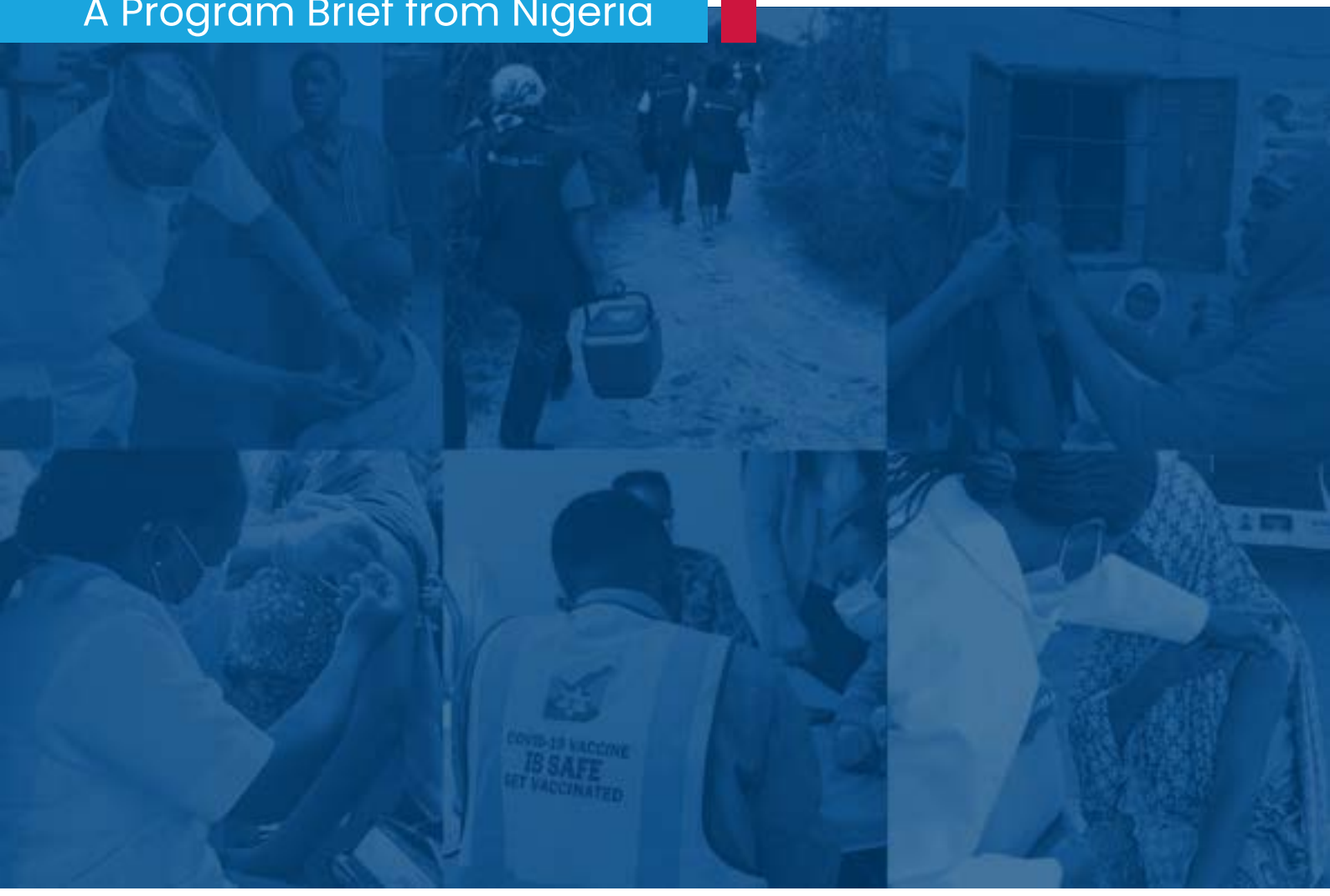
How Theory-Based Programming Can Drive COVID-19 Vaccine Uptake

A Program Brief from Nigeria



USAID
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Breakthrough ACTION
FOR SOCIAL & BEHAVIOR CHANGE

Acronym

FWKR	Follow Who Know Road campaign
J&J	Johnson & Johnson
KAP	Knowledge, attitudes, and practices
OR	Odds ratio
SAGE	Strategic Advisory Group of Experts on Immunization
SBC	Social and behavior change
WHO	World Health Organization

The Role of Behavioral Theories and Models in Social and Behavior Change Programming

Social and behavior change (SBC) programs use strategic approaches that first seek to deeply understand context and identify behavioral determinants and then design focused interventions that are based on using the identified behavioral determinants to influence behavior.

