The COVID-19 Vaccination Response: Country experiences, best practices, and lessons
Acknowledgements

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Foreword

Over the past three years, the COVID-19 pandemic has impacted our world in devastating ways, bringing about significant changes in our daily lives. The pandemic resulted in countless lives lost — certainly more than the seven million COVID-19 related deaths that have been officially reported to the World Health Organization. Many more individuals live today without loved ones, while others bear a lifetime of impairment due to lingering after-effects from COVID-19 infection.

Amidst the chaos and uncertainty, the rapid development and distribution of COVID-19 vaccines, starting in 2021, offered a beacon of hope to stop global transmission of the SARS-CoV-2 virus and allow for the gradual return to normalcy. Never in the history of mankind has a vaccine been developed at such an accelerated speed and deployed to all corners of the world. This would not have been possible without the commitment of countries to protect their populations, the ingenuity of researchers, the innovative spark of pharmaceutical companies, the generosity of donor agencies and Governments, and the determination of partners to pursue vaccine equity by launching the COVAX Facility, the vaccines pillar of the Access to COVID-19 Tools Accelerator.

COVID-19 vaccines have been essential in reducing hospitalizations and deaths due to SARS-CoV-2. When vaccines first became available, access was difficult for many low-income and lower-middle-income countries due to vaccine nationalism and export restrictions, underscoring stark global inequities. As a result, many poorer countries found themselves at the back of the queue, unable to vaccinate their populations while others had plenty.

By late 2021, the global vaccine supply began to improve and most countries could vaccinate — at a minimum — their high-risk populations against COVID-19. At the writing of this foreword, 13.3 billion doses of COVID-19 vaccines have been administered around the globe, a contributing factor to the WHO Director General’s declaration on May 5, 2023 to the end of COVID-19 as a Public Health Emergency of International Concern. We must collectively, however, remain vigilant against the virus which still lurks among us and continue to seek opportunities to vaccinate those in high-priority risk groups.

I am pleased to share this compilation of extraordinary country experiences as Governments rapidly introduced and deployed COVID-19 vaccines, often under circumstances marked by fragile health systems, limited resources and competing priorities. Through these country vignettes, readers will learn about the diverse range of strategies, approaches and innovations in immunizing individuals with COVID-19 vaccines and understand what factors contributed to the success of different interventions. I sincerely commend countries on their innovations and encourage all Governments to continue their efforts to promote COVID-19 vaccines as the safest and surest way to stay protected against the virus.

Furthermore, countries are encouraged to leverage their unique COVID-19 investments and lessons into further strengthening of immunization services and primary health care systems, to better prepare for future pandemics that might require the rapid deployment of vaccines or other medical countermeasures. I hope that these case studies will inspire countries to continue their efforts in promoting vaccine accessibility and equity, for COVID-19 vaccination and beyond.
The COVID-19 Vaccination Response:
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Introduction

The COVID-19 pandemic and the race for vaccines

Cases of pneumonia of an unknown aetiology were first reported to the World Health Organization (WHO) China Country Office on 31 December 2019. The pneumonia was detected in Wuhan City, Hubei Province and by 7 January 2020, Chinese authorities identified a new type of coronavirus as the causative agent and publicly shared the genetic sequence of the novel coronavirus, designated as SARS-CoV-2. Publishing the genetic sequence in the early phase of the outbreak enabled countries to rapidly develop diagnostic kits to monitor the spread of COVID-19 disease and facilitated the future development of COVID-19 vaccines.

On 30 January 2020, the Director-General of WHO declared the novel coronavirus outbreak a public health emergency of international concern (PHEIC), the agency’s highest level of alarm, setting off a series of steps to respond to the outbreak. The virus rapidly spread to all regions of the world with substantial mortality among the most vulnerable populations. COVID-19 put a tremendous strain on health systems and affected social and economic activities worldwide. While public health and social measures were rapidly put in place, it became clear that safe and effective vaccines would be required to control the outbreak.

COVID-19 vaccines were developed at an unprecedented scale and speed, using a variety of manufacturing approaches and novel development platforms. The first COVID-19 vaccine was approved by WHO for emergency use listing (EUL) one year after the PHEIC was declared, followed by other vaccines in quick succession. As sufficient evidence became available, WHO’s Strategic Advisory Group of Experts on Immunization (SAGE) issued interim recommendations on the optimal use of the vaccines. WHO subsequently published a roadmap to guide countries in prioritizing the most vulnerable groups to receive the initially limited supplies of vaccines.¹

Several global collaborations were established to facilitate equitable access to vaccines (see Graphic 1). The Access to COVID-19 Tools Accelerator (ACT Accelerator)² was established as a partnership of ten leading health and development agencies and leveraged relative strengths to establish the COVAX Facility to guarantee equitable access to COVID-19 vaccines. The Coalition for Epidemic Preparedness and Innovation (CEPI), Gavi, the Vaccine Alliance (Gavi), WHO, and UNICEF joined forces and leveraged their relative strengths to establish the COVAX Facility. The country readiness and delivery (CRD) workstream of the COVAX Facility and the COVID-19 Vaccine Delivery Partnership (CoVDP) consisting of WHO, UNICEF, Gavi, and other implementing partners supported countries with vaccine deployment and vaccination.

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¹ Gavi, the Vaccine Alliance, Wellcome Trust, the Coalition of Epidemic preparedness and Innovation (CEPI), the Global Fund, WHO, UNICEF, Foundation for Innovative New Diagnostics (FIND), Unitaid, the World Bank Group, and the Bill & Melinda Gates Foundation.
Country implementation of COVID-19 vaccination

Countries around the world have considerable experience introducing new vaccines into their national immunization programmes. However, no vaccine introductions match the scale and timelines for the implementation of COVID-19 vaccination. Previous introductions were largely for vaccines that had full market authorization, and for which product and performance characteristics were well-known. Sufficient planning time was available, and the scale of vaccination was generally limited to one birth cohort.

Before the COVID-19 pandemic, the only vaccine to be rolled out on such a large global scale and within short timelines was the inactivated poliovirus vaccine (IPV), beginning in 2016, in 126 countries. Nevertheless, the unprecedented magnitude and rapid pace of COVID-19 vaccine introductions were more daunting. Introduction of IPV required administering a single dose to one birth cohort in 126 countries; COVID-19 vaccination required multiple doses across multiple age ranges in every country around the globe. However, there were shared lessons, including the need to increase cold chain volume, create demand for the vaccine, and rapidly reach high coverage to achieve optimal population immunity. Experience from IPV introduction is valuable, well-documented, and served as a reference for COVID-19 vaccine roll-out.3-12

Graphic 1. Global collaborations supporting COVID-19 vaccine development, access, and implementation
Unique characteristics of COVID-19 vaccine introduction

**Rapid vaccine development.**
The COVID-19 vaccine products were rapidly developed and initially received regulatory authorization for emergency use. Countries had to quickly identify the appropriate regulatory pathways and apply their emergency use authorization protocols, to ensure appropriate monitoring of adverse events associated with these vaccines.

**Limited and erratic supply.**
Demand for vaccines was high in the early phases of the pandemic, but insufficient global supply in the initial months meant that countries had to prioritize highest risk groups for vaccination. Unexpected delays with vaccine shipments created unpredictability and made scheduling vaccination sessions difficult.

**Non-traditional target populations.**
COVID-19 vaccination target groups were largely adults and people living with comorbidities. While immunization programmes have extensive experience reaching children under 5 years, and often in mass vaccination campaigns, reaching adults required new strategies, public awareness and multi-sectoral coordination.

