

From Airports to Arms: New Insights and Urgent Recommendations to Accelerate Global COVID-19 Vaccinations

COVID Global Accountability Platform (COVID GAP), led by Duke University and COVID Collaborative; along with the World Health Organization, UNICEF, and Africa CDC

EXECUTIVE SUMMARY

Omicron's rapid and relentless advance across continents proves once again that a global pandemic requires a global plan of attack. Yet almost two years into the COVID-19 pandemic the world remains in a perilous position. The diplomatic landscape is littered with unfulfilled pledges and unrealized targets, while the trajectory of the pandemic remains unchanged – despite the fact that we have a new and highly transmissible variant before us and the tools and knowhow to successfully combat it.

The best defense against COVID-19 — including Omicron and potential future variants — is rapid, widespread, and equitable vaccination combined with additional evidence-based public health measures. Timely, predictable access to vaccines still remains a major challenge for many low- and lower-middle income countries. While many countries are managing to organize vaccination campaigns quickly as supply ramps up, in some countries increasing supply is highlighting critical bottlenecks to getting vaccines from airports to arms, including distribution, delivery, and demand generation challenges.

Converting vaccines to vaccinations is becoming the key to winning the race between vaccines and variants and to end the pandemic. **That is why we call on global, regional, and national leaders to take urgent actions to prioritize support for country-led vaccination strategies and implementation.**

Vaccine supply should be consistent and predictable, with a steady flow rather than sudden surges, ensuring deliveries well in advance of expiration dates. **National leaders should ensure a whole-of-government approach with high-level political leadership and accountability to increase trust and drive vaccination uptake. Global actors should ensure that supports for vaccine rollout are tailored to country priorities.** Investment in regional engagement and mechanisms for sharing learnings and best practices can further improve and accelerate vaccination implementation.

Timely access to appropriate financing remains a major constraint for country-level vaccination and broader pandemic response. To provide the financial tools and resources to enable low- and middle-income countries (LMICs) to scale-up effective vaccination, donors and multilateral development banks (MDBs) must simplify and speed up access to funding, and country-level and global costing projections should be updated and aligned to focus stakeholders on specific, shared targets. In-country funding must also rapidly be disbursed to vaccination initiatives.

Given the urgency of a global pandemic, **immediate vaccination strategies must prioritize speed and scale.** Countries can accelerate progress by focusing on quick deployment of vaccines, linked to robust monitoring and feedback. Urgent investments in COVID-19 response can then be leveraged to strengthen longer-term health system capabilities.



In addition to these cross-cutting challenges, countries must simultaneously address vaccination implementation bottlenecks including **cold chain and logistics, data systems, health workforce, and demand**.

Further national, regional, and global collaboration is urgently needed to provide additional clarity and support for key vaccination capabilities to achieve global COVID-19 containment. Working with local leaders and a wide range of regional and multinational organizations that are providing critical support for the campaigns, we will

collectively build on this status assessment to identify best practices and track progress on overcoming key local vaccination barriers.

By urgently addressing cross-cutting and technical barriers to vaccination and empowering country-level leadership and decision-making, stakeholders at national, regional, and global levels can collaborate more effectively to help end the pandemic – everywhere.

INTRODUCTION

Almost two years into the COVID-19 pandemic the world remains in a perilous position, with over 270 million reported cases, over 5.3 million reported deaths, and trillions of dollars in lost economic activity. Inequities in access to vaccines and other life-saving interventions, as well as a lack of commitment and implementation of a cohesive, coordinated, appropriately resourced global action plan, leave everyone more vulnerable, especially those in LMICs.

To end the pandemic, the best line of defense against COVID-19— including Omicron and potential future variants — is rapid, widespread and equitable vaccination combined with additional evidence-based public health measures. Persistent challenges to equitable vaccine supply, allocation, distribution, acceptance, and financing, combined with local and regional vaccine delivery factors have resulted in 70 of the world's poorest and least-resourced countries falling tragically short of reaching the World Health Organization's (WHO) year-end [target](#) of 40% vaccination coverage, a critical milestone to reaching the WHO and G20 [endorsed](#) target of 70% coverage by mid-2022. The inequities are stark: the average full vaccination [coverage](#) across low-income countries is only 4%, compared to 69% in high income countries.

