



**Vaccine
Acceptance
& Demand**

 SABIN VACCINE INSTITUTE

**PERCEPTIONS
AROUND VACCINES
& DEMAND
GENERATION:
THREE CASE
STUDIES IN INDIA,
KENYA, AND
NIGERIA**

**INITIAL FINDINGS FROM THE 2021-2022 SOCIAL
AND BEHAVIORAL RESEARCH GRANTS PROGRAM**

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A PRIMER FOR DECISION-MAKERS AND IMPLEMENTERS

Early narratives of the global COVID-19 pandemic erroneously described higher levels of COVID-19 vaccine acceptance and demand in the Global North and suggested that achieving high coverage in the Global South would be hindered due to vaccine hesitancy and a lack of willingness to vaccinate. In fact, the disparities in demand and coverage proved to be a function of barriers hindering vaccination access and rollout (i.e., vaccine production, affordability, allocation, and deployment)¹. This was most notably seen in Africa. A World Health Organization (WHO) assessment gauging global COVID-19 vaccination readiness, inclusive of the key areas of logistics quality and performance, scored Africa with an average preparedness score of 33% - nearly 50 percentage points below the desired benchmark². Focus on “vaccine hesitancy” as a driver of low vaccination coverage can miss the nuances of the factors that drive vaccination demand and uptake, which include barriers to the supply and accessibility of vaccines.

It is important to recognize that willingness or intent to vaccinate cannot translate into vaccination without strong health systems and sufficient resources in place to coordinate and enable widespread vaccination program rollout. Willingness to vaccinate is often high in LMICs. An analysis of COVID-19 vaccine acceptance amongst over 44,000 individuals across 10 LMICs in Asia, Africa and South America, Russia (an upper-middle-income country) and the United States, found higher willingness to vaccinate within LMIC populations (80.3%), as compared to the U.S. and Russia (64.6% and 30.4%, respectively)³. Evidence would suggest that prioritizing vaccine distribution to the Global South should yield high returns in advancing global immunization coverage. However, challenges towards actioning intention to vaccinate are related to the distinct but correlated issues of vaccine supply and access. For example, despite motivation to vaccinate, individuals from rural settings living on daily wages may not be able to afford the required hours-long transport to a vaccination facility.

In May 2023, the WHO declared that COVID-19 is no longer a public health emergency, however vaccination efforts will not cease⁴. Just weeks prior, UNICEF released its 2023 State of the World’s Children Report, sharing that over the last three years, persistent inequities and COVID-19 pandemic-related disruptions in health service delivery resulted in at least 67 million children being under-immunized and defenseless against vaccine-preventable diseases⁵.

1. Wouters, O., Shadlen, K., Salcher-Konrad, M., Pollard, A., Larson, H., Teerawattananon, Y., & et al. (2021). Challenges in ensuring global access to COVID-19 vaccines: Production, affordability, allocation, and deployment. *Lancet*, 397(10278), 1023–1034. [https://doi.org/10.1016/S0140-6736\(21\)00306-8](https://doi.org/10.1016/S0140-6736(21)00306-8)

2. Nyantakyi, E., & Munemo, J. (2021). Going the last mile: Improving sub-Saharan Africa’s logistics could be the key to successful vaccine delivery (pp. 17–19) [Finance & Development]. <https://www.imf.org/-/media/Files/Publications/Fandd/Article/2021/December/Nyantakyi.ashx>

3. Arce, J., & et al. (2021). COVID-19 vaccine acceptance and hesitancy in low- and middle-income countries. *Nature Medicine*, 27, 1385–139.

4. <https://www.devex.com/news/who-declares-the-covid-19-global-emergency-over-105479>

5. United Nations Children’s Fund, *The State of the World’s Children 2023: For every child, vaccination*, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.

Demand generation is a key component of overall strategies to engage communities and increase uptake of vaccination services for both children and adults, particularly among vulnerable groups. Evidence has shown that behavior change interventions can enhance vaccine demand and uptake; however, those interventions should be responsive to the local context in which behaviors evolve.

Launched in 2019, Sabin Vaccine Institute's Social and Behavioral Research Grants Program supports a global network of interdisciplinary and multisectoral researchers to investigate the social and behavioral drivers behind vaccination acceptance, demand, delivery, and decision-making. The program supports the design, piloting and testing of community-informed interventions in LMICs in order to elevate locally contextualized evidence that can be used to support vaccination uptake.

This case study report includes three of the ten projects from the third cohort of Sabin's Grants Program, which conducted research in 2021-2022, during the COVID-19 pandemic. The studies in this report focus on both routine childhood immunization and COVID-19 vaccination demand generation in the context of the COVID-19 pandemic. Considering these three case studies together highlights existing barriers to and opportunities for vaccination demand generation during a significant worldwide health emergency. Understanding the implications of this work will inform future pandemic and other emergency response planning efforts.

Approaches for Generating Localized Evidence

The three collaborative projects detailed within this report each designed and implemented quantitative surveys with or without complementary qualitative data collection within marginalized communities in three different regions (East Africa, West Africa, South Asia):

- [Ashoka University, Centre for Social and Behaviour Change \(CSBC\)](#): *COVID-19 Vaccine Hesitancy in Rural Uttar Pradesh and Bihar, India*;
- [University of California, Los Angeles](#), with partners from the [Kenya Medical Research Institute](#) and [Innovations for Poverty Action](#): *Effect of COVID-19 Pandemic on Routine Childhood Vaccination in Kenya*; and
- [Women Advocates for Vaccine Access](#): *Targeted Messaging for COVID-19 Vaccine Acceptance in Nigeria: the TM-COVAC study*.

Emerging Insights for Community Action

All three studies found that attitudes around vaccination were generally favorable, both for essential childhood immunization and for COVID-19 vaccines. Challenges with vaccine availability was found to be a barrier for uptake of immunization for both children and adults (routine and pandemic-related), contributing further evidence that building demand for vaccination should be accompanied by ensuring sufficient supply and readiness throughout the value chain of vaccine delivery. Additional insights from synthesis of these case studies include:

- Demand for childhood vaccination, including childhood vaccination against COVID-19, appears favorable in these contexts;
- Ensuring supply, access and effective vaccination service delivery should work alongside increasing demand for vaccination;

- Funding and resources are needed to support the identification and engagement of trusted community messengers for vaccination campaigns;
- Vaccination campaigns should be focused on reaching those more likely to be marginalized and distanced from traditional health services (e.g, persons with mobility challenges, stigmatized health or social status, ethnic minorities);
- Leveraging digital technologies such as SMS reminders can be useful in some contexts;
- Vaccination campaigns should be designed at the community-level to ensure responsiveness to and alignment with community needs;
- Outreach and messaging should be co-designed with community leaders and influencers (both internal and external to the health system) to address community-specific concerns about vaccination;
- Integrate communication and vaccination demand generation with vaccine delivery investments, programs, and services;
- Consider vaccination “opt-out” rather than “opt-in” programs within antenatal care programs;
- Messaging should address vaccine safety, particularly for high-risk groups (e.g., pregnant women); and
- Leverage existing community resources to design, build, and maintain sustainable messaging strategies.

Two of the three projects utilized the WHO Behavioral and Social Drivers of Vaccination (BeSD) Framework (Kenya, Nigeria), and each study considered vaccination demand and, in some cases, availability for essential childhood vaccination and pandemic vaccines, for both adults and children, during an active pandemic emergency. Commonalities in study approach emerged across all three case studies which surface insights around Community and Stakeholder Engagement and overall Research Design are found in Table 1.

Community & Stakeholder Engagement	Research Design
Building and maintaining trust and buy-in with community cohorts allow for rapid design and implementation of studies and interventions	Data collected using an established framework, such as the BeSD Framework, allows for comparison across contexts
Working with local community leaders is essential to identifying trusted messengers	Design studies that differentiate intention to vaccinate as separate from ability to access vaccination
Human Centered Design methods can contribute to community trust and ownership in an intervention	Utilizing mixed method designs can help elevate and incorporate community voices in a robust, comprehensive study design
	Mobile phones/devices can streamline data collection and management
	Cohort studies can be a useful design to evaluate changes in perception and behavior around vaccination across multiple doses and multiple vaccines

Informing & Investing in Vaccine Confident Communities to Drive Vaccine Demand & Uptake

The goals of sharing these initial findings are to:



Provide researchers and program implementers in LMICs with blueprints of successful research methodologies and approaches for piloting and evaluating strategies to increase vaccine confidence and acceptance in their communities.



Demonstrate the value of including these types of approaches and perspectives to sub-national, national, and global funders and policy and program decision-makers.

Considered together, these three projects have brought forth actionable insights for vaccination policy, programs, and practice. While individual, contextually-relevant recommendations are outlined in detail in each country's case study, broad insights have been synthesized from across all three case studies, as outlined.

The case studies demonstrate community-centric approaches and/or localized solutions for health system and provider readiness for vaccine introduction and for public trust building around vaccination to enable optimal vaccine acceptance, demand, delivery, and uptake. These early learnings aim to inspire and inform similar methodologies that can and should be used to continue generating critical knowledge and solutions to strengthen vaccine confidence in LMICs. One size does not fit all, and resources should focus on understanding effective approaches to design context-appropriate messaging and policy. These strategies should be embraced universally to drive vaccine uptake amongst historically marginalized social groups.

