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STRENGTHENING HEALTH SECURITY:

Leveraging Disease-Specific Programs for Broader Impact

>> INTRODUCTION

Health security threats are no longer episodic disruptions – they are persistent features of the modern global landscape. From emerging zoonoses and resurgent vaccine-preventable diseases to antimicrobial resistance (AMR) and environmental health risks, today's challenges are increasingly complex, transboundary, and disruptive to health systems and economies. At the same time, countries are facing increasing financial pressures with less external support, making it more important to find ways to achieve greater impact with current resources. As countries strive to build more resilient and responsive public health systems, a critical, and often underrecognized, opportunity lies in harnessing the infrastructure of disease-specific programs with proven value.

Over the past several decades, investments in polio, measles, and malaria programs have yielded benefits beyond their original disease-specific mandates. These efforts have also created robust, cross-functional infrastructure: trusted community interfaces, trained health personnel, laboratory and surveillance networks, and delivery systems capable of reaching people in vulnerable situations. Despite not being designed for this purpose, these platforms collectively provide essential components of pandemic prevention, preparedness, and response (PPR) capacities.

This paper aims to synthesize recent examples and emerging evidence of the potential for established infectious disease programs to actively contribute to broader global health security goals. It posits that integrating and optimizing these assets is not only feasible but cost-effective and timely. Leveraging proven successes strengthens the case for renewed political and financial commitment from international donors, health ministries, and global health institutions.

>> PREVENTION

Sustaining Immunization and Community Engagement Platforms

Preventing infectious disease outbreaks remains the most effective means of protecting the global economy and reducing morbidity, mortality, and strain on health systems. Programs focused on immunization and behavior change communication – particularly those targeting polio, measles, and malaria – offer scalable, trusted entry points for other preventive strategies.

India's COVID-19 vaccination campaign drew heavily on infrastructure originally developed for polio eradication, including cold chain systems, trained personnel, and community mobilization networks. This existing foundation enabled rapid scale-up in response to an emergent threat: between January and March 2023, India administered over 2.2 billion COVID-19 vaccine doses.[1] Approximately 1.03 billion individuals aged 12 and above received at least one dose, and about 952 million were fully vaccinated, representing around 95% and 88% of the eligible population, respectively. These efforts, built from polio infrastructure, were also integrated into the Universal Immunization Program, contributing to broader gains in routine immunization.

In Kenya, health worker Jeniffer Achieng prepares a dose of malaria vaccine to be administered during a vaccination campaign at Kisumu County Referral Hospital. Malaria vaccine pilot programme in Kenya. © UNICEF/Washington Sigu

Between 2021 and 2022, national immunization coverage increased by over 1.6 million children, and the number of zero-dose children declined from 2.7 million to 1.1 million[2], demonstrating how disease specific investments can strengthen routine delivery platforms over time by increasing points of contact with target communities and promoting trust.

Kenya has leveraged measles vaccination efforts to deliver other preventative health services to nearly 5 million children, including polio vaccines, vitamin A supplements, and long-lasting insecticide treated nets (LLINs). Together, these interventions helped prevent the escalation of a measles outbreak in the country, the further spread of a polio outbreak from neighboring Somalia, and the threat of increased malaria cases in high-risk areas.[3]

These examples demonstrate that programs originally designed to tackle single diseases can be effectively leveraged to prevent a wide range of health threats.

>> DETECTION

Leveraging Surveillance Systems for Broader Preparedness

Early detection remains the cornerstone of outbreak containment. Infectious disease programs have long supported surveillance infrastructure that now underpins multi-pathogen preparedness.

As of 2024, the Global Measles and Rubella Laboratory Network (GMRLN) includes 762 laboratories, the largest laboratory network coordinated by the World Health Organization (WHO). The network delivers highly sensitive surveillance for measles and rubella through standardized case definitions, laboratory protocols, and quality assurance systems, combined with sustained capacity-building efforts. These standardized elements not only enable accurate case classification and timely detection but also facilitate consistent data aggregation across countries.[4] These systems have been adapted to monitor Ebola, Zika, SARS-CoV-2, and other threats. For example, during the COVID-19 pandemic, several countries in the WHO South-East Asia and African regions used measles and rubella laboratory infrastructure to test SARS-CoV-2 samples when COVID-19-specific lab capacity was limited – helping to accelerate national testing scale-up during the early phase of the pandemic.[5]

The Global Polio Laboratory Network (GPLN) comprises 146 WHO-accredited laboratories across 92 countries. These laboratories process over 220,000 stool samples from acute flaccid paralysis cases and more than 8,000 sewage samples annually, following standardized

A technician examines blood samples in a malaria laboratory in Belize. © Estefania Bravo/UN Foundation

protocols for poliovirus detection, including isolation, identification, and genomic sequencing. The GPLN has also helped build country capacity and optimized costs to prevent, detect, and respond to infectious disease threats.[6]

In addition to laboratory-based surveillance, trusted community health networks have played a key role in early detection. In many malaria-endemic settings, trained community health workers are equipped to identify and test individuals with fever using rapid diagnostic tests. This helps distinguish malaria from other febrile illnesses and allows for early treatment and reporting.[7] In Thailand, for example, malaria surveillance has been successfully integrated into routine primary care services, offering a model for decentralized detection systems that support broader disease surveillance goals in line with the International Health Regulations.[8]

Vietnam's integrated approach to malaria control has not only significantly reduced malaria cases and deaths but has also enhanced the country's ability to detect and manage other febrile illnesses through syndromic surveillance. By combining early diagnosis and treatment of malaria with the distribution of LLINs, Vietnam achieved a 77% decrease in malaria cases and a 97% reduction in malaria-related deaths between 2012 and 2022.[9] This comprehensive strategy strengthened the national health infrastructure, enabling more effective surveillance and response to other diseases presenting with fever, such as dengue and typhoid fever.