Timely, predictable access still remains the major challenge for many low- and lower-middle income countries. Many countries have managed to organize vaccination campaigns quickly as supply ramps up. However, in some countries increasing supply is highlighting critical challenges on the ground in distribution, delivery, and demand generation. Converting vaccines to vaccinations

will soon become the key to winning the race between vaccines and variants and ultimately ending the pandemic.

On 13 December 2021, the COVID Global Accountability Platform (COVID GAP, led by Duke University and COVID Collaborative), WHO, United Nations Children's Fund (UNICEF), and Africa Centres for Disease Control and Prevention (Africa CDC), supported by The Rockefeller Foundation and the Bill & Melinda Gates Foundation, co-hosted a joint global convening on vaccination challenges (see Appendix II for list of the over 70 technical experts and programmatic leaders who participated). This collaboration is bringing together leaders from around the world to co-design and catalyze solutions that can accelerate global pandemic response. This report summarizes insights and recommendations from that convening, and also draws on learnings from national, regional, and global vaccination efforts over the past year, particularly those led by WHO and UNICEF through COVAX Country Readiness and Delivery (CRD) activities and by Africa CDC and the African Union.

We provide here the highest-priority findings and eight urgent, actionable recommendations emanating from this joint convening to increase vaccination coverage in LMICs. We identify three cross-cutting challenges: **strong leadership and trust, timely access to appropriate financing, and vaccination strategies that prioritize speed and scale**; as well as additional technical bottlenecks to vaccination: **cold chain and logistics, data systems, health workforce, and demand** (see Appendix I).

CROSS-CUTTING CHALLENGES FOR SUCCESSFUL VACCINATION

Among many challenges to vaccinating the world in the midst of a rapidly evolving pandemic and at unprecedented scale and speed, three cross-cutting challenges stand out.

Strong Leadership and Trust are Critical for Success

While adequate, predictable vaccine supply has been the most critical component for launching successful vaccination campaigns, strong political commitment and leadership are also essential. Countries with senior political and technical leaders committed to mobilizing the resources needed to scale up vaccination have shown success in getting vaccines into arms. Strong leadership and coordination across the national, subnational, and community levels is important to effectively implement vaccination campaigns.

Trust in the government and health systems is another factor that can have a significant impact on vaccination efforts. Governments, public health agencies, and health services providers will have a much harder time driving vaccine uptake and acceptance of vaccines if there is a lack of trust. Engaging with trusted partners across communities, academia, civil society, and the private sector can help overcome this hurdle.

In countries with low commitment from political leaders or lack of trust in governments or institutions, vaccination efforts have struggled to get off the ground. Several countries have had a low vaccine uptake of less than 0.15% of the population per day, while high performing countries manage to roll out vaccination at peak rates of 1% of the population per day.

Actionable Recommendations:

1. Ensure a whole-of-government approach with high-level political leadership and accountability to increase trust and drive vaccination uptake. Countries demonstrating relative success have emphasized political commitment to vaccination and taken a whole-of-government approach, employing innovative governance structures such as high-profile, cross-government task forces with direct accountability

to the head of government. This helps break down silos and facilitates better coordination across government at the national and sub-national levels. An effort that spans ministries including health, finance, education, and others enables effective procurement, distribution, strategy development, and implementation.

