

# EQUITABLE ACCESS TO AND DELIVERY OF COVID-19 VACCINES: STRENGTHENING THE COLD CHAIN SYSTEM IN THE KYRGYZ REPUBLIC

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## About this Brief

This brief presents work completed under the LHSS Kyrgyz Republic Activity *Intervention 4: Enhance Cold Chain System*. LHSS worked with key government stakeholders, including the Republican Center of Immunoprophylaxis, to digitalize and update components of the country's vaccine registry and complement these updates by adding additional functionalities for cold chain tracking and management.

The new immunization information system helped ensure a smooth rollout of COVID-19 vaccinations in the Kyrgyz Republic.

## BACKGROUND

In February 2021, the Kyrgyz Republic's Ministry of Health (MOH) developed the National Deployment and Vaccination Plan (NDVP) for COVID-19 vaccines. The plan included COVID-19 vaccines on a list of medicines that could be imported and used in the Kyrgyz Republic without registration. The Republican Center of Immunoprophylaxis (RCI) is responsible for predicting the demand for and distribution of COVID-19 vaccines. As a part of the NDVP, the MOH prepared a three-phase vaccination rollout that aimed to cover at least 70 percent of the country's total population, prioritizing essential workers and groups at high risk of severe disease. To ensure timely roll out of this plan there must be a well-designed, well-managed vaccine supply chain management system – one that can ensure that vaccines are adequately available and have been kept at the correct temperatures.

RCI has organized the COVID-19 vaccine distribution process by leveraging the existing vaccine distribution mechanism used for routine immunization in the country. RCI monitors the distribution of vaccines through the supply chain at four key points: (1) national RCI vaccine warehouses, (2) vaccine warehouses at the regional centers of the Department of Disease Prevention and State Sanitary and Epidemiological Surveillance, (3) district vaccine warehouses, and (4) vaccination sites. In the Kyrgyz Republic, routine vaccines are distributed across the country four times a year. Vaccines are initially stored at the central warehouse in Bishkek before being dispatched to regional warehouses every quarter. District warehouses pick up vaccines monthly from the regional

warehouses using their own transport (for example, general-purpose vehicles or ambulances equipped with refrigeration bags). Similarly, medical centers pick up vaccines from district warehouses monthly using vaccine thermoses and the public transportation system.

## VACCINE SUPPLY CHAIN MANAGEMENT DURING COVID-19

The roll out of COVID-19 vaccines presented an opportunity to strengthen the programming and distribution of vaccines, in both the long and short term.

As of October 2022, about 24 percent of the population had received at least one COVID-19 vaccine dose and 21 percent were fully vaccinated.<sup>[1]</sup> The national target for COVID-19 vaccination is 70 percent of the population. With this goal in mind, the MOH acknowledged that the country would require a significant amount of additional storage and transportation capacity, including ultra-cold chain storage, as well as strengthening of operational processes for the effective management of COVID-19 vaccines. As the country rolled out COVID-19 vaccines, timely and accurate information became increasingly important to avoid delays caused by slow processing of paperwork, inaccurate forecasting, and vaccinations not being allocated correctly.

Successful vaccination campaigns rely on up-to-date information on vaccine reserves at the facility, district, regional, and national levels. Prior to the COVID-19 pandemic, information on various components of the vaccine cold chain, such as equipment types, volume, and vaccine locations, was generally available. However, this information was often paper-based (or accessible via outdated software systems) which led to delays in forecasting and planning for COVID-19 vaccine rollout. This lack of appropriate digital tools also created information gaps and interfered with RCI's ability to assess actual needs at various levels of the health care system.

The MOH developed and led the “Kyrgyzstan – Green Zone” initiative, an integrated communication strategy and plan for the introduction of vaccines. As a part of this initiative, electronic vaccination certificates are available on mobile devices. Mobile network operators provided various incentives for people who were vaccinated, such as free internet, and text reminders to receive a second dose 21 days after receiving the first vaccine. The MOH posted online a digital map of “green” organizations and institutions, where at least 70 percent of employees were vaccinated.