Substantial evidence suggests that the use of theory in designing and implementing behavior change interventions increases the effectiveness of interventions.[1] Therefore, theories and models of behavior enhance and inform the design, implementation, and monitoring and evaluation of SBC programs. Use of these approaches help practitioners understand the environment and factors that impact peoples' decisions and behaviors, so interventions can be more effective in addressing individual, social, societal, and contextual factors. These theories are even more impactful when applied to specific, well-defined, and well-understood populations and audiences.

During disease outbreaks and emergencies, communities need to be informed, motivated, and equipped to practice behaviors that will protect them and their communities. People do not carry out a behavior simply because someone asks them to. SBC can help by addressing issues that prevent individuals and communities from making certain behavior decisions and providing them with accurate and clear information which allows them to make decisions that will protect themselves and curb disease spread. During an emergency such as the COVID-19 pandemic, understanding the factors that influence behaviors needs to be both a first and ongoing step in an emergency response. Applying SBC theories and models for risk communication and community engagement is critical to manage emotional response and enable people to make informed decision.

In collaboration with Government of Nigeria stakeholders, the Breakthrough ACTION-Nigeria set out to increase healthy behaviors related to COVID-19 and wanted to ensure that the strategy implemented to do this targeted specific audiences and carried accurate, tailored, and persuasive messages across different platforms to support behavior change. Breakthrough ACTION-Nigeria developed a strategy that would provide the project with ongoing data related to individuals' changing knowledge, perceptions, attitudes, self-efficacy and behaviors related to COVID-19

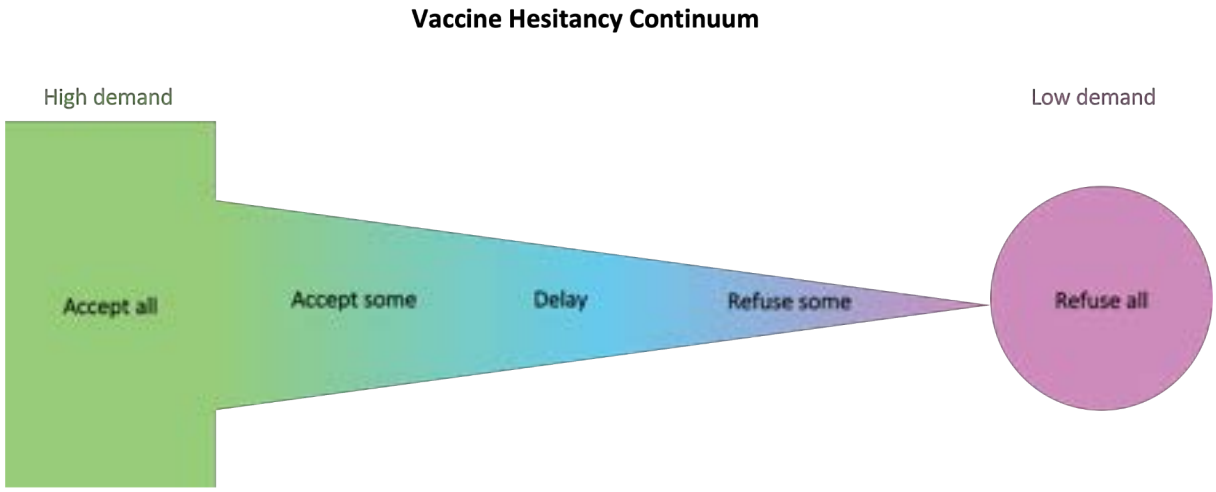
testing, prevention, and vaccination. The project also needed to adapt its SBC messages and programs accordingly.