CASE STUDY FROM UTTAR PRADESH AND BIHAR, INDIA

COVID-19 VACCINE HESITANCY IN RURAL UTTAR PRADESH AND BIHAR, INDIA



This study was conducted in Uttar Pradesh and Bihar, India between January and December 2022. It was implemented by the Centre for Social and Behaviour Change, Ashoka University, with funding from the Sabin Vaccine Institute. The project received ethics approval from the Institutional Review Board (IRB) at Ashoka University. Investigators: Dr. Sharon Barnhardt, Dr. Sneha Shashidhara, Dr. Pavan Mimidi, & Gautam Patel

KEY TAKEAWAYS

- While parents' vaccination status significantly influences their decision to get their children vaccinated against COVID-19, there was an overall high likelihood of parents' deciding to vaccinate their children across parental vaccination groups (fully vaccinated, partially vaccinated, unvaccinated)
- Key motivations for vaccination against COVID-19 were very similar amongst vaccinated individuals, regardless of number of doses received.
- Being pregnant, currently breastfeeding, and having pre-existing chronic health conditions emerged as critical barriers to vaccination.
- Misinformation around whether people with underlying health conditions should/not be vaccinated was a better explanation of delayed vaccination or vaccination refusal than disbelief in the COVID-19 pandemic or the efficacy of the vaccine, suggesting credible information provision as an important area of policy intervention.

IN CONTEXT

In addition to a supply-side bottleneck for COVID-19 vaccines, there is anecdotal evidence of hesitancy toward COVID-19 vaccines in India. However, not enough quantitative evidence exists to establish the level of vaccine acceptance or its contributing beliefs and barriers, especially in rural India. Large-scale online surveys across different states in India have been deployed as rapid assessments of vaccine hesitancy levels, using a limited, short categorical list of barriers to vaccine acceptance and are unable to report adequate respondent demographic information.

Oftentimes these surveys are implemented through social media platforms, such as Facebook, which limit its sampling frame to consist exclusively of Facebook users and thus excluding less privileged – and often marginalized - subgroups. A 2019 United Nations Development Program report on social media usage in India shared that Facebook is used primarily by urban-male-youth, casting doubts over how survey results may be representative of other more demographic groups in rural India (e.g., women, senior citizens, illiterate individuals), including digitally marginalized populations who have historically had more limited access to the internet and technology. In order to fill crucial knowledge gaps that will help construct strategies for the final mile delivery and communication of the COVID-19 vaccination program, there is an urgent need to design and field an in-person survey to reach the missed populations and those least represented in the online surveys.

1. Singh, R. K. S. (2021, June 21). Vaccine hesitancy puts India's gains against virus at risk. AP News. <https://apnews.com/article/india-science-coronavirus-pandemic-health-8dd07a1f6bb56f4352130307f843458f>
2. Mishra, A. (2021, June 23). Vaccine hesitancy, Covid myths rife in UP's Raebareli. India Today. <https://www.indiatoday.in/coronavirus-outbreak/story/vaccine-hesitancy-covid-myths-up-raebareli-ground-report-1818577-2021-06-23>
3. Sinha, B. C. (2021, July 1). Covid India: Women in rural Bihar hesitant to take vaccines. BBC News. <https://www.bbc.com/news/world-asia-india-57551345>
4. Mashal, M., & Kumar, H. (2021, July 11). One Village Quelled the Virus. The Next Was Overrun. It's a Bad Sign for India. The New York Times. <https://www.nytimes.com/2021/07/11/world/asia/covid-india.html>
5. IANS 2021
6. Prashnam 2021
7. LocalCircles 2021
8. UNITED NATIONS VOLUNTEERS INDIA OFFICE. 2019. "Social Media For Youth & Civic Engagement In India". United Nations Development Programme. <https://www.in.undp.org/content/dam/india/docs/UNV/Publications/SOCIAL%20MEDIA%20REPORT.pdf>.

APPROACH

With the study intending to focus on rural populations, the Center for Social and Behavioral Change (CSBC) chose the states of Uttar Pradesh and Bihar as they rank first and second in terms of the highest rural population in India in absolute terms. Together with a population of 247.18 million people, these two states contain 29.7% of India's rural population⁹. These states have historically lagged national averages in terms of development, and they continue to face significant socio-economic challenges. Within rural populations of the states of Uttar Pradesh and Bihar, India, a team from CSBC within Ashoka University aimed to comprehensively characterize the following:

- Attitudes toward the COVID-19 vaccine and supply and demand-side barriers to vaccination
- Problems faced by partially vaccinated individuals in obtaining the second dose of the vaccine, and
- Attitudes of both vaccinated and unvaccinated parents toward vaccinating their children against COVID-19.

To meet these objectives, between April and May 2022, the investigators conducted:

- A quasi-representative, door-to-door survey spanning 20 districts across Uttar Pradesh and 12 districts in Bihar amongst 6,319 adults, with data collected digitally on a mobile phone application. Within each state, districts were sampled to maximize the unvaccinated rural population.
- A nested study, at the time of the survey, to investigate change in parental intention to vaccinate their children after watching one of three informational videos in Hindi: two intervention videos depicting the importance of vaccinating children against COVID-19 using two different appeals (emotional vs rational), and one control video showing a United Nations-sponsored animated Hindi video describing the role of forests in climate change.

IMPLEMENTATION STAGES

Survey Sample Size, Development and Implementation

The survey sample size was estimated using population figures from the 2011 Census of India and vaccination statistics from the Ministry of Health and Family Welfare's Co-WIN dashboard, as of March 2021. Within each sampled district, eight villages were randomly sampled from the Census listing. The target enrolment within each village was four adult men and four adult women from each vaccination status category (unvaccinated, partially vaccinated [people with one dose of the vaccine], and fully vaccinated). The unvaccinated population, which accounted for less than one-third of the population at the time of the survey, was intentionally oversampled to ensure a comprehensive understanding of vaccine hesitancy in this setting.

9. Census of India, 2011. <https://censusindia.gov.in/nada/index.php/catalog/42617>

The 30-minute survey was conducted in Hindi and designed to measure reasons behind non-compliance with vaccination programs, distinguishing clearly between the intention to get vaccinated and the capacity/agency to get vaccinated. Participants were not incentivized in any manner.

Once vaccination status was established, trained enumerators asked the unvaccinated individuals closed questions about their vaccination intention and anticipated and experienced barriers to vaccination. Unvaccinated respondents also answered two open-ended questions: *What was the reason for not taking the vaccine?* and *What would convince [them] to take the vaccine?* A surveyor read the question and requested the respondent to speak into the smartphone to record their response.

All respondents (vaccinated and unvaccinated) were provided a curated list of nine common barriers to COVID vaccination, drawn from the developed for the University of Maryland's COVID-19 trends and impact survey in partnership with Meta¹⁰, and ask which barriers they faced, if any, when they tried to get vaccinated. The nine barriers included:

- Concerned about side effects,
- Plan to 'wait and see if it's safe',
- Others need it more,
- Don't like vaccines,
- Don't know if vaccine will work,
- Don't believe I need a vaccine,
- Concerned about cost,
- Against religious beliefs, and
- Other.

Additionally, the instrument covered knowledge about the COVID vaccine, COVID-19-appropriate behavior, trust in various information sources, risk perceptions around the vaccine (specifically in the context of vulnerable populations), and demographics.

Video Creation and Implementation

Quantitative surveys were conducted with 42 health providers and FCHVs involved in COVID-19 vaccination-related activities to assess vaccine readiness and acceptance in rural Sarlahi District. Healthcare providers included medical doctors, health assistants, nurses, assistant nurses, or midwives at health facilities in the study area. FCHVs are locally resident women who promote and distribute maternal and child health services in their communities.



10. University of Maryland's COVID-19 trends and impact survey in partnership with Facebook (Fan et al., 2020).

Table 1: Description of the video experimental arms for the vaccinated participants

Video	Assigned Arm	Description	Time
1	Control	A UN sponsored animated video describing the role of forests in climate change.	3 min 7 sec
2	T1 - Emotional Approach: Child vaccination	A conversation between a brother and a sister, where the brother, using a story of a family where children get COVID-19, convinces his sister to vaccinate her children. The tone is emotional and touches upon severe disease in children, cost of hospitalization, and the child vaccine being half the dose.	3 min 16 sec
3	T2 - Rational Approach: Child vaccination	A conversation between a brother and a sister where the brother convinces his sister to vaccinate her children using various facts and his expertise and experience as a frontline health worker. The tone is rational and touches upon severe disease in children, cost of hospitalization, and the child vaccine being half the dose.	2 min 25 sec

All of the unvaccinated participants were randomly assigned to seven experimental arms (i.e., one control arm and six intervention arms). Details of these are shown in Table 2. T1 and T2 are the same as shown to the vaccinated participants with one change. The video explicitly mentions that the adults are vaccinated and discusses children’s vaccination for the vaccinated participants. In contrast, that line in each of the videos was removed for the unvaccinated participants.

Table 2: Description of the video experimental arms for the unvaccinated participants

Video	Assigned Arm	Description	Time
1	Control	A UN sponsored animated video describing the role of forests in climate change.	3 min 7 secs
2	T1 - Emotional Approach: Child vaccination	Same as T1 for the vaccinated participants, without explicit mention of the adults being vaccinated.	3 min 16 sec
3	T2 - Rational Approach: Child vaccination	Same as T2 for the vaccinated participants, without explicit mention of the adults being vaccinated.	2 min 25 sec
4	T3 - Fear induce approach: Adult Vaccination	A short video inducing fear about COVID-19 by providing statistics of infection and death. It also mentions hospitalization and intubation, along with relevant visuals.	0 min 48 sec
5	T4 - Rational Approach: Adult Vaccination	A short video that compares COVID-19 to other fatal diseases and discusses how unlike them, severe COVID-19 is easily preventable by getting vaccinated; along with relevant visuals.	0 min 57 sec

6	T5 - Emotional Approach: Adult vaccination	An animated video that shows the journeys of two women, one vaccinated and another not. The vaccinated woman's family goes on to prosper, while the other woman dies due to infection, destroying future prospects of the family and children.	2 min 42 sec
7	T6 - Emotional approach: Mask-wearing	An animated video that shows the journey of a family where one unmasked meeting leads to an older woman dying of COVID-19.	2 min 29 sec

The treatment video concepts were all developed in-house by CSBC. Videos T1, T2, T3 and T4 were scripted in Hindi with the assistance of a freelance copywriter. Videos T5 and T6 were developed through an education platform with multimedia and narrative capabilities.

