

AFRICAN NATIONAL PUBLIC HEALTH INSTITUTES RESPONSES TO COVID-19: INNOVATIONS, SYSTEMS CHANGES, AND CHALLENGES

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National public health institutes (NPHIs)—science-based governmental agencies typically part of, or closely aligned with, ministries of health—have played a critical part in many countries’ responses to the COVID-19 pandemic. Through listening sessions with NPHI leadership, we captured the experiences of NPHIs in Africa. Our research was further supplemented by a review of the literature. To address issues related to COVID-19, NPHIs in Africa developed a variety of innovative approaches, such as working with the private sector to procure and manage vital supplies and address key information needs. Creative uses of technology, including virtual training and messaging from drones, contributed to sharing information and battling misinformation. Positive impacts of the pandemic response include increased laboratory capacity in many countries, modernized surveillance systems, and strengthened public–private partnerships; much of this enhanced capacity is expected to persist beyond the pandemic. However, several challenges remain, including the lack of staff trained in areas like bioinformatics (essential for genomic analysis) and the need for sustained relationships and data sharing between NPHIs and agencies not traditionally considered public health (eg, those related to border crossings), as well as the impact of the pandemic on prevention and control of non-COVID-19 conditions—both infectious and

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noncommunicable. Participants in the listening sessions also highlighted concerns about inequities in access to, and quality of, the public health services and clinical care with resultant disproportionate impact of the pandemic on certain populations. COVID-19 responses and challenges highlight the need for continued investment to strengthen NPHIs and public health infrastructure to address longstanding deficiencies and ensure preparedness for the next public health crisis.

Keywords: COVID-19, National public health institutes, Global Health Security Agenda, Field epidemiology training, International Health Regulations, Epidemic management/control

INTRODUCTION

CONCERNS ABOUT INTERNATIONAL public health threats have led to several global efforts to enhance preparedness and response. The International Health Regulations (2005), adopted by the World Health Assembly and last updated in 2014,¹ provide an overarching legal framework for handling public health events and emergencies.² The Global Health Security Agenda is a worldwide effort to strengthen countries' capacity to prevent, detect, and respond to major public health threats^{3,4} and meet the requirements of the International Health Regulations.

For many years, and increasingly since the 2014-2016 West African Ebola outbreak, countries in Africa have worked to enhance preparedness for public health threats, including investing in laboratory capacity and training public health professionals.⁵ In 2016, the African Union established the Africa Centres for Disease Control and Prevention (Africa CDC) to support public health initiatives in member states.⁶

As public health systems throughout the world have mobilized to respond to the COVID-19 pandemic, national public health institutes (NPHIs) have been critical to those efforts.⁷ NPHIs are science-based organizations that work for the public's health and usually sit within ministries of health or are closely aligned with them. NPHIs are typically responsible for such core functions as disease surveillance, outbreak and emergency response, health communication and health promotion, and using evidence to provide guidance for policies and programs.⁸⁻¹² Examples of well-known NPHIs include the US CDC, Germany's Robert Koch Institute, and the China CDC.

In recent years, an increasing emphasis has been placed on NPHI development in Africa to meet existing and emerging threats. For example, new NPHIs have been created (eg, in Liberia) and existing NPHIs strengthened by adding functions and providing legal frameworks (eg, in Mozambique and Nigeria).¹³ The joint external evaluation¹⁴ is a voluntary process that enables countries to assess their capacities to meet Global Health Security Agenda and International Health Regulations (2005) goals. A review of the joint external evaluation results from 11 countries in the World Health Organization (WHO) Africa Region identified strengthening NPHIs as a key component to addressing

critical health security gaps.¹⁵ The Africa CDC has prioritized development of NPHIs in all countries in the continent as essential to strong national public health systems.^{6,13,16}

The International Association of National Public Health Institutes (IANPHI) is a membership organization for NPHIs, which includes 110 members from 95 countries. In November 2020, IANPHI conducted a series of listening sessions with members of the IANPHI Africa Regional Network to capture their experiences in responding to the COVID-19 pandemic. Input from these listening sessions was supplemented by a literature review of news reports and publications in scientific journals.

In this article, we describe COVID-19 response innovations, pandemic responses that are leading to lasting public health system changes, and challenges and opportunities that endure. Our aim is to provide ideas to help NPHIs as they continue to address the COVID-19 pandemic and prepare to respond to future public health emergencies.