Wastewater surveillance, including the use of infrastructure developed through polio programs, has proven effective in tracking poliovirus, SARS-CoV-2, and AMR trends. Countries such as Brazil, Niger, South Africa, Thailand, and the United States have adopted these methods for routine and sentinel surveillance.

In South Africa, expanded wastewater surveillance in high-risk areas enabled early detection of poliovirus while enhancing surveillance of measles, rubella, and enteric pathogens. Utilizing digital Polymerase Chain Reaction (PCR) assays, researchers detected measles in wastewater samples collected from treatment facilities across nine provinces, demonstrating the value of wastewater surveillance in capturing silent virus circulation not reflected in conventional clinical reporting mechanisms.[10]

Similarly, Brazil leveraged polio wastewater surveillance infrastructure to enhance AMR detection. A study in São Paulo identified 26 antimicrobial resistance genes in wastewater from various sources – including sewage systems, veterinary hospitals and a pig farm – demonstrating early potential to integrate AMR detection efforts into existing environmental surveillance systems.[11]

These cases illustrate how infrastructure developed for vertical disease programs can be sustained and adapted to provide critical early warning data for a range of emerging health threats.

RESPONSE

Rapid Mobilization of Systems and Human Resources

Outbreak response requires the capacity to rapidly deploy personnel, resources, and information, particularly in areas of insecurity or with fragile infrastructure. Several infectious disease programs have developed assets that are both immediately deployable and scalable.

In Nigeria, Emergency Operations Centers (EOCs) originally established through polio programming have enabled the country's response to outbreaks and health emergencies.[12] From 2014 to 2019, the polio EOC structure and staff expertise were used to investigate and respond to Ebola, measles, yellow fever, and meningitis outbreaks. During the same time period, Nigeria's EOC also oversaw maternal and neonatal tetanus elimination campaigns. Staff have also conducted community mobilization and supported data management and analysis efforts for a range of health issues. The operational structure and staffing model developed through polio EOCs informed the development of broader Public Health Emergency Operations Centers that have helped reduce the average time between detection of an outbreak and response from 10 days to 3 days.[13]

Similar patterns emerge across other disease programs. In Malawi, investments made in malaria programs helped build a salaried community health workforce that now serves as a critical frontline response mechanism. Approximately half of the country's 10,000 health surveillance assistants were trained through grants from the Global Fund to Fight AIDS, Tuberculosis and Malaria, and now support services ranging from immunization to disease surveillance and maternal-child health. The presence of these health workers and their trusted role in communities has enabled Malawi to address broader health crises by providing surge capacity for outbreak response and sustaining essential health services in remote areas.[14] [15]

These examples underscore the potential of existing systems to deliver high-impact, rapid response functions during public health emergencies.

A 3-year-old boy receives a polio vaccine from a community health worker in Kalunga, Democratic Republic of Congo, as part of a polio vaccination campaign in Tanganyika province.

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CONCLUSION

With funding for vertical health programs plateauing or even declining, countries are increasingly challenged to sustain critical public health functions while preparing for emerging threats.

As the global community reflects on lessons from the COVID-19 pandemic and anticipates future challenges, one message stands out: health security requires long-term, systems-based investments, not episodic responses. Public health functions delivered through specific infectious disease programs offer a pragmatic starting point. By investing in integrating and optimizing established platforms for polio, measles, and malaria, the global health community can advance preparedness goals while protecting disease-specific gains. These platforms already serve as practical vehicles for prevention, surveillance, and rapid response, especially in underserved and high-risk contexts. Failure to sustain these systems – particularly amid the drawdown of legacy programs – risks eroding core capacities just as threats are accelerating. Conversely, strategic reinvestment to

develop robust multi-use platforms offers an efficient, high-yield approach to closing the preparedness gap.

For policymakers, donors, and health leaders, the current imperative is not to build anew, but to build smart – on foundations that are already delivering impact across a spectrum of health priorities. The examples presented in this paper represent just a fraction of how vertical programs have already been leveraged in practice, but they also hint at a broader potential. As health threats evolve and programmatic infrastructure matures, the repurposing of disease-specific systems will not only persist but also diversify in ways we may not yet fully anticipate – such as expanded surveillance, forecasting of zoonotic spillover, and developing innovative care delivery models for fragile contexts and displaced populations.

In an increasingly resource-constrained environment, where countries may face fiscal tightening and reduced external support, future-proofing global health security systems will require a strategic focus on doing more with less. Rather than developing entirely new platforms, health systems must think creatively about how to expand the utility of existing ones. Countries that have already begun integrating these platforms offer valuable models for others. To accelerate this shift, there is a collective need to document, share, and apply best practices across contexts. Supporting countries in navigating transitions and unlocking multiple benefits across programs should be a core priority for the global health community.

>> ENDNOTES

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