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Behavioral Dynamics Affecting Covid-19 Vaccination Uptake in India (Indian School of Business, Ontario Health, 1/29)

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Abstract

What is the message? Although widespread vaccinations can help address the COVID-19 pandemic in India, multiple barriers may limit vaccine uptake. Strategies from the studies of behavioral economics can help overcome the barriers. The strategies can address the intention-action gap, thus increasing not only the initial willingness to take the vaccines but also the subsequent action in actually doing so. The paper highlights multiple recommendations for policy.

What is the evidence? The authors review studies from behavioral economics and apply the insights to COVID vaccination needs in India.

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India Needs to Overcome Challenges that Could Limit Uptake of COVID Vaccines

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Currently, India has the second-highest number of confirmed cases globally, with more than 10 million confirmed cases and 150,000 people having lost their lives because of the disease. Due to the COVID-19 pandemic, India's GDP growth is forecasted to decline to 4.8 percent as per the United Nations' recent estimates[1]. Both lives and livelihood hinge on successfully developing herd immunity, which can be partly attained by vaccination.

Addressing the bottlenecks in the supply and demand for vaccines can help India in its fight against COVID-19. The components associated with the vaccination supply include procurement of large quantities of vaccination doses, storage of these vaccines, managing supply chain and vaccine delivery logistics, building human capital, and coordinating delivery operations. These components can be optimized using principles from operations management and operations research.

This article focuses on the uptake of the COVID-19 vaccine in India. Vaccination is widely recognized as one of the most successful public health measures. However, within the Indian context, there are several challenges for rapid mass vaccination uptake. We list some of the prominent ones here. First, India is a vast and populous country; its demographic and geographic diversity makes it virtually impossible to develop a one-solution-fits-all approach to nudge the public toward COVID-19 vaccination uptake. The presence of various leaders and religious groups, each bringing their own opinion about vaccination for COVID-19, coupled with the diversity in literacy rate across the country, adds to the difficulty in coming up with a universal approach for publicity campaigns. Second, a typical vaccine development process takes 10-15 years. The expedited development of the COVID-19 vaccine and the limited information regarding the vaccine approval process is bound to raise questions regarding its safety and efficacy in the public's mind. Third, the unavailability of data on long-term effectiveness and side-effects from vaccination may not only deter vaccine supporters, including early adopters, but also give anti-vaccinators support for avoiding vaccination. Fourth, the public in India is not accustomed to choosing a brand of vaccine. There are currently multiple brands of vaccines for COVID-19 approved in India with conflicting and incomplete results, resulting in a dilemma for the public on which brand to trust. This may lead to decision paralysis, and people

might end up avoiding vaccination altogether. Fifth, there exists a lack of adequate and equitable access to vaccination centers equipped with medical facilities in small towns and rural areas in India to address any immediate life-threatening side-effects resulting from vaccination. This can further discourage people from getting a COVID-19 vaccine.

Insights from behavioral economics can help alleviate several of the challenges and increase vaccination uptake. In this article, we apply those insights in the context of vaccination hesitancy and acceptance in India and provide tangible recommendations to policymakers and healthcare practitioners to help reduce the frictions in scaling of COVID-19 vaccination uptake.

Uptake of Vaccines

An individual's decision to vaccinate depends on multiple factors. From a behavioral perspective, the process of getting vaccinated can be subdivided into willingness and action.

1. **Willingness**

We list below some of the key factors affecting an individual's willingness to get vaccinated:

1. Perception
2. Confidence/Trust
3. Norms
4. Altruism

Perception

Public health experts widely use the health belief model to predict health-related behavior in terms of certain belief patterns[2]. The health belief model proposes that the uptake of a vaccine will depend on the perceived susceptibility of the disease; severity of the disease; benefits of the vaccine; and risks of the vaccine[2]2. A meta-analysis of previous vaccination studies shows that people are more likely to seek vaccination if there is an increased "perceived severity" and "perceived likelihood" of the disease[3].

Note, the word "perceived" here refers to perceptions which might be significantly different from reality. Vaccination data regarding efficacy and safety is conveyed with numbers and statistics.