METHODS

Listening Sessions

In 2020, IANPHI developed plans to document how NPHIs were responding to the COVID-19 pandemic and to capture lessons learned. With input from the IANPHI Executive Board, a review of information from WHO and the European CDC, and a series of bilateral discussions, a list of questions and potential probes encompassing 5 broad areas was developed. Questions covered issues such as NPHI roles and responsibilities, best practices, and independence and transparency of scientific advice.

IANPHI worked with the leaders of the IANPHI Africa Regional Network to identify a subset of questions to be discussed in "listening sessions" with African NPHI leaders. Because of time limitations, we chose to limit the number of questions to allow for more in-depth discussions, rather than cover a greater number questions superficially. We also decided that we would be flexible, deviating from the preselected structured interview questions and probes should participating leaders have particular topics they felt were important to discuss.

Directors of all IANPHI Africa Regional Network members were invited to participate in semistructured

listening sessions held November 6 through 18, 2020. Sessions lasted 90 minutes and were offered at 6 different times. To maximize participation and foster discussion, sessions were held separately in French and English and were facilitated by native speakers. Participants included leaders or their designees from Burkina Faso, Côte d'Ivoire, Ethiopia, Mozambique, Nigeria, Rwanda, South Africa, Togo, Uganda, and Zimbabwe. The number of NPHI leaders per session ranged from 1 to 3, with some individuals participating in more than 1 session. Sessions were also attended by several IANPHI staff. Some directors provided updated information and references during the process of reviewing this manuscript.

Literature Search

To complement the information shared in the listening sessions, we searched PubMed, Google Scholar, and Google for relevant English-language articles published between December 1, 2019, and March 14, 2021, for articles mentioning African NPHI responses to the COVID-19 pandemic. Search terms included “COVID-19” plus names of the NPHIs, and “COVID-19” plus names of the NPHI directors from countries highlighted in this article. Articles were reviewed for information related to the themes and topics covered in the listening sessions and highlighted by the NPHI directors.

RESULTS

All NPHI participants reported that their public health systems have been overwhelmed by the COVID-19 pandemic. Several reported having well-developed emergency response capacity—enough to address simultaneous outbreaks in a limited number of areas. However, none felt adequately prepared to manage the spread of COVID-19 over their entire country or to mount a response to a pandemic with no apparent end in sight. All participants reported that responding to COVID-19 has required enhancing existing systems, for example, strengthening the capacity of their NPHIs for laboratory testing and expanding their laboratory networks, surveillance, emergency operations centers, and communications. Selected innovations, long-term changes to public health systems, and remaining challenges and opportunities are summarized in the following sections.

Innovations

During the listening sessions and follow-up discussions, NPHIs described a number of small- and large-scale innovative approaches. The innovations highlighted in the following sections may provide ideas for other countries.

Supplies and Supply Chains

Representatives of several countries involved in our sessions described difficulties accessing reagents, personal protective equipment, and other supplies, with NPHIs and other

organizations competing to purchase from the same suppliers. Many addressed this issue by working with the private sector to develop in-country capacity to manufacture needed supplies.¹⁷ For example, the Ethiopian Public Health Institute worked with a company from China to produce diagnostic kits in Addis Ababa¹⁸ and repurposed most of the textile industry to produce masks and other types of protective garments. In Uganda, several local companies responded to the call by the National Institute of Public Health/Ministry of Health to provide personal protective equipment.¹⁹

Many African countries include remote areas and areas in conflict, making delivery of supplies difficult. Nigeria's NPHI, the Nigeria CDC, instituted a hub-and-spoke approach to the supply chain. The Nigeria CDC established a centralized warehouse in Abuja, Nigeria's capital city, from which it distributed supplies to laboratories, treatment centers, and health ministries in the 36 states and Federal Capital Territory. This approach enabled the Nigeria CDC to coordinate an efficient system that ensured flexible supply flow and rapid distribution, and also enabled tracking of supply quantity. They attempted to automate tracking using a system developed rapidly in collaboration with a partner organization that had developed software for tracking HIV-related needs and supplies. Using this software, tracking for COVID-19-related supplies improved but still remained a challenge, as HIV needs tend to be stable in a given area and forecasting is relatively straightforward, whereas with COVID-19, areas of greatest need and demand can shift rapidly.

Private-sector organizations supported NPHI responses by donating goods and opening facilities. For example, in Uganda, contributions included money, vehicles, food, and other supplies. Private-sector healthcare organizations were crucial to the response, not only for testing and treatment, but also for providing data and helping with communications.