- 2. Establish cross-sector partnerships to augment government vaccination capabilities.** Cross-sector partnerships that include the private sector, civil society organizations, academia, and global partners can help better coordinate complex challenges and access additional resources and capabilities.
- 3. Make global support for vaccine rollout more responsive to country priorities.** Coordinated, effective global leadership grounded in local needs and preferences has led to success in efforts to address issues such as HIV/AIDS and polio. The needs and priorities laid out by national and subnational leaders should drive the agenda for a coordinated local response from multilateral organizations, donors, and high-income countries. Leaders from LMICs must also have stronger voices, participation, and leadership in setting global priorities and targets.
- 4. Invest in regional engagement to improve and accelerate vaccination implementation.** Cross-sector stakeholders across countries should engage to share experiences, collaborate to solve shared challenges, and identify best practices to improve vaccination and pandemic response. These approaches should provide technical assistance, funding, and potentially surge staffing support from foundations, regional institutions, and multilateral organizations, including for implementation and scale-up of high-priority solutions.

Timely Access to Appropriate Financing Remains a Major Constraint

For many LMICs, particularly those that already have limited health budgets, financing is a key constraint to vaccination. The Access to COVID-19 Tools Accelerator (ACT-A) [Strategic Plan](#) for 2021-22 estimates \$7 billion in funding needed to support progress toward the 70% global vaccination target. While significant funding has

been committed for the delivery of COVID-19 vaccines, the funding is fragmented as it comes through many different channels (e.g., World Bank, Gavi, the Vaccine Alliance, UNICEF, WHO, bilateral donors, etc.). About \$3.9 billion has been pledged (as of 9 December 2021) by donors to support COVID-19 vaccine delivery and more funding could be drawn from The World Bank (\$20 billion window) and other MDBs,¹ but not all of this funding has been disbursed to be used by countries during vaccine roll-out. This has led to funding gaps at the country level, especially as countries have shifted to rely more and more on expensive campaigns.

Many countries have been reluctant to draw loans from development banks due to existing debt constraints or the conditionality and cumbersome process that comes with borrowing from multilateral institutions. Speed and agility to deploy funding against well-defined country strategies is critical so that it is available when needed.

Despite high-level global projections, there still is not a clear estimate of the entire cost, country by country, to reach the 40% and 70% vaccination targets globally. Funding needs differ by country, context, and the evolution of the pandemic, thus making it difficult to set meaningful funding targets as countries pilot strategies and pivot to different approaches based on numerous factors, including supply of different vaccines, reaching coverage targets in specific populations, and the changing nature of the virus itself.

Actionable Recommendations:

- 1. Simplify and speed up access to funding from donors and MDBs.** Donors and MDBs must take further steps to coordinate and increase transparency of various sources of funding and make it easier and faster for countries to apply for and receive funding. Existing efforts such as the WHO [Partners Platform](#) should be further leveraged to highlight available funding sources and amounts available to support vaccine procurement and vaccination strategies; and to serve as a consolidated, transparent platform where country-by-country financing needs are tracked and actively matched with available sources of funding.
- 2. Update and align country-level and global costing projections.** Based on learnings from the past year, countries should take the lead (with access to technical

assistance as needed) to update their projections of funding needs for the overall pandemic response based on their national targets, especially for vaccine purchase, distribution, delivery, and demand generation. Such an effort will provide clarity for global financing goals and progress. This can be done as countries update their national deployment and vaccination [plans](#) and share them via the Partners Platform. A clear projection of country-developed financing projections that can be rolled up by region and globally would complement global projections, including the ACT-A 2021-22 funding estimates, helping to further refine a fully-costed action plan and engagement of donors on specific burden sharing arrangements.

Prioritize Speed and Scale, with Transition to Sustainability Over Time

As access to more predictable vaccine supply improves over the coming months, countries must develop or refine strategies for vaccine distribution and delivery. In the midst of a pandemic, speed of implementation is a critical driving factor, with mass vaccination campaigns often providing the most effective and efficient approach. Over time, countries may adapt their strategy to “normalize” COVID-19 vaccination as part of routine immunization programs across a person’s lifespan to enable longer-term success and sustainability. Based on local circumstances, including vaccine access, countries may shift between these models or even deploy them both in complementary ways to maximize effectiveness.

