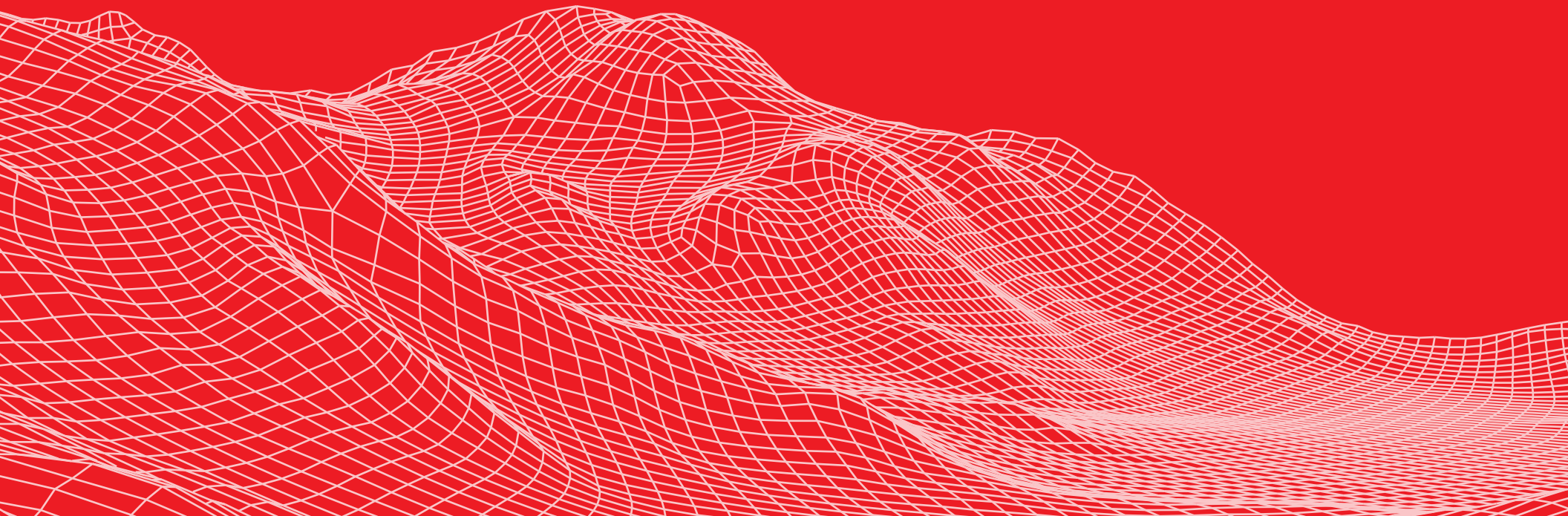


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# Near-universal Childhood Vaccination Rates in Rwanda

REACH PROJECT



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This research is funded by the Mastercard Center for Inclusive Growth, the Canada Research Chairs program, and the Ralph and Roz Halbert Professorship of Innovation at the Munk School of Global Affairs and Public Policy. We express our gratitude and appreciation to those we met and interviewed in Rwanda, specifically those in government, the health services field, international and local NGOs, and all others who contributed to the important process of child vaccination in Rwanda. We also deeply value the continued support and guidance of the Ministry of Health through Rwanda Biomedical Center. Your work and dedication are inspiring.

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# PREFACE

**E**ffective childhood immunization programs in low-income countries improve health equity, reduce the incidence of communicable diseases, and decrease vulnerability to damaging outbreaks of vaccine-preventable diseases. Unfortunately, many low- and high-income countries fall short of expected vaccination rates in the twenty-first century. These shortcomings led to the United Nations' creation of Sustainable Development Goal (SDG) 3.2, which highlights the importance of vaccination for overall national development. Increasing vaccination coverage to 90 percent in the poorest countries over the next ten years would prevent an estimated 426 million cases of illness and avert nearly 6.4 million needless childhood deaths worldwide. Rwanda is one of the rare countries that has increased its vaccination coverage.

Rwanda is a country in the Great Lakes region of East Africa, with a small land area and a population of approximately 11 million. Its population density is well above the sub-Saharan African average and is one of the highest in the world. It is divided into four provinces and the capital, Kigali, and further subdivided into thirty districts.

Several factors affect Rwandan residents' ability to access goods and services, including health

services. These factors include the country's mountainous physical geography, the fact that 63 percent of Rwandans live in extreme poverty,<sup>1</sup> and the predominantly rural population. The 1994 genocide against the Tutsi devastated health and governing infrastructure in Rwanda and led to a large exodus of health workers and a shortage of trained physicians. To restore and strengthen the health system required funding, political will, and efficient use of resources.

In spite of these barriers, Rwanda has been a regional and global leader in improving its vaccination coverage. Spurred by the UN's Millennium Development Goals (MDGs) to reduce by two-thirds the mortality of children under the age of five by 2015, Rwanda scaled up its immunization program and other health and development programs to meet this goal.<sup>2</sup> Despite its geographic and historic barriers to improving child mortality outcomes, its immunization program clearly demonstrates effective reach. Reaching the hardest to reach means delivering knowledge, services, and care to those in need regardless of their geographical location and socioeconomic status. In 2015, its overall national coverage for childhood immunizations was 98 percent. This childhood vaccination rate outperforms Rwanda's regional neighbors. It also

emphasizes the country's interest in health equity. There are minimal differences in vaccination rate when the data are disaggregated by wealth quintile, gender, or place of residence.

We aimed to identify factors that have contributed to Rwanda's successful vaccine program. Other countries, nongovernmental organizations (NGOs), and implementers can draw on these lessons to help replicate Rwanda's success in reaching the hardest-to-reach populations.

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<sup>1</sup> Poverty data from the World Economic Forum on Africa, "Five Things to Know About Rwanda's Economy." ☒

<sup>2</sup> The UN describes these millennium goals as ranging from "halving extreme poverty rates to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015." On their website they say the goals "have galvanized unprecedented efforts to meet the needs of the world's poorest. The UN is also working with governments, civil society and other partners to build on the momentum generated by the MDGs and carry on with an ambitious post-2015 development agenda." See "Millennium Development Goals and Beyond 2015." ☒

## ABOUT THIS RESEARCH

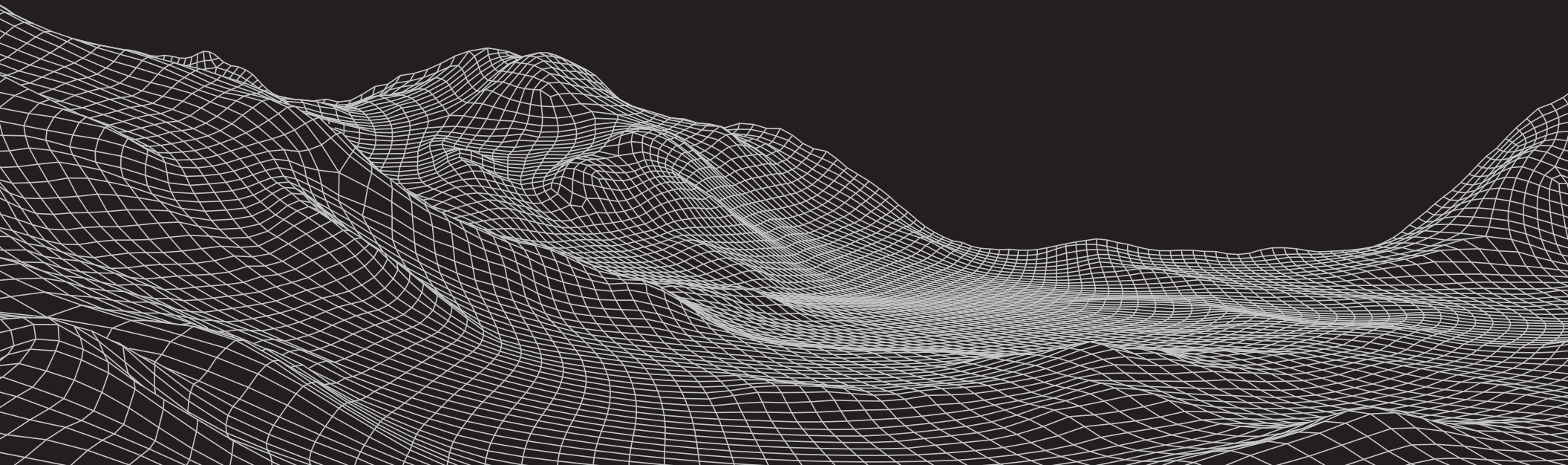
This report detailing the success of Rwanda's childhood immunization program is the result of a year-long research project carried out by the Reach Project under the supervision of Professor Joseph Wong of the Munk School of Global Affairs and Public Policy and the Department of Political Science at the University of Toronto, with assistance from the project's research officer, Kirstyn Koswin. This case study was led by Professor Stanley Zlotkin, Chief of Global Child Health at Sick Kids Hospital and Professor of Nutritional Sciences and Pediatrics at the University of Toronto. The project was carried out by four student researchers: James Bao, Heather McAlister, Julia Robson, and Alissa Wang. The Ministry of Health of Rwanda, through the Rwanda Biomedical Center, collaborated on the project. The following Rwandan collaborators coauthored the report: Félix Sayinzoga (MD, MSc, PhD[c]), Hassan Sibomana (MSc), Jean de Dieu Hakizimana (MPH), Jose Nyamusore (MD, MPH), Adeline Kabeja (MPH), and Jean Paul Uwizihwe (MD, MSc, PhD[c]).