Staff from the Bishkek Family Medicine Center No. 3 test the immunization information system. (Photo: LHSS Kyrgyz Republic)

## THE CHALLENGES

Considering the scale of the national COVID-19 vaccination campaign and the number of vaccines that needed to be procured, transported, and appropriately stored, the MOH and RCI decided to integrate the electronic registry of persons vaccinated against COVID-19 into the Kyrgyz Republic's broader health information system. To do this, an immunization information system needed to be developed.

<sup>[1]</sup> Holder, Josh. (upd. October 10, 2022). Tracking Coronavirus Vaccinations Around the World. *The New York Times*. <https://www.nytimes.com/interactive/2021/world/covid-vaccinations-tracker.html>

In March 2021, the “Registry of persons vaccinated against COVID-19” was launched by the E-Health Center with support from the Soros Foundation-Kyrgyzstan and was linked to the vaccination website (<https://vc.emed.gov.kg>). The website, which has so far been used by more than 400 temporary vaccination sites across the country, includes a map and tabular catalog of active vaccination sites in the country, interactive information dashboards with vaccination rates, a page to register for vaccination, and a page where registered users can export and download a vaccination certificate. There is also a page where adverse side effects can be reported and users from the MOH and RCI can create reports to monitor vaccinated people who experience adverse reactions. However, the system did not have the full functionality needed to track, record, and manage immunization logistics and operations processes such as:

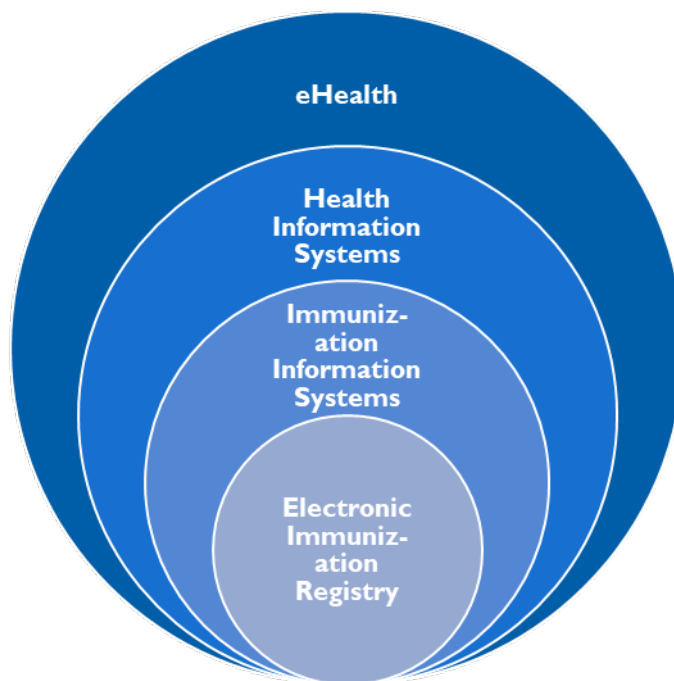
- Monitoring the availability of vaccines and consumables in RCI warehouses, regional and district warehouses, and at vaccination sites.
- A refrigeration equipment inventory module to track the storage of COVID-19 vaccines and routine vaccines; which in turn meant data was not available for a sizing tool<sup>1</sup> to automatically calculate the usable storage capacity of refrigeration equipment.
- Systems for tracking transportation of vaccines.

Due to the large volume of COVID-19 vaccines coming to the country and the urgent need to ramp up vaccination, RCI identified the need for an immunization information system (Figure 1) that could be used to monitor and use accurate data in developing policy; for epidemiological and statistical analysis and decision-making; and for health care facilities to track target groups, maintain electronic records of immunizations, manage reserves, and determine needed supplies.

## IMMUNIZATION INFORMATION SYSTEM DEVELOPMENT

LHSS, along with the E-Health Center, RCI, and with inputs from the WHO (Box 1) developed a more holistic, web-based unified immunization information system.

**Figure 1. Interrelationships among health information systems and immunization information systems**



Source: Pan American Health Organization. Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation. Washington, D.C.: PAHO; 2017.