Findings

Of the 6,319 adults surveyed, 36.2% (n=2,288) were unvaccinated, 32.3% (n=2,042) received one COVID-19 vaccine dose, and 31.5% (n=1,989) were fully vaccinated.

Adults' attitudes and decision-making about personally receiving COVID-19 vaccine(s)

Of the unvaccinated individuals:

- 41.8% reported they did not try to get the vaccine
- 58.2% shared they did tried to get the vaccine, of which 67% said they would definitely take the vaccine and 48% said they would get the vaccine immediately (versus 'within the next 30 days', 'between one and three months', between three and six months', between six and 12 months', and 'never').

Table 3 contains the proportions of the sample population who held the share attitude or perception, disaggregated by vaccination status.

Table 3. Attitudes and perceptions

Attitudes and Perceptions (N=6,319)	Unvaccinated (n=2,288)	Partially Vaccinated (n=2,042)	Fully Vaccinated (n=1,989)
Strongly agree with national mandate for COVID-19 vaccination:			
In general	93%	95%	95%
For schools	93%	95%	95%
Vaccine protects from infection	91%	94%	94%
Vaccine protects from hospitalization	86%	87%	86%
Considers taking second dose on time as absolutely essential	88%	92%	96%
Definitely agree people should wear masks even after vaccination	64%	70%	74%
Definitely agree children can get COVID-19	64%	71%	75%

Recommend the vaccine to:			
Pregnant women	60%	66%	67%
Breastfeeding women	65%	69%	72%
Diabetics	54%	54%	68%
Tuberculosis patients	52%	54%	58%
Cancer patients	48%	49%	53%
Completely likely to vaccinate children	86%	90%	93%
Trust the following as an information source:			
Health workers	93%	94%	95%
Indian scientists	91%	94%	95%
WHO	89%	91%	93%
Government officials	93%	95%	96%
Politicians	74%	73%	67%
Journalists	84%	85%	83%
Friends and family	94%	94%	94%
Religious leaders	76%	75%	70%

Supply and demand-side barriers to COVID-19 vaccination

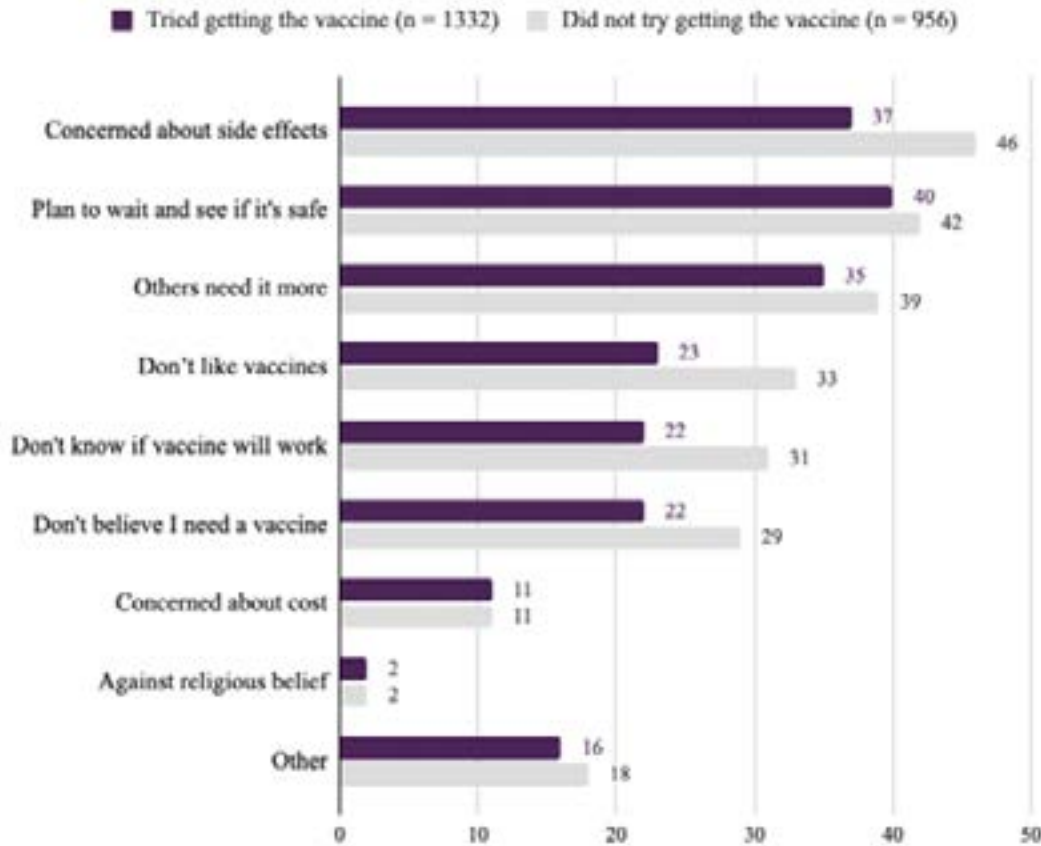
The two main reasons that unvaccinated respondents shared for not being vaccinated were due to having a health issue (33%) and/or being pregnant or breastfeeding (22%). Despite over half of the responses mentioning health, only 98 (4.3%) respondents mentioned having consulted with a doctor. Thus, many of these holdouts may be due to misinformation about eligibility rather than having genuine medical complications barring COVID-19 vaccination.

Other reasons involved identification-related issues (12%), such as not having a valid government identification card which is required for vaccination in India; and vaccine-related perceptions (2%), such as disliking the vaccine or not considering it necessary and/or being afraid of vaccination.

Respondents most frequently discussed three of the nine most common barriers to vaccination, developed for the University of Maryland's COVID-19 trends and impact survey: side effects, wanting to 'wait and watch' before taking the vaccine, and the perception that others needed it more. The least common barrier was religious beliefs. See Figure 1 for common barriers.



FIGURE 1: % OF RESPONDENTS WHO INDICATED A REASON AS CONTRIBUTING TO THEIR DECISION TO NOT TAKE THE VACCINE (n=2288 UNVACCINATED INDIVIDUALS)



Motivators for COVID-19 vaccination

Key motivators for COVID-19 vaccination were similar across partially vaccinated and fully vaccinated adults and the reasons were as follows:

- 91.5%, to protect from COVID-19 infection
- 60.5%, due to many people taking it
- 58.1%, it is a societal responsibility
- 54.2%, there is no harm in taking it
- 52%, the vaccine is free
- 50.9%, taking the vaccine will eradicate the COVID-19 infection.

Adults' attitudes toward vaccinating their children against COVID-19

Adults' attitudes toward vaccinating their children (15–18-year-olds) against COVID-19 – the only children's age group eligible for vaccination at the time, were similar across the three groups surveyed, with the following proportions of adults reporting willingness to vaccinate their children: unvaccinated (86%), partially vaccinated (90%), and fully vaccinated (93%). The majority of all adults (94%) favored making vaccinations compulsory in schools.



Images: Barabanki District, Uttar Pradesh.

Both the rational and emotional videos for child vaccination showed positive effects in child vaccination intention in both vaccinated and unvaccinated adults. Among unvaccinated adults, the rational video increased the intention to vaccinate children 2.4 times compared to the control and was rated 1.8 times more trustworthy than the control video. Vaccinated adults rated the rational child vaccination video 1.4 times more trustworthy than the control video. See Figures 2.1 and 2.2 for further details.

FIGURE 2.1: RESPONSES TO CHILD VACCINATION VIDEOS AMONG UNVACCINATED ADULTS

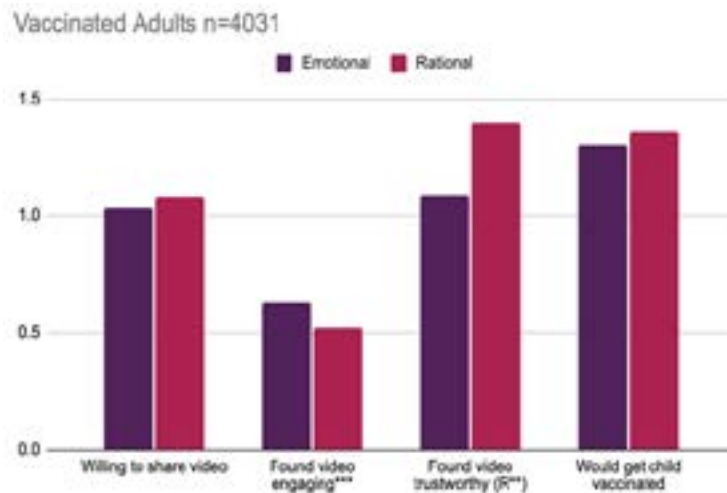
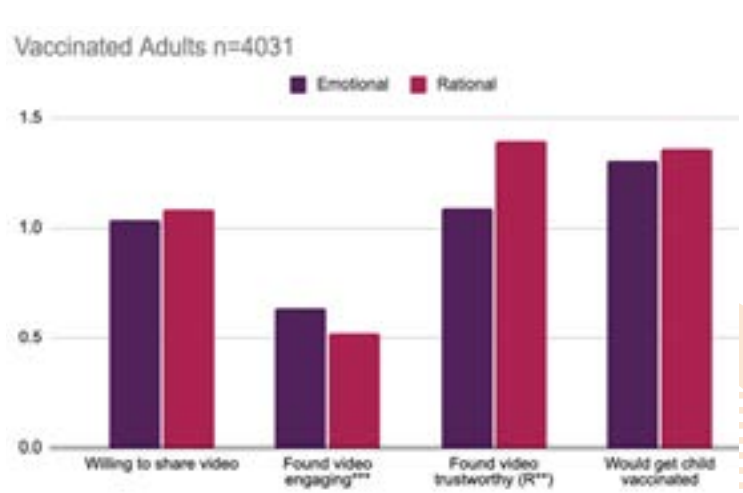


FIGURE 2.2: RESPONSES TO CHILD VACCINATION VIDEOS AMONG UNVACCINATED ADULTS



INFORMING COMMUNITY ACTION

Policy

- Invest in special efforts to seek out those with comorbidities, as many members of this population reported they decided independently to not get vaccinated rather than listening to the advice of their healthcare practitioner.
- Implement vaccination campaigns utilizing the voices of trusted messengers—health workers, scientists, and government officials are the most trusted, as opposed to politicians and religious leaders, by the fully vaccinated community members in Uttar Pradesh and Bihar, India.