Research was conducted from September 2016 through August 2017, including primary fieldwork in Rwanda from 12 to 20 August 2017. A total of twenty-four interviews and two site visits were conducted in the Rwamagana district, in the City of Kigali, and in the Rulindo district.

Our estimation of vaccination coverage in Rwanda (98%) is based on 2015 data from the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). The WHO and UNICEF verify vaccination coverage data independently from the Rwandan government. The vaccinations included in the country's national Expanded Program on Immunization are the BCG vaccine against tuberculosis, the third of three doses of the polio vaccine (Pol3), the third of three doses of the DTP vaccine (DTP3—diphtheria, tetanus, and pertussis), the third of three doses of the hepatitis B vaccine (HepB3), the third of three doses of the *haemophilus influenzae* type B vaccine (Hib3), the third of three doses of the pneumococcal conjugate vaccine (PCV3), and the first of two doses of the measles vaccine (MCV1). These vaccinations reflect the WHO recommendations for routine vaccinations for children.

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# Rwanda in the Regional Context





## PHYSICAL AND HUMAN GEOGRAPHY

With its mountainous landscapes, rainy seasons, and a predominantly rural population, Rwanda's geography creates both challenges and advantages in terms of vaccine delivery. The country's population is distributed across a wide range of different elevations, from valleys to mountains. Rwanda's childhood immunization program has successfully reached these geographically diverse population groups by modifying its transportation and delivery practices to suit the regional geography. For example, because rural roads in mountainous areas are often better accessed by motorcycles than trucks, the Maternal Child and Community Health Division/Vaccine Preventable Disease Unit, commonly referred to as the National Expanded Program on Immunization, uses motorcycles to reach these communities whenever necessary, contributing to the country's ability to reach hard-to-reach children. Vaccination "outreach sites" have also been created to increase accessibility for populations where physical geography or distance are barriers to access. This flexibility is in contrast to vaccination access in other countries in the region, where access can be limited outside of major urban centers.

The accurate and timely delivery of properly stored vaccines and supplies to rural health centers is essential to maintaining high vaccination coverage. Delivery is often affected by the quality and quantity of available roads. Building and maintaining road infrastructure in hilly and mountainous terrain can also pose a costly engineering challenge. Although the main roads in Kigali and major routes outside of the city are well developed and maintained with flood-resistant infrastructure, other rural roads tend to be unpaved and may wash out during the intense and prolonged rains of the biannual rainy seasons. Wash-outs impose



A view from Rwanda's Rulindo District

significant annual infrastructure costs and impede the delivery of vaccines. Other low-income countries in different climactic zones would not have to bear these unpredictable infrastructure costs. Their government programs, including immunization programs, might therefore benefit from lower infrastructure costs compared to Rwanda's. Fortunately, Rwandans have found many ways to adapt to the local climate, including paving major roads, enhancing flood infrastructure in some areas, and adjusting the timing of vaccination campaigns.

Certain rural areas are more difficult to reach than urban areas because they lack road and telecommunications infrastructure, and there are significant

distances between patients and health facilities. According to the World Bank, Rwanda's population is approximately 70 percent rural. This figure is 10 percent higher on average than in other countries in the region. The country's predominantly rural population is more difficult to reach than populations in surrounding countries. However, the Rwandan government has been able to overcome this challenge through targeted funding (see section 4), increasing the number of community health workers in rural areas (section 3), using population-wide communication techniques such as *Urunana* public-health soap opera radio broadcasts (section 3), and cellular-telephone-based data collection (section 3).

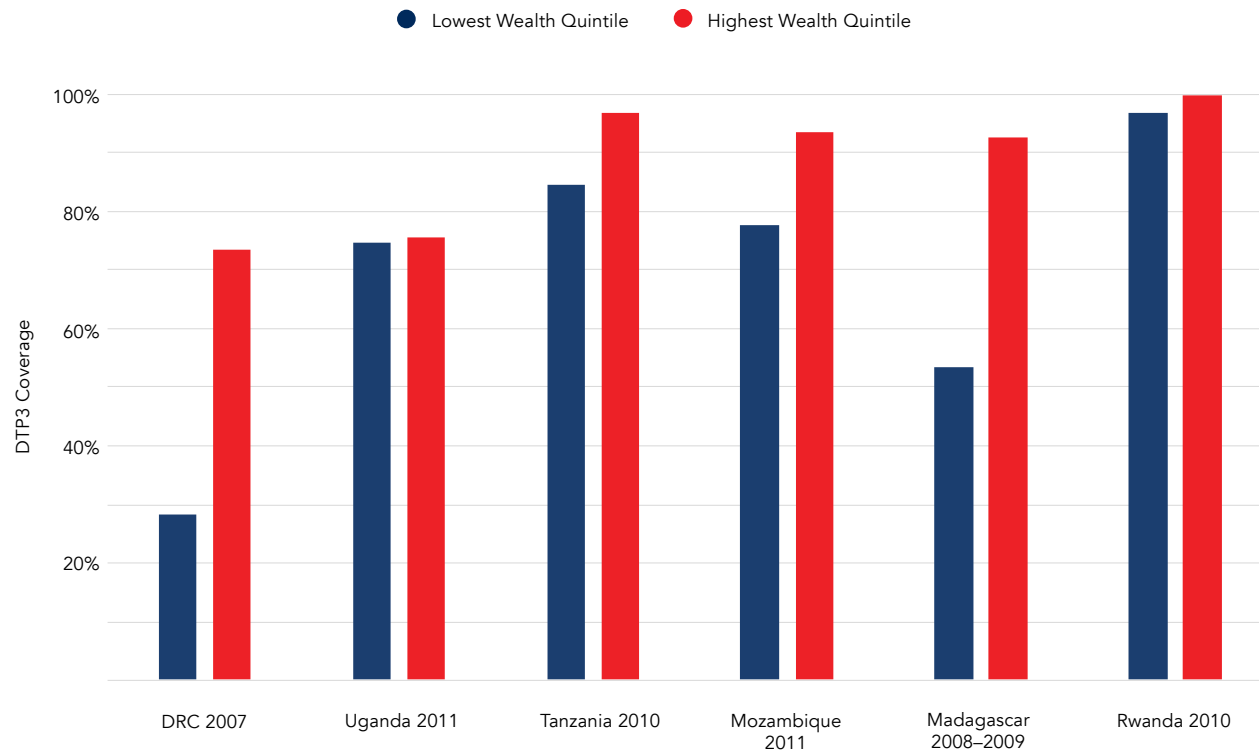


FIGURE 1. DTP3 coverage in Rwanda and neighboring countries by wealth quintile<sup>3</sup>

Any deficiencies in vaccine coverage within any group there, including refugees, pose a public health risk. For this reason, the more than 145,000 refugees living in Rwanda in 2015, mainly from the Democratic Republic of Congo and Burundi, were integrated into Rwanda's community immunization programs and forecasting. When refugees initially arrive in Rwanda, their vaccination needs are assessed by the government and they receive emergency vaccines from UNICEF. As the refugees become settled, their health needs are integrated into routine community care. Rwanda's provision of vaccines to noncitizens demonstrates the country's commitment to comprehensive vaccination cover-

age at the community and national levels.