This program brief explains how Breakthrough ACTION-Nigeria applied the 3Cs Model, developed by the World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) on Immunization, to identify effective behavior change factors to be applied to SBC interventions to achieve behavior change related to COVID-19.

Photo credit: **Ramatu Ada**

The 3Cs Model for Vaccine Hesitancy

In 2014, SAGE developed a conceptual model for vaccine hesitancy determinants called the "Confidence, Complacency, Convenience (3Cs) Model of Vaccine Hesitancy."[2] This model (Figure 1) posits that vaccine attitudes can be seen on a continuum, ranging from total acceptance to complete refusal. Vaccine-hesitant individuals are a heterogenous group in the middle of this continuum and may refuse some vaccines but agree to others; delay vaccines; or accept vaccines but are unsure in doing so.



Ideation is the concept that people's actions are influenced strongly by their cognitive, emotional, and social factors ("ideational factors") and that changing them can change behaviors.. The 3Cs model defines ideational factors that fit within each of the "Cs"(Figure 2).[2]

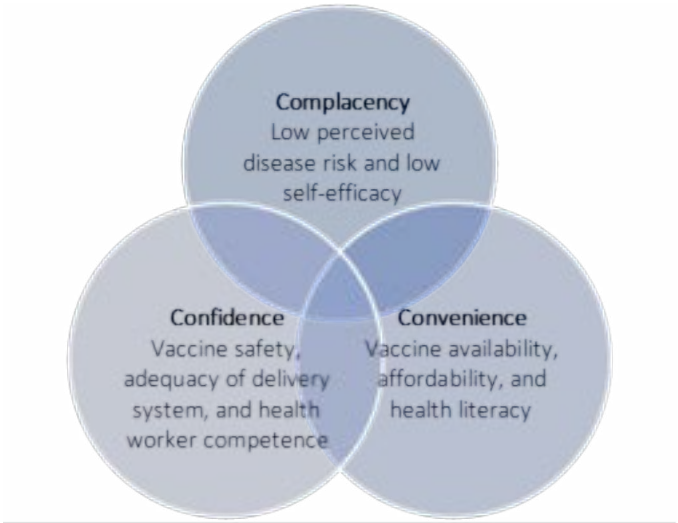


Figure 2. 3Cs Model of Vaccine Hesitancy. Source: SAGE, 2014.
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This set the foundation for Breakthrough ACTION-Nigeria to apply a systematic approach to develop SBC programs focused on the ideational factors which are the strongest predictors of behavior change.

Guiding Model and Theories Applied by Breakthrough ACTION-Nigeria

Definitions[2]

Vaccine Confidence is defined as trust in (1) the effectiveness and safety of vaccines; (2) the system that delivers vaccines, including the reliability and competence of the health services and health professionals in that system; and (3) the motivations of the policymakers who enact laws and coordinate potential resources regarding the needed vaccines.

Vaccine Complacency exists where perceived risk of vaccine-preventable diseases is low and individuals deem vaccination unnecessary for prevention. Complacency about a particular vaccine or about vaccination in general is influenced by many factors, including other life/health responsibilities that one may prioritize at a particular point in time. Self-efficacy also influences the degree to which Complacency determines hesitancy.

Vaccine Convenience is measured by the extent to which physical availability, affordability, willingness-to-pay, geographical accessibility, ability to understand (language and health literacy), and appeal of immunization services affect uptake. All of the following affects the decision to be vaccinated and factors increasing or decreasing the likelihood of vaccine hesitancy: quality of service (real or perceived), the degree to which vaccination service delivery occurs at a convenient and comfortable time, place, and context.

Understand the Audience

Understanding the audience makes theory-based SBC programs more effective. Breakthrough ACTION-Nigeria adopted existing audience segmentation data conducted by Johnson & Johnson (J&J) Global Public Health in February 2021.[4] The J&J Global Public Health model organizes audiences into five segments based on their level of acceptance regarding the COVID-19 vaccine (Figure 3). Breakthrough ACTION-Nigeria aligned the segments to the 3Cs model to present a clearer picture of the attitudes each segment had around the COVID-19 vaccine.