**Multiple vaccine products.**
Countries received several COVID-19 vaccine product types with different handling requirements and dose regimens. The multiplicity of products created challenges with logistics, vaccine storage, delivery of mix-match schedules, and added complexity to health worker training.

**Complex vaccine management requirements.**
Several COVID-19 vaccines required very stringent storage requirements at ultra-cold temperatures, as low as -70 celsius. In addition, many vaccine products had unusual handling and storage procedures that made vaccine management procedures complex. Many vaccines also came with a very short shelf-life, requiring rapid administration to reduce the risk of vaccine wastage.

**Vaccination rumours and misinformation.**
COVID-19 sparked a global infodemic of rumours and false information about the disease and effects of vaccination. That environment made communicating the risks and benefits of vaccines to the public challenging, especially when new scientific evidence and policy recommendations constantly emerged.

**Preventing COVID-19 transmission during vaccination sessions.**
Health workers had to ensure that infection prevention and control measures against COVID-19 were in place and maintained during vaccination sessions, including physical distancing and use of personal protective equipment.

**Global pressure for vaccination data.**
Due to the global nature of the pandemic and the need to understand COVID-19 vaccination trends, demand for data on progress with vaccination was extremely high. Countries were obliged to rapidly design, and scale-up data systems and report vaccination data at high-frequency intervals.
The global COVID-19 vaccination response provides many lessons on how to better prepare for future emergencies and pandemics that may require rapid, large-scale vaccination. In addition, many of the best practices, innovative solutions, and lessons from the COVID-19 vaccination response could be leveraged to strengthen immunization programmes. This will enable their ability to deliver high-quality services across the life course and be more resilient during times of crisis.

**Purpose and scope of this document**

The purpose of this document is to share country experiences with relevant global and regional agencies, country decision-makers, program managers, and development partners who support national immunization programmes. These learnings have implications for mainstreaming COVID-19 vaccination, strengthening immunization and primary health care services and preparedness for outbreaks of vaccine-preventable diseases.

The information in this document, compiled in thematic areas, comes from multiple sources, including but not limited to: implementation experiences shared by national programs during global or regional webinars in the form of case studies, anecdotes and presentations; by partners (at the sub-national, national, regional, and global levels) in the form of case studies and lessons learned; reports from intra-action reviews (IARs); and COVID-19 vaccine post-introduction evaluations (cPIEs). The Global Compendium of Country Experiences is a larger repository of country experiences and includes more detailed case studies that are summarized in this document.

Each chapter presents an overview of activities associated with the theme, challenges, best practices, and innovations. In addition, the implications of these lessons for mainstreaming COVID-19 vaccination and strengthening immunization and primary health care services are highlighted.
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Chapter 1. Planning, coordination and resourcing: the foundation for success

Responding to the public health threat of the COVID-19 pandemic required unparalleled political leadership as well as multisectoral and multi-partner coordination. Robust coordination structures within the national Ministries of Health and across different sectors were fundamental for successful pandemic response and vaccine deployment.

Planning for COVID-19 vaccine roll-out was often complicated due to persistent uncertainty on the types of vaccines that would be available, their performance characteristics, handling requirements, shipment timelines, and volumes in each shipment. As new information became available, National Immunization Technical Advisory Groups (NITAGs) or their equivalent needed to adjust national vaccination schedules or strategies in an evolving situation, and support programmes in making informed decisions on the vaccine products and prioritisation of risk groups. Data rapidly emerged and was often incomplete.

National planning required engagement with the subnational levels for feasibility checks and complementary planning exercises. Subnational levels needed information from the national-level plan in order to develop their local microplans and map out all target populations, their communities, and identify the best strategies for reaching them. At the global level, guidance on developing national deployment and vaccination plans (NDVPs) and conducting simulation exercises helped countries draft comprehensive plans and test their feasibility.
Key elements required for the successful planning, coordination and resourcing of COVID-19 vaccination:

- Political or government leadership
- National deployment and vaccination plan
- Coordination Mechanisms
- Technical expertise (NITAGs)
- Subnational coordination
- Microplanning
- Simulation Exercises
- Budget and Finance

Key challenges

Securing political leadership

Highest-level political leadership was essential to rapidly implement the vaccination response in a coordinated, cross-sectoral manner. Although most countries had political support, the level of engagement and commitment varied.

Lack of functional coordination structures

Countries established or built on existing structures for coordination; however, there were often gaps in coordination and communication between the national and sub-national levels. The COVID-19 vaccination response garnered support from other health programs, non-health sectors, and development partners but this often led to duplication of efforts or redundant processes.

Inadequate resources

Quickly securing adequate financial resources to cover operational costs was difficult for many low- and middle-income countries (LMICs). When funding became available, disbursement to the operational levels was often challenging and created implementation bottlenecks.

Suboptimal microplans

Subnational-level microplans informed vaccination implementation with clear delineation and mapping of prioritized target groups and the strategies to reach them. In many LMICs, the microplans were not available or sufficiently detailed, which hindered the ability to vaccinate target groups. The urgency of implementation also made microplanning challenging.
Best practices and innovation

Despite these challenges, countries found innovative solutions to begin vaccinating against COVID-19 at the speed and scale required. A few of these solutions are summarized below.

**Strong political leadership**
The political leadership in several countries led the way to enable a robust vaccination response to the pandemic.

*Nigeria’s* political leadership launched the Service Delivery, Communication, Accountability, Logistics, Electronic Reporting, and Supportive Supervision (SCALES 2.0) strategy. Key components of this strategy were decentralizing planning, tripling the number of vaccination teams, and engaging religious and community leaders for community mobilization and dialogue.

*Bhutan* had exemplary leadership from the highest level and solidarity with different sectors both at the central and the district levels. This coordination and engagement contributed to the success of the COVID-19 vaccination campaign.

**Functional coordination structures**
Coordination structures were established in several countries to facilitate cooperation between health programmes at national and subnational levels.

*Botswana* established a National Emergency Operation Centre that included representative structures at the district level to reflect field realities, ensure feasibility, and provide support on operational and tactical issues (e.g., pooling transport from different departments to support the rollout).

*Somalia* established a national coordination committee chaired by the federal ministry and included all development partners and State Ministries. State Ministries in turn chaired State-level coordination committees. All international and national NGOs were engaged and collaborated in the COVID-19 vaccine rollout.
**Resource mobilization**

National governments in several countries took extraordinary steps to ensure that funds were available to implement the COVID-19 vaccine rollout.

**Bolivia**

Bolivia’s Ministerial office mobilized resources to ensure adequate financing for all planned activities. The central government implemented austerity measures to reduce spending by public institutions and reallocated the savings for COVID-19 vaccination.

**Community engagement**

Engaging community and religious leaders enabled planning and implementation at the local level and promoted community uptake of vaccination.

**Ghana**

Ghana engaged community leaders, female traditional heads, driver union representatives, religious leaders, and traditional rulers. These community leaders were used as a resource by districts to address issues related to the planning and implementation of the COVID-19 vaccination campaign.
Robust operational planning

The two case studies below illustrate innovative approaches taken to overcome the microplanning challenges and ensure that the programme was prepared to implement them.

