

STRENGTHENING IMMUNIZATION DEMAND AND DELIVERY: LESSONS FROM EXISTING EVIDENCE

Please note: This document was prepared by the J-PAL Health Sector to provide recommendations for addressing both routine and Covid-19 immunization. It is not an exhaustive review of all the rigorous evidence on the discussed topics.

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Vaccines are one of the most impactful and cost-effective public health commodities, responsible for protecting millions of people every year against various infectious diseases such as polio, measles, and, most recently, Covid-19.ⁱ However, the Covid-19 pandemic has caused major disruptions to routine vaccination services around the world.ⁱⁱ In many countries, immunization campaigns were suspended due to travel restrictions, lack of personal protective equipment (PPE) for health workers, and limited health worker availability.ⁱⁱⁱ Demand for established vaccines also fell, as individuals were afraid of getting Covid-19 if they went to get vaccinated for other diseases or were unable to travel due to limited public transportation and lockdown policies.^{iv} Estimates in September 2020 suggested that routine immunization coverage for children in 2020 fell to rates last seen 25 years ago.^v

Even prior to the pandemic, global immunization progress had stagnated for many vaccines. Over the past 10 years, coverage of established, routine vaccines, such as those protecting against measles, polio, diphtheria, tetanus, and pertussis, had stalled at roughly 85 percent.^{vi} In 2019, 19.7 million children were not fully immunized. Of those, 14 million children were “zero-dose,” having not received the initial dose of DPT.

Meanwhile, many governments, global health organizations, civil society members, and more are ramping up Covid-19 vaccination efforts with an eye towards ending the pandemic. COVAX, coordinated by Gavi, the Vaccine Alliance, the Coalition for Epidemic Preparedness Innovations, and the World Health Organization, has served as a groundbreaking global effort to accelerate the development, production, and equitable distribution of the vaccines. As of August 6, 2021, 4.4 billion doses of Covid-19 vaccines have been administered globally.^{vii}

Despite major accomplishments, Covid-19 vaccine rollouts continue to face challenges as of mid 2021.^{viii} Major vaccine shortages have prevented widespread access, particularly in many low- and middle-income countries.^{ix,x} In many instances, vaccine hesitancy or refusal are also present.^{xi, xii, xiii, xiv} Vaccine rollout plans should not only account for logistics and service delivery challenges but also aim to strengthen the public’s demand for Covid-19 immunization to ensure adequate take-up for herd immunity.^{xv}

This note provides an overview of policy lessons stemming from economic research on improving immunization coverage. This research may hold valuable insights on increasing coverage to protect against Covid-19 as well as more routine childhood illness. While most of these evaluations were not conducted during the pandemic, they may provide a useful starting point for understanding the behavioral barriers to Covid-19 vaccination. The note focuses on interventions that can improve the delivery of vaccines as well as strategies to strengthen demand.

This note does not tailor recommendations to specific contexts or provide details on implementation. Rather, we encourage policymakers to reach out to [Anupama Dathan](#), J-PAL Health Sector manager, for follow-up conversations on incorporating the evidence into policy decisions.

IMPROVING VACCINE DELIVERY

Improving the availability and accessibility of vaccination is critical. Once procurement challenges are overcome, ensuring vaccines are reliably and locally available with well-motivated health workers can increase immunization rates. Given that the quality of care can also impact demand for services, supply-side investments may have additional benefits on increasing demand.^{xvi}

A NECESSARY PRECONDITION: QUALITY SERVICES AVAILABLE LOCALLY

Reliable and easy access to vaccines is paramount to increasing immunization rates. Reducing physical distance to immunization services is an important first step; evidence from multiple evaluations shows that reducing distance to care increases adoption of healthy behaviors, including vaccination.^{xvii}

Policymakers may want to consider prioritizing mobile outreach services for routine immunization, immunization catch-up, and Covid-19 immunization as lockdowns ease and vaccines become available. While necessary to improve vaccine take-up, however, simple and reliable access alone is not sufficient to achieve high rates of immunization coverage.