National and subnational leaders must actively manage the potential tension between mass vaccination campaigns prioritizing speed of vaccination versus sustainability, with investments supporting infrastructure for routine immunizations and essential health services. Finding the right local approaches to vaccination, with a clear strategy and adaptation to evolving circumstances over time, presents an opportunity to invest in and strengthen health system infrastructure for the longer term, including improved access in remote and last-mile communities, enhanced digital health and data systems, and increased cold-chain capacity (see below).

Clear country-led strategies for vaccination will help to clarify the necessary capabilities, capacity, and resources (both financial and human capital) required for successful

¹ Source: UNICEF regular engagement with donors

implementation, and will enable more productive engagement of global and regional organizations in support of that strategy.

Actionable Recommendations:

1. Establish and adapt country-level vaccination strategies to prioritize the quick deployment of vaccines linked to robust monitoring and feedback.

Establishment of a national strategy and priorities, coupled to monitoring and management of vaccination efforts through whole-of-government approaches such as a national task-force, can enable more successful implementation. Mass vaccination sites and national immunization campaigns, adapted for local and community contexts, can bring vaccinations closer to the communities they serve. This approach may rely in the coming months on vaccination campaigns that tend to be more expensive, requiring additional resources (e.g., funding, health workers, and logistics) that need to be coordinated and supported. Real-time feedback loops with high-quality data and analysis can accelerate the speed, effectiveness, and efficiency of vaccination campaigns.

2. Leverage urgent investments in COVID-19 response to strengthen longer-term health system capabilities. To prioritize speed of vaccination, countries can move forward with fast campaigns while simultaneously planning for integration of new capacities and resources into their long-term infrastructure. It is increasingly clear that boosters are likely to be necessary to maintain immunity. Therefore, building systems now that can incorporate boosters (or third doses) into future immunization programs is a priority. Preparing a workforce for supply surges, for example, could also provide the foundation for additional primary care support in non-emergency times. Data systems implemented now to trace COVID-19 vaccine authenticity, stock, and utilization (e.g., immunization information systems) will strengthen the pharmaceutical supply chain across a wide range of products and transform immunization systems needed for assessing coverage among segments of the population and provide insights into equity.

TECHNICAL BOTTLENECKS TO VACCINATIONS

Supply Chain and Logistics

Unpredictable deliveries of COVID-19 vaccine doses, often near expiry dates, have hampered LMIC efforts to scale up vaccinations. Country leaders report having no doses for months and then suddenly hundreds of thousands or millions of doses are delivered, with little advance warning and often with only weeks left before expiration. These supply surges cause problems across the entire in-country distribution system.

Additionally, vaccine cold storage is limited in many LMICs, particularly outside of major cities. Despite recent investments in expanded cold chain in preparation for COVID-19 vaccines, health system leaders cannot always meet the storage needs for a sudden surge in supply, particularly for those vaccines requiring ultra-cold storage. Surges cause a similar issue for vaccine transport vehicles, replacement cold packs, and vaccine carriers, all in short

supply. And once the vaccines reach local communities, there are often not enough trained vaccinators to administer the surge of doses before their expiration date. Countries may also be reluctant to begin demand generation activities without assurance of availability of supply.

Donor countries and vaccine manufacturers, in collaboration with African Vaccine Acquisition Trust (AVAT) and COVAX, must radically increase the transparency of planned vaccine deliveries and coordinate directly with recipient country governments to support effective planning.

Vaccine supply should be consistent and predictable, with a steady flow rather than sudden surges, ensuring that deliveries occur well in advance of expiration dates.

Data Systems

A lack of data tools to track stock, utilization, and expiration dates compounds the challenge caused by unpredictable deliveries. Overstretched health systems need to manage limited resources through careful planning and strong data systems. Insufficient systems and capabilities at the country level hamper efforts to determine eligibility, schedule appointments, track vaccination status, and monitor adverse events. Data collection on vaccine administration is often infrequent and incomplete, and there are significant gaps across countries and regions. To address these issues, national leaders can improve governance of data privacy and security; strengthen connectivity; and leverage strategic partnerships and digital innovations to increase vaccination capacity.