However, relating to numbers at an individual level is difficult. People will make perceptions based on statistics, and at times fill the void of information with their own stories, and so fall prey to biases, such as confirmation bias (tendency to seek out information that supports something you already believe); availability bias (tendency to use the information we can quickly recall); in-group bias (people are more likely to support or believe someone within their own social group than an outsider); and optimism bias (overestimating the chance of getting a favorable outcome, or underestimating the chance of getting an unfavorable outcome).

For an instance, since April 2020, the COVID-19 pandemic has spread widely across India. Many people may now know of someone within their close circle who may have either met with an unfortunate incident due to the disease or may have recovered from the disease. Due to an in-group bias, these close contact stories will play a major role in shaping people's perceptions of the disease's susceptibility and severity, hence influencing their vaccine uptake. If someone close to them recovered easily from COVID-19, they might believe the disease is not severe and may not decide to get vaccinated. Similarly, a particular section of the society may underestimate their own risks due to "optimism bias".

Policy implication: The key point here for policy is that asking people to act as outside observers and consider the vaccination decision for someone like them may improve the assessment of their own risk and lead to higher vaccination rates[4].

Another important consideration related to perception shaping vaccination behavior is the "perceived benefit and risk" associated with vaccines. A study on vaccination showed that the decision to vaccinate is positively correlated with perceived benefit and inversely correlated to the severity of vaccine-associated adverse events[3]. The vaccine will be given to millions of people. There are bound to be cases where the vaccine is ineffective, where a person gets infected even after getting vaccinated, or when someone has a serious side-effect or dies after getting vaccinated. Some of these adverse incidents might be unrelated to the vaccination. However, these stories will affect people's perception of risk and benefit of vaccination and their demand for the vaccine. For an instance, recent news from Norway reported that 29 people died after receiving Pfizer COVID-19 vaccine[5]. Although such outcomes typically have little or nothing to do with the vaccine, they shape public perceptions. These reports, as well as any other uncommon stories sensationalized by the media, may discourage vaccination uptake.

Policy implication: Systems should be in place to avoid or correct for these perception biases. Common side effects, such as muscle fatigue and headache can be easily managed by providing information. However, managing any serious side-effects such as hospital admission and death will require an extensive planning and proactive approach. One strategy to address vaccination side-effects is to continually monitor the health status of the vaccinated population and accordingly modify the recommendations, as done in a case from Norway. Another way to influence perception regarding vaccination and support optimal decision-making is to provide easy-to-understand, clear and transparent information, allowing people to understand the benefits and risks of vaccination and discern the differences in causation and correlation.

Furthermore, in the cases where marginal cost increases due to the perceived risk associated with side-effects from the vaccine, leveraging regret theory can be an effective strategy. Invoking regret can be initiated through loss framing messages in terms of getting seriously ill or encountering death from vaccine-preventable disease than being more focused on the vaccine's potential side effects[6]. Policymakers and medical practitioners should carefully tailor messages to address peoples' fears and misinformation.

Confidence/Trust

The demand for any healthcare intervention depends on the confidence the public has in that intervention. COVID-19 vaccination is no different. Vaccine confidence can be measured by perceived benefits and risks along with the trust in the providers of vaccines[3]. Here, the term "providers" refers to not only the medical community advocating for the vaccine but also the decision and policymakers involved in approving the vaccines. People's confidence in vaccination may be lower, resulting in a low uptake, if (a) the manufacturing and distribution for the vaccine are rushed, (b) manufacturing vaccines in countries where people have low-confidence, and (c) lack of transparency related to vaccine's approval process, benefits, and side-effects.

A recent global survey on vaccination intent revealed that 87% of Indians are willing to seek vaccination, but only 34% of participants will seek vaccination as soon as it is available[7]. This difference in intentions can be explained by people's concerns regarding the safety and the efficacy of the vaccine[7]. India recently approved a vaccine for emergency use whose efficacy is

yet to be proven and another vaccine with 62-90% efficacy[8]. In contrast, Europe, the United States, and Canada approved vaccines with greater than 90% efficacy. Such actions may be perceived as hasty and raise questions regarding policy-makers intentions for public safety.

Policy implications: Confidence can be built and maintained based on trust through periodic and transparent dissemination of information on the approval process and rigorous surveillance measures, of cases of ineffectiveness, plus possible COVID-19 reinfection despite vaccination. Communication should be done concretely and consistently, through which information feels immediate, proximate, feasible, and likely to directly affect people or those they care about. E.g., in the case of the vaccine approval process, instead of saying phase 3, say, "the vaccine has been tested on X number of people"[6]. Moreover, the rapid spread of miss-information (infodemic) on social media channels should be rigorously monitored, contained and addressed to gain public's trust.