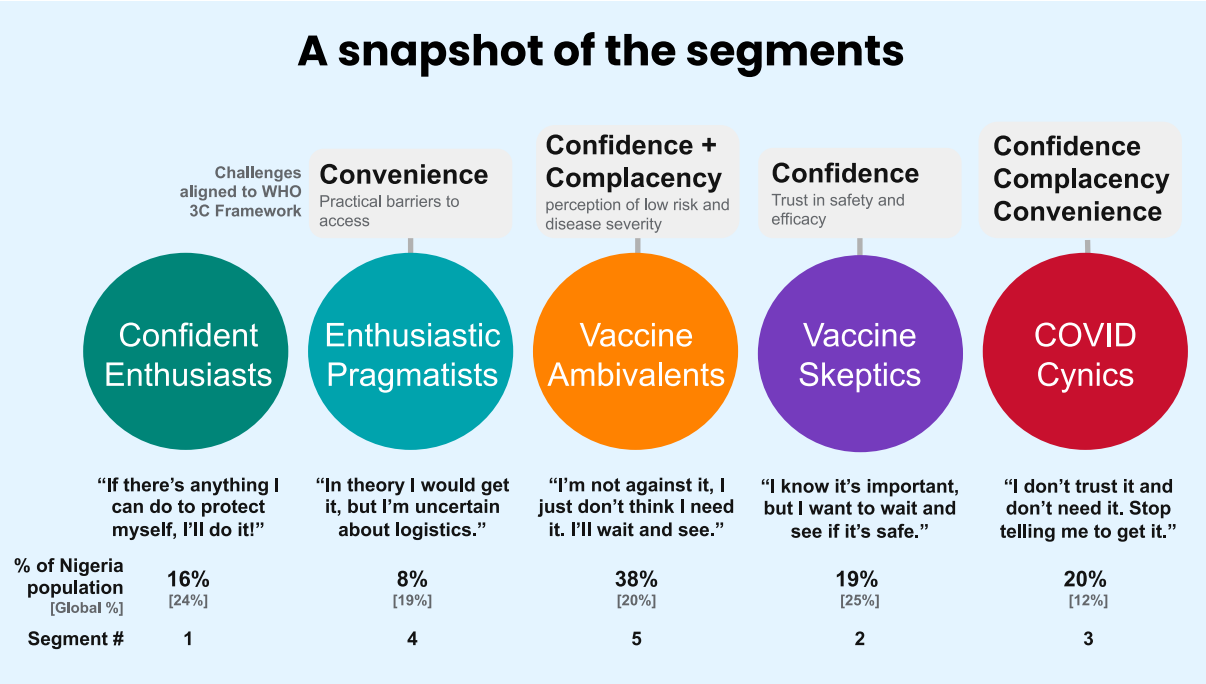


Figure 3. Audience segments based on COVID-19 vaccine acceptance and according to the 3Cs. Source: Johnson & Johnson Global Public Health, 2021.[4] Used by permission.

Using data on COVID-19 vaccine acceptance to design and track selected factors in the 3Cs Model

In collaboration with key stakeholders—National Primary Healthcare Development Agency, Nigeria Centre for Disease Control and Prevention, WHO, UNICEF, USAID, US CDC, Sydani Group, the African Field Epidemiology Network, and other United States Government Service Delivery implementing partners—Breakthrough ACTION-Nigeria implemented a routine national and state level telephone-based COVID-19 perception and vaccine acceptability survey. To better understand and analyze the data, project staff organized responses from the December 2021 survey around the 3Cs model. In subsequent implementations of the survey, additional questions were added to better understand the 3Cs model. Project staff conducted a regression analysis of the responses with the following goals:

- To determine any association between factors in the 3C model and COVID-19 vaccine uptake.
- To understand how to prioritize the factors and which combinations of the factors might result in increasing the likelihood that a person will get the COVID-19 vaccine.