Donors and multilateral organizations should support country governments to invest in data systems to improve traceability and monitoring of vaccine stocks and utilization as well as vaccination implementation.

Health Workforce

Many LMICs faced health worker shortages even before COVID-19. The pandemic has worsened gaps in the health workforce due to infections, death, quarantines, labor protests, and strikes. Health workers are being asked to work longer, harder hours without fair compensation which is leading to low morale and burnout. Separate from COVID-19, there is a need for greater investment in the healthcare workforce.

In the short-term, **reaching ambitious coverage targets requires a surge workforce to support vaccination.** This can be done by task shifting among diverse groups including nursing students, retirees, pharmacists, dentists, and potentially the military (though this should be done with caution due to concerns around trust). There is also a need to ensure the security of health workers. This includes providing personal protective equipment and proper compensation that acknowledges their increased workloads. Offering incentives, especially for additional work, training, and outreach needed for COVID-19 vaccination campaigns, can motivate and show appreciation to overstretched health workers.

Demand Generation

Over the coming months, generating demand for vaccines will become a crucial determinant of success for each country. A multitude of factors drive a person's intent to get vaccinated, including structural factors (e.g., supply, access, and cost), behavioral and social drivers (e.g., social norms, cultural and political beliefs), and information needs (e.g., mis/disinformation, delivery mechanisms, and quality of information).² **Governments should make investments to support behavior change interventions, community engagement, and risk communications at the hyperlocal level.**

There is also a concerning lack of trust among some health workers, perhaps the most powerful influencers of vaccination, whose own acceptance of vaccination could have a ripple effect in their communities. **Building health worker knowledge and confidence through education on vaccine development, effectiveness, and safety – and how to address common questions and concerns in a respectful and open dialogue – is an important step to improving vaccine uptake.**

Equally important is generating the evidence needed to know what works and what doesn't work to strengthen demand efforts. Coordinated engagement among academia, research institutions, local health practitioners, social and behavioral scientists, and civil society organizations who know their communities best, can help to develop timely, nuanced insights about vaccine confidence, supporting refinement of strategies over time.

Partnerships with the private sector can also help to improve vaccine demand. Well-coordinated efforts between technology companies and governments informed by hyperlocal vaccination interventions can quickly stop inaccurate and malicious information. Employers also play a large role in engaging their employees to encourage them to get vaccinated and set up on-site vaccine clinics for convenience. In addition, companies have valuable insights into consumer behavior that are applicable to immunization acceptance.

² Stefanie Freidhoff, Associate Professor of The Practice, Brown School of Public Health (11/2021)

CONCLUSION

Millions of lives have been lost around the world despite the unprecedented pace of safe and effective vaccine development and scaled-up manufacturing leading to billions of doses. Inequitable access to these life-saving tools has prolonged the COVID-19 pandemic and cost lives while upending livelihoods and economies.

We must collectively commit to more effective, equitable, and urgent efforts at national, regional, and global levels to vaccinate the world and undertake additional public health measures that improve our response to this pandemic.

We call on donor countries and manufacturers, in collaboration with AVAT and COVAX, to immediately increase the transparency and predictability of planned vaccine deliveries and coordinate directly with recipient country governments to support effective planning and implementation.

As vaccine supply and predictability improve over the coming months, we also call for further coordinated actions to increase capabilities, capacity, and investments in support of country-led vaccination efforts in LMICs. That will require addressing cross-cutting vaccination

challenges – leadership and trust; timely access to financing; and prioritizing speed and scale – while simultaneously addressing multiple technical challenges that are inter-connected.

