WORLD BANK GROUP
Poverty & Equity

eMBeD
Mind, Behavior, and Development Unit

Leveraging Behavioral Science for COVID-19 Vaccine Distribution

Ongoing and Potential Work

Context

The World Bank is extending up to US$12 billion in financing to ensure low and middle-income countries have the resources needed to meet the demand for COVID-19 vaccines. The new program is expected to enable vaccination for up to 1 billion people in developing countries. Much of the resources to-date have been used to ensure access to vaccines and country readiness to distribute them. As countries secure access to vaccines and begin distribution, policy makers will need support to design distribution and monitoring systems as well as communication strategies to reach the high rates of vaccine take-up that are needed for achieving population immunity.

Behavioral science can help by addressing key challenges for both the supply and demand for COVID-19 vaccines. For countries to successfully vaccinate their populations, they must establish policies, solve technical problems related to cold chain, storage, tracking and monitoring supplies and distribution, train health workers, and disseminate information to communities and individuals. On the **supply side**, behavioral science can inform the design of protocols to increase compliance and reduce errors in vaccine handling, equip health workers to counter misinformation effectively, and design effective communication campaigns. On the **demand side**, countries will face the dual challenge managing expectations given the prioritization to specific groups to address the limited supply early in the process, as well as low take-up even among those who want and intend to vaccinate, due to logistical issues and behavioral barriers (intention-action gaps). Finally, vaccine hesitancy will be an issue throughout the rollout for a range of concerns, affecting the rollout and reaching the high levels of vaccination rates needed.

The objective of this note is to outline 3 areas of ongoing and potential activities where the World Bank's behavioral science unit (eMBeD) can support Covid-19 vaccine efforts in both delivery (supply) and take-up (demand) activities.

Activity 1: Improve vaccine distribution using choice architecture and human centered design

The design of an effective system for vaccine delivery to health facilities requires readiness and strict adherence to medical requirements for safe distribution and storage. Behavioral insights could complement these design efforts through process mapping by developing clear and

transparent procedures that ensure fair and timely distribution both to health facilities and to citizens. Human based design and choice architecture concepts could be used to minimize process bottlenecks and make it easy to access the vaccines. Some examples include advising the development of a centralized monitoring system of vaccine distribution with clear rules on how the roll out will work in practice (priority groups, live updates of vaccination timelines), to offline /online vaccine registration system that is easy to access with succinct information on vaccination locations, appointment processes, planning for booster shots etc.). Thinking behaviorally to support such efforts will be especially important in low capacity settings where technological solutions will be constrained both for the health system as well as citizens.

Activity 2: Support frontline health staff with solutions that simplify vaccination protocols, improve motivation and reduce misinformation

A central element of the success of any immunization effort will center around the capacity of frontline workers to deliver the vaccines safely and efficiently. Behavioral insights could inform training material on the vaccination process and design performance-based incentives to improve delivery. In addition, frontline workers - like all individuals - are also influenced by their social environments and their own mindsets. In the context of Covid-19, this could affect their own views on vaccine efficacy and safety which could directly affect motivation and performance of vaccine delivery. Behavioral work could support diagnostics around health workers' mindsets and beliefs and develop interventions that can reduce misinformation and biases towards Covid-19 vaccines and improve motivation and recognition in the limited bandwidth environment that the pandemic has created.

Activity 3: Design effective communication to increase take up[1]

There is a complex process involving structural factors, individual decision-making, and the last-mile actions needed to deliver a vaccination to an individual. Figure 1 in the Appendix shows a conceptual model of the process. Vaccine intentions are formed by three key elements in mind: Convenience, Confidence, and Complacency (WHO, 2014). **Convenience** addresses dimensions of access to the vaccine including vaccine availability, local distribution points, and financial barriers. **Confidence** addresses trust and perceptions of vaccine effectiveness and safety. **Complacency** addresses the perceived need for the vaccine. Behavioral biases can impact the formation of these proximate determinants, for example through mental models of health and

[1] This work is a partnership between World Bank teams in the Health Global Practice (HNP), the Mind, Behavior, and Development Unit (eMBeD) in the Poverty and Equity Global Practice (POV), the Development Impact Evaluation department (DIME); External and Corporate Relations (ECR), and external partners including Facebook's Health Partnerships and Upswell.

health production determining the perceived need and trust in vaccine safety. These proximate determinants are shaped in turn by characteristics of the epidemic and the vaccine, community-level factors, and by individual characteristics that predict health behaviors.

As such, the outcome of a successful vaccination campaign will be determined by vaccine intentions translating into the uptake of the vaccine. Even among **those who want to get vaccinated**, behavioral barriers can interrupt following through on their intention, for example due to limited attention that can lead to de-prioritization of preventive care, or complicated systems and lack of simple directions that discourage seeking information to schedule up appointments. In addition, for those who are **hesitant**, understanding the channels by which their beliefs are formed, social norms around them and their trust in implementing authorities will be a critical element for designing communications that can address concerns. Finally, there is likely to be **hesitancy** even **among health frontline staff**, so a special communication emphasis may be needed to be directed to them as part of general communication campaigns or as part of potential capacity training discussed earlier.