- One example comes from rural [Rajasthan, India](#) in 2004-2007, in which reliable NGO-provided monthly immunization camps at the village level tripled rates of full immunization, from 6 percent to 18 percent. A mobile immunization team held local camps from approximately 11 a.m. to 2 p.m. on a fixed date of the month. A social worker who lived in each village informed mothers of the camp and educated them on the benefits of immunization. At the first immunization, every child was given an official immunization card.

IMPROVED MONITORING AND PERFORMANCE-BASED INCENTIVES CAN HELP MOTIVATE HEALTH WORKERS AND IMPROVE PERFORMANCE IN SOME CONTEXTS

Ensuring health workers are reliably present and well-motivated is an important element of improving vaccine delivery.

Policymakers want to consider ways to boost health worker motivation. Performance-based pay and community monitoring have been shown to improve job performance in some contexts, but not always. Interventions to increase provider effort are insufficient, and can even backfire, in contexts where the main barrier is household demand.

- In [Uganda](#), a community monitoring program taking place between 2004-2006 provided information on service quality, asked communities to determine actions to improve service delivery, and allowed them to monitor health service performance via report cards. Program health facilities saw a 13 percentage point (28 percent) reduction in absenteeism, a 15 percentage point (30 percent) reduction in the frequency of drug stock-outs, and a 12-minute (9 percent) reduction in waiting time. The program increased immunization rates for BCG (7.8 percentage points), polio (6.6 percentage points), and measles (5.6 percentage points) in areas with baseline immunization rates ranging from 59 to 79 percent. This was at a time when immunization rates were fairly low in Uganda (66 percent of children fully immunized). Ten years later, when full immunization coverage had improved to 85 percent, [a similar program](#) had no impact on immunization.
- In [Pakistan](#), smartphone-based monitoring alongside performance-based incentives (1,000 rupees, or approximately \$10, for attempting 300 vaccinations across two days) in 2014 increased the number of polio immunizations community health workers (CHWs) administered. CHWs who received any performance-based incentives made 23.18 more polio vaccination attempts relative to 149.92 attempts by those in the comparison group. Measuring health workers' innate tendency to put off effort and then tailoring incentives that helped them to overcome this tendency was especially impactful.
- In the [Democratic Republic of Congo](#), performance-based pay for health workers based on service utilization, including immunization, increased their attendance and efforts to attract patients between 2009 and 2013. However, there was no impact on service utilization or health outcomes. Health workers sought to generate demand for services through reduced user fees and outreach, yet these were ineffective at bringing more people to the health facility. Researchers hypothesize that the combination of intense direct selling through preventive sessions and outreach activities, and reduced user fees, may have signaled lower quality of the health service. After performance pay phased out, worker attendance dropped and workers became less intrinsically motivated. Asking health workers to address community reluctance without additional support to build immunization demand can thus backfire and reduce motivation in the long run.

- In [Rwanda](#), performance-based pay had no impact on full child immunization despite positive impacts on the number of institutional deliveries and general preventive care visits for children 23 months or younger. This study, taking place between 2006-2008, was in the context of an intensive national vaccination campaign that raised immunization rates to 78 percent in areas with no performance-based pay. An increase beyond 78 percent would have required substantial effort on the part of the providers to identify unvaccinated children in their community and vaccinate them; performance-based pay did not succeed in generating such additional effort.

STRENGTHENING IMMUNIZATION DEMAND

Even when vaccines are readily available and provided free of charge, several factors may make it difficult for caregivers to fully vaccinate their children or for adults to get vaccinated against diseases such as seasonal influenza and Covid-19. Such barriers include lack of or inaccurate information, lack of trust, the low private benefits of immunization relative to the overall societal gains from herd immunity, and behavioral biases. Well-designed information campaigns, nudges, small incentives, and trust-building policies can address these barriers to increase demand for immunizations.

SOCIAL NETWORKS CAN BE LEVERAGED TO PROMOTE IMMUNIZATION

A large body of evidence from around the world shows that peers and community members can influence behavior.^{xviii} For immunization, social networks can be leveraged to diffuse key logistical information such as when and where services are available or the presence of incentives, should those be in place. Spreading messages via social networks can also increase demand by sharing information about the benefits of immunization or keeping immunization top of mind.