Large gaps remain in many countries between vaccination goals and adequate technical supports to achieve them rapidly. Further national, regional, and global collaboration is urgently needed to provide additional clarity and support for key vaccination capabilities to achieve global COVID-19 containment. Working with local leaders and a wide range of regional and multinational organizations that are providing critical support for vaccination campaigns, we will collectively build on this status assessment to identify best practices and track progress on overcoming key local vaccination barriers.

We possess all the necessary tools and resources to urgently save more lives and end the pandemic more quickly. We can, and must, do more to equitably vaccinate the world.

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This report has been developed collaboratively based on input from dozens of experts and leaders around the world. The primary writing team for the report is listed below (alphabetically by last name):

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CO-HOSTING ORGANIZATIONS

About COVID GAP

The COVID Global Accountability Platform (COVID GAP), led by Duke University and COVID Collaborative, aims to improve and accelerate global pandemic response by serving as an independent source of insights and actionable recommendations, convening key stakeholders to galvanize actions and collaborations, and strengthening transparency and accountability. Find out more: <https://covid19gap.org/>.

About the World Health Organization (WHO)

WHO is the United Nations agency that connects nations, partners and people to promote health, keep the world safe and serve the vulnerable – so everyone, everywhere can attain the highest level of health. WHO leads global efforts to expand universal health coverage. We direct and coordinate the world's response to health emergencies. And we promote healthier lives – from pregnancy care through old age. Our Triple Billion targets outline an ambitious plan for the world to achieve good health for all, using science-based policies and programmes.

About UNICEF

UNICEF works in some of the world's toughest places, to reach the world's most disadvantaged children. Across more than 190 countries and territories, we work for every child, everywhere, to build a better world for everyone.

About African Union

The African Union (AU) is a continental body consisting of the 55 Member States that make up the countries of the African Continent. It was officially launched in 2002 as a successor to the Organisation of African Unity (OAU, 1963-1999). <https://au.int/en/overview>

About Africa CDC

Africa Centres for Disease Control and Prevention (Africa CDC), is a specialized technical institution of the African Union that strengthens the capacity and capability of Africa's public health institutions as well as partnerships to detect and respond quickly and effectively to disease threats and outbreaks, based on data-driven interventions and programmes. Learn more at: <https://africacdc.org>

SUPPORTING ORGANIZATIONS

About the Bill & Melinda Gates Foundation

Guided by the belief that every life has equal value, the Bill & Melinda Gates Foundation works to help all people lead healthy, productive lives. In developing countries, it focuses on improving people's health and giving them the chance to lift themselves out of hunger and extreme poverty. In the United States, it seeks to ensure that all people—especially those with the fewest resources—have access to the opportunities they need to succeed in school and life. Based in Seattle, Washington, the foundation is led by CEO Mark Suzman, under the direction of Bill Gates and Melinda French Gates. See <http://gatesfoundation.org> for further information.

About The Rockefeller Foundation

The Rockefeller Foundation is a pioneering philanthropy built on collaborative partnerships at the frontiers of science, technology, and innovation to enable individuals, families, and communities to flourish. We work to promote the well-being of humanity and make opportunity universal. Our focus is on scaling renewable energy for all, stimulating economic mobility, and ensuring equitable access to healthy and nutritious food. For more information, sign up for our newsletter at <https://www.rockefellerfoundation.org/> and follow us on Twitter @RockefellerFdn.

APPENDIX I:

Table of Challenges and Bottlenecks to COVID-19 Vaccinations in Low- and Middle-Income Countries