In Nigeria, the government opened additional warehouse capacity to manage the distribution of the donations received. Corporate interest in assisting was so great that private organizations formed a coalition, the Coalition Against COVID-19 (CACOVID), to pool private-sector resources, build on individual strengths, and provide strategic and focused support to the government response. The CACOVID private-sector task force works in partnership with the Nigerian federal government, Nigeria CDC, and WHO, with the sole aim of stopping the spread of COVID-19 in Nigeria. The primary mode of collaboration is for the government to identify big-ticket items that are needed and CACOVID organizes to supply them.

Communications and Use of Mobile Technologies

Most governments quickly established call centers, which were initially overwhelmed. For example, the call center of South Africa's NPHI, the National Institute for Communicable Diseases, received 146,000 calls in 1 day.

Telecommunications companies in some countries supported the response. For example, the call center at the Nigeria CDC began using a shortened, 4-digit number. Many telecommunications companies incorporated public health messages into their routine services. In Uganda, MTN and Airtel disseminated messages about how to keep safe from COVID-19. In the first 100 days of Nigeria's response, over 100 million text messages were sent to Nigerians about ways to protect against COVID-19.²⁰ In Ethiopia, ring tones pass on messages about COVID-19, reaching over 50 million users. In Mozambique, a WhatsApp account enabled individuals to send a message saying *Ola* ("hello" in Portuguese) to a particular number and get updated information about local COVID-19 case rates.²¹

Many countries, including Ethiopia, Mozambique, and South Africa, used SMS messaging to rapidly send COVID-19 test results to individuals who had been tested.²² South Africa's National Institute for Communicable Diseases worked with the National Department of Health to develop COVIDConnect and the COVID Alert South Africa app notification systems to provide results and notify people if they were in close contact with a patient diagnosed as positive.²³ In Rwanda and Uganda, people with COVID-19 and contacts in home isolation received text message check-ins via SMS for 2 weeks, enabling self-reporting of new symptoms or issues.²⁴

The COVID-19 infodemic—misinformation and disinformation that often spreads faster than the virus—has also been a challenge worldwide.^{25,26} While disseminating and increasing access to correct information is one approach to countering disinformation, NPHIs found that this was not sufficient. Several countries built on experience addressing disinformation during previous public health problems, including Ebola and, in Nigeria, with polio vaccination. Examples of additional approaches included enlisting religious and other community leaders, engagement of youth groups, and close monitoring of social media to assess messaging priorities. With support from the United Nations Children's Fund (UNICEF) and other partners, Nigeria's CDC integrated an interactive chatbot into existing technology being used for communication.²⁷ In South Africa, the National Institute for Communicable Diseases worked with the National Department of Health to display red labels stating "FAKE NEWS" or "FAKE" on material that was blatantly untrue.²⁸ Mozambique and other countries provided training for journalists and others critical for communications to ensure they could correctly and critically interpret data and study results.²⁹

Creative Uses of Technology

Some countries adopted new technologies to address difficult issues. For example, in Rwanda, drones were flown above houses in Kigali and remote areas to increase awareness of the COVID-19 pandemic and communicate prevention messages.³⁰ Rwanda's NPHI, the Rwanda Biomedical Centre, used high-tech robots in COVID-19

treatment centers to perform tasks such as checking vital signs and distributing meals, substantially reducing healthcare workers' exposure to COVID-19.³¹

As has been common throughout the world during the pandemic, meetings and trainings have been held using online conferencing platforms. This has reduced the threshold for attending and the logistical complexity of holding trainings; as a result, more trainings have been conducted and new audiences are being targeted. For example, Mozambique's Instituto Nacional de Saúde (INS) provided remote training to over 200 journalists about COVID-19 and the INS response. INS believes this led to substantial improvements in the quality of reporting and a decrease in misinformation. The Nigeria CDC conducted communications trainings for 526 subnational risk communication officers, security personnel, traditional and religious leaders, and other key personnel to increase the workforce at state and local levels to address communications issues. The Echo platform was used by Côte d'Ivoire's Institut National de Santé Publique to train over 10,000 providers across all districts and in South Africa for both private- and public-sector training.³²

Long-Term Changes to NPHIs and Public Health Capacity

Many of the changes to NPHIs and the public health infrastructure as a result of the COVID-19 response are crucial not only for the response but also for ensuring long-term improvements in public health in Africa. Examples of enhancements likely to persist once the pandemic is over are described in the following section and in Table 1.