TABLE 1. 3Cs ELEMENTS

THE 3Cs	FACTORS CONTRIBUTING TO THIS ELEMENT
Confidence = Trust in vaccine and the health system	• Health care workers' recommendation to get the vaccine. • Awareness that some people have mild side effects. • Understanding what potential side effects are. • Understanding that the COVID-19 vaccine is safe to use. • Accepting that the COVID-19 vaccine will not negatively affect future health. • Disclosure of the country where the vaccine is made. • The global recognition of the vaccine. • Awareness of the vaccine's effectiveness at limiting transmission. • Awareness of the vaccine's effectiveness at limiting hospitalization.

THE 3Cs	FACTORS CONTRIBUTING TO THIS ELEMENT
	• Understanding of how many doses of the vaccine are necessary for protection. • Awareness of how long the vaccine has been used in Nigeria.
Complacency = Risk/benefit and relative importance to other things	• High practice of prevention behaviors. • Anxieties about the spread of COVID-19 in Nigeria. • Confidence in one's ability to protect oneself from COVID-19. • Perceived likelihood of getting infected. • Belief that the vaccine lowers anxiety about getting infected. • Belief that the COVID-19 vaccine will protect oneself and one's family. • The vaccination status of friends and family members.
Convenience = Perceived accessibility and affordability	• Perceived ease of access to the vaccine.

A specific question asked whether respondents were already vaccinated, planned to get vaccinated immediately, in the next six months, leaning towards no, or never. This allowed program staff to categorize the respondents within the J&J audience segmentation, resulting in the following three categories:

1. **Uptakers:** Respondents aligned to Confident Enthusiasts and Enthusiastic Pragmatists (as named according to the J&J audience segmentation). This group of people already received the vaccine or were about to. This group's major concerns were related to Convenience, specifically practical barriers to the vaccine.
2. **Intenders:** Respondents aligned to J&J segments Vaccine Ambivalents and Vaccine Skeptics. This group of people were open to getting the vaccine after some time, and their concerns related to Confidence and Complacency; particularly to the safety and efficacy of the vaccine. They had a low-risk perception of COVID-19.
3. **Hesitators:** Respondents aligned to the COVID-19 Cynics in the J&J audience segmentation. This audience either will definitely not take the vaccine or were leaning towards no.

Next, Breakthrough ACTION-Nigeria conducted a logistic regression to measure the relative importance of these factors in vaccine acceptance. According to the J&J audience segmentation, 20% of Nigerians were Hesitators (i.e., those who refuse the vaccine),[4] so the project felt focusing on the remaining 80% of the population would produce better outcomes, and it therefore excluded Hesitators from the analysis. The analysis compared the Uptakers and Intenders groups to reveal which factors set the two groups apart. By comparing the already vaccinated and those who intend to get vaccinated soon with people who are open to getting vaccinated but plan to wait, the project was able to identify the specific ideational factors that set these two groups apart and their relative importance of these factors.

Findings from the Initial Analysis

The regression analysis identified several statistically significant factors, providing an understanding of the level of strength each factor has on vaccine uptake. Interestingly, these factors were only under the Confidence and Complacency categories. The analysis calculated no significant Convenience factors. This is consistent with the J&J segmentation model, which showed that Vaccine Ambivalents and Vaccine Skeptics did not have Convenience barriers. This provided the program with critical information to know which factors are predictive for the desired behavior change—i.e., vaccine uptake—informing future SBC intervention design and development.

TABLE 2. 3CS IDEATIONAL FACTORS DECEMBER 2021
SAMPLE SIZE: 1,602

3CS FACTORS	ODDS RATIO (OR)
Confidence (trust in vaccine and the health system)	
Is aware that some people have mild side effects	0.23**
Believes the COVID-19 vaccine is safe to use	2.09*
Believes the COVID-19 vaccine may affect health in future	0.41**
Believes the country where the vaccine is made is important	0.29**
Believes the global recognition of the vaccine is important	4.16*
Complacency (risk/benefit and relative importance to other things)	
Believes the COVID-19 vaccine will protect oneself and one's family	3.45*
Is aware that friends and family members have been vaccinated	3.35***
Notes: Estimated model also adjusts for age, education, religion, and marital status * p<0.05; ** p<0.01; *** p<0.001	

This analysis allowed Breakthrough ACTION-Nigeria to understand the barriers and facilitators that influence the behaviors of the groups as well as the level of influence these barriers and facilitators actually have on the behavior. This comparison provided insight on what would most likely shift attitudes in those who want to get vaccinated but haven't yet.