<table>
<thead>
<tr>
<th>Case study 1.</th>
<th>Use of geospatial mapping to improve subnational microplanning — Zambia¹⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
<td>Zambia’s 2020 census exercise was postponed twice due to funding shortfalls. The census data were meant to inform planning for both routine and COVID-19 vaccination.</td>
</tr>
</tbody>
</table>
| **Challenges** | • Available census data were not up-to-date or detailed enough to plan for vaccination services and health workers had to make assumptions about where people lived.  
• Health workers depended on hand-drawn maps, which were often not accurate or complete, to get a sense of where people lived and use it for microplanning. |
| **Solutions** | • The Geo-Referenced Infrastructure Data for Development (GRID3) initiative partnered with the Health Information Systems Programme (HISP) developed maps for the Chinsali district in Muchinga province.  
• Maps included information on population distribution, settlement location, and health facility location and catchment areas.  
• The GRID3 team supported health workers to use these maps and data for microplanning. |
| **Impact** | • Health workers reported that the system saved time and the improved plans helped them reach all communities in their catchment area.  
• The mapping approach will be expanded to all of Muchinga province and will be expanded nationwide. |
## Case study 2. Use of simulation exercises to evaluate operational plans — India

India had to plan one of the largest COVID-19 pandemic responses in the world.

**Challenge**

- The national immunization programme had experience conducting multi-age measles and rubella vaccination campaigns, but the COVID-19 campaigns would be of a larger scale.
- It was the first time the programme had to identify, prioritize, and vaccinate pre-defined beneficiaries.

**Solution**

- India developed an app (Co-WIN) to pre-register and schedule vaccination for priority populations according to national policy.
- The immunization programme conducted a simulation exercise to:
  - Assess the operational feasibility of the Co-WIN app in the field.
  - Test linkages between planning, implementation, and reporting mechanisms.
  - Identify challenges and take corrective actions.
  - Provide confidence to programme managers at all levels.
- Beneficiary registration, microplanning, and the functioning of vaccination sites were assessed.

**Impact**

- The simulation exercise generated critical information to refine operational plans at all levels and inspire confidence among the programme managers.
- As of 9 December 2022, the country had registered over 1.1 billion beneficiaries 12 years and older and administered over 2.19 billion doses of COVID-19 vaccines.
- The complete primary series had been administered to over 69% of the total population.
Implications for the future - action areas

Sustaining key partnerships
It will be beneficial to maintain partnerships that will continue to enhance vaccination across the life course in order to build more resilient programmes. The cross-sectoral collaboration and coordination used to reach COVID-19 priority target groups are equally relevant for other vaccine-preventable diseases. For example, synergies can be built with reaching older adults with influenza vaccination or health workers for hepatitis B and influenza vaccination. The “one team, one budget” approach could be used to enhance national immunization programmes and primary health care.

Leveraging innovative solutions and technologies
Digital applications for pre-registration and scheduling, SMS reminders, and geospatial tools to improve microplanning were all used during the COVID-19 vaccination. These solutions could also be expanded to increase access to essential immunization services and reach zero-dose or under-vaccinated children, as well as older age groups.

Mobilizing resources
The principles and innovations used to mobilize and distribute financial resources during the COVID-19 response could be leveraged to ensure adequate financing of immunization programmes and outbreak response.

Preparing for future outbreaks and pandemics
Preparedness for future outbreaks and pandemics could be enhanced by: (i) updating outbreak response plans in line with lessons learned from COVID-19; (ii) establishing, strengthening, and sustaining platforms for service delivery across the life course to reach the most vulnerable groups; and (iii) conducting periodic simulation exercises to assess and maintain a high-level of outbreak preparedness.
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Chapter 2. Ensuring adequate human resource capacity

At a time when health systems were overwhelmed with caring for people with severe COVID-19, countries needed to mobilize a significant workforce for immunization. The end-to-end handling of vaccines and the heightened public awareness of COVID-19 vaccination generated diverse cadres and skill sets of immunization staff (Graphic 2). On top of estimating and securing the workforce surge capacity, Governments needed to adequately train the workforce and establish supervisory networks before the first vaccines could even be administered.

Understanding how countries identified, trained, and supervised frontline health workers is important for a future emergency mass vaccination response. The key elements for staffing a national, large-scale vaccination response are provided.

Graphic 2. The major workforce cadres needed for vaccine deployment

<table>
<thead>
<tr>
<th>Communications</th>
<th>Vaccine Handlers</th>
<th>Vaccination Teams</th>
<th>Data Managers</th>
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<tbody>
<tr>
<td>Professionals in:</td>
<td>Persons responsible for:</td>
<td>Persons responsible for:</td>
<td>Persons responsible for:</td>
</tr>
<tr>
<td>Media</td>
<td>Supply management</td>
<td>Registration</td>
<td>Data reporting</td>
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<tr>
<td>Demand creation</td>
<td>Supply distribution</td>
<td>Screening</td>
<td>Data analysis</td>
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<tr>
<td>Risk communication</td>
<td>Cold chain</td>
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<tr>
<td>Community engagement</td>
<td></td>
<td>Data entry</td>
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</tbody>
</table>

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Key elements for ensuring adequate human resource capacity for a national, large-scale vaccination response:

- **Human resource mapping**
- **Surge capacity**
- **Training**
- **Supervision**
- **Staff well-being**
- **Private sector collaboration**

### Key challenges

**Securing and sustaining an adequate workforce**
While some countries were able to meet the surge capacity, many had to shift tasks of existing staff to rapidly scale up vaccination. A delicate balance was required to avoid debilitating other health services because of the task shifting. In addition, absenteeism among frontline health workers due to illness or quarantine requirements added to the existing strain on the health workforce.

**Training under physical distancing constraints**
Face-to-face training was largely not possible due to travel restrictions and the risk of transmission of infection. Virtual training became the norm but it made trainee engagement difficult to monitor and hampered hands-on demonstration of vaccine handling and administration. Regular training updates were required due to staff surges and turnover, new vaccine introduction, and policy changes.

**Implementing supervision**
Supervision was important in keeping health workers up-to-date and well-trained on the different COVID-19 vaccines, their handling requirements, shifting target groups, and changing policies. These product nuances were a source of confusion that could result in vaccination errors.
Best practices and innovation

Successfully surging
Many countries used multiple strategies to fill health workforce gaps and take care of staff well-being.

**Zambia** used multiple avenues for increasing its workforce including deploying newly graduated health workers and accepting secondment of staff from partner organizations.

**Bolivia** hired workers without a health background to carry out pre-registration and to support data entry and reporting, allowing the health workers to focus on vaccination.

**El Salvador** reported taking additional measures to ensure the well-being of their staff and maintain motivation by providing health insurance to cover any illness, and a good working environment, e.g., food boxes, air-conditioned cabins, and relaxing music.
Case study 3.
Using multiple strategies to fill workforce gaps — the Philippines.
(Source: the Philippines COVID-19 post-introduction evaluation (cPIE) report)

Context
Data from the Human Resources for Health (HRH) Philippine Masterplan 2020-2040 suggested that there were significant gaps in human resource coverage across the country; an estimated 25% of all barangays (administrative units just above the service delivery level) in the Philippines did not have any health workers.

Challenge
With an already fragile human resource foundation, building a workforce for deploying COVID-19 vaccines was an even bigger challenge in the Philippines.