Laboratory Capacity Enhancement

All NPHI leaders participating in our listening sessions reported that the COVID-19 pandemic has brought a massive expansion of laboratory testing, through the establishment of new public health laboratories and linkages with private (including research) laboratories. In South Africa, as in other countries, existing infrastructure for HIV and tuberculosis testing was able to quickly adapt to and mobilize for COVID-19 testing. This was followed by additional mobile laboratory capacity, developed within 6 weeks, which was deployed to various parts of the country. When Nigeria reported its first COVID-19 case in February 2020, only 4 laboratories in the country could test for COVID-19. Today, every state in Nigeria has a public health laboratory that can diagnose COVID-19.³³ Initially, Ethiopia had only 1 federal-level laboratory in its NPHI to conduct COVID-19 testing. As of April 2021, 75 national, regional, hospital, and private laboratories were testing for COVID-19, with validation provided by the NPHI.³⁴ Mozambique's INS had worked for years to find funding for public health laboratories in certain provincial capitals. COVID-19 illuminated the need for laboratory capacity, which has since been developed and ideally will remain

Table 1. Long-Term NPHI Changes, Challenges, and Opportunities Resulting From the COVID-19 Pandemic

| <i>Category</i> | <i>Examples</i> |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Long-Term Changes</i> | |
| Laboratory capacity enhancement | <ul style="list-style-type: none"> • Existing laboratories expanded and new ones created • Additional staff trained • New capacities in existing laboratories (eg, for molecular biology) • New and strengthened public–private partnerships |
| Use of virtual platforms | <ul style="list-style-type: none"> • Increased communication (eg, between national and subnational levels) • Increased training capacity • Use of webinars to share information • Rapid deployment of new approaches and technologies |
| Surveillance modernization | <ul style="list-style-type: none"> • More efficient surveillance systems (eg, using electronic data capture and transmission) |
| Strengthening of public health at subnational levels | <ul style="list-style-type: none"> • Improved data collection and transmission systems • Expanded decentralized laboratory capacity • Engagement of communities in communications campaigns |
| <i>Challenges and Opportunities</i> | |
| Increased NPHI visibility | <ul style="list-style-type: none"> • Centrality of NPHI data • Opportunities for new partnerships • Directors seen as heroes or enemies |
| Communications challenges | <ul style="list-style-type: none"> • The infodemic and rapid spread of disinformation • Need for constant updating of messaging and approaches • Tensions from attempts to balance dissemination of public health data with other concerns |
| Expansion of partnerships | <ul style="list-style-type: none"> • Need for greater linkages with organizations typically not considered to be public health |
| Workforce development | <ul style="list-style-type: none"> • Need more people trained in epidemiology, surveillance, and public health practice • Need disciplines such as economic analysis and analysis of big data • Need to develop “soft skills” in leaders and staff |
| Genomics capacity gaps | <ul style="list-style-type: none"> • Gaps in laboratory capacity and bioinformatics skills |
| Commodities issues | <ul style="list-style-type: none"> • Global competition for limited supplies • Need for pipeline and access to critical commodities • Need for quality control |
| Addressing non-COVID-19 priorities | <ul style="list-style-type: none"> • Reduction in non-COVID-19 prevention and treatment services |
| Addressing inequities | <ul style="list-style-type: none"> • Inequities in access to care and quality of care |

Abbreviations: NPHI, national public health institute.

after the pandemic and continue to grow. Similarly, in Mozambique, the INS partnered with private-sector organizations to establish public health laboratories and/or purchase molecular biology equipment in several provinces. As a result, testing with molecular methods is now available in many cities that did not previously have it, increasing access to tests and reducing turnaround time.

Use of Virtual Platforms

Similarly, use of virtual platforms for meetings and training is likely to continue. NPHIs have become more technologically capable, comfortable, and adept at using virtual platforms, and audiences have become more receptive to remote interactions. Examples of benefits include increased interactions between national and subnational levels and the ability

to rapidly train large numbers of people (eg, to use new communications approaches and new technologies). Webinars will continue to be an important approach to sharing information, both within countries and internationally.

Surveillance Modernization

Although surveillance system modernization had long been a priority, with COVID-19 the need for national governments to access accurate testing numbers and case counts became critical. Therefore, systems for collecting and managing data were rapidly improved in many countries. For example, Ethiopia was using Microsoft Excel to collect facility-based surveillance data when the pandemic started; they now use District Health Information Software 2, which is a sophisticated, open-source, and customizable

software platform that supports data collection, analysis, and visualization.³⁵ Uganda has shifted to the use of Go.Data tool, which is managed by the WHO Global Outbreak and Response Network and includes secure data exchange and functionality for case investigation, contact follow-up, and visualization of chains of transmission.³⁶ The Nigeria CDC deployed the Surveillance Outbreak Response Management and Analysis System, which supports case-based digital surveillance from health facilities. At the beginning of 2020, only 17 states had begun to use the system; by November 2020, at least some facilities in all states were using it.³³ In Nigeria, in addition to disseminating health messages as previously described, the telecommunications companies and the government also negotiated favorable long-term voice and data packages, which was critical to meet the need for rapid and voluminous data transmission from 774 local governments.