Despite its difficult terrain, Rwanda's geography also contributes to the successful distribution of vaccines in several ways. Compared to larger nearby countries such as the Democratic Republic of Congo, Uganda, Tanzania, and Ethiopia, Rwanda's smaller land area means that relatively fewer resources are required to achieve high rates of vaccination coverage across the country, including areas that are difficult to reach. Health centers and healthcare providers are also located evenly across the country to reduce the likelihood of district- or income-based disparities in healthcare equity.

Rwanda's land area and population density permit efficient, decentralized country-wide health center coverage that would not be feasible in a country with a significantly lower population density. Robust distribution has contributed to remarkably high and equitable coverage in Rwanda (Figure 1).

Geopolitical stability has also contributed to Rwanda's high rates of childhood vaccination coverage. Rwanda has experienced relative stability since the 1994 genocide against the Tutsi. Countries in the region experiencing periodic conflict, including the Democratic Republic of Congo, Burundi, and South Sudan, are often unable to procure or distribute vaccines because they lack infrastructure or face other more urgent medical priorities or active conflict. By contrast, the peace Rwanda has brokered in the past two decades contributes to increasing stability that facilitates vaccine distribution. Geopolitical stability in Rwanda also increases funders' willingness to contribute long-term resources to assist with vaccination infrastructure.

## SUMMARY

Rwanda's physical and human geography, including topography, transportation infrastructure, and population distribution, present both challenges and advantages for vaccine delivery. The country has successfully worked to overcome many of these challenges, while leveraging its advantages to improve vaccination coverage. Political will, local ownership, and logistics also help to explain Rwanda's successful childhood immunization program.

<sup>3</sup> Adapted from Angela K. Shen, Rebecca Fields, and Mike McQuestion, "The Future of Routine Immunization in the Developing World: Challenges and Opportunities," *Global Health: Science and Practice* 2, no. 4 (2014): 381-94.

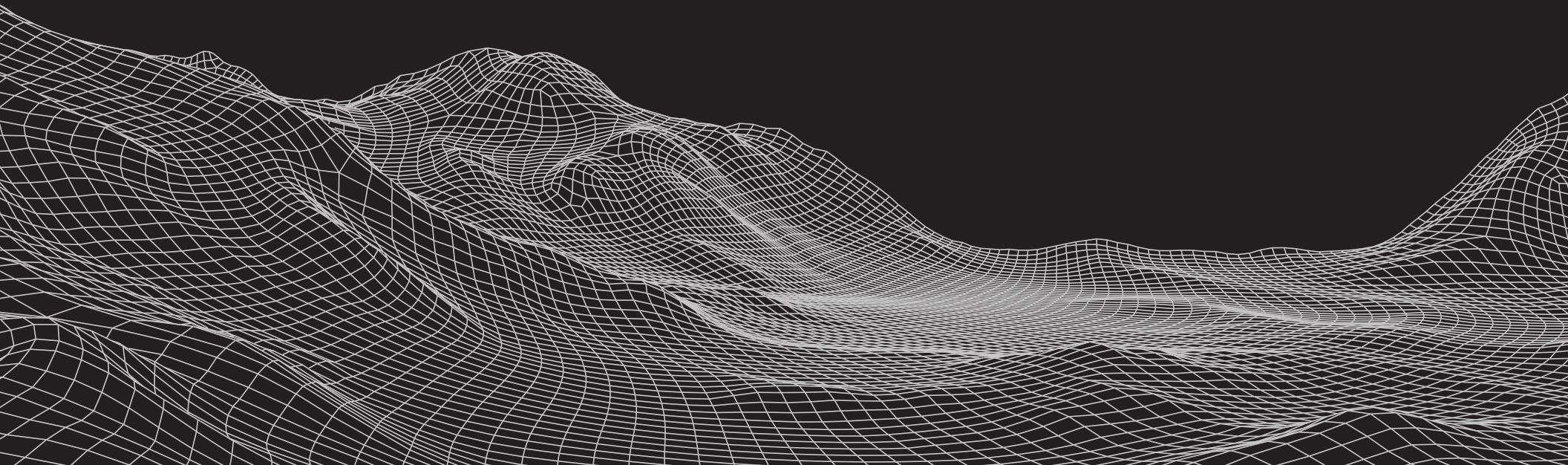


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# Political Will



The success of Rwanda's national immunization program is rooted in a political landscape shaped by unique aspects of its history and culture. The political system is led by a strong central government at the top with a hierarchical chain of command that extends down to the local level. The government's strong political will begins with a top-level commitment to equity in all aspects of service delivery, motivated by the legacy of the 1994 genocide against the Tutsi. Strong top-level leadership is complemented by a culture of accountability. In particular, *imihigo* ("vows to deliver") performance contracts bind all government personnel to levels of authority above, along the entire chain of decentralized implementation bodies.



## STRONG, EQUITY-DRIVEN LEADERSHIP AT THE TOP

Memories of Rwanda's 1994 genocide against the Tutsi significantly affected the country's political landscape. The genocide provided a dire warning against policies that create division, differences, and inequality. The government clearly stated its commitment to unity and equity in its fundamental guiding principles and development policies. The Rwanda Vision 2020 document, the country's leading development policy paper, outlined the country's "aim of attaining per capita income of a middle-income country in an equitable way, and the aspiration to become a modern, strong and united nation, without discrimination between its citizens."

In the context of Rwanda's delivery of health and social services, the lessons of the genocide motivated a strong political commitment to equity-driven policies. The government has clearly expressed its commitment to equitable service delivery that reaches all citizens, even those who are hardest to reach. The country's Economic Development and Poverty Reduction Strategy II framed this focus on service delivery as "part of government's social contract with citizens." Many interview participants reiterated that Rwanda does not have a health equity problem. When the government provides a service, it aims to do so in an equitable way across the population, without exclusion or exception. As we heard in interviews, the central government's target is always 100 percent coverage. This strong, equity-driven focus underpins the ambitious policies that support Rwanda's immunization program.

## ACCOUNTABILITY: IMIHIGO

Permeating every level of government is a uniquely Rwandan accountability mechanism called *imihigo*. The Kinyarwanda word is the plural of *umuhigo* which translates as "a vow to deliver." This word has its roots in Rwanda's historic, precolonial culture: Rwandan warriors would set objectives to achieve within a certain time frame and promise to complete them regardless of the challenges in their way. Post-genocide decentralization required a monitoring and evaluation system to keep local officials accountable and ensure they achieved their local targets. To facilitate monitoring and evaluation of targets, President Paul Kagame revived the historic practice of *imihigo* in 2006.

In the present context, *imihigo* are performance contracts that bind all government officials to the level of government above them. The process begins with a list of national priorities determined by the central government, which are presented to district mayors. The district mayors then discuss the plans and priorities with the ministers and set targets together. This creates an action plan for each district that mirrors the national plan. In the context of the immunization program, central ministries are bound by *imihigo* with the president, the district mayors with the central ministries, and the health centers with the district mayors. Even at the community level, households have *imihigo*: mothers will often set goals to get all of their children vaccinated.