Policymakers may want to consider leveraging social networks and local “immunization ambassadors” to promote both routine and Covid-19 vaccination. Importantly, research shows that simply asking a few community members to name well-connected individuals is an inexpensive, easy, and accurate way to identify promising individuals to include in community-level immunization promotion.^{xix}

- In a study from [Haryana, India](#), between 2016 and 2017, well-connected individuals in a community effectively spread important information on immunization and increased full immunization coverage by 27 percent compared to randomly selected individuals. To identify these immunization ambassadors, 17 randomly selected households in each village were asked to nominate people who would be good at diffusing information. The six top nominees were asked to be program ambassadors and spread information about the immunization camps.
- In a large-scale [Covid-19 survey from 23 countries](#) occurring from October 2020 until March 2021, providing individuals information on the estimated vaccine acceptance reduced by 5.3 percent the fraction of people who are “unsure” or more negative about accepting a Covid-19 vaccine.

CELEBRITIES AND SOCIAL MEDIA PLATFORMS CAN HELP SPREAD KEY MESSAGES AND COMBAT MISINFORMATION

Because of larger networks, role modeling, ease of information sharing, and more, celebrities and social media platforms can help diffuse knowledge and combat misinformation on key health issues.^{xx}

However, celebrities can also be a source of misinformation, and particularly polarizing or political celebrities could potentially have negative impacts.

Policymakers may want to consider leveraging celebrity outreach or social media to increase knowledge about immunization. Knowledge about the importance of immunization is a critical step in motivating take-up; however, the extent to which increased knowledge translates into actual immunization improvements may be limited in contexts where other important barriers remain.

- A 2015-2016 study in [Indonesia](#) found celebrity endorsement significantly increased the likelihood that a tweet promoting immunization was liked or retweeted relative to similar tweets without celebrity endorsement. The effect came primarily through celebrities speaking in their own voice rather than simply passing on a message. Explicitly citing an external medical authority reduced the message spread by 27 percent. Exposure to 15 campaign tweets increased knowledge about a key antimyth message by 12 percent, on average, though there was no impact on other knowledge areas.

OFFERING NUDGES TO GET IMMUNIZED CAN HELP ADDRESS BEHAVIORAL BIASES AND INCREASE TAKE-UP

Nudges are light-touch interventions that address behavioral issues such as impatience, procrastination, or demand for convenience. They can help make immunization more salient and, in some cases, provide information. Nudges can take multiple forms, such as text message reminders and prompts at the pharmacy or doctor's office. The design of the nudges is particularly important for their efficacy.

Policymakers may want to consider using nudges for immunization to reach individuals who may be indifferent to immunization; however they are unlikely to influence those who are hesitant or opposed to vaccines. For nudges providing information, specific and actionable guidance is important to promote behavioral change.^{xxi} Additional message framings, such as emphasis on prosocial behavior or personal benefits as well as nudge frequency, can also impact the effectiveness of information dissemination and nudges depending on the context.

- In the United States, two studies tested multiple text message nudges to encourage flu vaccination among adults. [One study](#) tested 19 different text messages encouraging flu vaccination to patients prior to a primary care visit, six of which were effective (fall 2020). [A second study](#) tested 22 different text messages encouraging Walmart pharmacy patients to visit Walmart for a flu vaccine, 14 of which were effective compared to the worst-performing

message (fall 2020). Both found that the most effective messages were framed as reminders to get flu shots that were already reserved for the patient and used standard communications tones rather than trying to be surprising, casual, or interactive (11 percent and 8 percent increases, respectively).