Public confidence can be gained by increasing the vaccine's attractiveness by highlighting the clinical endorsement of vaccines by people involved in the manufacturing and approval of the vaccines, and by showcasing medical professionals and politicians getting vaccinated. Recently, many key leaders in the US, such as Kamala Harris and Joe Biden, received COVID-19 vaccines to display their own confidence in the vaccine's safety. On the contrary, the Indian government asserted that politicians would not be considered a priority group and will not be vaccinated in the first phase of the rollout, perhaps instilling a sense of doubt and fear in the minds of the public[9]. Government leaders should be put at the forefront of vaccination intake to instill the trust of the public in the vaccination.

Another challenge that India faces is the market for fake, counterfeit, or substandard medicines, accounting for 25% of India's drugs[10]. The presence of fake medicines reduces people's trust in the system and makes them apprehensive about seeking treatment.

Policy implications: To build confidence, India will have to take decisive steps to identify and control any potential fake vaccine market.

While India has made vaccination voluntary, the decision to pick and choose among the approved vaccines is currently not available. This policy is similar to other countries, but in India, a vaccine was approved despite incomplete data. The unavailability of choice here raises several

ethical and safety concerns and may harm people's trust and confidence in the vaccine.

Policy implications: Confidence in vaccination can be increased by providing people with a choice and control over their decisions.

Norms

The theory of planned behavior proposes that uptake of the vaccine will depend on subjective and social norms. Subjective norms refer to the belief about whether most people approve or disapprove of the behavior. It relates to a person's beliefs about whether peers and people of importance think they should engage in the behavior. Social norm refers to the customary codes of behavior in a group of people or a larger cultural context. This means that people tend to fit their actions to others' behavior and expectations, and vaccination is no exception[3]. As more people vaccinate, the act of vaccination will become a social norm and eventually a default action.

In this age of social media, influencers play a key role in increasing vaccination uptake and influencing social norms. These influencers can range from a close family member to a group influencers as immunization programme managers, community and religious leaders, health workers, civil society organizations, media outlets, and digital platforms.

Policy implications: Favorable vaccination behavior can be attained through consistent messaging, which iterates based on the context and the audience. Drawing parallels from the ALS bucket challenge or i-voted campaign, showing society influencers taking the vaccination jab can create a powerful ripple effect and help establish vaccination as a social norm.

Moreover, childhood vaccination and flu vaccination experiences show that a medical practitioner, especially a family doctor, plays a significant role in influencing social norms.

Policy implications: Relevant practitioners can be provided with a toolkit that contains messages and FAQs, which can be used as a reference material to address patients' concerns regarding vaccination. Similarly, using important nodal links such as the school system, or large employers to spread vaccination information may influence subjective norms and intended behavior.

Altruism

Getting a vaccine benefits not just an individual but others as well. An externality of vaccination is that if enough people vaccinate, then it can lead to herd immunity. This benefits people who are unable to vaccinate due to medical or any other reasons. Several studies from the flu vaccination campaign for health care workers indicate that the uptake for vaccination increased when the vaccination behavior was made salient and social with messages such as, "I vaccinated from influenza to protect you"[3]. A recent vaccination intention study indicated that younger age group participants between the ages of 18 and 24 were less likely to vaccinate than other age groups[11].

Policy implications: One way to influence a change within hesitant groups is to invoke the feeling of altruism by conveying how a vaccination decision impacts the wellbeing of more vulnerable segments of the population with messages such as, "thank you for vaccination, you have saved a life of a cancer patient and a pregnant woman".

2. **Action**

Once an individual is willing to get vaccinated, there can still be an intention-action gap. Addressing the last mile challenge to access the vaccine is dependent on two factors:

1. Barriers
2. Affordability

Barriers

Barriers entail the effort required to perform an action. Reducing the effort required can increase vaccination uptake[12]. Humans are far less likely to search for, pay attention to, understand, use information, or choose wisely when hassle costs are substantial. Even slight amounts of extra hassle can have significant adverse effects on our behavior[11].