Program

- Deliver vaccination opt-out—as opposed to opt-in—within antenatal care programs for women who have registered their pregnancies with the local healthcare system to ensure vaccination appointments are scheduled and communicated.
- Ensure correct information about vaccines and vaccination reaches the frontline health worker, as this cadre of professionals are a group that rural citizens see and trust.

Practice

- Provide pregnant women with correct information regarding the risks and benefits of the vaccine relative to those of COVID-19, focusing on both the mother and her unborn child.

RESEARCH LEADS



Dr. Sneha Shashidhara

Senior Research Fellow, CSBC

Dr. Sneha Shashidhara is a Senior Research Fellow at the Centre for Social and Behaviour Change, with a teaching position at the Psychology Department of Ashoka University. She is a cognitive neuroscientist by training working as a researcher studying mechanisms of the brain underlying higher-order cognition and decision making, with an interest in the interaction between cognition and social psychology. A Gates-Cambridge scholar, she did her PhD, studying the multiple demand network in the brain, at the University of Cambridge. This network is active in different demands, be it language, memory, math etc and handles many types of task difficulty. Prior to that, she did her Master's in Neuroscience at International Max Planck Research School (IMPRS), Goettingen, Germany.



Dr. Sharon Barnhardt

Director - Research, CSBC

Dr. Sharon Barnhardt is the Director – Research at the Centre for Social and Behaviour Change at Ashoka University. She is an applied development economist and behavioural scientist who uses experiments to study policy-relevant topics in India. Her behavioural research focuses on sanitation and malnutrition.

Sharon is also active in Executive Education for the policy sector, having taught Behavioural Economics at the Lal Bahadur Shastri National Academy of Administration and program evaluation with J-PAL South Asia and CLEAR.

She is a Faculty Affiliate at the Jameel Abdul Latif Poverty Action Lab (J-PAL) and the Institute for the Study of Labor (IZA, Bonn). Her experience includes positions at the Centre for Experimental Social Sciences (Nuffield College's lab in India), the Indian Institute of Management – Ahmedabad, IFMR Business School (at Krea University), the World Bank, and J.P. Morgan.

Sharon's academic record comprises a Ph.D. from Harvard University, an M.P.A. from Princeton University, and a Bachelor's from NYU.

RESEARCH LEADS



Dr. Pavan Mamidi

Director, CSBC

Dr. Pavan Mamidi is an empirically informed senior advisor in the policy space, and a social scientist. Substantively, he pursues two streams of professional work and scholarship - law/policy, and applied behavior science.

He currently serves as the Director of the Centre for Social and Behaviour Change at Ashoka University, and also works closely with the NITI Aayog. He has led the initiative to set up India's first Nudge Unit, the Behavioural Insights Unit of India. He has also helped set up Behavioural Insights Units for the states of Uttar Pradesh and Bihar. His main work focuses on development related issues in education, health, nutrition, and gender.

He has a Doctor of Philosophy (Ph.D.) from the University of Oxford and a Master's (LL.M.) from Harvard Law School.



Dr. Shardul Vaidya

(Former) Behavioural Data Specialist, CSBC

Dr. Shardul Vaidya was Behavioural Data Specialist at the Centre for Social and Behaviour Change, where he was involved in designing sound experimental evaluations for the Centre's multi-disciplinary portfolio of interventions. Shardul's substantive research interests are in studying how groups of people interact with each other, the use of behavioral nudging, and the evolution of social norms.

Shardul was previously Lab Manager at CESS Nuffield – FLAME University, where he was leading design and deployment of lab and lab-in-the-field experiments, across areas such as linguistics, inter-ethnic conflict, corruption, cooperation and trust, amongst others. He enjoys discussing and developing research designs, especially walking the tightrope of curiosity, practicality and rigour.

Shardul holds a B.Tech in Chemical Engineering from the Indian Institute of Technology (IIT), Bombay.

RESEARCH LEADS



Selva Swetha

Senior Research Specialist, CSBC

Selva Swetha is a Senior Research Specialist in the Field Empirics team at the Centre for Social and Behaviour Change. Most recently, at J-PAL South Asia, she managed resource development and advisory for various state governments and central agencies towards making their administrative data research ready. She has also managed a large-scale research study jointly run with the Government of Tamil Nadu, and has worked as an RA on a large-scale evaluation in Odisha. Previously, as RA at the MIT Department of Political Science, she led fieldwork for a large-scale RCT on civic leadership training in the Philippines.

Swetha has a Master's in Global Policy Studies with a focus on econometrics and quantitative methods from The University of Texas at Austin, and a Bachelor's from the University of Warwick.

CASE STUDY FROM KENYA

EFFECT OF COVID-19 PANDEMIC ON ROUTINE CHILDHOOD VACCINATION IN KENYA

UCLA

SABIN
VACCINE INSTITUTE



This project was conducted in Nairobi and Kiambu Counties in Kenya between January and December 2022. It was implemented by the University of California, Los Angeles (UCLA); Kenya Medical Research Institute (KEMRI), and Innovations for Poverty Action (IPA); with funding from the Sabin Vaccine Institute. The project received ethics approval from the UCLA Institutional Review Board (IRB) and KEMRI Scientific and Ethics Review Unit. Investigators: Dr. Corrina Moucheraud and Dr. Doris Njomo.

KEY TAKEAWAYS

- Overall, women in Nairobi and Kiambu counties have positive beliefs and attitudes towards routine childhood immunization, regardless of delivery prior to or during the pandemic. However, positive attitudes nor social norms are directly correlated with child immunization.
- Women with strong ethnic/tribal identities (versus national identity) were more likely to have negative vaccination attitudes and receive vaccine information from traditional practitioners.
- Access to vaccination services and supply availability were associated with under-vaccination.

In Context

Decreased vaccination during the COVID-19 pandemic is a public health emergency. Over 228 million people globally – including many children – are at risk of vaccine-preventable diseases due to disruptions to vaccination programs during COVID 19¹⁻³. Programs in Africa have been disproportionately affected by these disruptions^{2,3}. A passive approach to vaccination catch-up will not be sufficient to recover from these losses, but concerted, well-informed efforts that are targeted to the specific context can narrow the vaccination gap and save lives.

To get routine childhood vaccination back on track, additional information is required to understand why vaccination coverage declined so much and for so long during COVID-19 declined. There are a myriad of potential reasons, including suspended mass vaccination campaigns, disruptions in supply and distribution, routine service interruptions, diverted resources (human and financial) toward pandemic response, and decreased demand for health services. It is also essential to understand how the pandemic intersected with preexisting vaccination norms and behaviors.

In Kenya – the setting of this study – only 57.5% of children aged 12–23 months were found to be fully vaccinated in a 2014 nationally representative survey⁴. Preliminary data collected in 2020 from Kenya suggest a vaccination gap for babies born during this time, and an inverse association between trust in the health system and avoidance of newborn healthcare in this population. Context-specific, locally informed, multidisciplinary research is needed to understand the potential drivers of childhood under-vaccination due to the COVID-19 pandemic and to design catch-up strategies to close this gap.

APPROACH

This mixed-methods study investigated the effect of the COVID-19 pandemic on routine childhood vaccination in Kenya and approaches to inform catch-up strategies for under-vaccinated children in Kenya born during COVID-19.

1. UNICEF. Immunization services begin slow recovery from COVID-19 disruptions, though millions of children remain at risk from deadly diseases. 2021
2. Abbas K, Procter SR, van Zandvoort K, et al. Routine childhood immunisation during the COVID-19 pandemic in Africa: a benefit–risk analysis of health benefits versus excess risk of SARS-CoV-2 infection. *The Lancet Global Health* 2020; 8(10): e1264–e72.
3. Robertson T, Carter ED, Chou VB, et al. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. *The Lancet Global Health* 2020; 8(7): e901–e8.
4. Kenya. Kenya demographic and health survey. Inst. for Resource Development/Westinghouse; 2015.

The study leverages a previous project with women who delivered a baby in 2019 and 2020 in urban and peri-urban settings within Nairobi and Kiambu Counties and had participated in surveys about their antenatal and childbirth care experiences. Between May and June 2022, women who had consented to being re-contacted for future research were invited to participate in a new survey around vaccination. A random subset of these women was also invited to participate in a focus group discussion (FGD).