Based on the above, the design of an effective communications campaign will also need to take into consideration the phasing of the vaccine distribution. As the rollout of the vaccine begins, initial communicational efforts should focus on providing information on the logistical considerations discussed above to make vaccination easy (learning about vaccine options, where and when to go, what to expect, how to get appointments, how to get to appointments or vaccination centers, etc.). As the rollout advances, communication that can be tailored to different hesitant groups can also be introduced.

Activity 3.1 Measuring COVID-19 vaccine intentions and mental models

A first task to inform communication interventions for country-tailored COVID-19 vaccination implementation plans involves conducting behavioral diagnostics through data collection on vaccine take-up intentions and perceptions. This data collection, which aims to emulate the information captured in the conceptual framework of Figure 1, is currently underway in a few pilot countries, aims to specifically: (i) identify different profiles of individuals in terms of hesitation and vaccine acceptance; and (ii) identify preferences for improved vaccine take-up. In order to achieve this, the underlying survey, which is also designed to complement the World Bank's ongoing COVID-19 High Frequency Surveys (HFS), includes questions on basic demographics, vaccine intentions, COVID-19 exposure and experience, and behavioral dimensions such as perceptions, beliefs, social norms and trust related to vaccination decision-making (see Table 1 in the Annex for details).

By analyzing the data collected, the team can establish overall levels of intention to vaccinate, characterize segments of the population who are uncertain about vaccination, and offer

preliminary information about preferences related to vaccination distribution. By measuring the role of behavioral characteristics in addition to basic demographic information in predicting vaccine intentions, we can create population subgroups that have similar attitudes around vaccination. For example, the uncertain group may be composed of several sub-groups, such as those who are hesitant about all vaccines for religious reasons, those who feel uncertain due to specific features of the COVID vaccine rollout, and those who have low levels of overall knowledge about the COVID vaccine and seek more information. Understanding such heterogeneity can then be used to design tailored communication for each group.[2]

The work started with a pilot program in a few countries in the Middle East and North Africa region in January 2021 (Iraq, Lebanon, Libya, Tunisia, West Bank and Gaza), with an aspiration to scale to other countries in the coming months.[3]

Activity 3.2: Designing tailored communication campaigns

Based on the insights from the data collected, iterative testing of communication messages tailored to each persona identified in Activity 3.1 can be designed and implemented. First, to make it easy and remove the intention to action gap among those that already **want to get the vaccine,** communication and related solutions can focus on ways to improve planning, increase commitment, and prompt offline actions related to vaccination. Solutions may include signing up for alerts, joining an online group, sharing a link, etc. Integrating iterative rapid testing of a range of framings can also help identify solutions for online interventions that can translate into offline actions, such as scheduling an appointment, sharing information with a family member, or making a social commitment to vaccinate. Similarly, reminders or pre-scheduling the appointments for the second dose of the vaccine can be designed to ensure full **adherence** and vaccine efficacy.

Finally, among those that are **unsure** and **hesitant**, designing messages could focus on ways to build trust, identify appropriate role models for credibility-enhancing displays, and test various messengers to increase stated intentions to vaccinate. Each message variant will be first tested on each persona to identify the overall effectiveness of each message, and the effectiveness of

[2] The team is currently exploring additional methodologies to collect information on vaccine hesitancy using other online platforms, as well as more traditional techniques via mobile phones. This will potentially allow scaling to a wider part of the world's population given that only 1 in 2 people around the world are currently connected to social media platforms. Also see below at activity 3.3.

[3] For each country, 5,000 surveys will be collected through social media platforms. For the first batch of countries that is underway, this is done via Facebook. Participants are recruited using Facebook ads and taken to a chatbot in Facebook messenger to complete the survey. The sample in each country is drawn based on a sample of all Facebook accounts in the country and stratified by pre-defined demographic groups (based on age, gender and regions) to ensure adequate balance across these clusters and to potentially explore the feasibility of applying sampling weights for nationally representative estimates.

each message iteration for each persona. This process will allow to refine messages as well as profiles of targeted public to maximize impact.

Activity 3.3: Leveraging machine learning and artificial intelligence[4]

A final activity which complements the activities above involves using publicly available information across the internet to synthesize information on local-specific discourse and narratives around vaccine attitudes. Using machine learning and artificial intelligence techniques, this work entails exploring online search behavior, public conversations on social media platforms, news, blogs, and forums to create an "online ecosystem" for a specific country or locality. This can then be used to identify different audience segments and their profiles related to vaccine attitudes, allowing a validation and triangulation of the insights from activity 3.1 on population typologies around vaccine attitudes. The techniques also allow the curation of content for communication campaigns by analyzing public content and identifying messages and related content that can be targeted to specific audiences to promote adoption of desirable behaviors with respect to vaccination efforts.