These performance contracts are decided upon by both official mechanisms from the central government as well as by public pressure from citizens.

*Imihigo* implementation is evaluated on a periodic basis. Following the creation of action plans, the government selects indicators for assessment. For example, the *imihigo* for vaccination may be 100 percent coverage for the district, and the indicators are the number of children vaccinated. The targets in *imihigo* are often precise and quantitative, allowing for direct evaluations by national evaluation teams who also provide recommendations for addressing any failures in the future. The scoring system is based on how completely the *imihigo* targets set out in the performance contract have been achieved. *Imihigo* evaluations also lead to a ranking of all districts from first to last place in performance. The top-three-performing districts get monetary awards, and the rankings are made publicly available. Officials often sign their *imihigo* in public and the signing ceremonies are usually aired on TV, online, and on radio, aiming for as broad an audience as possible. The consequences of not doing well in the *imihigo* evaluation are thus serious and public. *Imihigo* performance is also an important criterion for elected officials' selection and re-election. Local authorities are held accountable by moral and public pressure from their local population below as well as by formal pressure from government levels above.

Vaccination coverage, as one of the *imihigo* targets, benefited from this system of accountability. *Imihigo* contracts incentivize and motivate local leaders to achieve their set targets and together contribute to the national targets. These *imihigo* serve as crucial links that connect each level of government to the level above it, and ultimately to the central government and its national targets.

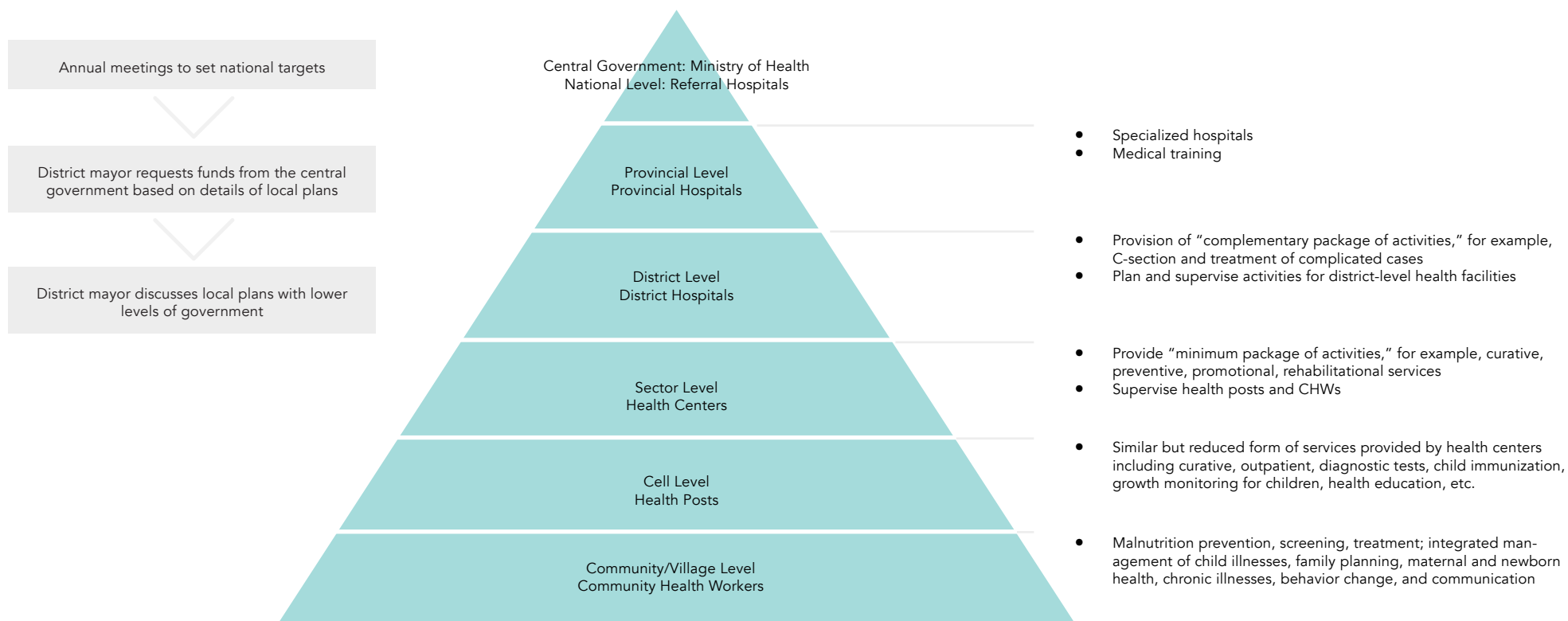


FIGURE 2. Health decision-making pyramid in Rwanda

## DECENTRALIZED IMPLEMENTATION BODIES

Strong central government leadership is supported by decentralized implementation bodies. This way, the health system is represented at all levels of government to ensure the effective delivery of vaccinations and other health services (Figure 2). In 2000, Rwanda adopted the National Decentralization Policy which included laws that redesigned the tiers of local government. This had a direct impact on the policy-making process—a process of consensus that requires input from all levels of government. At annual meetings, government personnel from the

central and district levels of government come together to discuss and set the national targets. District mayors then meet with local authorities at lower levels of government to formulate and agree on more detailed plans adapted to local circumstances. Once local plans are in place, the districts request funds from the central government to ensure that programs can run as planned. The district is responsible for coordinating implementation (see Figure 2).

The public health pyramid begins with the central government’s Ministry of Health, followed by the provincial hospitals, district hospitals, the sector-level

health centers, and cell-level health posts and ends at the village level with the community health workers (CHWs). In the immunization program specifically, the districts play a pivotal role. As the largest local government entity, districts coordinate service delivery and oversee hospitals. District mayors prepare detailed and precise micro-plans that determine how services will reach all members of the district. Below the district level is the sector level, responsible for the actual delivery of services, as well as data reporting, and social mobilization. Under the sector level are cells that also provide support with community mobilization and data reporting. Finally, at the



A busy street in a central area of Kigali

community level, each CHW knows each member of his or her community, and thus knows exactly which children have been vaccinated and which have not. Decentralized implementation is a critical aspect of Rwanda's successful reach. This system translates high-level policies into local action that reaches virtually every child.

#### SUMMARY

Political will underlies the success of Rwanda's immunization program. This political will takes several forms: equity-driven leadership at the top, decentralized implementation, and an effective accountability mechanism. At the top, motivated by the lessons of the recent genocide, the central government

is committed to ambitious and equitable service-delivery policies that do not exclude any part of the population. These national policies are carried out by decentralized government bodies, extending all the way to the CHWs who know each member of the community. Finally, the link between each of these levels of government is the uniquely Rwandan *imihigo* performance contracts. *Imihigo* ensure that authorities at each level of government are held accountable for the targets they have agreed to, which together contribute to the national target.