The study had three main aims:

Aim 1: Estimate vaccination coverage for babies born between March and November 2020 and understand correlates of under-vaccination through:

- Collating childhood immunization history using either medical record reports (child health booklets filled out by health workers and kept by parents) as study participant self-report, and
- Implementing a seven-module, phone-based survey, which reflected constructs from the World Health Organization (WHO) Behavioural and Social Drivers of Vaccination (BeSD) model (Table 1).⁵

BeSD domains	Corresponding survey instrument modules
Thinking and feeling	<ul style="list-style-type: none"> • Beliefs/attitudes about vaccines, health^a • Knowledge about vaccines^a • Experiences with healthcare, vaccination • Trust in health system, government, pharmaceutical industry^a
Social processes	<ul style="list-style-type: none"> • Social norms around vaccination - perceptions of vaccine acceptability and uptake among community members, friends and family • Spousal support for vaccination^a • Influential social messengers^a
Practical issues	<ul style="list-style-type: none"> • Policies, programs affecting access to vaccination^a • Exposure to information, messages on vaccines^a • Access to vaccine services (availability, affordability, accessibility) • Attitudes of healthcare workers^a
Other	<ul style="list-style-type: none"> • Demographics (age, religion, ethnicity, educational attainment)

^aPotentially modifiable determinants Behavioural and Social Drivers of Vaccination Uptake (BeSD)

Aim 2: Compare under-vaccination and its correlates for babies born during 2020 compared with babies born previously, to identify differences associated with the pandemic.

Aim 3: Understand women's experiences with vaccination services in 2020 and 2021, during the COVID-19 pandemic.

5. World Health Organization. Understanding the Behavioural and Social Drivers of Vaccine Uptake Who Position Paper–May 2022. Weekly Epidemiological Record (2022) 97(20):209-24.

IMPLEMENTATION STAGES

Survey Development, Data Collection, and Analysis

The survey instrument was developed collaboratively and iteratively by the U.S.- and Kenya-based research team, which included expertise in pediatrics, immunizations, infectious diseases, survey research, and public health. Once finalized, the instrument was translated to Swahili by bilingual members of the research team. Surveys were conducted by phone amongst women who verbally consented to take part in the study.

The survey assessed under-vaccination using two approaches; this was estimated for four key routine childhood vaccines - BCG, pentavalent, pneumococcal, and rotavirus - based on the child's age/eligibility at the time of the survey:

- For women who provided their child's immunization history using medical records, vaccination timeliness was estimated by calculating days unprotected from vaccine-preventable illness – i.e., the number of days a child was due for a vaccine per Kenya national guidelines but not yet vaccinated..
- If women did not have their child's medical record available, they were asked whether the child had received each vaccine dose, and each dose was classified as received or missed.
- To account for potential measurement errors, all observations with vaccines that were more than one year overdue were removed.

Survey data were analyzed to investigate associations between under-vaccination and the factors listed in Table 1.

Focus Group Discussion, Data Collection, and Analysis

Upon completing the phone survey, women who had indicated their child was missing at least one vaccine were asked if they would be willing to be re-contacted for an invitation to a FGD. Among willing participants, a subset was randomly selected and invited to a FGD either in Kiambu or Nairobi Counties. An experienced focus group leader facilitated each group, and there was an assigned note-taker who also assisted with logistics. The two groups (one among four women and one among eight women) were held in-person, and the discussions (in Swahili) were audio-recorded. All women gave consent to participate and for audio recording.

The FGD guide began with an open-ended question ("Can you please tell me about what it was like to vaccinate your child born in 2020"). This was followed by a set of exercises:

- Group discussion around a focusing vignette about a first-time mother who faced challenges vaccinating her newborn,
- A brainstorm about programs to help women like the vignette protagonist who encounter problems seeking vaccination services, and
- Group prioritization to choose favorite program ideas that would be most effective for promoting routine child immunization.

The audio recordings were transcribed and translated to English. A rapid qualitative analysis was conducted, where each transcript was read closely, and key concepts were identified and Table 2.

Table 2. Children birth years, source of vaccination, and prevalence of under-vaccination

Mothers (N=843)	Children (N=1042)
Recalled/self-reported child's immunization data (n=616, 73.4%) Provided child's medical record data (n=227, 26.9%)	Born between 2017-2019 (n=482, 46.3%) Born in 2020 (n=442, 42.4%) Born between 2021-2022 (n=118, 11.3%)
Child Vaccination Data (n=1021)	
Source of child vaccination data Self-report data (n=780, 76.4%) Medical record data (n=241, 23.6%) Note, 21 child records were removed due to potentially erroneous vaccination date reporting.	
Prevalence of under-vaccination (any missed vaccination): 7.1% (n=72)	
<ul style="list-style-type: none"> • Born between 2017-2019 (7.1% prevalence of under-vaccination) [45.8% of all children missing a vaccine] • Born in 2020 (6.5% prevalence of under-vaccination) [38.9% of all children missing a vaccine] • Born in 2021-2022 (9.7% prevalence of under-vaccination) [15.3% of all children missing a vaccine] 	
Days unprotected (utilizing medical record data)	
<ul style="list-style-type: none"> • Children had an average of 7 days unprotected from vaccine-preventable illness • Almost two-thirds (n=151/240, 62.9%) had zero unprotected days. • Among those with any unprotected days, the average number of unprotected days was approximately 19. • Children born between 2021–2022 had a higher average number of unvaccinated days (10.3 days) compared with children born between 2017–2019 (6.3 days) or in 2020 (6.4 days). 	

A number of correlates of motivation to vaccinate and correlates of under-vaccination were identified; Table 4 summarizes these by domain. Very few factors were significantly correlated with either missing any vaccine or untimely vaccination. Children of working women were less likely to be missing a vaccine than children of women who were not working ($p < 0.05$), as were children in households without sufficient income ($p < 0.1$). Female children had more average days unprotected than male children ($p < 0.1$).

Table 4: Correlates of motivation to vaccinate and under-vaccination

Construct	Correlates of Motivation to Vaccinate	Correlates of Under-vaccination
Thinking and feeling	<ul style="list-style-type: none"> • On average, women endorsed 9.9 positive beliefs and attitudes around vaccination (out of 13); no significant difference between women's year of delivery. • It was least common for women to express positive attitudes about vaccine safety. • Strong ethnic/tribal identity (versus national identity) was the only demographic factor associated with negative vaccination attitudes. 	<ul style="list-style-type: none"> • Children of women who agreed that "children receive too many vaccines" had 86% higher odds of a missed vaccine than women who did not agree with the statement (p-value=0.098).

Thinking and feeling	<ul style="list-style-type: none"> • Radio and television were major sources of vaccination information (85% of women, each) • Women delivering during the pandemic were significantly more likely to have heard vaccination information from family members and traditional practitioners, as compared to women who delivered prior to 2020. • Women who strongly identified with their tribal/ethnic origin were more likely to have heard vaccine information from traditional practitioners, as compared to receiving information from community health workers, and through newspapers, television, and the internet. 	<ul style="list-style-type: none"> • Women who agreed that “if I vaccinate my child, he/she may have serious side effects” had 81% higher odds of a missed vaccine than women who did not agree with the statement (p-value=0.034). • Children of women who agreed with statements about vaccines being important for community health were around half as likely to have missed vaccines. • A mother holding more positive attitudes overall was not significantly associated with the child’s vaccination status.
Social processes	<ul style="list-style-type: none"> • Women very strongly endorsed most statements about trust in healthcare providers, although approximately half said “Sometimes, I do not trust my healthcare provider’s opinion, and therefore I feel I need a second one”. • The most highly trusted health messengers, on average, were healthcare workers (2.5 on a 0-to-3-point scale) and community health workers (2.2), and the least-trusted institutions were traditional healers (0.9) and herbalists (0.7). • Almost two-thirds of women (64.7%) said they trusted traditional healers less post-pandemic than before, and this was more commonly reported by women who delivered during the pandemic. • Almost half of women shared their trust had declined toward neighbors (47.9%), the county government (47.9%), non-governmental organizations (47.5%), the national government (45.8%), religious leaders (44.6%), and journalists (43.1%). • Declined trust in neighbors, religious leaders and journalists was significantly more prevalent among women who delivered during the pandemic versus before. • Trust toward health workers declined only among 16.6% of women. 	<ul style="list-style-type: none"> • Social norms were not correlated with under-vaccination. • Children of women expressing more trust in healthcare providers were significantly more likely to be vaccinated (aOR=1.18, p-value=0.012). • Women with trust in scientists and journalists less commonly had under-vaccinated children than women who did not trust these groups, but no other institutional trust variables were significantly associated with missed vaccines in adjusted models. • Children of women who with declined trust in health workers were significantly more likely to be missing a vaccine (aOR=1.93, p-value=0.03).

Practical issues	<ul style="list-style-type: none"> • Most women (n=696, 82.6%) said they faced no problems when accessing routine childhood immunization services. • Among the 147 women who did face problems, the most common were: stockouts (21.8%), distance to the service (21%), the child being ill (18.4%), cost of transport (18.4%), being turned away from services (12.9%), and cost of services (12.2%). 	<ul style="list-style-type: none"> • Children of women who did not experience any access barriers had approximately one-third the odds of a missed vaccine compared with women who faced at least one barrier. • Nearly all specific access challenges were reported more commonly among mothers of children with missed vaccines, but the only significant correlations were with women who said they struggled with the cost of transport (aOR=3.10, p-value=0.076).
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Adjusted odds ratio, aOR.