Solution
A strong and rapid deployment of human resources took place at all levels to manage vaccination. This was accomplished using a variety of strategies:
- Task shifting with staff being asked to shift the focus of their work away from their pre-pandemic roles and into the COVID-19 vaccination roll-out.
- The establishment of ‘office hopper,’ teams consisting of health workers who worked from a different geographical location each day, based on needs within various health facilities and communities.
- Hiring additional staff for screening, vaccination, data entry, and medical support via short contracts or job orders.
- Strategies to motivate and sustain the workforce, including the provision of financial incentives, food, haircuts, awards, and acknowledgement from political figures and community leaders.
- Engagement of barangay health workers to create master lists of eligible persons in the barangay, follow-up with persons due for subsequent doses, and contribute to demand creation.

Impact
As of May 2022, the country was able to fully vaccinate 62% of its ~111 million population, in large part due to the robust and motivated workforce.

Trailblazers in training
Countries often recorded virtual training sessions to be able to share information with those not able to attend the scheduled sessions. These recordings also became good resources for refresher or induction training sessions. Other country innovations in training are described below.

Kenya used WhatsApp groups to increase awareness of vaccine safety and effectiveness among health workers. The programme designated and trained specific health workers to serve as “information ambassadors.”
Support for supervision

The most important enablers of supportive supervision are to secure designated staff, provide them with clear terms of reference, and have funds available to move them around. Case study 4 provides an excellent example of partnering to allow for these important enablers.

Case study 4.
Partnering for programme monitoring COVID-19 vaccine to inform corrective actions — Lebanon
(Source: Lebanon cPIE report)

Context
Lebanon had experienced a prolonged economic crisis that impacted all aspects of vaccine deployment, including supportive supervision.

Challenge
Implementing systematic supervision requires substantial human and financial resources; costs of fuel and transportation could be significant.

Solution
To ensure fair, broad, and fast access to COVID-19 vaccines, Lebanon’s Ministry of Public Health (MOPH) entered a partnership with the International Federation of Red Cross and Red Crescent Societies (IFRC) and the World Bank to support a systematic approach to monitoring vaccine deployment.

- The World Bank provided funding, and IFRC acted as a third-party monitoring agency. The monitoring included independent assessments and feedback on vaccine distribution, temperature maintenance, service delivery at vaccination sites, eligibility of vaccine recipients, and client perspectives.
- IFRC used checklists to conduct in-person observations, monitoring, and interviews. They reviewed stock data and monitored social media and the MOPH call centre data as part of the Grievance Redress Mechanism.
- A total of 18 project staff were trained and rotated to monitor all COVID-19 vaccination sites at least once a week.
- The data and reports were generated to trigger the development of technical updates and corrective actions. For example, to correct the practice of mixing supplies (vaccine with other medication) and to improve practices for replenishing supplies.

Impact
- In August 2022, all 26 health facilities visited had a recent monitoring visit as evidenced by the cPIE conducted in 8 governorates.
- Systematic reporting and corrective actions prompted by the monitoring were key contributors to the country’s achievement of completing the complete primary series of vaccination to 35% of its population by August 2022, amid a severe economic crisis.
Implication for future – action areas

Sustaining the capacity-strengthening gains
The increased knowledge of vaccines and skills in vaccination across multiple cadres should be maintained and used for vaccine advocacy, screening and referral for vaccination, enhanced preparedness, and for surge capacity to respond to vaccine-preventable disease outbreaks.

Adopting innovations in training
To further expand the reach of health worker training, leverage and enhance the capacity for virtual training to broaden and optimize the learning and performance management approaches for health workers.

Digitizing supervision findings
Recording supervision findings into digital applications, including hand-held devices will ensure that the visits take place, and facilitate feedback and analysis for programme improvement.

Preparing for the future
Update outbreak response plans to reflect workforce deployment lessons, and establish and maintain the surge capacity to mount a timely response to future public health threats.
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Chapter 3.
Scaling up service delivery to reach the most vulnerable

To reach the various priority target groups and administer mass-scale COVID-19 vaccination, most countries used multiple approaches to providing vaccination services. The most efficient approach was to offer vaccination at fixed sites, either at health posts familiar to communities or highly visible, dedicated COVID-19 mass vaccination sites. While many countries used their routine immunization sites for the delivery of COVID-19 vaccination, additional vaccination sites exclusive to COVID-19 were needed because of the scale of vaccination and the differences in eligibility between COVID-19 and routine vaccination. For those who had trouble accessing fixed sites (e.g., geographically remote or individuals with limited mobility), outreach and mobile delivery services were offered.

Some countries organized highly publicized mass campaigns over a few days, especially later in the pandemic, as a strategy to boost coverage or to rapidly use vaccines that were nearing the expiry date.

Private provider engagement was encouraged given the need to reach non-traditional target groups; especially those with co-morbidities who often seek care from private healthcare providers.

During the height of the pandemic, infection prevention and control measures were needed at the vaccination sites, adding to the complexity of administering vaccination at a mass scale.
Key elements for scaling up service delivery:

- Fixed site services
- Mobile and outreach activities
- Mass or events-based campaigns
- Tailored strategies to reach high-risk groups
- Integrated service delivery
- Innovative service delivery modes
- Private sector engagements
- Community volunteers

Key challenges

Meeting global vaccination targets
The target to vaccinate 70% of the total population of a country within short timelines was unprecedented.

Reaching priority target groups
Several priority groups had challenges accessing vaccination services due to limited mobility, e.g., older adults and persons with co-morbidities. In addition, some priority groups remained hesitant because they were not usually targeted for vaccination, or they were uninformed or misinformed about vaccine risks and benefits. Hesitancy was also observed among working adults if taking time off for vaccination affected their livelihood.

Delivering vaccination in remote and underserved communities
To adequately reach and immunise communities in remote and underserved areas required special measures given the scale and speed at which vaccination had to be administered.
Best practices and innovation

Countries responded to the service delivery challenges by implementing a variety of innovative solutions, a few of which are briefly described below.

**Meeting vaccination targets**

To protect their population and achieve vaccination coverage targets, countries exhibited creativity and innovation in scaling up vaccine delivery.

- **Namibia**, used drive-through vaccination and farm-to-farm vaccination to scale up access; the latter strategy was used to reduce disparities in uptake between urban and rural areas.

- **Zimbabwe**, private facilities offered vaccination; and private sector companies participated in mobilizing their workers to get vaccinated and provided logistical support to vaccination teams.

- **Burkina Faso** established intersectoral partnerships to conduct intensified campaigns targeting institutions like universities, and places of worship to increase vaccination coverage in population groups otherwise not reached.
Case study 5.
Implementing successful mass vaccination campaigns — Zambia¹⁶

Context
Zambia started implementing COVID-19 vaccination in April 2021. As of September 2022, only 36% of the total population, and 56% of those over 12 years had completed the primary vaccination series.

Challenge
In September 2022, the 4-week average daily vaccination rate was only 0.1% of the total population and trending downwards. Only slightly more than half (57%) of available vaccine doses had been utilized.

Solution
- A 10-day mass vaccination campaign was planned to increase coverage with the primary series to at least 70% of the target population and 50% of the total population. A Ministry of Health steering committee supported by 11 WHO experts provided oversight.
- A readiness assessment of each district was conducted with corrective actions to ensure preparedness. A campaign budget was developed, and resources were mobilized. Supervisors were trained and supportive supervision was tracked.

Impact
- Over 1.9 million people (96% of the campaign target) were vaccinated.
- Following the campaign, coverage with the complete primary series was 74% of the targeted population and 45% of the total population.
Case study 6. Establishing high-volume vaccination sites in urban areas (Vaccinodromes) — The Democratic Republic of the Congo

Context
The Democratic Republic of the Congo began the rollout of COVID-19 vaccination in April 2021, followed by a staggered extension of vaccination to all 26 provinces.