Applying the Model and Data to Design and Implement an SBC Strategy

With an understanding of which factors have the most influence on uptake of the COVID-19 vaccine, Breakthrough ACTION-Nigeria developed its SBC strategy. Based on the analysis, the project developed a two-prong approach. The first prong was designed with a primary focus on addressing Confidence and Complacency factors, primarily among Intenders, with the goal of driving them up the "segmentation ladder" towards Enthusiasts. The second prong had a specific focus on addressing Convenience factors. Both were implemented concurrently.

Activities deliberately did not target the COVID-19 Cynics (Hesitators) segment. J&J Global Public Health data showed this group made up 20% of the population, and while this is not a small number, resources would be put to use better by encouraging vaccine uptake among the other 80% of the population who have not yet gotten vaccinated.

Prong One: The first prong aimed to guide Intenders, whose concerns were related to Confidence and Complacency, towards becoming Enthusiasts, who are ready to take the vaccine:

1. The project developed a national COVID-19 **mass media campaign**, "Follow Who Know Road" (FWKR) and disseminated it through radio, television and social media. The ideational factors related to Complacency and Confidence identified using the regression analysis informed script and character development. Over a series of nine spots, FWKR follows a character named "Madam Naija," a trusted community leader who is skeptical about COVID and the vaccine, gets COVID-19,

infects her family, gets vaccinated, and finally becomes a champion for the COVID-19 vaccine. Each of the nine spots addresses the predictive factors from the polls. In addition to the FWKR campaign, the project also continuously developed COVID-19 Public Service Announcements (PSAs) to quickly respond to emerging public concerns about the COVID-19 vaccine, address Government of Nigeria priorities as well as to address Convenience factors. For example, PSAs were developed to respond to misinformation related to the vaccine causing infertility that needed to be quickly responded to. Both approaches were required in order to more holistically and more rapidly address barriers to COVID-19 vaccine uptake.

2. Project staff designed and implemented **community engagement approaches** which addressed Complacency and Confidence factors. Activities were selected and implemented based on a state's context and the numbers of Uptakers and Intenders. The project designed strategies that, over time, supported community members to build their confidence in the vaccine and increase their perceived risk of being infected with COVID-19. These types of approaches take time and, at the community level, complemented the FWKR mass media campaign. Activities included:

    - **Working through trained community volunteers,** who disseminated messages to community members. These messages stated that the vaccine is safe and effective and that taking the vaccine protects individuals and their loved ones from COVID-19. Community volunteers received job aids, such as discussion guides, to facilitate these conversations requiring a deeper level of interpersonal communication skills to support individuals with their concerns. Volunteers delivered the messages and engaged in conversations via compound meetings, community dialogues, and town hall meetings.

— Knowing that trusted voices in the communities are key influencers of behavior, Breakthrough ACTION-Nigeria identified **influential persons, such as religious and traditional leaders and affinity groups.** Project staff worked with these leaders to leverage their influence as communicators to address confidence factors among their followers. Speaking guides were developed to aid religious and traditional leaders in talking about the safety and efficacy of the vaccine and to address Complacency factors, encouraging followers to take the vaccine as others, including themselves, have. The project collaborated with religious leaders to make media appearances, encouraging listeners to understand that a key benefit of taking the vaccine is that they would be protecting their loved ones.

- **Community listening approaches** to intentionally and continuously understand the types of rumors and concerns within a community; structured community listening sessions were held. The findings were then used to update discussion guides accordingly to address those rumors and concerns.