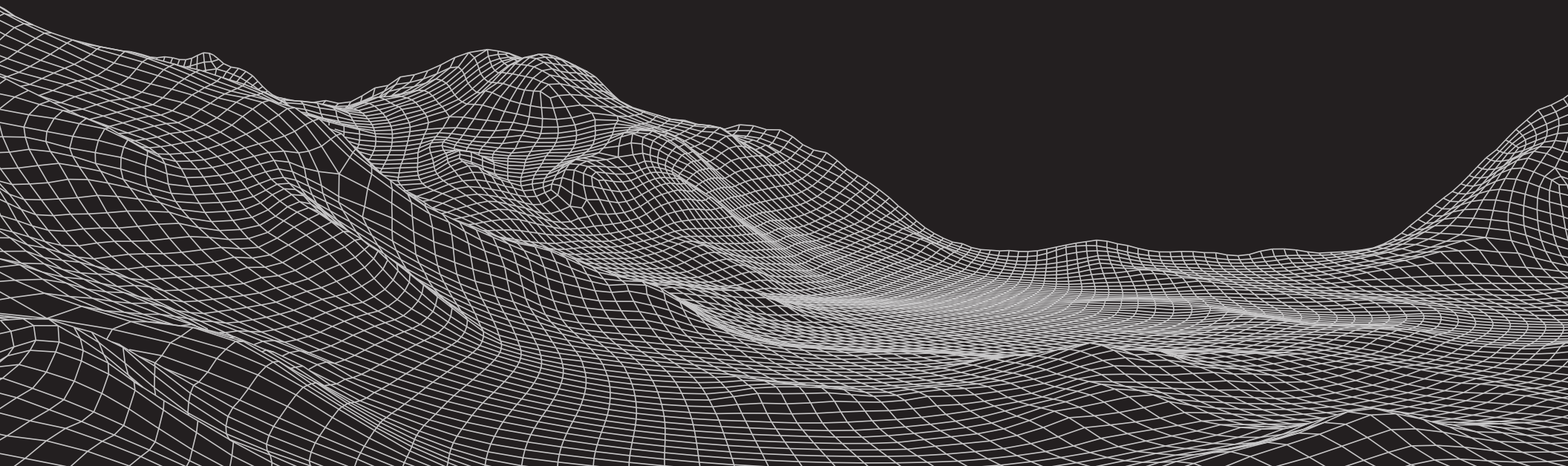


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# Local Ownership



The Government of Rwanda designed a decentralized health system that empowers healthcare professionals, from the district to the village level, to provide care to the hardest to reach. Most Rwandans access health care, including vaccinations, at the community level through this decentralized system.



## CHWs play an integral role in the healthcare system in Rwanda. Their responsibilities include comprehensive childhood vaccination education and ensuring all children in their communities receive all required vaccines.

### COMMUNITY HEALTH WORKERS

Rwanda has a severe shortage of physicians and other healthcare professionals. Community health workers fill some of these gaps. The country's approximately 45,000 community health workers (CHWs) assess and manage health care primarily at the community level. Transferring demand from central to peripheral providers decreases pressure on other parts of the healthcare system, which can meet needs that would otherwise remain unmet in part as a result of the CHW model. CHWs play an integral role in the healthcare system in Rwanda. Their responsibilities include comprehensive childhood vaccination education and ensuring all children in their communities receive all required vaccines.

In 2009, the government rolled out its CHW program in communities across the country. CHWs provide front-line care in their communities. Three CHWs are elected to care for 100 to 150 households in the community (village), known as *umu-dugudu*. An *Agent de Santé Maternelle* (ASM) provides maternal and child health education and healthcare services (including education about vaccinations and tracking children's vaccination histories). A *binome* pair (one man and one woman) teaches family planning, monitors people living with

HIV, provides referrals, rapidly diagnoses malaria, and counsels communities on nutrition, sanitation, and hygiene. CHWs are paid for their services through cooperatives that focus funds on community projects to help local economies grow.

Although they do not perform vaccinations themselves, CHWs are essential for mobilizing communities to get children vaccinated. Since CHWs must know their communities well to be elected, they are aware of the number of children in each household. It is relatively easy for them to track each child's vaccination history because of their close relationships with each household. CHWs attend monthly meetings at their district health center and report on community health indicators. At these meetings, health centers provide CHWs with a list of any children who have not been vaccinated. The CHWs' existing knowledge of their community is cross-referenced with this list. CHWs go house to house checking appointment cards given to mothers to remind them of dates and times for upcoming vaccination appointments, and making sure no children are missed for vaccinations. As needed, CHWs accompany mothers and unvaccinated children to the health center to ensure children get all necessary vaccinations.

CHWs also educate their communities on the different types of vaccinations, their purpose, and when they are to be vaccinated. Given their important role in the community, CHWs are a resource to community members. Prior to each vaccination campaign, CHWs receive refresher training to prepare them for community education. The Rwandan Ministry of Health designs the refresher training and district health centers deliver it. Each CHW is also trained in identifying and reporting cases of vaccine-preventable diseases to ensure a rapid response in the event of an outbreak. CHWs collect community-level data through RapidSMS—a data-collection program powered by cell phones that CHWs carry, which adds another level of vaccination data monitoring to the work they already do. CHWs strengthen community health and help ensure complete community vaccine coverage by serving as educators and as early identifiers of missed vaccinations.

The culture of continuous feedback, evaluation, and improvement at all levels of the health system is another important factor in the CHW program's success. Each health center gathers feedback from communities on their preferred dates for vaccination campaigns and adapts to this advice as needed to ensure maximum attendance. Cell coordinators



also monitor CHWs to ensure data collection and referrals are performed accurately. These checks at multiple levels of the healthcare system add accountability to the vaccine program.

## COMMUNITY SENSITIZATION

Sensitization campaigns are another important community-level intervention to ensure that all children are vaccinated. A popular radio program called *Urunana* and the Rwandan Red Cross (RRC) use a variety of innovative communication platforms to reach people across the country with information on vaccinations and many other health interventions.

Rwandans receive messages to encourage vaccination across a variety of platforms. The RRC uses educational video screenings with trivia and games to raise awareness in areas with the lowest vaccination rates. It also spreads messages about vaccinations at churches and other spaces where communities gather. Traditionally, villages and communities gather regularly on the last Saturday of each month for an event known as *Umuganda*. During *Umuganda*, citizens volunteer their services for part of the day to improve their communities. Messages about vaccinations and other health programs are sometimes shared during this time.

Radio has been a widely used means of communication in Rwanda for decades. Since 1998, the British Broadcasting Corporation (BBC) has supported a program known as *Urunana*. The popular soap opera in the main local language, Kinyarwanda, has characters and stories woven into lessons on health, including vaccinations. Health professionals identify gaps in health knowledge among the general population and advise *Urunana* to integrate education on these subjects into their storylines. For example, when CHWs reported issues with parents waiting



Mutuelle de Santé is the national health insurance program in Rwanda.

too long to get their children vaccinated, *Urunana* wrote parts of episodes to raise awareness about the recommended vaccination schedule. Sometimes these soap operas also perform live shows to audiences of over 5,000 in communities across Rwanda. The show receives audience feedback through social media and in-person discussions, and the feedback is integrated into future content. The design of future radio programs is informed by data gathered on the most effective ways to educate people about each vaccination. To maximize the messages' impact, the information is written in a positive tone and conveyed by relatable role models. Since most Rwandans speak Kinyarwanda and regularly listen to the radio, *Urunana's* radio programs have wide reach and are an important

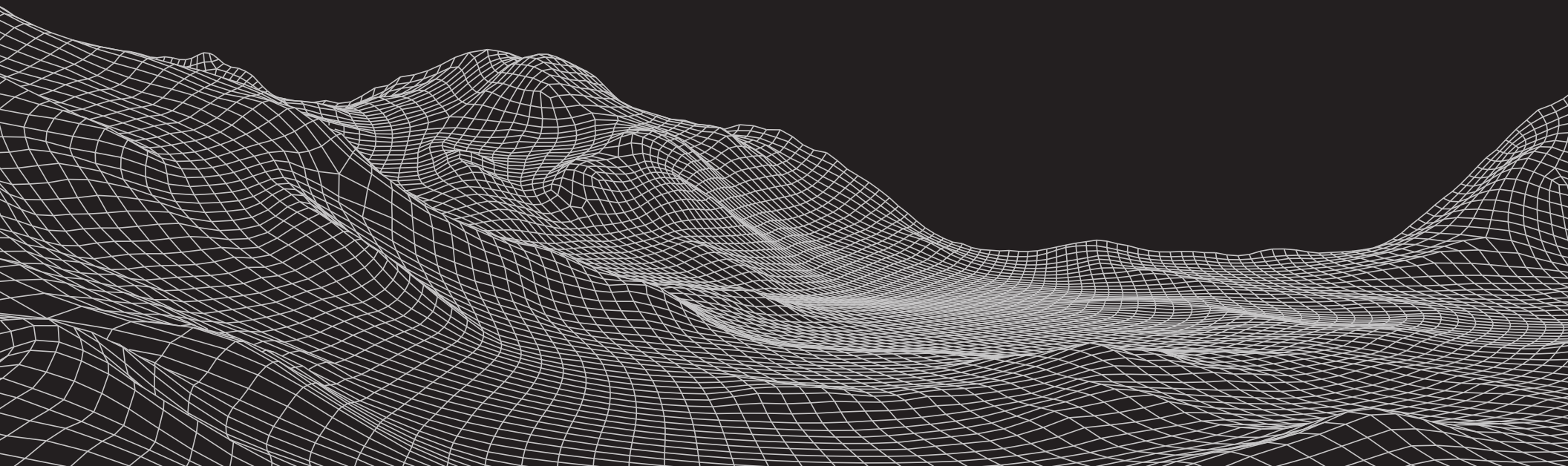
way to address health knowledge gaps and stigmatized health topics.