Challenge
Six months after initiating vaccination, only 38,163 people had completed the primary series, representing 0.03% of the country’s total population.

Solution
- The Government, supported by Village Reach, established high-volume, temporary vaccination sites in tents in downtown Kinshasa with one site established in November 2021, followed by 3 additional sites in 2022.
- Each site could accommodate over 200 people per hour and had a target to vaccinate at least 500 people per day.
- Each site also provided vaccination through outreach and mobile services and conducted social mobilization efforts with the help of community workers.

Impact
- Over 229,983 people were vaccinated in the four “Vaccinodromes” during 8.5 months, including 118,652 who completed the primary series.
- The “Vaccinodromes” accounted for 33% of the 696,269 people vaccinated in Kinshasa at the time.

Reaching priority groups
The COVID-19 vaccination programme established new partnerships and found solutions to engage with the priority groups, allay fears, and make it convenient for individuals to get vaccinated.

Uganda conducted a series of regional campaigns and deployed mobile teams to reach elderly persons and others who were unable to reach fixed vaccination posts, especially when the demand was high, and the queues were long.

Afghanistan used political advocacy to ensure the appointment of an adequate number of female health workers, and tailored communication materials to improve the demand and uptake of vaccination in women.

Zambia arranged for the delivery of COVID-19 vaccination in anti-retroviral treatment (ART) clinics, where clients were informed and directed towards a specially organised COVID-19 vaccination corner within the clinic.
Case study 7.
Community engagement and intergenerational dialogues targeting high-risk populations — the United Republic of Tanzania

Context
Tanzania started COVID-19 vaccination in July 2021. There was low uptake of the vaccine after introduction, particularly among the older and more vulnerable age groups.

Challenge
Older adults, despite being in the high-risk group for COVID-19, were hesitant and refused to accept the vaccine due to:

- Lack of access to trusted information.
- Lack of trust in government sources of information.

Solution
- Engaged communities and conducted facilitated dialogues to clear misconceptions about COVID-19 disease and vaccines.
- Facilitated intergenerational dialogues promoted information exchange across age groups.
- A direct engagement took place with groups like home-based carers, active aging clubs, young volunteers, and health workers for outreach services to promote vaccination in older adults.

Impact
- The initial three-month intervention in the two pilot regions of Mwanza and Kigoma resulted in a 99% increase in COVID-19 vaccination in older people and an 88% increase in other age groups.
- Later, with the support of HelpAge, the approach expanded to five program regions covering 600 village communities. In these areas, the number of older people who were vaccinated increased from 7,830 in February 2022 to 18,470 in May 2022.

Delivering vaccination to remote and underserved communities
Underserved and remote populations with poor access to health services were especially at risk from COVID-19. Hence, it was important to be able to reach them with a preventive vaccine.

Bolivia took special measures to address reasons for hesitancy, schedule vaccination appointments, and ensure access to vaccination for native indigenous and rural populations who live in areas that are difficult to access, have communication and/or intercultural barriers.
Pakistan hosted as many as 1.4 million Afghan refugees according to official records, plus as many as 2 million more unregistered migrants from Afghanistan at the time of the COVID-19 vaccine deployment. Due to limitations in access to health services, the health conditions of refugees and migrants deteriorated during the COVID-19 pandemic.

- The large population of unregistered Afghans and others without formal papers had been unable to take advantage of the vaccination program.
- There were no COVID-19 vaccination centres in the refugee camps.
- Refugee populations who wanted to get vaccinated were not aware of the registration process necessary to access vaccination services.

COVID-19 mobile vaccination and integrated health service camps were set up across Pakistan; seven were in refugee camps in Karachi, two in Hyderabad, and four in Islamabad.

- Information materials were displayed in Afghan refugee camps to promote vaccination.
- The vaccination drive was supplemented by 63 integrated health camps providing a variety of additional PHC interventions.
- Vaccination counters were established at border crossings.

Due to these efforts, close to 169 000 vaccine doses were administered among the refugees settled in Karachi and Hyderabad, as of August 2022.

1500-2000 people were vaccinated daily and given vaccination cards at border crossings during that time.
Implication for future - action areas

**Meeting vaccination targets**
The experiences and lessons learned from mass vaccination need to be carefully documented and will serve to enhance preparedness for future pandemics and outbreaks that require the rapid scale-up of vaccination. Best practices developed based on the lessons learned should be part of the pandemic and outbreak preparedness plans.

**Reaching priority groups**
The priority groups for COVID-19 vaccination represent vulnerable populations who are likely to be prioritized for vaccination for influenza and other pandemic-prone diseases. Lessons from mapping these populations, and the strategies to reach and deliver vaccination for them would be important for future pandemic preparedness and for delivering seasonal or booster vaccination. The experience and lessons could also be useful in establishing or strengthening life-course approaches to vaccination.

**Using innovations to improve routine immunization coverage**
The innovations implemented for COVID-19 service delivery such as digital applications for pre-registration and scheduling vaccination appointments, reaching priority target groups and tracking defaulters, could be applied to improve coverage with routine vaccination.

**Reaching underserved populations**
Lessons from the strategies and approaches to deliver vaccination to remote or underserved populations during the COVID-19 pandemic could be applied to routine immunization delivery to improve coverage and promote equity.
Chapter 4.
Innovations in managing vaccine supplies and waste

Immunization programs had well-established mechanisms in place for vaccine procurement and management. However, these mechanisms needed to be adapted to manage the multiple COVID-19 vaccine products with varied storage requirements that required rapid deployment. For instance, some of the COVID-19 vaccines needed to be stored at ultra-cold temperatures of -70°C. In addition, most vaccines that received emergency use authorization initially had shelf lives shorter than three months, requiring very careful stock management to ensure vaccine use before expiration.

Stock management was important, especially in the initial phases when supplies were limited, to ensure fair distribution and access to the highest priority-use groups.

The scale of vaccination efforts generated vast quantities of healthcare waste that needed to be managed and destroyed safely. This included not only injection waste but also personal protective equipment used by health workers at vaccination sites.

Most countries used more than one product, with several countries using five or more different products simultaneously. The right products to complete the primary series and/or provide booster doses needed to be available at each vaccination site.
Key elements for vaccine supply chain management, logistics, and waste management:

- **Vaccine supply management**
- **Vaccine distribution**
- **Vaccine security**
- **Cold chain assessment & monitoring**
- **Waste treatment & recycling**
- **Private sector engagement for vaccine storage, distribution, waste management**

### Key challenges

#### Vaccine storage and distribution
Multiple products and their different handling and cold chain requirements rendered logistics and vaccine distribution difficult. Cold chain capacity, especially for vaccines requiring storage at ultra-cold temperatures, was limited.

#### Stock management systems
Erratic supplies and vaccine shipments that arrived with short notice, often with a shelf-life of less than three months, required careful stock management to optimize deployment and reduce wastage. Given the urgency, countries often developed new logistics management information systems that were disconnected from existing systems and created data entry burdens at the delivery level.

#### High volumes of waste generated
The massive volume of immunization-related waste generated, combined with the need to dispose of vaccines that had passed their expiry dates, exposed gaps in waste management capacity. Equipment for the safe and environmentally friendly disposal of the waste was often not available and open burning at times contributed to air pollution. Improper use and disposal of safety boxes were observed in some countries. Many countries delayed the disposal of expired vaccine doses that continued to occupy already stretched cold chain capacity.
Best practices and innovation

The following examples illustrate a few of the best practices and innovations that were adopted to address the challenges in managing vaccine supply and waste.