3. Breakthrough ACTION-Nigeria developed a package of intervention to **support health care workers** by first recognizing them as an audience, that require information to address their own concerns about COVID-19 vaccines. In addition, health care workers were identified as an important channel of communication to address Complacency and Confidence factors among the population. The package of interventions included a training curriculum, "**Building Trust and Empathy**," which aimed at building the health care workers' skills to more effectively and empathetically counsel clients who have Confidence or Complacency concerns in the COVID-19 vaccine.

   Breakthrough ACTION-Nigeria developed reference materials-such as a training participant's booklet, learning videos, other materials developed as part of behavioral economics interventions, and job aids/nudges interventions-to supplement and reinforce the learnings and guidance obtained from the in-person trainings. The materials served as job aids health care workers could use while engaging with clients.

Photo credit: **Valentine Edoziem**

Prong Two: The second prong targeted Uptakers, who have already decided to get vaccinated. In addressing Convenience factors and to lower any potential barriers to access, this approach aimed to encourage this cohort to get vaccinated faster. SBC interventions, reaching Uptakers, included the following:

1. Breakthrough ACTION-Nigeria produced materials, such as hospital signage, which highlighted the availability of the COVID-19 vaccine alongside well-publicized mass vaccine drives in areas of large pockets of Uptakers. The project intended these interventions to also amplify SBC messages that address Convenience barriers.

2. The project devised community engagement approaches through which messages could be quickly disseminated that address factors related to Convenience. These activities included market storms, neighborhood walks, and motorized campaigns. Motorized campaigns are an approach where community town announcers and publicized jingles disseminated messages that directed community members to the nearest vaccination center. The community engagement activities were implemented in collaboration with Government and Service Delivery partner, who ensured vaccine logistics and delivery. The combined community engagement and vaccine delivery efforts made accessing the vaccine easy for Uptakers who were ready to take the vaccine.

Photo credit: **Valentine Edoziem**

Ongoing Review of the Targeted Elements of the 3Cs Model

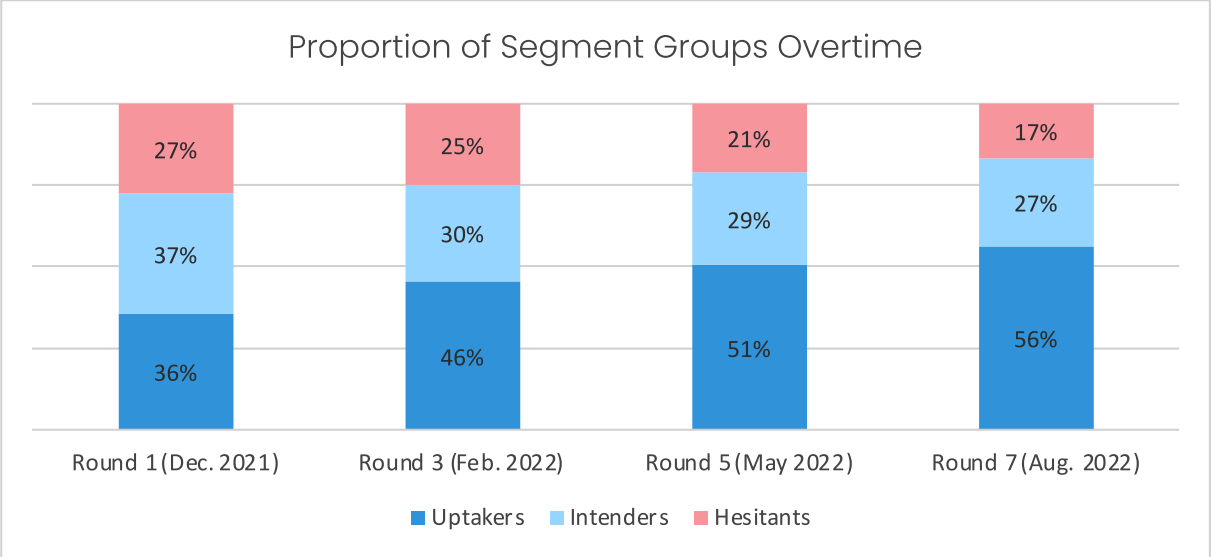
Breakthrough ACTION-Nigeria continued to review the data from the routine national and state level telephone-based COVID-19 perception and vaccine acceptability survey. Additionally, the project continued to modify the questionnaire to ensure staff asked questions that would elicit helpful answers aligned to the vaccine uptake factors.