## SUMMARY

Decentralization of health care means that health education and care happen primarily at the community level. Community health workers mobilize and educate Rwandans to ensure children are vaccinated. They are an integral part of the country's vaccination success. *Urunana* and the Rwandan Red Cross also support community education in innovative and accessible ways, supporting the immunization program's extensive reach.

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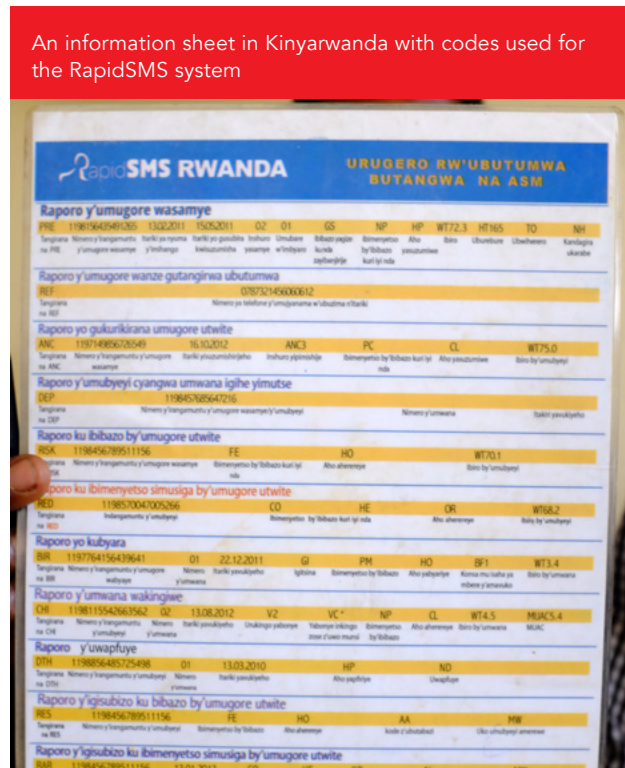
# Logistics





### TRACKING EVERY MISSED CHILD

While delivering a timely, appropriate vaccine to the majority of children in a given area is a substantial feat, the more challenging task is ensuring every single child receives their vaccinations. This includes the last few remaining children who were missed by routine campaigns. In addition to the factors we outlined earlier, Rwanda’s healthcare providers need precise and accurate health information systems to reach these remaining children. A robust health information management system uses data from several sources to ensure that virtually every child can be identified and thus targeted to receive vaccinations.



An information sheet in Kinyarwanda with codes used for the RapidSMS system

Data collection is integral to identifying missed children. Through a bottom-up approach, data from community health workers (CHWs) form the foundation of this effort. At the local level, the health information system uses two complementary data-collection systems to identify children who have not received their vaccinations. These systems ensure appropriate supports and resources are available to support strong vaccination coverage.

RapidSMS is a data-collection program used by specialized maternal and child health community health workers, known as *Agents de Santé Maternelle*. With support from local health-center data managers, these specialized CHWs are trained to input crucial health data on mothers and children via text messages. Data managers track input errors to identify individual CHWs who might require additional training.

mUbusima is a community-level health data system that utilizes data collected through RapidSMS to generate a holistic picture of health indicator performance within each community. Health centers enter the RapidSMS data and conduct data quality checks. The complete data inform targeted supervision in low-performing areas for vaccinations. The data also allow policy-makers at the local and national levels to appropriately utilize resources to ensure that the immunization program is successful.

While top-down leadership from the national level has been instrumental in advancing Rwanda’s immunization program, accessibility of collected data at all levels facilitates local ownership of vaccination activities. The government trains district monitoring and evaluation officers in data analysis and has access to their district’s data. As a result, health districts have the ability to analyze data in a timely manner to adapt local programming, while data are concurrently fed to the national level for aggregated analysis.

At the national level, the Ministry of Health combines data sources through the country’s National Data Warehouse. This allows for rapid identifica-

tion of children who have not yet been vaccinated, and guides the implementation of required follow-up activities. These activities include increasing supervision of staff in poor-performing areas, and implementing supplemental vaccination activities. For example, in 2015, the National Data Warehouse logged just a single suspected case of measles. However, subsequent years showed a continued rise in suspected cases, surpassing a low trigger threshold that initiated a notification to the government’s National Expanded Program on Immunization. Program planners therefore implemented a catch-up vaccination campaign to preempt a potential measles outbreak.

## The government follows international best practices for cold storage, including stock of additional cooling units and generators on hand in case of failure.

By utilizing the strongest and most recent evidence to guide program planning and implementation, Rwanda's Health Management Information System (HMIS) has grown more effective. HMIS data supported the rollout of the pneumococcal conjugate vaccine when pneumonia was the leading cause of death in children under the age of five years. In addition, local data demonstrated the need for a second measles booster and rubella coverage, leading to Rwanda's implementation of the measles-rubella vaccine.

### A ROBUST AND EFFICIENT IMMUNIZATION SUPPLY CHAIN

Vaccinations are among the most cost-effective public health interventions. Unfortunately, a supply chain's failure to procure vaccines in a timely and reliable manner stifles the delivery of these life-saving interventions. Rwanda relies on a simple but robust procurement process that gets effective vaccines to where they need to be.

Rwanda's healthcare system uses a "pull" approach to predict the need for vaccines throughout the country: health centers at lower administrative levels request the number of vaccine doses they require by using paper forms. District hospitals

receive the data and electronically enter requests to the central government level. These data forecast the need for vaccine doses across the country. Once the needs are determined, UNICEF procures vaccines for Rwanda and distributes them to districts and health centers.

Rwanda benefits from a uniquely efficient procurement process for vaccines. Rather than procuring vaccines alongside other pharmaceutical and medical products, the country maintains a stand-alone supply chain for vaccines. Its vaccine-specific supply chain allows for quicker procurement and reduces the administrative burden that could exist if vaccines were grouped with all other medical goods being brought into the country.

While the government now directly funds the procurement and delivery of all non-novel vaccines, Gavi (the Global Alliance for Vaccines and Immunization) and private companies historically contributed a significant portion of funding for these vaccines. Gavi is a public-private partnership with the goal of supporting access to immunization in low- and middle-income countries. It brings together key UN agencies, private industry, and governments to improve coverage worldwide. When Gavi helps finance vaccine purchasing, it has to approve funds

and disburse them to the country's government before vaccines can be purchased and imported into the country, which can lengthen the procurement process. By contrast, Rwanda has an alternate arrangement to increase the speed and efficiency of vaccine delivery. UNICEF, which has an established relationship with Gavi in many countries, directly accepts disbursements from Gavi. UNICEF directly procures vaccines for Rwanda on behalf of the government, rather than the government acting as an intermediary for Gavi funds. This arrangement eliminates an additional step in the procurement process and helps ensure vaccines are delivered in a timely and affordable manner.