Ensuring vaccine storage and distribution capacity
Countries took measures to ensure adequate storage capacity, built partnerships and used innovative means to distribute vaccines rapidly to remote areas.

- **El Salvador.** The timely acquisition of ultra-cold chain (UCC) equipment, refrigerated trucks, and other cold chain equipment ensured optimal capacity for the storage and transport of vaccines.

- **Uganda** performed a nationwide assessment of the cold chain storage capacity. Weekly temperature monitoring and reporting from the districts ensured that there was adequate capacity and temperature management.

- **Bolivia.** The COVID-19 vaccination programme established a strategic alliance with Boliviana de Aviacion and the national police; the alliance enabled rapid and secure vaccine transport and distribution.

- **Malawi** leveraged its existing drone network to distribute COVID-19 vaccines to 25 hard-to-reach health centres in two districts that were at-risk of being completely cut off by floods.

Strengthening stock management systems
Several countries strengthened their logistics management information systems and carefully managed stock movement, to ensure that the right products in the right amounts were available at the right time at vaccination sites, and that vaccine wastage was minimized.

- **India** leveraged their electronic Vaccine Intelligence Network (eVIN) and linked it to the digital application for registration and scheduling vaccination, to ensure adequate supply at each vaccination session.
Niger established a stock management system that enabled health workers to monitor daily vaccine usage rates to inform deployment strategies and redeploy vaccines from one site to another, as needed, to avoid wastage.

Argentina monitored vaccine distribution from the moment of arrival in the country until their administration using two modules in the Argentine Integrated Health Information System: the Monitoring System of Medical Supplies (SMIS), and the Federal Register of Nominalized Vaccination (Nomivac).

Case study 9.
Using health information systems and national real-time monitoring to address logistical challenges — Rwanda

Context
Rwanda recorded over 110,000 COVID-19 cases by the end of 2021. Rwanda had a digital health plan and used the established DHIS2 platform to collect and manage all health information.

Challenge
The deployment of the right vaccine product in the right amount to vaccination sites, given the availability of multiple products, created logistical challenges.

Solution
- Rwanda leveraged the existing DHIS2 platform to establish an electronic logistics management information system (eLMIS) for COVID-19 with accountability structures and clear coordination mechanisms.
- These efforts included technical advice and system maintenance support to facilitate monitoring vaccine distribution and uptake.

Impact
The expansion and rapid scale-up of an existing health information infrastructure made the deployment of COVID-19 vaccines and the immunization rollout dynamic, user-friendly, and evidence-based. The expansion filled a programmatic need and ensured interoperability between the various digital tools used in the health system.
Managing immunization waste
Countries adopted a variety of measures and established partnerships to manage the vast quantities of healthcare waste generated by the COVID-19 vaccination response.

**Ghana.** The Ministry of Health partnered with waste management companies to manage the enormous amount of injection waste from the COVID-19 vaccination response.

**Nepal.** In a pilot study, 3361 safety boxes with injection waste were collected in various vaccination sites, transported, disinfected, and disposed of using non-incineration methods. Lessons from the pilot study enabled safe and environmentally friendly disposal of injection waste from the COVID-19 vaccination response.

Implication for future – action areas

**Ensuring adequate vaccine storage**
Future outbreaks with novel pathogens and the availability of new vaccine platforms are likely to lead to the availability of multiple products with varied characteristics, shelf-life, and storage needs. The lessons from the COVID-19 vaccine response should enable countries to improve preparedness and capacity to store multiple vaccines in the event of future outbreaks.

**Strengthening stock management systems**
eLMIS established as part of the COVID-19 vaccination response could be leveraged to improve vaccine management of national immunization programmes to ensure that the right products, in the right amounts, are available at the right time at all vaccination sites for all immunization activities.

**Ensuring timely distribution of vaccines to all areas**
The innovations used for the distribution of vaccines to remote areas could be leveraged to support the achievement of immunization equity goals by ensuring timely access to vaccines to all communities at all times.

**Managing immunization waste**
Innovative solutions in waste management established during the COVID-19 pandemic could be leveraged to transition to more efficient and environmentally friendly approaches, such as non-incineration options.
Chapter 5.
Managing public messaging and creating demand for vaccination

Introducing and rapidly scaling up COVID-19 vaccination presented a unique set of communication and vaccine confidence challenges. The unprecedented speed of vaccine development, emergency use authorization (rather than full market authorization) from regulatory agencies, and the numerous types of different products – some of which used novel development platforms – were a source of concern to many.

Many communities felt vulnerable and mistrust of governments was often high in many settings. Vaccine effectiveness and safety concerns were amplified as a result of misinformation and disinformation that spread through social media.

The evolution of the pandemic and the availability of new data necessitated frequent changes in vaccination strategies and schedules. New data resulted in a shift in focus from reducing transmission by achieving high vaccination coverage to preventing severe outcomes in selected high-risk populations. This shift in strategies and priorities confused the public, posed communication challenges and further harmed trust in institutions.
Key elements for managing public messaging and creating demand:

- Advocacy & communication plan
- Human & financial resources for communication
- Political & partner engagement
- Media & influencer engagement
- Community engagement
- Monitoring demand & hesitancy
- Rapid response to rumors & misinformation
- Transparent communications & response to adverse events

Key challenges

Changing messages and shifting objectives
As the pandemic evolved and new evidence on the safety and effectiveness of COVID-19 vaccines became available, the objectives of vaccination needed to be modified, vaccination schedules optimized, and concerns around the emerging vaccine safety risks addressed. Communicating complex scientific information to the public and maintaining their trust during a constantly evolving pandemic was challenging. Few countries were able to adapt messaging quickly and effectively. This challenge was compounded in countries where public mistrust of government authorities was already prevalent.

Monitoring and responding to community perceptions and concerns
Public perceptions about the pandemic were dynamic and needed to be well understood to mount an effective response. National immunization programmes needed to rapidly assess the behavioural and social drivers of COVID-19 vaccination uptake and use the findings to implement strategies to optimize vaccine uptake. Since community perceptions changed as the pandemic evolved, these perceptions needed to be monitored over time and acted upon.

Infodemic management and response
The rapid spread of misinformation and disinformation through social media reached epidemic proportions during the pandemic and was labelled as the “infodemic”. Few countries had the capacity to conduct ‘social listening’ and mount a timely response to this infodemic, which had a significant influence on community demand and uptake of COVID-19 vaccination.

The gap between intent and behaviour
Several countries noted a high willingness to get vaccinated but still experienced low vaccination uptake despite adequate supplies of vaccines. There were many barriers to following through on vaccination, including the accessibility of the nearest fixed site, the inability to leave the workplace or home because of travel restrictions, and the limited mobility of older adults and persons with disabilities. This highlighted the fact that creating awareness alone was not enough to improve uptake.
Best practices and innovation

A few select examples of innovations and best practices adopted to address the challenges with communications and demand generation for COVID-19 vaccination are illustrated in the summaries and case studies below.

**Building capacity for managing the changing messages and responding to community concerns**

While robust plans and activities were essential to ensure demand and uptake of COVID-19 vaccination, the action plans needed to be constantly adapted to meet the evolving situation.

- **Bhutan** trained their health and communications staff to improve their communication skills and build trust and allay fears among beneficiaries.