Findings from focus group discussions and associated activities

Some common themes emerged across the focus group discussions and activities in Kiambu and Nairobi:

- Limited service availability during the pandemic, with women from Kiambu noting overcrowded facilities and under-staffing. Women in Nairobi more commonly spoke about health worker strikes and stockouts.
- Women wanted to seek care elsewhere due to challenges of limited service availability – often private facilities. However, this was an expensive alternative and could result in worse quality care. Women in Kiambu spoke about being worried about exposure to COVID-19 at crowded health facilities. Private facilities were viewed as less crowded and therefore less risky, but also less accessible.
- One theme that arose in both groups was how health workers treated clients. Women were frustrated by how they were being spoken to by health workers, particularly when delayed care was due to pandemic-related factors beyond their control. This was experienced across both counties, but very prominently highlighted through the reports from the FGDs conducted in Nairobi.
- In Kiambu, the group was enthusiastic about an intervention that would include SMS messages to educate women about vaccines and remind them of upcoming due dates.
- In Nairobi, women wanted to see more activities in the community, including engagement of community health workers and local education/sensitization efforts.

INFORMING COMMUNITY ACTION



Policy

- Ensure access to and availability of healthcare services, including vaccination; so they are affordable and available to mothers as and when they seek them.

Program

- Adjust childhood vaccination service strategies at the sub-national level to better support diverse settings and community needs:
 - Conduct community-based outreach and awareness campaigns in contexts where women have repeatedly frustrating encounters with service delivery and health workers, which may also increase trust.
 - Implement SMS reminders of child vaccination due dates and community-based vaccination campaigns in communities facing vaccination access barriers.
- Incorporate focused outreach amongst populations with strong ethnic/tribal identities to address specific concerns and fears and positively shift beliefs and attitudes around routine childhood immunization.

Practice

- Communications campaigns, especially TV and radio programming, should address issues around vaccine safety.
- Health workers can be leveraged as trusted and effective messengers of vaccination information and recommendations.

RESEARCH LEADS



Corrina Moucheraud, ScD, MPH

Dr. Corrina Moucheraud is an Associate Professor in the Department of Health Policy and Management at the Fielding School of Public Health at the University of California Los Angeles (UCLA) and Associate Director at the UCLA Center for Health Policy Research. Corrina is a global health policy and systems researcher, focused on the question: how can we deliver high-quality, efficient, equitable, sustainable health services in resource-constrained health systems? Corrina obtained her ScD from the Department of Global Health and Population at the Harvard T.H. Chan School of Public Health, and her MPH from the Department of Health Behavior at the University of North Carolina Gillings School of Global Public Health.



Doris Njoma, PhD

Doris Njomo is a principal research scientist at the Kenya Medical Research Institute (KEMRI) in Nairobi. Her area of research is in the social determinants of health and health-seeking behavior and has over 20 years of experience conducting implementation research in the control and elimination of preventive chemotherapy for Neglected Tropical Diseases (NTDs) and has published over 40 peer-reviewed journal articles. She is a member of the African Research Network for NTDs and is serving at the Centre Director for Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC), KEMRI. She obtained a PhD in Public Health from Jomo Kenyatta University of Agriculture and Technology.

CASE STUDY FROM NIGERIA

Targeted Messaging for COVID-19 Vaccine Acceptance in Nigeria: the TM-COVAC study



The TM-COVAC study was conducted in Gwagwalada Area Council (GAC) in the Federal Capital Territory in North Central Nigeria from January to December 2022. It was implemented by Women Advocates for Vaccine Access (WAVA), with funding from the Sabin Vaccine Institute. The project received ethics approval from the Federal Capital Territory Health Research Ethics Committee. Investigators: Dr. Chizoba Winodi and Dr. Joseph Olisa.

KEY TAKEAWAYS

- To effectively address vaccine hesitancy, context-specific messages and solutions anchored on the concerns and realities of the target population must be developed and deployed.
- It is feasible to adopt human-centered design approaches that bring together providers, clients, and community members to identify local concerns about vaccines and co-create key messages and solutions that address these concerns and improve the socio-behavioral drivers of vaccine uptake. acceptance.
- Trusted messengers who are nominated by the community members can help combat vaccine hesitancy by using local structures and meeting platforms to dialogue with community members and disseminate key messages to address community concerns about COVID-19 vaccines.
- Messages alone will not translate into people getting vaccinated unless they also have easy access to vaccination services. Consequently, a combination of vaccinating and messaging teams working in tandem would likely work best to ensure that positive shifts in thinking and feeling around the COVID-19 vaccine are translated into vaccine uptake and coverage.

IN CONTEXT

The TM-COVAC study aimed to identify factors that influence COVID-19 vaccine uptake in Nigeria, and to develop targeted messages to increase vaccination rates among hesitant healthcare workers and adults. As of June 2022, when the project commenced the messaging intervention, only 22%¹ of Nigerian adults were fully vaccinated despite ample vaccine supply in the country. Coverage was well below the national target of 70% by December 2022.² This low uptake was partially due to vaccine hesitancy among adults, fueled by conspiracy theories and misinformation about the pandemic, the response, and the vaccines. Some believed the pandemic was a hoax, the virus was not real or dangerous, or that the government response was fraudulent^{3,4}. Others had concerns about the vaccine safety and feared side effects because of the speed of vaccine development and a distrust of the West^{3,4}. This led to distrust of the vaccination program and reluctance to receive the COVID-19 vaccine. Although the National Primary Health Care Development Agency (NPHCDA) had made efforts to combat vaccine hesitancy, results were modest due to highly centralized program design and planning⁵.

Data suggest that reasons and motivations for vaccination vary across place, persons, space, and time⁶. Research shows that targeted messages that are co-designed with community partners to be context-specific, culturally appropriate, and community-empowering improve childhood, adolescence, and adult vaccination⁷. Therefore, growing vaccine confidence and improving vaccine uptake will require decentralized approaches that draw on socio-behavioral insights and align behavior change communication closely with community concerns, experiences, and structures.

1. COVID-19 Vaccination Update: July 11th 2022, in 36 States + the FCT.; 2022. #YesToCOVID19Vaccine <https://t.co/rjZuxSfGdH%22> / Twitter
2. Nigeria yet to achieve 70% COVID vaccine coverage, says NPHCDA. Accessed April 7, 2023. <https://www.thecable.ng/nigeria-yet-to-achieve-70-covid-vaccine-coverage-says-nphcda>
3. Wonodi C, Obi-Jeff C, Adewumi F, et al. Conspiracy theories and misinformation about COVID-19 in Nigeria: Implications for vaccine demand generation communications. *Vaccine*. 2022;40(13):2114. doi:10.1016/J.VACCINE.2022.02.005
4. Islam MS, Kamal AHM, Kabir A, et al. COVID-19 vaccine rumors and conspiracy theories: The need for cognitive inoculation against misinformation to improve vaccine adherence. *PLoS One*. 2021;16(5):e0251605. doi:10.1371/JOURNAL.PONE.0251605
5. Nigeria consolidates efforts to curtail vaccine hesitancy | WHO | Regional Office for Africa. Accessed April 7, 2023. <https://www.afro.who.int/news/nigeria-consolidates-efforts-to-curtail-vaccine-hesitancy>
6. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA (Feb, 10.1038/s41562-021-01056-1, 2021). *Nat Hum Behav*. 2021;5(7):960.
7. Messaging Strategies for Mitigating COVID-19 Through Vaccination and Nonpharmaceutical Interventions.; 2021. doi:10.7249/pea1270-1

APPROACH

This study sought to understand drivers of COVID-19 vaccine uptake in Nigeria and identify targeted messages to improve COVID-19 vaccine uptake among hesitant HWs and adults. Specifically, the study aimed to answer the following questions among hesitant HWs and adults:

Aim 1: What are the socio-behavioral determinants and drivers of COVID-19 vaccine uptake?

Aim 2: How do we co-design and co-disseminate targeted messages to improve COVID-19 vaccine uptake?

Aim 3: Can we demonstrate the effectiveness of targeted messaging in addressing COVID-19 vaccine hesitancy?

A quasi-experimental mixed qualitative and quantitative methods approach was used to explore and answer these questions. The study utilized the World Health Organization’s (WHO) Behavioral and Social Drivers (BeSD) of Vaccination⁸ as the framework for organizing the analysis, which looks at four constructs:

- People’s thoughts and feelings about vaccines,
- Relevant social processes,
- Individual motivations, and the
- Practical issues that influence (COVID-19) vaccination uptake.

A human-centered design (HCD) approach was employed as the mechanism co-creating targeted messages the community.

The study was implemented in Gwagwalada Area Council (GAC) in the Federal Capital Territory in North Central Nigeria. GAC was selected because it had the lowest COVID-19 vaccination coverage of the six Area Councils in the Federal Capital Territory, as of January 2022. GAC is a mixed urban, semi-urban, and rural area, serving as a major transit point for travelers out of the Federal Capital Territory. The study ran in three phases from January to December 2022 (Figure 1).

Figure 1. Overview of study phases



Focus-group discussion, FGD; Human-centered design, HCD; Healthcare worker, HCW; Household, HH; In-depth interview, IDI; Key informant interview, KII; Trusted messenger, TM.

8. WHO. Understanding the behavioural and social drivers of vaccine uptake: WHO position paper – May 2022. Weekly epidemiological record. 2022;97(20).

IMPLEMENTATION

Phase 1 – Baseline Assessment

A baseline assessment was conducted to understand the socio-behavioral determinants of COVID-19 vaccine uptake among HWs and eligible adults (aim 1). The assessment utilized a mixed-methods approach. Qualitative data was obtained from key informant interviews (KIIs), focus group discussions (FGDs), and in-depth interviews (IDIs) with purposely selected individuals. One KII was done with an immunization program manager at the local government area (LGA) level. Three FGDs with HWs at primary, secondary and tertiary care levels, four FGDs with community members (adult men and women aged 18-49 years, and older women and men aged 50 years and above), and one FGD with LGA-level program managers. Each FGD had eight participants. Thirteen IDIs were conducted as follows; five with health workers; two each with traditional and religious leaders and one each with a young man, young woman, older man and older woman. To ensure representation, interviews were conducted across primary, secondary, and tertiary care levels, as well as across rural and rural/urban wards. Similarly, community member respondents were spread across the wards to represent both rural and rural/urban settings. Eligibility criteria for these interviews are in Table 1.