After seven rounds of polling, a follow-up regression analysis demonstrated a change in predictors of vaccine uptake (**Table 3**). The significance of predictors around Convenience, which did not emerge as significant during the initial analysis of the December 2021 data, emerged. Particularly, Convenience factors made an impact in the form of beliefs around how long getting the vaccine at the facility takes. Locating and finding a vaccine center also emerged as key issues for Intenders. A second key factor appeared, indicating that people are more likely to get vaccinated if a health care worker recommends it. The initial analysis did not suggest this.

Photo credit: **Valentine Edoziem**

TABLE 3: 3CS IDEATIONAL FACTORS AUGUST 2022 SAMPLE SIZE: 4,147	
3CS ELEMENTS	**OR**
Confidence	
Confident in the competency of health care workers to administer vaccine	1.91**
Recommendation of a health care worker to get the COVID-19 vaccine	10.18***
Complacency	
Believes that more neighbors have taken the COVID-19 vaccine	3.49***
Believes the COVID-19 vaccination will protect oneself and one's family	1.61**
Understands that those who get the COVID-19 vaccine can still get infected with the virus if they do not protect themselves	1.39*
Believes someone close will get infected with COVID-19	0.79*
Is anxious about the spread of COVID-19 in Nigeria	0.72**
Convenience	
Believes getting a vaccine at a vaccination center will not take long	4.88***
Believes locating a vaccination center is convenient	2.58***
Believes accessing the COVID-19 vaccine is easy	2.11***
Believes one can afford to reach the vaccination center to get the COVID-19 vaccine	1.36*
Notes: Estimated model also adjusts for age, education, religion, and marital status * p<0.05; ** p<0.01; *** p<0.001	

The table below shows how the proportion of Uptakers, Intenders, and Hesitants has changed overtime. A hypothesis is that Hesitants became Intenders, as Intenders became Uptakers, moving along the Vaccine Hesitancy Continuum. This evolution of the segments would explain why the two different regression models showed such different results. J&J's Vaccine Hesitancy Segmentation model showed that COVID Cynics, categorized as Hesitants in the BA-Nigeria regression now have Convenience barriers along with Complacency and Confidence. As the Hesitants moved along the continuum to Intenders, they appear to have carried their Convenience barriers with them. Another insight that emerged was the importance of the recommendation by a Health Care Worker to get vaccinated, which increased the odds that a person would get vaccinated by more than 10, compared to the December 2021 analysis.



The project team continued to adapt its SBC messaging and ensure conceptual linkage to the emerging insights on the importance of Convenience factors and the Health Care Worker recommendation. For example, the project team prioritized developing a radio and TV "Vaccine Site Locator" spot guiding audiences to the nearest vaccination site. Based on the insight that healthcare workers are a trusted source of information, a well-known and trusted Nigerian doctor, "Aproko Doctor," served as one of the faces of the FWKR campaign.

Conclusion

Results from a systematic process indicates that the application of the 3Cs Model and deep understanding of predictors provide implementers with valuable information on the significant predictors of COVID-19 vaccine uptake in Nigeria. Breakthrough ACTION-Nigeria used this information to design and implement a multi-pronged communication response that included a campaign and community-based SBC activities aimed at addressing determinants that will drive adoption of the desired behaviors. By using the model, Breakthrough ACTION-Nigeria was able to understand what would have the most potential to drive change, allowing it to create more focused approaches to SBC with regard to vaccine hesitancy. While the national level analysis provided critical guidance for the program, state level programming also needed state-focused analysis so the project team could identify the factors most relevant at that level.

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Get in touch!

2nd Floor, No. 23, Tahir Lane, Utako, Abuja.

info@ba-nigeria.org

www.breakthroughactionandresearch.org

BreakthroughActionNg

@BANigeria

@BANigeria