- Also in the [United States](#), quarterly letters in 2013-2014 reminding women to finish the three-dose HPV vaccination schedule increased completion rates from 46.6 percent to 56.4 percent, a 21 percent increase.
- In [Pakistan](#) in 2003-2004, redesigning children's immunization cards to be larger, simpler, and place more emphasis on the child's next scheduled vaccine along with a brief informational session that highlighted the importance of immunization increased completion of DPT vaccinations by 31 percent among low-literacy mothers.
- In the [same study from Haryana, India](#) mentioned above, taking place in 2016-2017, personalized text and voice call reminders sent to caregivers when their child was due for an immunization had no impact. It is possible that caregivers did not understand the information provided and did not have anyone to ask to explain the message content.

SMALL INCENTIVES CAN INCREASE DEMAND AND COMPLEMENT SUPPLY-SIDE INVESTMENTS

Small incentives can help address behavioral biases such as procrastination and increase the immediate perceived benefit of receiving a vaccine.^{xxii} By improving immunization demand, these incentives can amplify the impact of investments in vaccine delivery. Although incentives may go to those who would have been vaccinated without incentives, in some contexts the cost per child has fallen when incentives were introduced by spreading fixed costs over a larger number of recipients.^{xxiii}

Policymakers may want to consider creating small incentives that signal progress through the immunization schedule. In the context of Covid-19, such progressive incentives could be especially relevant for multidose vaccines. Small incentives are unlikely to overcome strong opposition to immunization but rather may be more effective for those who procrastinate, are ambivalent about being vaccinated, or are slightly hesitant to do so.

- In the [same study in Rajasthan, India](#), from 2004-2007 mentioned above, adding a small nonmonetary incentive (a bag of lentils, a staple food) more than doubled full immunization rates among children compared to immunization camps alone. The percentage of fully immunized children increased by 21 percentage points (116 percent) to 39 percent, relative to immunization camps only. Furthermore, providing lentils as an incentive, in addition to improving the supply of services, halved the cost of fully immunizing a child: the camps with incentives were busier than those without incentives, making more efficient use of the nurses' time.

- In [Haryana, India](#), in 2016-2017, mobile phone credits that increased through the immunization schedule (450 rupees total) improved full immunization rates among children by 33 percent. However, the same total amount of mobile phone credits equally spaced across the immunization schedule had no impact. Smaller mobile phone credits of either constant or increasing value (250 rupees total) also had no impact, underscoring the importance of appropriately sized incentives.
- In the [United States](#), a study taking place in 2017 found that a \$5 or \$10 incentive for Black men to get the flu shot during a free health screening increased demand for vaccination by 19.2 and 29.9 percentage points, respectively. Upon arriving at the health clinic, participants were given a tablet that showed a list of services and told that their assigned doctor would provide all preventive services they chose, including a flu shot and the randomly assigned incentive. Study participants then selected which (if any) of the preventive care services they would like to receive.

ADDRESSING LOW CONFIDENCE IN THE HEALTH SYSTEM IS CRITICAL TO INCREASE DEMAND

Low confidence in health systems could stem from a variety of factors, including low-quality care, negative experiences with the health system, discrimination, or a lack of information.

Policymakers may want to consider implementing trust-building interventions to increase vaccine take-up in instances where marginalized groups may be less willing to get vaccinated or past events have undermined confidence in health care. Such policies will look different depending on the context but could include the ability to see health providers from the same race or implementing accountability mechanisms and other quality improvements. Given that low-quality care can contribute to low confidence in health systems, supply-side investments may have additional benefits to vaccine demand.^{xxiv}

- In 2017 in the [United States](#), Black men, typically more mistrustful of the health care system due to systemic racism and historical injustices, were more likely to trust providers of the same race.
- Also in the [United States](#), videos promoting flu vaccination from nonexpert race concordant individuals increased intent to get the flu and Covid-19 vaccines as well as self-reported flu vaccine take-up in 2019-2021. The effects were concentrated among individuals with the least prior experience with vaccination. Nonexpert messengers could have been more effective because they were more proximate community members or because medical experts may have been seen as part of broader social interests or private interests such as insurers or pharmaceutical companies.