Bottleneck	Critical Components to Solve	Highest Priority Recommendations	Stakeholders Who Could Take That Action
Political Context and In-Country Planning Mechanisms	<ol style="list-style-type: none"> Leadership and Coordination: Weak or unclear coordination mechanisms at national or sub-national level, disconnect between political and technical agendas Lack of supply visibility: Erratic shipments of large and small shipments, with little lead time for preparation and planning Multiple products; short shelf-life; cold chain capacity: Juggling multiple products with varying handling procedures and target groups – AZ, Moderna, Pfizer, Janssen, Sinopharm, and Sinovac, etc.; Receipt of large quantities of vaccines with very short shelf-life, sometimes only with weeks of useable life to deploy to lower levels; Inadequate storage capacity at national and local government level Data and data management: Limited data sources to estimate target populations Competing priorities: To manage competing public health activities (cVDPV2 outbreaks response, measles/Men A campaigns, Yellow fever outbreaks/preventive mass vaccination campaigns, etc) 	<ol style="list-style-type: none"> Develop, implement, and adapt clear, localized strategy (e.g., campaign-based vaccination strategy vs. integration of vaccination into routine immunization and health services) Establish country-level and sub-national governance structures that break down silos and enable whole-of-government response complemented by coordination with private sector, CSOs, and other key stakeholders Enable regional learning and engagement platforms to share best practices, learnings, and to support collaboration on shared challenges Inform leaders across government of the risks of COVID-19 and the importance of vaccination to end the pandemic Provide advance notice on shipments including number of doses, type of vaccine, and expiration date to allow governments to coordinate and prepare for distribution and administration; regularly time shipments will also improve coordination 	<ul style="list-style-type: none"> Country-level political and technical leadership, including MOH, MOF Vaccine manufacturers Donor countries
Financing	<ol style="list-style-type: none"> Country-level inadequate budgets for COVID-19 vaccination operational and vaccine purchase needs Donor money is committed but slow to reach countries, and often slowly trickle down to facilities and front-line providers While Multi-lateral Development Bank (MDBs) funds have been made available, existing country debt loads and/or loan conditionalities preclude loan signing Some countries are reluctant to apply for MDB loans, and/or lack time and capacity to apply for GAVI funding 	<ol style="list-style-type: none"> Strengthen links between MOH and MOF Mobilize advocacy for country-level financing MDBs and donors can make the process of applying for loans or funding easier and release funds more rapidly, with increase in grant funding relative to debt Country leaders can allocate domestic funds and draw on MDB funding to ensure a fully funded vaccination campaign Set clear strategy to forecast total costs over time, which donors can provide funds to support 	<ul style="list-style-type: none"> MOH, MOF, head of government MDBs Donors
Demand and Hesitancy	<ol style="list-style-type: none"> Lack of trust in governments and health systems Low perception of risk of COVID-19; people more willing to get vaccinated during a wave, but 2nd dose hard to give if wave is over Lack of access to vaccination sites/lack of awareness of where to get vaccine Mis- and disinformation from media, social media, WhatsApp groups, religious groups, community leaders, etc. Lack of good training and education of health workers on the vaccines, interpersonal skills, and how to address common questions and concerns Reaching refugees, immigrants, religious minorities, and other disenfranchised populations who fear retribution if they register for vaccination Poor services quality affects acceptance of vaccines 	<ol style="list-style-type: none"> Health worker confidence building through education Leverage work being done in social sciences, social listening and media monitoring to form solutions (e.g., Knowledge Attitudes and Practices or “KAP” surveys) Implementing interpersonal communication strategies that act on real-time insights Work with private sector and leverage their insights, influence, and communication channels with employees Increase local engagement with and build capacity among CSO’s, faith groups, and academic institutions Normalize vaccination (don’t treat COVID-19 as special) Work with media and other influencers to a rapidly address mis- and disinformation; host media trainings and share communications assets in real-time to address emerging and trending questions and concerns Improve service quality at vaccination sites; opening hours, accessible and user friendly services, including safe vaccination and health care workers with stable income 	<ul style="list-style-type: none"> Government (national and sub-national level) officials Civil Society Organizations Private sector Academics (particularly in social sciences) Communications leaders Technical support from WHO, Unicef, Gavi, IFRC

Table of Challenges and Bottlenecks to COVID-19 Vaccinations in Low- and Middle-Income Countries Continued