- **The Gambia** used an “immunization caravan” that engaged audiences through the use of edutainment* approaches and used local influencers to provide accurate information on COVID-19 vaccines.

- **Bangladesh** partnered with 16 community radio stations to spread correct information about COVID-19 vaccines and tailor messages to high-risk groups.

- **Moldova**, Over 300 pharmacists in 110 pharmacies in the country were at the centre of an information-sharing campaign to create awareness of COVID-19 vaccination.

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*b Educational entertainment
Case study 10.
Utilization of multiple communication strategies for a COVID-19 vaccination campaign — Ethiopia

Context
Though Ethiopia had over 450,000 confirmed cases of COVID-19 since March 2020, only 4% of their population had completed the primary series of vaccination by December 2021.

Challenges
Multiple factors were affecting the uptake of vaccination, including:
- Community denial of COVID-19 (refusal to accept scientific facts).
- Negative local community perception and rumours causing vaccine hesitancy.
- Low capacity of rural health facilities to deliver vaccination.
- Conflict in parts of the country.

Solution
- More than 5000 key informants were engaged and received risk communication and community engagement training.
- Media, information, education and communication (IEC) materials, role play, and focus group discussions were used to improve uptake.
- Communities were engaged in planning vaccination campaigns.

Impact
- Over 500,000 people were reached through home visits, awareness campaigns, and other community mobilization approaches.
- More than 33,000 persons were subsequently vaccinated in 2 days during an outreach campaign.
- Engaging communities in planning the timing of the campaign was instrumental in its success.

Monitoring community perceptions
Studies to collect information on the behavioural and social drivers of vaccine acceptance and monitoring of public conversations on social media platforms were used to develop tailored messages, correct rumours and address other causes of vaccine hesitancy.

South Sudan used evidence from studies on the behavioural and social drivers of vaccine acceptance to inform the design of their communication plans and to develop appropriate messages, especially targeted at women.

Nigeria used trusted messengers to deliver targeted messages that responded to community concerns with the vision of achieving the behavioural shifts needed to raise COVID-19 vaccine coverage.
Viet Nam monitored online public conversations through its vaccine demand observatory to identify misinformation and provided vetted messages.

Case study 11.
Vaccine advocacy led by celebrities — Burkina Faso

Even though the country started its vaccination journey in June 2021, only 14% of the population had completed the primary series of vaccination by June 2022.

- The low uptake of vaccination was likely further aggravated by the proliferation of rumours, a suboptimal communication approach, and mistrust of the authorities.
- Conflicting media messages about COVID-19 vaccines made the usual methods to mobilize the population for vaccination less effective.

Solution
- Breakthrough ACTION, a collaboration led by the Johns Hopkins Centre for Communication Programs, implemented an awareness campaign with the reggae singer Sana Bob.
- The campaign combined entertainment with information about COVID-19 vaccination.

Impact
- In some local clinics, which had previously recorded no vaccinations, 95 people got vaccinated the day after the campaign.
- Other areas also noted an increase in the number of people getting vaccinated.

Infodemic management and response
There are several examples of measures that a few countries took to monitor misinformation and disinformation and take proactive measures to respond.

Ghana established a misinformation and rumour management taskforce for social listening and proactive misinformation management at the national and sub-national levels.

Fiji used community feedback and established a dedicated social listening subgroup within a multi-partner risk communication and community engagement initiative to improve demand for routine immunization and COVID-19 vaccination.
Malawi. Red Cross in partnership with Katikati, used a communication software with 2-way SMS communication to gather insights, monitor perceptions, and address rumours and other causes for vaccination hesitancy.

Case study 12. Coupling Rumor Management System with multimedia approach — Cote d’Ivoire

| Context | Since the start of Côte d’Ivoire’s vaccination campaign in early 2021, progress was slow. The trends in vaccine uptake indicated that the WHO-defined target to vaccinate 70% of the population by June 2022 would not be met. |
| Challenge | Ivorians remained hesitant to get vaccinated due to fear of perceived adverse effects of the COVID-19 vaccine on fertility, combined with a low risk perception of the disease. |
| Solution | • A rumour management system that aggregated and summarized rumours each month was sourced from community informants, social media, and the national COVID-19 hotline.  
• An intensive radio campaign was conducted during the December holiday period to address misinformation and encourage preventive behaviours.  
• TV spots were aired which responded to rumours and prevalent public concerns, including the fear of COVID-19 vaccination side effects. |
| Impact | • The data-driven communication effort supported an increase in vaccination coverage by the end of 2021; 15% of the population completed the primary series (compared to 10% before the campaign).  
• Among priority groups, 87% of health workers, 99% of the military, and 85% of the elderly had received at least one dose by that time. |
**Using incentives to convert intent into behaviour change**

A few countries successfully implemented strategies to translate intent into receipt of COVID-19 vaccination using incentives or soft mandates, i.e., making COVID-19 vaccination a requirement to access other benefits or services as illustrated in the examples below.

<table>
<thead>
<tr>
<th>The <strong>United Republic of Tanzania</strong> collaborated with the Tanzania Football Federation to provide free tickets for the first 50 people who accepted COVID-19 vaccination before they entered the football stadium to watch a game.</th>
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<tbody>
<tr>
<td><strong>Cote d’Ivoire</strong> made vaccination a requirement for attending sports and cultural events and offered vaccination at the event site to permit access.</td>
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</table>

**Implication for future - action areas**

**Strengthening capacity to conduct assessments of the behavioural and social drivers of vaccination**

Achieving and sustaining high and equitable vaccination coverage requires a comprehensive understanding of the behavioural and social drivers of vaccine uptake. Several countries conducted studies to collect data on these drivers and used it for developing appropriate strategies. The experience from the COVID-19 vaccination response will enable countries to implement such approaches for other vaccines. The studies conducted during the pandemic will also provide special insights and facilitate preparedness into the acceptance of novel vaccines during periods of emergencies.

**Leveraging the capacity for social listening and the use of social media to improve uptake**

Social media is a double-edged sword. It is an effective communication vehicle that can quickly reach millions of individuals, but the spread of misinformation and disininformation reached epidemic proportions during the pandemic. The pandemic response enabled countries to establish social listening platforms to gather information on community perceptions and disseminate tailored public messages through social media. Lessons from the proactive use of social media for responding to rumours and conveying positive messages about vaccination could be extended to essential immunization and other PHC services.

**Exploring the use of incentives and soft mandates**

There is information on the use of incentives and soft mandates to improve the uptake of vaccination. Several such efforts were employed to increase the uptake of COVID-19 vaccination. The requirement to be vaccinated before international travel was a significant motivator for many individuals. It is worth documenting these lessons and exploring the optimal use of such approaches to improve vaccination coverage.
Chapter 6.
Advancing digital registries and monitoring systems

Strong monitoring systems are essential to measuring the progress and effectiveness of any health programme and to identifying operational gaps. The unprecedented scale and speed of the COVID-19 vaccine rollout required the rapid expansion and adaptation of data systems to monitor implementation and inform operational planning. Immunization monitoring systems needed to be adapted to monitor uptake in target groups such as health workers, older adults, and those with co-morbidities; these population groups were not typically included in the routine immunization programmes in many countries.