Rwanda maintains a technically strong and reliable centralized cold chain storage system for vaccines. Electronic interfaces such as Beyond Wireless allow staff to continually monitor central refrigerator temperatures remotely. The government follows international best practices for cold storage, including stock of additional cooling units and generators on hand in case of failure. However, to be effective, implementers must maintain the cold chain from its place of origin to destination, where the vaccine is given. To reduce vaccine wastage, the government also maintains a roster of cold chain technicians who can be called to the subnational health district



A highway just outside of Kigali

level to ensure cold chain continuity. To further improve the vaccine supply chain's effectiveness, Rwanda continues to improve cold chain capacity after regular independent evaluations by international organizations.

#### PURPOSEFUL CONTROL AND USE OF FUNDS

Several years after the genocide, hundreds of international nongovernmental organizations (NGOs) worked in Rwanda. A large number were providing health care, or other health-related programming. With so many organizations active in the health sector, the government was concerned that there would be redundancies among the NGOs. To address this challenge, it challenged

the NGOs starting in the late 1990s to demonstrate their impact. NGOs that could not demonstrate their impact were no longer allowed to operate in the country. NGOs that could, however, were required to agree to complete certain tasks and have their performance tracked by the government. As a result of the government's active management of NGOs in the health sector, Rwanda has largely been able to avoid the unplanned, unchecked, and unintentional patchwork of health and development NGOs that is sometimes found in other sub-Saharan African countries. Support from NGOs and international organizations (IOs) has benefited Rwanda's immunization program in many ways, including improved cold chain capacity, procurement of newly developed

vaccines, and funding for immunization programs for refugees.

The Rwandan government has mechanisms to coordinate the efforts of important development partners, which include Gavi, Partners in Health, and UNICEF. Regular coordination meetings ensure that development partners are on track to contribute to the government's goals. They also ensure that, as much as possible, services are neither financed nor delivered in "silos." The government has also leveraged disease-focused funding sources to build system-wide healthcare infrastructure. For example, the Ministry of Health used financial assistance from the Global Fund—targeted toward tuberculosis, malaria, and HIV—to improve health centers. The



improvements benefit the delivery of vaccination campaigns, and a variety of other health services. Funding is also distributed equitably among regions, according to needs-based assessments.

In addition to collaborating with NGOs and funding organizations, Rwanda's immunization program also benefits from collaboration across multiple healthcare programs. The Ministry of Health began integrating healthcare services in the early 2000s. As part of this larger trend, the ministry integrated postnatal care and vaccination schedules. For example, mothers attending regular appointments at health centers receive information about infant nutrition while their children receive their vaccines. Through integration, the Ministry of Health has increased the efficiency of healthcare service delivery.

Finally, although corruption is an issue that plagues many countries attempting to implement and sustain health interventions, Rwanda is a regional exception that has decreased measures of corruption in recent years. The World Bank's Worldwide Governance Indicators 2016 report shows that Rwanda improved in its corruption ranking from the fiftieth percentile in 2006 to the seventy-fifth percentile in 2016, suggesting improved corruption-prevention efforts. Lower levels of corruption mean that internal and external funding is more likely to be used effectively. The country's ability to consistently meet or exceed expected results after receiving funding from Gavi and other funders contributes to its continued ability to secure necessary external funding.



A motorcyclist on a street in Kigali, with a gated residence in the background

## SUMMARY

System-wide management of external funding, the government's channeling of disease-focused contributions, the integration of healthcare services, and the control of corruption are managed uniquely compared to countries in the region and those with a similar GDP per capita. These processes and indicators help to explain Rwanda's high childhood vaccination-coverage rates.

The Government of Rwanda carefully manages donor funds and the roles of NGOs to optimize the immunization program. A strong health information system means every single child can be tracked and thus receive their vaccinations. Once the monitoring system identifies children in need of vaccination, the efficient supply chain ensures that the vaccines reliably reach where they need to be.

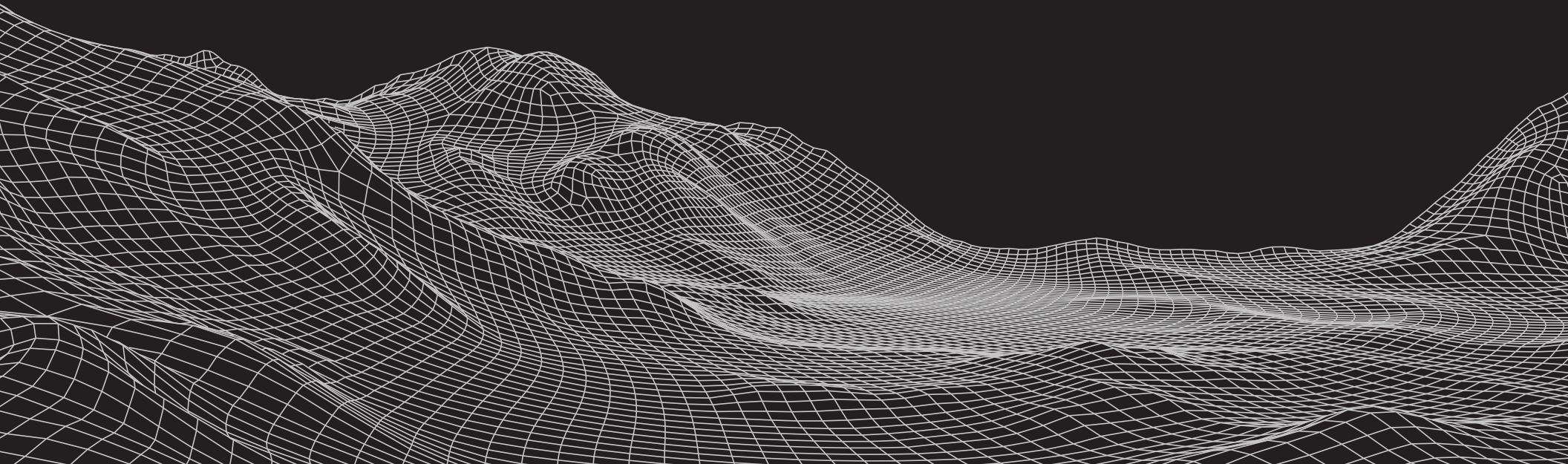


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# Lessons Learned



With its outstanding coverage rate, Rwanda's immunization program offers lessons that can potentially be transferred to similar programs elsewhere in the region and in the world. Its example challenges assumptions about the ability of low-income countries to design and successfully deliver high-quality immunization programs. High-income countries should also be reminded to avoid complacency about vaccination rates and poor-quality programs. As one of the most effective and least expensive public health interventions, effective immunization programs should be prioritized by governments around the world.



## WHAT LESSONS CAN BE LEARNED FROM RWANDA'S IMMUNIZATION PROGRAM?

### Political Will

Rwanda's success involves at its core a successful interaction of strong, centralized leadership and decentralized implementation. The health system's structure demonstrates that centralization and decentralization are not necessarily contradictory. The central government has remained committed to ensuring that service delivery reaches everyone in the population in an equitable way, including the hardest to reach. Rwanda also has a robust, binding, and incentive-driven accountability system referred to as *imihigo* contracts. This accountability system reinforces the central government's commitment to service delivery through the many levels of decentralized implementation.

### Data to Support Health Decision Making

Rwanda effectively uses data to support the implementation of its immunization program. The country's health management information system is largely electronic and collects vaccination data from the village level in real time. This supports timely analysis and action based on the data. Analysts at the district level are able to access and analyze the data, allowing for local ownership and local program planning based on the data collected. Rwanda's commitment to the use of evidence and data is also echoed at the national level. Local data on the burden of vaccine-preventable diseases has driven the introduction of several new vaccinations. Timely response to potential vaccine-preventable disease epidemics is an important component of vaccination success.