IMPLEMENTING MULTIPLE INTERVENTIONS TOGETHER MAY MAXIMIZE IMPACT AND COST-EFFECTIVENESS

The majority of these research studies test one type of intervention at a time without comparing these different interventions or testing them in combination with one another. Multiple interventions need to be implemented to maximize overall effectiveness, leading to the largest increase in immunization, and cost-effectiveness, leading to the largest increase in immunization per dollar spent.

- In the aforementioned study from [Haryana, India](#), in 2016-2017, researchers tested 75 unique combinations of targeted reminders, incentives, and local immunization ambassadors. The most effective package of interventions combined well-connected local immunization ambassadors, targeted SMS reminders, and small nonmonetary incentives (mobile phone credit) to caregivers, increasing measles vaccination by approximately 55 percent (4.02 measles vaccines per village per month). The most cost-effective policy overall combined local immunization ambassadors with SMS reminders without incentives: adding local ambassadors and text messages to the government’s routine immunization program increased the number of fully immunized children per dollar spent by 9.1 percent relative the status quo because the combination was particularly effective and inexpensive.

ONGOING IMMUNIZATION STUDIES BY J-PAL AFFILIATES & INVITED RESEARCHERS	
Covid-19 Vaccine Take-Up in a County-Run Medicaid Managed Care Population	As of mid-July 2021, only about half of eligible Americans have been fully vaccinated against SARS CoV-2. Vaccine take-up rates are low, even for some groups facing high risk of infection, hospitalization, and mortality from Covid-19. In this work, researchers are partnering with Contra Costa Health Services (CCHS), the department of health in Contra Costa County, CA, to test the role of financial incentives, the lowering of appointment scheduling frictions, and provider messages on vaccine take-up in a racially and ethnically diverse Medicaid managed care population.
Influenza Vaccine: The Combined Influence of Preferences and Information About Risks and Benefits	Influenza vaccination is important as it can reduce the risk of both getting and spreading influenza. Researchers are studying how self-reported regret for not having gotten an influenza vaccination depends on individual preferences and information about the importance of vaccines. Participants are provided either no information, information about the importance of vaccines to reach herd immunity, or information about the possible importance of influenza vaccination regarding Covid-19. The study is embedded in a survey conducted on the employees of the University of Zurich, collecting demographic data, self-reported economic preferences, and beliefs about vaccinations and the medical sector.

ONGOING IMMUNIZATION STUDIES BY J-PAL AFFILIATES & INVITED RESEARCHERS

Covid-19 Vaccine Acceptability in Mozambique	Researchers are studying how to address two relevant threats to Covid-19 vaccine acceptability in Mozambique: the low level of trust in the national health system's capacity and the wild circulation of fake news. Researchers first convey a simple message endorsing vaccination against Covid-19. They then add a statement praising a previous successful immunization campaign that eradicated wild polio to lever social memory and to test whether the memory of an earlier achievement can increase trust in the capacity to operationalize the vaccination campaign against Covid-19. Finally, researchers raise awareness about how fake information about Covid-19 vaccines may spread by asking the respondent to share her worst concerns. They then convey a message about the dangers of contributing to create and spread fake news.
Effects of Information on Vaccination Intentions and Decisions	Researchers are studying how important information affects vaccination intentions and decisions of the general population. To better understand variations in treatment based on innate characteristics, they are also considering vaccination intentions prior to the study as well as the impact of characteristics such as sociodemographics.
Encouraging Flu Vaccination Among High-Risk Patients Identified by Machine Learning	Researchers are testing different interventions to determine the most effective way to promote flu vaccine uptake in a high-risk population, as identified by an artificial intelligence or machine learning algorithm. They will inform these patients that they are at high risk and then test the impact of additionally explaining that this characterization comes from an analysis of their medical records and of explaining that an algorithm made this determination.

ABOUT J-PAL

The Abdul Latif Jameel Poverty Action Lab (J-PAL) is a network of more than 225 affiliated professors from over seventy universities. Our mission is to reduce poverty by ensuring that policy is informed by scientific evidence. We engage with hundreds of partners around the world to conduct rigorous research, build capacity, share policy lessons, and scale up effective programs. J-PAL was launched at the Massachusetts Institute of Technology (MIT), and now has regional offices in Africa, Europe, Latin America and the Caribbean, the Middle East and North Africa, North America, South Asia, and Southeast Asia.