<sup>1</sup> The sizing tool is a WHO planning tool for national program managers to estimate the size of the required supply chain infrastructure for vaccine storage and transportation at each level and facility

## BOX I. KEY PARTNERS

**RCI**, in partnership with LHSS, led the development of the immunization information system. RCI oversees regulatory and operational processes related to the Kyrgyz Republic's vaccine supply, storage conditions, and identifies and provides commodities and equipment needed to administer vaccines at vaccination sites safely. RCI relies on a secure and smoothly operating information system to make data-informed decisions for day-to-day operations and for policy development, analysis, and epidemiological monitoring. RCI incorporated the paper-based operational and logistics processes and standards from the previous immunization system into the new immunization information system.

**E-Health Center** provided IT support to inform the design, testing, and piloting of the immunization information system. It also produced manuals and video instructions for end users. In partnership with RCI, IT specialists from the E-Health Center conducted online and in-person training for 468 employees of health care facilities in Bishkek on the use of digital cold chain management tools.

**WHO** supported the digitalization of COVID-19 vaccine cards, recording adverse events following immunization, and vaccine refusals in the immunization information system. This information enables RCI to have access to additional, up-to-date data to guide the COVID-19 vaccination strategy.

To start, the proposed immunization information system would need to integrate vaccine logistics and operations functions for vaccine deployment of COVID-19 and other vaccines, in accordance with the country's national immunization schedule. The system needed to be adaptable and encompass all levels of the vaccine delivery system, including:

- Level 1 – National (RCI).
- Level 2 – Regional health care facilities.
- Level 3 – District health care facilities.
- Level 4 – Vaccination centers, including family medicine centers, centers of general medical practice, family group practices, and *feldsher*-obstetric points (last-mile, primary health care services in remote areas).

LHSS developed the pilot cold chain management system, and subsequently added additional immunization information system modules and dashboards that will help users analyze vaccination trends.

### Modules

LHSS developed and integrated modules on four components of the immunization information system: warehouse accounting, inventory of refrigeration equipment, the sizing tool, and the tracking system (Table I). These modules were incorporated into the broader system, as were dashboards for data visualization.

**Table 1. The four modules of the immunization information system**

Module name	Functionalities
Warehouse accounting	<ul style="list-style-type: none"> <li>• Allows data on distribution of vaccines and consumables at warehouses to be entered.</li> <li>• Displays the availability of vaccines and consumables per warehouse.</li> <li>• Keeps records of the movement of vaccines and consumables between warehouses by issuing invoices (waybills).</li> <li>• When creating an invoice (waybill), analyzes if space is available in refrigeration equipment for storing vaccines and displays an alert if there is not enough space. This functionality is available via calculations made in the sizing tool.</li> <li>• Tracks vaccines and vaccine consumables that were disposed of due to damage or other causes. The disposal registry contains a table that shows the item that was disposed of, date of disposal, and the reason for disposal.</li> <li>• Contains a map of warehouses which are labeled by name. When selecting a label, the name of the warehouse and the availability of vaccines in the warehouse are displayed in real time.</li> </ul>
Inventory of refrigeration equipment	<ul style="list-style-type: none"> <li>• Contains the refrigeration equipment registry.</li> <li>• Tracks changes in refrigeration equipment status.</li> <li>• Records disposal of refrigeration equipment that has been damaged or isn't functioning.</li> <li>• Contains a registry of hand-held, refrigerated bags used to transport vaccines.</li> </ul>
Sizing tool	<ul style="list-style-type: none"> <li>• Calculates the volume available in refrigeration equipment for storing vaccines (for both routine and unscheduled immunization) in national and intermediate warehouses.</li> <li>• Defines requirements for minimum order quantities and use of vaccines and safe injection equipment during mass vaccination campaigns and routine immunization.</li> </ul> <p>This module is linked to the module "<i>Inventory of refrigeration equipment</i>" and the current volumes of vaccines stored in warehouses.</p>
Tracking system	<ul style="list-style-type: none"> <li>• Assigns a driver and vehicle to transport vaccines and consumables between warehouses.</li> <li>• Generates several routes on the digital map of the country, offering options for the cargo's route(s).</li> </ul>

The immunization information system also includes a mobile application for tracking transport operations. This system allows users to track and confirm receipt and delivery of cargo, which is fed into the broader database. The mobile application allows users to track the location of cargo by geolocating the driver's phone. There is also a map feature that allows users to display the current location of the driver and show the route between the delivery points indicated in the invoice (waybill) (Figure 2).

