021;398(10308):1377-1380. doi:10.1016/S0140-6736(21)02046-8.
57. Callaway E. COVID vaccine boosters: The most important questions. *Nature*. 2021;596(7871):178-180. doi:10.1038/d41586-021-02046-9.

58. D'Souza G., Dowdy D. Rethinking herd immunity and the Covid-19 response end game. Johns Hopkins University Bloomberg School of Public Health blog. Published September 13, 2021. Accessed April 2023. <https://www.jhsph.edu/covid-19/>.
59. Njoga E.O., Awoyomi O.J., Onwumere-Idolor O.S., et al. Persisting vaccine hesitancy in Africa: The whys, global public health consequences and ways-out - COVID-19 vaccination acceptance rates as case-in-point. *Vaccines*. 2022;10(11):1934. doi:10.3390/vaccines10111934.
60. Uwishema O., Adriano L.F., Chalhoub E., et al. Bird flu outbreak amidst COVID-19 pandemic in South Africa: Efforts and challenges at hand. *J Med Virol*. 2021;93(10):5676-5679. doi:10.1002/jmv.27224.
61. Aborode A.T., David K.B., Uwishema O., et al. Fighting COVID-19 at the expense of malaria in Africa: The consequences and policy options. *Am J Trop Med Hyg*. 2021;104(1):26-29. doi:10.4269/ajtmh.20-1351.
62. Aborode A.T., Tsagkaris C., Jain S., et al. Ebola outbreak amid COVID-19 in the Republic of Guinea: Priorities for achieving control. *Am J Trop Med Hyg*. 2021;104(6):1966-1969. doi:10.4269/ajtmh.21-0436.
63. UNICEF. COVID-19 pandemic leads to major backsliding in childhood vaccinations: New WHO, UNICEF data. Accessed April 13, 2023. <https://www.unicef.org/press-releases/covid-19-pandemic-leads-major-backsliding-childhood-vaccinations-new-who-unicef-data>.
64. Centers for Disease Control and Prevention. Measles in Africa. Updated 2023. Accessed April 13, 2023. <https://wwwnc.cdc.gov/travel/notices/watch/measles-africa>.
65. Deb A., Abdelmalek J., Iwuji K., et al. Acute myocardial injury following COVID-19 vaccination: A case report and review of current evidence from vaccine adverse events reporting system database. *J Prim Care Community Health*. 2021;12:21501327211029230. doi:10.1177/21501327211029230.
66. Lau C.L., Mayfield H.J., Sinclair J.E., et al. Risk-benefit analysis of the AstraZeneca COVID-19 vaccine in Australia using a Bayesian network modeling framework. *Vaccine*. 2021;39(46):7429-7440. doi:10.1016/j.vaccine.2021.10.079.
67. Funk P.R., Yogurtcu O.N., Forshee R.A., et al. Benefit-risk assessment of COVID-19 vaccine, mRNA (Comirnaty) for age 16-29 years. *Vaccine*. 2022;40(20):2781-2789. doi:10.1016/j.vaccine.2022.03.030.
68. Greinacher A., Thiele T., Warkentin T.E., et al. Thrombotic thrombocytopenia after ChAdOx1 nCov-19 vaccination. *N Engl J Med*. 2021;384(22):2092-2101. doi:10.1056/NEJMoa2104840.





**President George H.W. Bush & Lt. Gen. Brent Scowcroft**

"We live in an era of tremendous global change. Policy makers will confront unfamiliar challenges, new opportunities, and difficult choices in the years ahead. I look forward to the Scowcroft Institute supporting policy-relevant research that will contribute to our understanding of these changes, illuminating their implications for our national interest, and fostering lively exchanges about how the United States can help shape a world that best serves our interests and reflects our values."

**— Lt. Gen. Brent Scowcroft, USAF (Ret.)**



## *In Memoriam*

### **Lieutenant General Brent Scowcroft**

(March 19, 1925 - August 6, 2020)



*The George H.W. Bush Presidential Library & Museum and The Bush School of Government & Public Service at Texas A&M University, College Station, Texas, USA*

The views expressed and opinions presented in this paper are those of the Scowcroft Institute of International Affairs and do not necessarily reflect the positions of The Bush School of Government & Public Service or Texas A&M University.



## Scowcroft Institute of International Affairs

THE BUSH SCHOOL • TEXAS A&M UNIVERSITY



TEXAS A&M UNIVERSITY  
The Bush School  
of Government & Public Service



TEXAS A&M  
UNIVERSITY®





TEXAS A&M UNIVERSITY  
The Bush School  
of Government & Public Service

**Scowcroft Institute  
of International Affairs**  
THE BUSH SCHOOL • TEXAS A&M UNIVERSITY



**TEXAS A&M**  
UNIVERSITY®