Countries took unprecedented measures to strengthen their data systems to enable real-time monitoring of COVID-19 vaccination. To satisfy their data needs, many countries opted to establish new, or strengthen existing data systems, to provide timely and more granular information. Innovative digital applications for pre-registration, prioritization of target groups, scheduling vaccination appointments, sending reminders for follow-up doses, and issuing digital certificates with bar or QR codes, were established in many countries. While this created new opportunities, accompanied by new resources, countries also encountered unprecedented challenges. These opportunities and challenges are laid out in a situation report of the COVID-19 vaccine delivery partnership (CoVDP).
Key elements for monitoring and guiding strategies for COVID-19 vaccine administration and uptake:

- Estimating numbers in target groups (denominators)
- Establishing coverage & equity indicators & targets (especially in vulnerable populations)
- Tools for recording and reporting data (vaccination cards, immunization registers)
- Systems for registration & defaulter tracking
- Systems design: digitalization, interoperability & innovation
- Data analysis at all levels
- Dissemination of data & findings for action (dashboards, situation reports)

Key challenges

**Uncertain denominators**
Because most of the COVID-19 target groups are not the same as for other vaccines, especially in countries without mature vaccination programs for adults, data on the size of the highest-priority-use target groups were often not available. Available data were imprecise, and difficulties in assessing eligibility for inclusion in these priority groups led to mismatches between the numerators and denominators.

**The multiplicity of vaccine products**
The introduction by countries of different Covid-19 vaccine products with varying vaccination schedules in terms of the number of doses required to complete the primary series and the differing intervals between doses made data collection and monitoring complex. The multiple vaccine products also created challenges in interpreting and using the data for operational decisions.

**The scale of vaccination and frequency of reporting**
In some countries, vaccination occurred in periodic mass campaigns that required the management of enormous amounts of data over a short period of time. Data needed to be reported weekly and sometimes daily to enable operational decisions. The fast pace negatively impacted the quality of data and necessitated a substantial workforce for data entry.

**Technical challenges and resource constraints**
Many countries opted to establish electronic systems to meet data needs. However, the urgency with which they needed to be developed led to parallel systems that were often not interoperable. Human resource constraints, compounded by the large amount of data generated, created data entry backlogs. This led to a reversion to paper-based systems or to dual reporting systems that added to the workload of over-extended health workers.
Best practices and innovation

Despite the challenges described above, several countries successfully established robust monitoring systems that have the potential to significantly improve their immunization data systems overall. These systems have the potential to contribute to improving their national immunization programme performance, enable them to achieve their immunization goals, and better prepare them to respond to future pandemics. Two country examples are summarized below.

### Case study 13.

**Use of digital solutions for registration, service delivery, and monitoring of COVID-19 vaccination — India**

#### Context
India implemented one of the largest COVID-19 vaccination responses in the world with a target of administering over 2 billion doses of vaccines to achieve high coverage in the eligible population.

An eLMIS (e-VIN) to oversee vaccine logistics for the national Universal Immunisation Programme already existed.

#### Challenge
- The target populations for COVID-19 vaccination were not routinely targeted for vaccination.
- Scheduling vaccination based on prioritisation and ensuring availability of vaccine supply was critical for session management and safeguarding service quality.
- Data were needed on a real-time basis for monitoring progress, informing management decisions and issuing certificates.

#### Solution
- India developed the COVID-19 Vaccine Intelligence Network (Co-WIN) digital platform, an open-source, cloud-based system, to complement e-VIN.
- Co-WIN facilitated beneficiary registration, appointments, session planning, SMS reminders, adverse events reporting, monitoring and analytics. It also generated digital certificates with QR codes.
- Several options were provided for registration to those who lacked digital access.

#### Impact
- Co-WIN provided benefits to both beneficiaries and health workers.
- As of July 1, 2022, Co-WIN had facilitated the registration of over 1 billion beneficiaries; recorded over 1.97 billion vaccine doses administered at 504,478 vaccination centres across the country. It enabled real-time monitoring of the vaccine rollout using multiple products.
- Co-WIN handled 13.7 million registrations within eight hours when eligibility for vaccination was expanded from vaccination of the highest priority-use groups to include all those 18 to 44 years of age.
### Case study 14.
Scaling real-time monitoring approaches using digital solutions — Rwanda

| Context | Rwanda received its first doses of COVID-19 vaccines in March 2021. Vaccines were distributed within days to 50 district hospitals and 508 health centres across the country. As of January 2022, over 13 million people had been vaccinated and 55% of the population had completed the primary series. |
| Challenge | With the implementation of the COVID-19 vaccination, Rwanda required a system to register and monitor individual vaccinations, track the progress of the programme, and be able to respond in real-time to issues in areas of low coverage. |
| Solution | The country adapted the existing DHIS2 platform to include the “e-tracker” module to establish a national electronic registry to collect transactional data on COVID-19 vaccination. Individual beneficiary data were linked to the national ID number enabling the generation of vaccination certificates with QR codes and sending SMS reminders for follow-up visits. The system enabled the creation of a real-time data dashboard used for management decisions. |
| Impact | Health workers reported clear benefits of having a common system for the pandemic response. Public use of the system to access COVID-19 and other health-related information increased. Real-time data availability enabled timely management decisions that contributed to Rwanda’s successful vaccination response. |
Implication for future – action areas

Improving the estimates of the target population size in high-risk populations
The highest priority-use groups for COVID-19 vaccination are the same as those targeted for seasonal influenza vaccination and influenza pandemic preparedness. These priority groups are likely to have the highest risk of infection, hospitalization, or death in future pandemics, irrespective of the pathogen involved. However, there is a lack of accurate estimates of the size of these target populations. Countries could benefit from the experience of the COVID-19 pandemic response to identify important data sources and improve the accuracy of these estimates. Countries that established electronic registration systems should periodically update their estimates using these systems. Beyond pandemic preparedness, these estimates can help strengthen the delivery of other routine vaccinations to these target groups as part of the progression towards life-course vaccination.

Leveraging digital systems for routine immunization
Leveraging digital systems to register beneficiaries, schedule immunization visits, and send reminders for follow-up doses could improve the quality of immunization services overall. It could also improve the beneficiary experience, leading to higher uptake of routine immunization. These digital systems could be leveraged to establish functional electronic immunization registries that would provide high-quality granular data to support management decisions in improving immunization outcomes.

Advancing towards more integrated or interoperable data systems
The lessons from the pandemic could enable countries to take well-informed and measured steps toward comprehensive digital health information systems. However, the efforts to develop comprehensive digital health systems should be carefully planned and designed to avoid the problems faced by some countries when establishing electronic vaccination registries during the pandemic.
Conclusion

The COVID-19 vaccination response provides many lessons to Governments not only to enhance preparedness for future pandemics that require vaccination but also for improving components of essential immunization programmes and PHC. The scale of the response and the speed at which COVID-19 vaccination was introduced in countries demonstrated their tremendous commitment and national resilience. At the same time, it also exposed weaknesses in the health systems of many countries, especially those in LMICs.

When faced with the breadth of challenges for rapid deployment of COVID-19 vaccination, Governments rose to meet these challenges by investing in their health systems, augmenting their human resource capacities, innovating, building partnerships, and strengthening their engagement with the communities they serve. Documenting, learning and building on these experiences will enable leveraging their full potential to make systems even more resilient to future stressors. Such actions will also facilitate progress towards the acceleration of a life-course approach to vaccination that provides the benefits of vaccination to all, irrespective of who they are and where they live.

This document has summarized only a few of these important lessons and provides links to additional sources of information that can serve as critical resources for future planning.
Bibliography


The COVID-19 Vaccination Response: Country experiences, best practices, and lessons