The World Health Organization states, "Everyone, everywhere who could benefit from safe and effective COVID-19 vaccines should have access as quickly as possible, starting with those at highest risk of serious disease or death"[13]. In terms of COVID-19 vaccination, if the vaccination location is not easily accessible, it will fail to reach the masses. Additionally, suppose

scheduling for and getting a vaccination requires intensive effort such as lengthy wait times, requiring several ID proofs, then people will be more likely to not seek vaccination due to increased hassle cost.

Furthermore reading and thoroughly understanding information related to the vaccine, such as vaccine efficacy, side-effects, and follow up at the time of vaccination, can create a further impediment to action. These constraints are particularly strong if the information is not presented in an easy and clear format. This is because humans cannot process vast amounts of information all at once, which may be exaggerated with large variations in literacy levels. The government should try to reduce these barriers to uptake of vaccination.

Policy implications: Vaccination centers should be easily reachable, accessible for differently-abled, familiar to the target public, approved for safety as per vaccination guidelines, and rigorously sanitized. The process of scheduling and getting vaccinated should be easy, take little time, and require minimal paperwork.

One strategy to make the process easy, hassle-free, and straightforward would be to design a seamless encounter experienced by travelers at airports. The facilities can use similar approaches such as pre-check-in, pre-read and understandable instructions before coming to the facility and should be able to locate the nearest facility with the help of 'Co-WIN App,' a mobile application[8]. Using the principles of choice architecture, the vaccine provider can pre-register the user after the first appointment for the second dose and send them a reminder requiring an acknowledgment to decrease the no-show rate.

In addition, the health care workers at vaccination centers should be knowledgeable in educating the public about the benefits, side-effects, what-to-dos, costs, and where-to-go facts on COVID-19 vaccination and pay close attention to customer service and de-escalation skills.

Patients could also be provided with allowable flexibility in the visit timings. Despite the benefits of flexibility, this would require careful planning to avoid long wait times, which might otherwise result in the patients walking away. Long wait times could also result from patients deciding to commute to the center in groups, which must be prohibited.

Policy implications: Proven strategies from operations management can help minimize over-

crowding at the vaccination facilities and ensure respectful time management, thus decreasing an overall no-show rate. The higher the consistency, availability, and quality of care service, the more motivated the public will be to visit the centers.

Affordability

One other key factors related to vaccine uptake is the out-of-pocket cost burden carried by the end-users. Indian vaccination programs have been hugely lauded across the globe due to the country's home-grown manufacturing facilities, along with robust storage and tracking mechanisms. Critically, 90% of costs are covered under India's Universal Immunization Programme (UIP)[14]. The Indian government can take advantage of pandemic pricing policies through which the vaccine developers cannot generate extraordinary profit.

Policy implications: Care must be taken that the price reduction should come from cost-efficiency rather than merely through price controls. Additionally, the public should have an option if they want to get a vaccine of their choice at a higher price with some degree of governmental control.

Looking Forward

It is crucial to understand the determinants of individual vaccination decisions to establish effective strategies to support the success of country-specific public health policies. Interventions should be carefully targeted by first understanding underlying reasons of "why" certain people might refrain from COVID-19 vaccination uptake, which can then inform "what" suitable interventions can be appropriately put in place to increase vaccination uptake and developing that much-needed herd immunity to save lives and to jump-start the economy.

Vaccine refusal can occur due to fears related to vaccination side effects, lack of trust in policy and decision-makers, and abundant misinformation or ambiguous information. We believe that policymakers and essential government task forces need to play a significant role in influencing vaccination perception and thus creating much-needed trust and confidence in the process and benefits of vaccination. As shown by several studies, the accelerated development of vaccines has caused reluctance for vaccination decisions. The behavioral tools of choice architecture, message framing, addressing cognitive biases, and creating norms can be powerful arsenals in

the policy-makers tool kit to influence pro-vaccination behavior for the COVID-19 disease. Selection of these tools requires understanding the root causes of vaccine hesitancy and will need an experimental mindset to determine the best course of action.

Lastly, addressing the last mile challenge related to the accessibility of safe vaccination sites and affordability of vaccines can be tackled through thorough planning and coordination. The goal of inoculating approximately 1.3 billion people within a year is ambitious. India can draw from the effective interventions employed by the western countries and its own world-recognized past vaccination efforts, including the eradication of polio and smallpox to ensure uptake of COVID-19 vaccination within its population. The fight against COVID-19 is not over, but we will get there.

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