Quantitative data was from household surveys of eligible adults and online surveys of HWs (as shown in Figure 1). Household survey respondents were sampled through stratified cluster sampling, while HWs were sampled through snowball sampling. Facility heads who were chosen to represent health facilities in ten different wards and levels (i.e., primary, secondary, and tertiary care levels), were asked to share the survey links to their colleagues.

Insights from the baseline assessment were used to select COVID-19 vaccine-hesitant HWs and eligible adults in the community as participants for the HCD workshops in Phase 2.

Table 1: Eligibility criteria for qualitative interview respondents			
Level	Respondent	Inclusion Criteria	Exclusion Criteria
State	SERICC Program Manager (PM) or State Immunization Officer (SIO)	*There is only one SERICC PM and SIO at the state level	There is only one SERICC PM and SIO at the state level
Local Government Area	Local immunization officer (LIO)	There is only one LIO per LGA	There is only one LIO per LGA
Health Facility	Health Worker	<ul style="list-style-type: none"> Designation – trained COVID-19 vaccinator, focal person, or officer in charge Years of experience – participated in phases 1 and 2 of COVID-19 vaccination 	Health workers not directly involved in COVID-19 vaccination

Community	Community leader	<ul style="list-style-type: none"> • Designation – religious and traditional leader or their deputy/scribes • Years in position – one year or more • Residence – must have resided in the community for one year or more • Other – have an understanding of community norms and traditions 	Community leaders that have lived in the community for less than one year
	Young adults	<ul style="list-style-type: none"> • Must have resided in the community for at least one year • Between 18 – 35 years (female) or 18 – 49 years (male) 	Adults who have lived in the community for less than one year
	Older adults	<ul style="list-style-type: none"> • Must have resided in the community for at least one year • 50 years and above 	Adults who have lived in the community for less than one year

State Emergency Routine Immunization Coordination Center, SERICC.

Phase 2 – Intervention

Activities to co-design and co-disseminate targeted messages using trusted messengers (aim 2) were undertaken over the course of six months. Trusted messengers (TMs) were identified within the ten wards of the GAC through engagement with community leaders. Five TMs were identified within each of the wards, yielding 50 TMs in total. These were typically community leaders – e.g., women leaders, youth leaders, members of community councils, retired civil servants, and community health workers. The TMs were divided into three clusters based on their location. Cluster 1 included TMs from Paiko, Ibwa, and Dobi; Cluster 2 had TMs from Tunga Maje, Zuba, and Ikwa, while Cluster 3 had TMs from Central, Kutunku, Gwako and Quarters. To centralize coordination and ensure personalized interactions, Paiko, Zuba, and Central wards were chosen, in consultation with LGA health educators, as coordination hubs for each of the three clusters. Meetings and coordination platforms with the TMs were then organized in these hubs.

The HCD co-creation workshops were conducted in two stages in Paiko, Central and Zuba wards. The first stage focused on reviewing and discussing location-specific community concerns and experiences identified during the baseline assessment. This stage was also used to co-design context-specific and evidence-based messages that would resonate with the communities. The second stage was to identify community platforms and forums to use for message dissemination and to make concrete dissemination plans with trusted messengers. From May 18th to 25th 2023, a total of six

workshops were held overall.

Subsequently, bi-weekly SMS were sent to all study participants who consented to be texted and provided a phone number. The SMS contained the following:

- Information on vaccine access (when, where, and how to access the vaccines),
- Benefits of vaccination, and
- Facts to address common concerns and counter mis/disinformation based on HCD outputs.

TMs were encouraged to flag any new concerns about COVID-19 vaccines identified in the community, so that appropriate counter messages would be developed and disseminated. No new concerns emerged. TMs self-reported their message dissemination activities in their cluster-specific WhatsApp groups to allow tracking of the activities undertaken. Monthly, short telephonic surveys were also conducted to longitudinally track self-reported COVID-19 vaccine uptake among a cohort of eligible adults who were unvaccinated at baseline (aim 3).

Phase 3 – Endline Assessment

At endline, key informant interviews, in-depth interviews (IDIs), and focus group discussions (FGDs) were conducted with the same categories of respondents as at baseline, but with different individuals. This was done to evaluate the effectiveness of the trusted messengers in addressing COVID-19 vaccine hesitancy, and to document experiences and lessons learned. Additionally, a household survey of eligible adults was repeated using the same sampling approach as at baseline. As this was a cross-sectional sample within the same study area, some individuals may have been sampled at baseline despite the adoption of an independent stratified sampling approach. The ending HW sample used a purposive sampling approach with survey links shared by facility heads and in-person interviews conducted in at least one health facility per ward.

Analysis

The intervention reach was assessed through:

- Program tracking data, including self-reported activity logs of the trusted messengers,
- The volume of SMS messages broadcasted, and
- An analysis of qualitative and quantitative data collected.

The impact of the study was assessed by comparative analysis between baseline and end line data to evaluate the difference in prevalence of the socio-behavioral drivers of COVID-19 vaccination, as well as the change in COVID-19 vaccination rate.

Preliminary Findings and Results

Community engagement activities and reach of trusted messengers.

A total of six human-centered design workshops were conducted with 50 trusted messengers and 10 hesitant adults drawn from ten wards. Through these interactions, a repository of 41 targeted

messages and communication strategies were co-developed to improve COVID-19 vaccine uptake. These messages were classified into seven categories, based on the major drivers of vaccine hesitancy identified from the baseline assessment: fear of adverse events following immunization (AEFI) with COVID-19 vaccination, lack of trust in vaccine efficacy and safety, misinformation and conspiracy theories about the vaccines, distrust in the government, long waiting times, gender-related barriers and vaccine unavailability. Examples of these targeted messages are shown in Table 2.

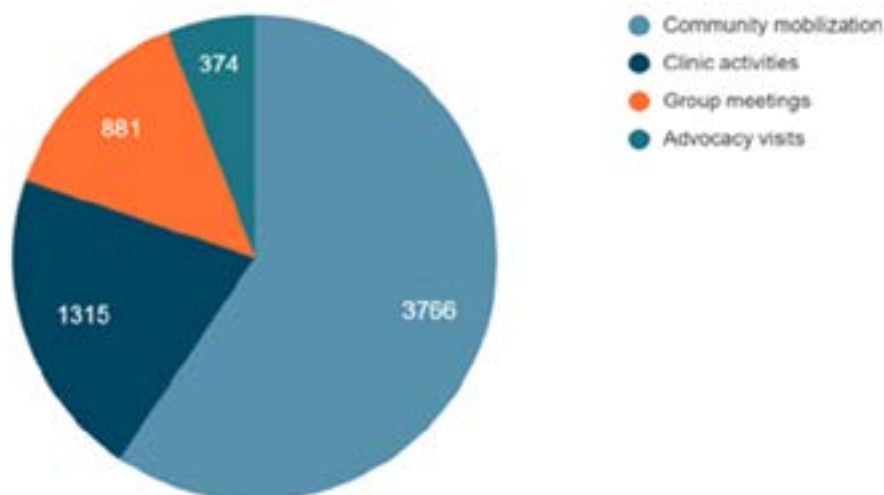
Table 2. Examples of co-created targeted messages	
Category	Message
Fear of adverse events following immunization (AEFI) with COVID-19 vaccination	It is normal to experience mild side effects such as pain at the injection site, fever, tiredness, headache, muscle pain, and watery stool after getting vaccinated against COVID-19. These mild effects go away within a few days on their own. It is a natural sign that your body is developing protection against COVID-19. Visit the health center for your COVID-19 vaccine today! Report any cases of side effects to your health worker or doctor.
Lack of trust in vaccine efficacy and safety	COVID-19 vaccines are safe. They undergo a serious testing process before they are approved for use. Even when they are introduced all over the world, they are constantly monitored for side effects and safety. Getting the COVID-19 vaccine could save your life and that of your family!
Misinformation and conspiracy theories about the COVID-19 vaccines	Pregnant women and breastfeeding mothers can take the COVID-19 vaccine. If you are pregnant, you are more likely to get very sick from COVID-19 compared to people who are not pregnant. Get vaccinated today!
Distrust in the government	The government is not our enemy. Let's join hands and fight the real enemies - COVID-19 and other viruses. Take your vaccine today.
Long waiting times	When you visit a health facility, some processes might make you wait for a little time, but the healthcare workers will definitely attend to you. They are doing everything to serve you better.
Gender norms	Men should support their families by giving them information about the COVID-19 vaccine and permission to get vaccinated.
Vaccine unavailability	The COVID-19 vaccines are available. You can visit the nearest health center today and request your COVID-19 vaccine.

To build confidence and increase demand for vaccination, trusted messengers reached 6,336 people with these targeted messages on COVID 19 vaccination using various community platforms and touch points between July 1 and October 30, 2022. The touch points included a total of 127 activities (Figure 2):

- Community mobilization activities (village meetings, community meetings, women's meetings, market shop-shop visits, etc.),
- Clinic activities, and
- Advocacy meetings with community leaders.

Most of the messages were found to be highly accepted by recipients. In addition, the study reached 542 people (525 adults and 17 health workers) with targeted messages via bi-weekly SMS in the same time period.