ⁱ WHO and UNICEF, 2020; Our World in Data, 2021

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- ii See the [WHO routine immunization recommendations](#), which differ from those delivered via campaigns and associated with accelerated disease control (ADC), eradication, or elimination initiatives ([Global Vaccine Action Plan 2011–2020](#)).
- iii [WHO, UNICEF, and GAVI Pulse Poll One, 2020](#); [WHO, UNICEF, and GAVI Pulse Poll Two, 2020](#)
- iv [WHO, UNICEF, and GAVI Pulse Poll One, 2020](#); [WHO, UNICEF, and GAVI Pulse Poll Two, 2020](#)
- v [Bill & Melinda Gates Foundation, 2020](#)
- vi [WHO and UNICEF, 2020](#)
- vii Edouard Mathieu et al., “A Global Database of Covid-19 Vaccinations,” *Nature Human Behavior* (2021); [Our World in Data, 2021](#).
- viii Mueller, Benjamin and Rebecca Robbins. “*Where a Vast Global Vaccination Program Went Wrong*” *New York Times*, August 2, 2021, <https://www.nytimes.com/2021/08/02/world/europe/covax-covid-vaccine-problems-africa.html>.
- ix Christopher Rowland, et al., “Drug Companies Defend Vaccine Monopolies in Face of Global Outcry,” *The Washington Post*, March 22, 2021, www.washingtonpost.com/business/2021/03/20/covid-vaccine-global-shortages/.
- x “Covid: Europe's Vaccine Rollout 'Unacceptably Slow' – WHO,” *BBC News*, April 1, 2021, www.bbc.com/news/world-europe-56600660.
- xi [Wouters et al., 2021](#)
- xii Matina Stevis-Gridneff and Monika Pronczuk, “Worry Over 2 Covid Vaccines Deals Fresh Blow to Europe’s Inoculation Push” *New York Times*, April 13, 2021, <https://www.nytimes.com/2021/04/13/world/europe/covid-vaccines-astrazeneca-johnson-johnson.html>.
- xiii Sheryl G. Stolberg and Annie Karni, “Nation Faces ‘Hand-to-Hand Combat’ to Get Reluctant Americans Vaccinated,” *New York Times*, April 28, 2021, <https://www.nytimes.com/2021/04/21/us/politics/coronavirus-vaccine-rates.html>.
- xiv Rachel Treisman, “West Virginia Will Pay Young People \$100 To Get Vaccinated Against Covid-19,” *National Public Radio*, April 27, 2021, <https://www.npr.org/sections/coronavirus-live-updates/2021/04/27/991173625/west-virginia-will-pay-young-people-100-to-get-vaccinated-against-covid-19>.
- xv [WHO, UNICEF, and World Bank, 2020](#)
- xvi [Christensen et al. 2021](#)
- xvii Studies from J-PAL affiliates and other researchers on reducing physical distance to health products and services include [Banerjee et al. 2010](#), [Metsch et al. 2012](#), and [Thornton 2008](#).
- xviii For more on how peer effects and social networks can help to increase adoption of healthy behaviors, please see the [J-PAL insight here](#).
- xix [Banerjee et al. 2019](#)
- xx [Banerjee et al. 2020](#); [Bowles et al. 2020](#); [Alatas et al. 2020](#)
- xxi For more on how specific and actionable information can help to increase adoption of healthy behaviors, please see the [J-PAL insight here](#).
- xxii Policymakers may be concerned about introducing incentives for immunization for fear that they may increase the perceived risk of vaccination, reduce intrinsic motivation for those who had been willing to do it voluntarily, and/or reduce motivation in subsequent campaigns when incentives are not offered. However, more research is needed on these potential effects, and the evidence to date indicates incentives are a powerful means of increasing take-up in the short run.
- xxiii [Banerjee et al. 2011](#)
- xxiv [Christensen et al. 2021](#)