### Community Health Workers

Although CHWs are not unique to Rwanda, the CHWs there have an important role in the country's immunization program. Rwanda effectively harnesses CHWs to collect community health data and then uses these data to target supportive supervision at the national level. CHWs are integral in educating their communities about vaccinations and in following up to ensure there are no missed cases.

### CONCLUSION

Rwanda's success is not a one-dimensional story but a collection of overlapping and coherent narratives that together resulted in the country's enviable 98 percent vaccination coverage rate for children. Rwanda overcame physical and demographic challenges through a combination of a strong political will characterized by the government's dedication to equity, a decentralized implementation structure, an effective accountability mechanism, a strong sense of local ownership as shown through the work of CHWs and community-level campaigns, as well as a robust logistics system that allows for efficient supply chain management and purposeful use of funds. In this sense, the near-perfect coverage rate, while impressive in its own right, is a profound and nuanced health success story.

# RESEARCH TEAM



## DR. JOSEPH WONG

Joseph Wong is the vice provost and associate vice president, International Student Experience, at the University of Toronto. He is also the Ralph and Roz Halbert Professor of Innovation at the Munk School of Global Affairs and Public Policy and a professor of political science. He held the Canada Research Chair in Democratization, Health, and Development for two full terms, ending in 2016. Wong was the director of the Asian Institute at the Munk School from 2005 to 2014.



## DR. STANLEY ZLOTKIN

Stanley Zlotkin (CM, OOnt, MD, PhD, FRCPC) is a professor of pediatrics, public health sciences, and nutritional sciences at the University of Toronto, a senior scientist at The Hospital for Sick Children Research Institute, and a clinician/scientist in the Department of Paediatrics at SickKids. He received his MD degree from McMaster University, his fellowship training in pediatrics at McGill, and his PhD in nutritional sciences from the University of Toronto. His current research and advocacy focuses on preventing malnutrition in children. He was awarded the HJ Heinz Humanitarian Award in 2001 for his international advocacy work for children, the CIHR National Knowledge Translation Award in 2006, the Order of Canada in 2007, and the Order of Ontario in 2016 for his contributions to improving the lives of children.



## KIRSTYN KOSWIN

Kirstyn's research examines the delivery of services to marginalized populations. She is particularly interested in the delivery of services to populations affected by violent conflict. Through her role with the Reach Project, Kirstyn has led research teams in India, Jordan, Rwanda, Sri Lanka, and Tunisia. Kirstyn holds a BA (honors) from McGill University, and a master of global affairs from the Munk School of Global Affairs and Public Policy at the University of Toronto.



## ALISSA WANG

Alissa Wang is a student in the combined JD/PhD program at the University of Toronto. She studied international relations and global health in her undergraduate studies. She is currently in the first year of her PhD studies in political science with a focus on international relations and comparative politics. She was a part of the Reach Project's Rwanda team, studying the country's immunization program.



## HEATHER MCALISTER

Heather McAlister holds a master of global affairs from the Munk School of Global Affairs and Public Policy and has a bachelor's of African studies and political science. Her interest in global health has involved work with Doctors Without Borders, the World Health Organization, the Open Society Foundations, and a UNAIDS research affiliate. She is currently gaining project management experience at Health Canada.



## JAMES BAO

James Bao is a final-year medical student at the University of Toronto. Prior to medical school, he studied health systems and global health during his master's at the John's Hopkins Bloomberg School of Public Health.



## JULIA ROBSON

Julia Robson received her bachelor of science (honors) from the University of Toronto in 2018. She majored in health studies, and is particularly interested in climate change and health. Julia previously volunteered with the telemedicine and administration teams at Médecins Sans Frontières Canada. She is a student in the MD program at Queen's University.



#### **DR. FÉLIX SAYINZOGA**

Dr. Félix Sayinzoga is a maternal, child, and community health division manager at the Rwanda Biomedical Center (RBC). He is a medical doctor and received his master's in epidemiology from the School of Public Health/National University of Rwanda. Currently a PhD candidate at Radboud University/ Nijmegen-Netherlands, he has been working as a general practitioner for four years in CHUB and district hospitals, especially in maternity service. He has been part of a number of maternal, newborn, and child health promotion activities, including the elaboration of many Ministry of Health documents on maternal- and child-health-related policies, strategic plans, guidelines, and training materials.



#### **HASSAN SIBOMANA**

Hassan Sibomana has been the director of the vaccination programs unit in the maternal, child, and community health division at the Rwanda Biomedical Center since 2015. From 2012 to 2015, he was the immunization epidemiologist senior officer there in the Vaccine-Preventable Diseases Program where he worked in vaccination program planning, new vaccines introduction, data analysis, sustainability of the vaccination program, and training healthcare providers in the vaccination domain. Prior to this, he was the monitoring and evaluation officer in Nemba District Hospital where he oversaw all activities related to supervision, planning, monitoring, and evaluation of infectious diseases within the catchment area. Hassan holds a master of science in epidemiology from University of Rwanda.



#### **JEAN DE DIEU HAKIZIMANA**

Jean de Dieu Hakizimana holds a master of public health degree from University of Rwanda/College of Medicine and Health Sciences. Since July 2014, he has worked as an AEFIs surveillance and monitoring officer (MCCH Division–RBC) where he participated in developing the national AEFIs guideline; documenting the quality of Phase I Wild Poliovirus Laboratory Containment Activities: Laboratory Survey and Inventory in Rwanda; and developing the National Polio Outbreak Preparedness and Response Plan. He also participated in the EPI Review and Data Quality Audit in Health Facilities in Rwanda; the production of the *Rwanda Immunization Success Story* documentary, and the development of vaccine management SOPs. Before joining the EPI Rwanda, he worked as a professional in charge of health and community development in the Ministry of East African Community.

#### **DR. JOSE NYAMUSORE**

Dr. Jose Nyamusore works at the Rwanda Biomedical Center. He holds an MD and a master of public health.



#### **ADELINE KABEJA**

Adeline Kabeja is the director of the diseases surveillance unit, epidemic surveillance, and response division in the Institute of HIV/AIDS Disease Prevention and Control at the Rwanda Biomedical Center. She is a public health professional with a master's degree in public health from the School of Public Health, Faculty of Community and Health Sciences of the University of Western Cape in South Africa. She has more than fifteen years' experience working with national public health institutions and collaborating in research with national and international institutions. She played a significant role in establishing the HIV surveillance system in Rwanda (sentinel surveillance and behaviors surveillance) from 2002 to 2005 when the epidemiological situation of HIV in Rwanda was unknown. She is among the key people who improved the national epidemic diseases surveillance-and-response system by designing and grafting into the District Management Health System (DHS-2) the electronic epidemic surveillance system commonly called eIDSR.



#### **DR. JEAN PAUL UWIZIHIWE**

Dr. Jean Paul Uwizihwe was trained as medical doctor with a master of science in vaccinology and pharmaceutical clinical development. He is currently working as a senior research advisor (seconded staff) at the Institute of HIV/AIDS Disease Prevention and Control at the Rwanda Biomedical Center. His research interests focus on the use of digital health technology in primary health care in low-resource settings.

# REACH PROJECT



Development is about delivery—the will and ability to deliver interventions to very poor and vulnerable people to help improve their lives. The development “space” is filled with great ideas and innovative solutions, from technological interventions to new policy initiatives. But the effects of these potentially game-changing ideas are severely mitigated if they do not actually get to the people they are intended to benefit. We think of this challenge in terms of “reach.” Solutions can solve problems only if they reach those who need them most.

The Reach Project focuses on the delivery of services and interventions to those who are hardest to reach. We are a research initiative supported by a partnership between the Munk School of Global Affairs and Public Policy at the University of Toronto and the Mastercard Center for Inclusive Growth. The Reach Project is led by Professor Joseph Wong. The commitment of student researchers and faculty mentors from across the University of Toronto drives our work. Together, we examine the delivery of services and interventions to those who are hardest to reach in countries around the world.