Figure 2. Distribution of community engagement activities and number of persons reached by trusted messengers



Comparison of Pre- and Post-Intervention Assessments

The median age of the household survey sample at baseline was 36 years; 57% were females; 77% were married; 67% were Muslims and 33% were Christians; and 18% had no education, while 26% had graduate schooling or higher. The demographic distribution of those participating in the endline survey was similar to those surveyed at baseline. Table 3 shows a comparison in vaccination behavior and BeSD of vaccination between pre- and post-intervention.

Table 3. Change in prevalence of key variables (household survey)					
Variable		Baseline (N=1,515)	Endline (N=1,496)	% difference	Confidence Interval (95%)
Vaccination behavior					
1	Vaccination rate	44%	46%	+2%	[-0.055, 0.015]
2	Hesitancy	33%	36%	-3%	[-0.064, 0.004]
Behavioral and social drivers					
3	Knowledge of where to get vaccine	54%	53%	-1%	[-0.026, 0.046]
4	Knowledge of where to get vaccine (unvaccinated respondents)	29%	36%	+7%	[-0.103, -0.037]
5	Confidence in vaccine benefit	54%	70%	+16%	[-0.194, -0.126]
6	Belief in the safety of COVID-19 vaccine	61%	72%	+11%	[-0.143, -0.077]
7	Trust in COVID-19 vaccine	59%	70%	+11%	[-0.144, -0.076]
8	Change in your attitude towards COVID-19 in the last 4 months	45%	56%	+11%	[0.145, -0.075]
9	Getting vaccinated to protect others in the community	55%	71%	+16%	[-0.194, -0.236]
10	Need to get COVID-19 vaccine	46%	55%	+9%	[-0.126, -0.055]
11	Negative concern seen or heard about COVID-19 vaccine	31%	27%	-4%	[0.008, 0.072]
12	Satisfaction with message received	-	96%	NA	

13	Support of family and friends (family norm)	62%	57%	-5%	[0.015, 0.085]
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Bold 95% CI is significant.

The median age of the healthcare workers survey sample at baseline was 36 years; 63% were females; 62% were married; 53% were Christians and 46% were Muslims; and 97% had attained post-secondary education. The demographic distribution of those participating in the endline survey was similar to those surveyed at baseline. Table 4 shows a comparison in vaccination behavior and BeSD of vaccination between pre- and post-intervention.

Table 4. Change in prevalence of key variables (HCWs survey)					
Variable		Baseline (N=139)	Endline (N=198)	% difference	Confidence Interval (95%)
Vaccination behavior					
1	Vaccination rate	83%	82%	-1%	[-0.072, -0.092]
2	Hesitancy	33%	43%	+10%	[-0.004, 0.204]
Behavioral and social drivers					
3	Confidence in vaccine benefit	92%	93%	+1%	[-0.067, 0.047]
4	Belief in the safety of COVID-19 vaccine	88%	93%	+5%	[-0.115, 0.015]
5	Trust in COVID-19 vaccine	86%	-	NA	
6	Change in your attitude towards COVID-19 in the last 4 months	-	56%	NA	
7	Getting vaccinated to protect others in the community	81%	92%	11%	[-0.185, -0.035]
8	Recommending COVID-19 vaccine to eligible patients	95%	92%	-3%	[-0.024, 0.082]
9	Negative concern seen or heard about COVID-19 vaccine	58%	36%	-22%	[0.114, 0.326]
10	Support of family and friends (family norm)	67%	85%	18%	[-0.273, -0.087]
11	Satisfaction with message received	-	100%	NA	

Bold 95% CI is significant

Among the adults surveyed, nearly all the drivers of vaccine uptake changed in the positive direction at endline. For example, confidence in the vaccine safety rose by 11%. The biggest change was a 16% rise in the proportion of adults reporting confidence about the vaccine benefit and those reporting that protecting others in the community was their main motivation to get vaccinated. These data were corroborated with the findings from the key informant interviews, focus group discussions and in-depth interviews. At baseline, the dominant concerns expressed by interview participants about COVID-19 vaccination were concerns about side effects, lack of trust in vaccine effectiveness, and lack of safety of the vaccine, given its novelty. By the endline, respondents did not place much emphasis on these issues due to perceiving COVID-19 as less of a threat and viewing the vaccine more like other vaccines that they had come to accept.

Among HWs, most social-behavioral drivers of COVID-19 vaccination had a marginal positive increase at endline, except for recommending the vaccine to eligible adults that had a decrease of 3%. The biggest change in the drivers among HCWs was an 18% increase in proportion of those

reporting support of family and friends for the COVID-19 vaccines, and 11% rise among those whose primary motivation for getting vaccinated was to protect other community members. Also, negative concerns seen about or heard about COVID-19 vaccine decreased to 36% at end line compared to 58% at baseline.

Despite the positive shifts in thinking and feeling about the COVID-19 vaccine, no impact on vaccination rate was observed. The lack of impact on vaccination rate at the population level may hinge on two factors:

- Intensity and duration of the activities of the trusted messengers, as part of the study was small and inadequate to impact the larger population – with only 50 trusted messengers deployed over a population of about 400,000 in the Gwagwalada Area Council. This is likely insufficient to provide the level of engagement needed to convince vaccine sceptics, especially as trusted messengers report that repeated engagements are often needed to overcome people’s vaccine-related concerns.
- Messages alone will not translate into people getting vaccinated unless they also have easy access to vaccination services. Consequently, a combination of vaccinating and messaging teams working in tandem would likely work best to ensure that positive shifts in thinking and feeling around the COVID-19 vaccine are translated into vaccine uptake.

INFORMING COMMUNITY ACTION



Policy

- Involve trusted community members and vaccine-hesitant eligible adults in developing evidence-based targeted messages and communication strategies to address COVID-19 vaccine hesitancy.
- Allocate sufficient funding and logistical support for engagement of trusted messengers to have impact on vaccine hesitancy at the population level.

Program

- Integrate communication, community dialogue and awareness creation activities with vaccination service delivery to promote vaccine uptake.
- Involve program managers in the human-centered design process to build their skills around how to use the approach to design context-specific solutions to improve community acceptance of interventions, including vaccinations.

Practice

- Leverage existing community structures and platforms to co-develop and co-disseminate targeted messages, which is essential for sustainability.
- Utilize a bottom-up approach and involve trusted community members in diagnosing and solving their issues, as this engenders community participation and ownership, allowing for sustainable solutions.
- Engage trusted messengers in the community to establish resource persons at the community level, whom immunization teams can activate to increase demand for immunization and other primary healthcare services.

RESEARCH LEADS



Chizoba Wonodi, MBBS, MPH, DrPH **Founder, Women Advocates for Vaccine Access (WAVA)**

Dr. Chizoba Wonodi is a public health physician with over 27 years of research and program experience in Africa, Asia, and America. She serves as the Nigeria Country Director at the International Vaccine Access Centre (IVAC). In this role, she leads an important portfolio of work on technical assistance, implementation research, and policy advocacy to improve immunization service delivery and primary healthcare systems in the country. She is currently the principal investigator for a Gates Foundation-funded project to improve immunization uptake by sending SMS messages to inform, educate and remind caregivers of their child's vaccinations. Implemented as a cluster randomized trial, this intervention – the Immunization Reminder and Information SMS System – is intentionally large in scope to demonstrate how innovations like SMS reminders can be taken to scale. In keeping with her focus on public health practice, Dr. Wonodi founded the Women Advocates for Vaccine Access (WAVA), a coalition of Civil Society Organizations (CSO) in Nigeria advocating for increased uptake of vaccines and for sustainable financing of immunization programs. WAVA serves as the secretariat for the national platform, the Expanded Civil Society Initiative for Immunization (ECSII) in Nigeria. At the global level, Dr. Wonodi holds the vice chair position of the Gavi CSO Platform Steering Committee, a body that coordinates Civil Societies active in immunization.



Dr. Joseph Olisa **Technical Manager, Direct Consulting and Logistics (DCL)**

Dr. Joseph Olisa is currently the Technical Manager of Direct Consulting and Logistics (DCL), a Public Health Consulting organization located in Abuja, Nigeria. He provides programmatic and administrative coordination for the implementation of Research Funded Projects (RFP). He is the focal person for driving the In-country partnership involving DCL, International Vaccine Access Centre (IVAC), and Women Advocates for Vaccine Access (WAVA). He is a member of the National Emergency Routine Immunization Committee (NERICC) for Nigeria through the National Primary Healthcare Development Agency (NPHCDA); a parastatal of Nigeria's Federal Ministry of Health. He was Director of Health Services and Medical Director at Landmark University Omu-Aran, North Central Nigeria between 2017 and 2022. In this role, he managed the daily operations of the 100-bed University Medical Centre and served as one of the principal officers of the university Management during his tenure.

RESEARCH LEADS

TM-COVAC PROJECT TEAM

S/N	NAME	DESIGNATION
1.	Dr. Chizoba Wonodi	Technical Advisor
2.	Dr. Joseph Olisa	Principal Investigator
3.	Abdulrasheed Abdulraheem	Project Coordinator
4.	Pius Angioha	Research Associate
5.	Ikechukwu Okpe	Data Analyst
6.	Nwamaka Ezeanya	Project Officer

ABOUT SABIN



The Sabin Vaccine Institute is a leading advocate for expanding vaccine access and uptake globally, advancing vaccine research and development, and amplifying vaccine knowledge and innovation. Unlocking the potential of vaccines through partnership, Sabin has built a robust ecosystem of funders, innovators, implementers, practitioners, policy makers and public stakeholders to advance its vision of a future free from preventable diseases. As a non-profit with more than two decades of experience, Sabin is committed to finding solutions that last and extending the full benefits of vaccines to all people, regardless of who they are or where they live. At Sabin, we believe in the power of vaccines to change the world.

For more information, visit sabin.org and follow us on Twitter, [@SabinVaccine](https://twitter.com/SabinVaccine).

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