Bottleneck	Critical Components to Solve	Highest Priority Recommendations	Stakeholders Who Could Take That Action
Health Workforce	<ol style="list-style-type: none"> 1. Loss of health workforce due to infections, deaths, quarantine, labor protests, and strikes and Covid 19 response <ul style="list-style-type: none"> • Lack of incentives to go out and look for adults to vaccinate • Lack of PPE • Underpaid or not paid • Being asked to work longer, harder hours without fair compensation (e.g., burn out, low morale) 2. Acute shortages in staffing that existed even prior to the pandemic 3. Lack of training on COVID-19 vaccines which has contributed to hesitancy among health workers 4. Struggling to layer COVID-19 vaccination on top of other essential health services 5. Risk of retribution for poor health outcomes during COVID-19 surges (e.g., oxygen running out and patients dying) 	<ol style="list-style-type: none"> 1. Task shifting – dentists, pharmacists, nursing students (offer credit for services), retirees, military (with caveat that it may inflame mistrust in some countries) 2. Health care worker trainings 3. Ensure security of health workers including provision of PPE and proper compensation 4. Offer incentives for going above and beyond (outreach for vaccination) 	<ul style="list-style-type: none"> • MOH officials at national and sub-national levels • Leaders/MOF to provide more funding and resources for health workers
In-Country Supply Chain	<ol style="list-style-type: none"> 1. Insufficient cold chain capacity at sub-national and district levels, including no ultra-cold chain capacity for many countries 2. Transport of vaccines is hampered by lack of vaccine monitoring capacity, competing demands for transport vehicles, inadequate supply of cold boxes, replacement cool packs, and carriers. These issues are compounded for rural and remote areas. 3. No “surge” capacity to handle large and unpredictable volumes of vaccines with short shelf life that require rapid deployment 4. Lack of traceability system increases risk of counterfeit vaccines 5. Ineffective in-country stock tracking means vaccines closest to expiry are not used first 	<ol style="list-style-type: none"> 1. Implement effective in-country traceability and monitoring of vaccine stocks and utilization 2. Expand cold-chain capacity 3. Design and validate procedures for in-country transport at -25 to -15 C 4. Develop standards for real-time tracking of vaccine conditions during in-country distribution 5. Establish regional (inter-country) vaccine supply hubs to support deployment of emergency response vaccines 6. Shorten supply chain as much as possible from manufacturing to user 7. Implement advance shipment plans that ensure long shelf lives to allow countries to prepare and distribute 8. Engage CHWs in marginalized communities with consistent training 9. Track syringe supply chain together with vaccines 	<ul style="list-style-type: none"> • Country-level leadership, including MOH • Financial support needed from MDB and donors • Technical support from WHO
Data Systems	<ol style="list-style-type: none"> 1. Lack of data systems at country level to determine eligibility, schedule appointments, and track vaccination status 2. Infrequent data collection and reporting (often monthly) 3. Weak capacity for adverse events tracking 4. Insufficient data completeness, quality, and granularity 5. Need standard use of terms, such as “fully vaccinated” 6. Need more data on demand, acceptance, and hesitancy 	<ol style="list-style-type: none"> 1. Improve governance of data privacy and security 2. Leverage strategic partnerships (including public-private) and digital innovations to increase country-level capacity 3. Build digital and data competencies of health workers 4. Strengthen data infrastructure, including connectivity 	<ul style="list-style-type: none"> • Country-level political and technical leadership • Private sector leaders in digital health and data systems • Technical support from WHO (for standardized terms, best practices for country-level surveillance systems) and researchers (for improved data on vaccine acceptance and demand) • Financial support from MDB and donors

APPENDIX II:

List of Meeting Participants

The following individuals participated in a discussion on 13 December 2021 focused on solutions to accelerate global COVID-19 vaccinations. The meeting was held under the Chatham House Rule, and no position or statement is attributed. The content and recommendations in this report do not necessarily reflect the viewpoints of any person who attended the discussion. We are grateful for the thoughtful input from these individuals, all of whom have contributed with the greatest sense of shared purpose at this time of global need.

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