**Figure 2. Route displays (Bishkek – Karakol) on the interactive map**



## Dashboards

Dashboards visualize information from the immunization information system database in a variety of formats, including tables, diagrams, and digital maps. Data can be segmented and presented using various filters. This feature can help guide decision making for users. The dashboards have the ability to display the following datapoints:

- Number of entities receiving vaccines, such as health care facilities (counter).
- Number of warehouses (all levels, i.e., national, subnational) (counter).
- Number of refrigeration equipment (counter).
- Refrigeration equipment per site (counter) and status of refrigeration equipment.
- Number of refrigerators by temperature regime by regions.
- Deliveries of refrigeration equipment (by supplier).
- Number of refrigerators in terms of storage capacity by region.
- Number of vaccines received by name, type, and supplier.
- Distribution of vaccines across regions.
- Number of consumables received by type and supplier.
- Distribution of consumables across regions.
- Information about refrigeration equipment capacity/space.
- Number of completed routes (counter).
- Number of vehicles and drivers.

## Piloting of the immunization information system

After LHSS supported the development of the modules, the E-Health Center created training materials which consisted of four videos on 1) vaccine administration, 2) vaccines, 3) vaccine warehousing, and 4) vaccine refrigeration. Additionally, the center created three user manuals on 1) immunization information system, 2) sizing tool, and 3) how to inventory refrigeration equipment. These materials were used during pilot training of 468 staff from health care facilities in Bishkek that were conducted throughout the year. The training courses were recorded and transcribed and are available as an additional video resource. LHSS also procured over \$30,000 in server equipment and additional components for the MOH to support the rollout of the system. Following the



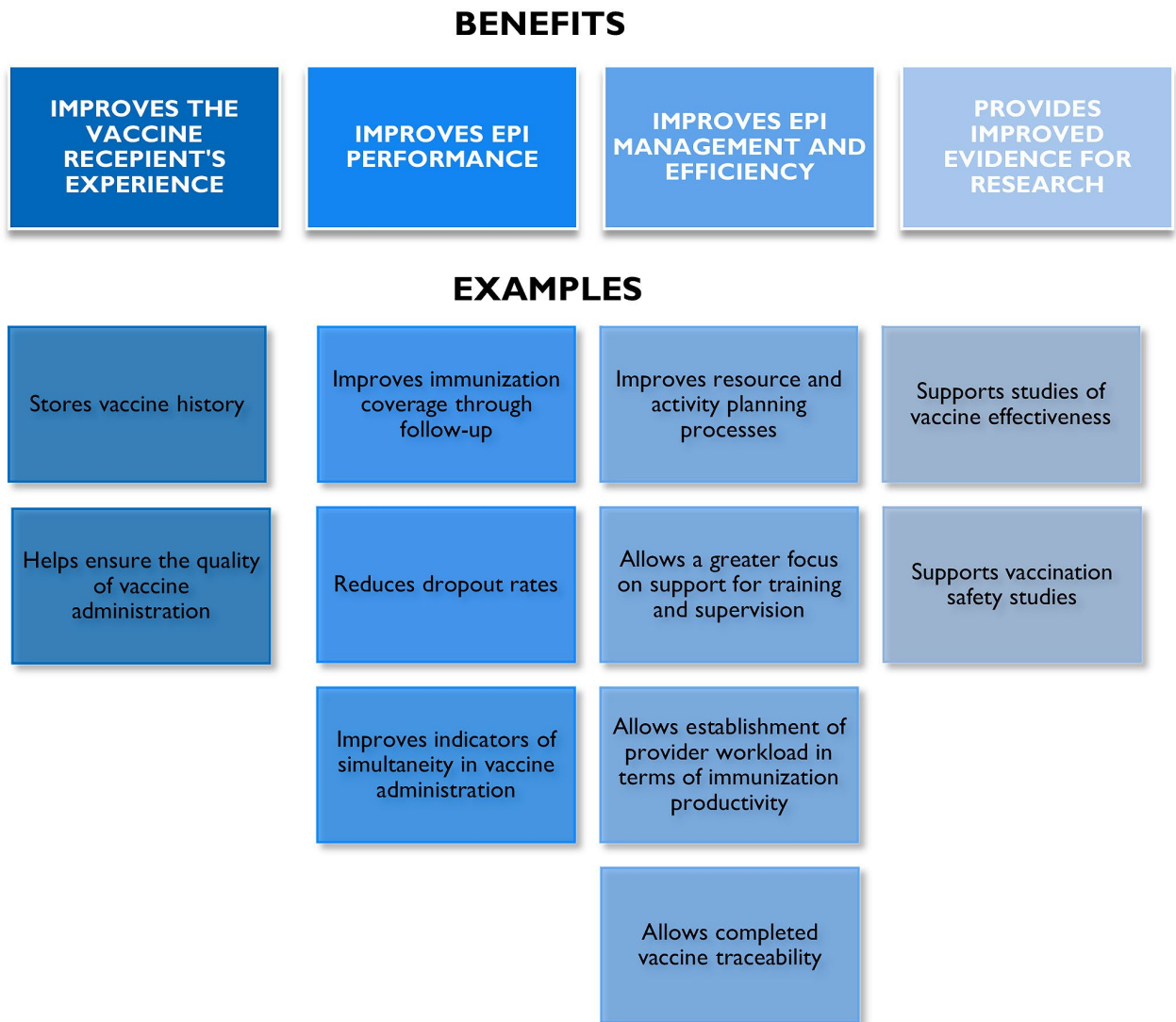
Staff from a Bishkek health care facility participate in a training on how to use the sizing tool. (Photo: LHSS Kyrgyz Republic)