One nice feature of this approach is that this information can be constantly updated and can thus serve as a monitoring dashboard for both aggregated information such as search traffic around vaccination, influencers, sentiment analysis trends, but also provide evaluation insights around the efficacy of vaccine distribution efforts. For example, an increase in vaccine confidence for a given locality should translate into a decrease in online search for the safety or side effects of vaccines. Finally, using this dashboard, authorities could integrate administrative data on vaccine distribution and improve the targeting and content of communication efforts.

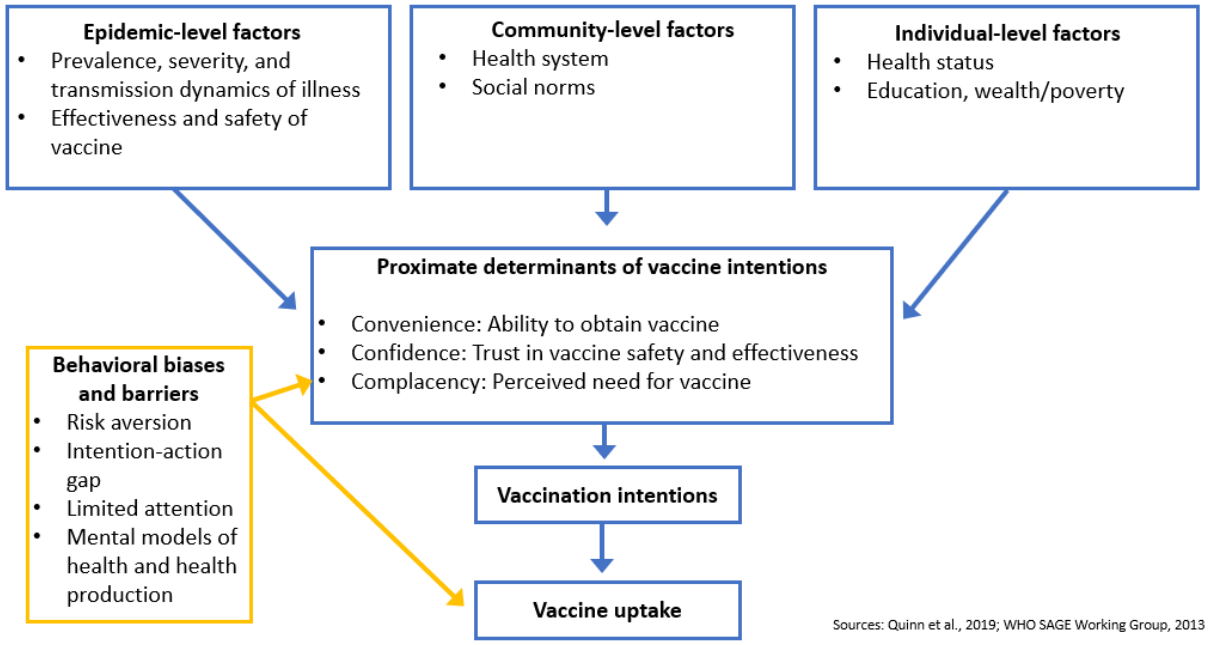
[4] The team is partnering with Quilt.AI for this work and building on a current collaboration in India where we are using these techniques to improve father parenting practices around child nutrition.

References

1. Report of the SAGE working group on vaccine hesitancy. WHO (2014). https://www.who.int/immunization/sage/meetings/2014/october/1_Report_WORKING_GROUP_vaccine_hesitancy_final.pdf
2. Quinn, S.C., Jamison, A.M., An, J., Hancock, G.R. and Freimuth, V.S., 2019. Measuring vaccine hesitancy, confidence, trust and flu vaccine uptake: Results of a national survey of White and African American adults. Vaccine, 37(9), pp.1168-1173.
3. World Health Organization. (2020). Behavioural considerations for acceptance and uptake of COVID-19 vaccines: WHO technical advisory group on behavioural insights and sciences for health, meeting report, 15 October 2020. World Health Organization.

Annex

Figure 1: Conceptual model of vaccine uptake



Sources: Quinn et al., 2019; WHO SAGE Working Group, 2013

Table 1: Survey themes and key indicators

Demographics Identify views of key groups and correlates of hesitancy for targeting	• Location • Age/gender/Marital status • Income • Education/Occupation • HH composition
Vaccine behavior & intentions Measure proximate determinants of vaccine uptake	• Prior immunizations • Knowledge of COVID-19 vaccine research • Vaccination intentions for COVID vaccine • Vaccine delivery location preference • Vaccination status of children
Role models & trust Provide info for designing credibility-enhancing displays and communication design	• Trusted sources of health info • Role models influence on vaccine intentions (survey experiment)
Concerns & hesitancy Measure dimensions of hesitancy to allow targeting of communication	• Altruism • Trust in vaccine info • Religiosity • COVID-19 vaccine questions
Social norms Understand norms and expectations, which influence decision-making	• Empirical norms expectation • Normative social norm • New vaccine intentions • Locus of control
COVID-19 Measure COVID knowledge/behaviors to assess perceived risks and health behaviors	• Prevention behaviors • Seen government campaign • Government response • HH COVID cases