Following the pilot, the modules were finalized. Users who had participated in the pilot training reported that the tools have significantly reduced their data input and management time and have allowed them to record and assess the use of and need for COVID-19 vaccines and vaccine supplies more accurately.

## RESULTS

1. By expanding the functions of the registry, the MOH will be better able to meet the NDVP's goals, as there is now a reliable, digital, and patient-centered immunization information system.
2. Linkages between the vaccination sites, E-Health Center and RCI have been strengthened, which will increase their ownership of the immunization information system.
3. The immunization information system has been successfully piloted and presented to stakeholders, highlighting the system's longer-term importance for routine immunization.
4. The presence of new digital tools will enable better reporting and analysis of vaccination trends in the Kyrgyz Republic.

**Figure 3. Advantages of using an electronic immunization registry**



Source: Pan American Health Organization. Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation. Washington, D.C.: PAHO; 2017.

## NEXT STEPS

- The MOH and RCI have completed the introduction of the immunization information system in Bishkek and plan to expand it to several vaccination sites in the Chui region (dependent on the availability of funds).
- The E-Health Center plans to integrate a registry of unvaccinated persons into the immunization information system. This information will help guide the MOH's broader COVID-19 vaccination campaign and contribute to vaccination sites' improved understanding of the COVID-19 vaccination rates in their catchment areas.



- After piloting the system’s new modules and dashboards, LHSS and RCI identified the need to develop a reporting form related to the movement of vaccines. This reporting form would be automatically generated at all levels of the vaccine supply chain– from a vaccination site to the national level. The E-Health Center is assessing the feasibility of integrating this module with the country’s District Health Information System 2 platform.



### Local Health System Sustainability Project

The Local Health System Sustainability Project (LHSS) under the USAID Integrated Health Systems IDIQ helps low- and middle-income countries transition to sustainable, self-financed health systems as a means to support access to universal health coverage. The project works with partner countries and local stakeholders to reduce financial barriers to care and treatment, ensure equitable access to essential health services for all people, and improve the quality of health services. Led by Abt Associates, the five-year project will build local capacity to sustain strong health system performance, supporting countries on their journey to self-reliance and prosperity.

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