Strengthening Subnational Public Health Capacity

Responding to COVID-19 has required strengthening subnational capacity and enhancing linkages between national and subnational levels. Positive impacts of the response include decentralized and expanded laboratory capacity, engagement of community leaders in communications efforts, and support for data collection at dispersed facilities. Ethiopia's Public Health Institute Community-Based Action and Testing campaign is an example of an extensive time-limited effort that continues to have lasting impact.³⁷ This 1-month testing and community engagement effort conducted over 25,000 tests a day in woredas (equivalent to a district) and kebeles (subdivisions of woredas, which comprise the smallest unit of local government) throughout the country and was used to assess case detection rates and identify community fatigue and complacency related to prevention strategies. This information helped guide further community engagement efforts.

Challenges and Opportunities

As demonstrated in the previous examples, NPHIs have used a variety of approaches to support their countries' pandemic responses—approaches that will be the foundation for addressing ongoing challenges. Some of the continuing challenges and opportunities for NPHIs are described in the sections that follow and summarized in Table 1.

Increased Visibility for NPHIs

A core role of NPHIs in most countries is provision of public health data that can be used to understand public health problems, inform the public, and provide a basis for governmental decisionmaking. The COVID-19 pandemic has brought increased visibility to NPHIs both within government and to the broader population.

For many countries, NPHIs are the lead agencies providing COVID-19 data, such as numbers of cases and hospitalizations. In South Africa, the National Institute for Communicable Diseases had included respiratory diseases

caused by novel respiratory pathogens, including those caused by coronaviruses, as a notifiable medical condition since 2017; reporting within 24 hours was already required.³⁸ This paved the way for immediate reporting of COVID-19. Other countries struggled to obtain the needed numbers, especially early in the pandemic.

Increased public visibility for NPHIs has been both an opportunity and a challenge. Ilesh Jani, director of the Mozambique INS, said, "Each crisis is an opportunity for the NPHI to become stronger, and more doors open." Visibility during the pandemic has resulted in more private-sector interest in supporting NPHIs and new partnerships, as described earlier.

Several NPHI directors reported that their NPHIs have become household names. In some cases, even the directors' names have become widely known. One NPHI director said that being visible had both good and bad aspects; NPHI directors are perceived by some groups as shining stars but by others as enemies (eg, for restricting the size of gatherings). For this director, being the public face of the response brought threats and the need for enhanced personal security.

Communications Challenges

For many NPHIs in Africa and other parts of the world, gaining trust and countering rumors and falsehoods has been a major challenge. Because information about the pandemic has evolved so quickly, public health messaging has had to change rapidly, which sometimes resulted in the perception that leaders lack credibility. Many countries in Africa are extremely diverse, are greatly divided by language and culture, and have areas in deep conflict. As was true during the Ebola outbreaks, proactive approaches, including engaging local leaders and the innovations previously described, have been helpful in countering misinformation. Given the constantly changing nature of the epidemic, the introduction of new tools such as vaccines, and the continued creativity and success of those spreading rumors and misinformation, NPHIs will need to continuously update their messaging and strategies and to learn from each other about successful approaches.

Hesitancy by ministry or other high-level officials to rapidly share data with the public sometimes conflicts with NPHI's sense of urgency in making data public. Reasons for hesitancy include the desire to ensure that data are as accurate as possible (balancing the good with the almost-perfect) and the desire to develop detailed government response plans before data are released. In many countries there is also a perception of conflict between taking public health measures and maintaining a strong economy.

Expansion of Partnerships

During our listening sessions, participants highlighted the development of many new partnerships and identified the need for additional partnerships. For example, participants suggested that NPHIs and ministries establish relationships and agreements with a multitude of governmental and

nongovernmental organizations in “peacetime”—well before emergencies occur. A recent assessment led by the Chatham House highlighted the need for systems to be in place for NPHIs to access information from and share information with government and private-sector organizations such as private healthcare facilities, ports of entry, and academic and nongovernmental organizations.⁷ A specific unfortunate example discussed during our sessions was the situation that arose at the Kenya–Uganda border when Uganda imposed compulsory COVID-19 testing without adequate testing or administrative capacity at the border.³⁹

Workforce Development

Shortages of trained workers impacted responses in all countries. Participants noted that individuals who had been trained or were currently participating in field epidemiology and laboratory training programs (FELTPs) have been essential both in addressing needs at headquarters and in supporting work in more remote areas.^{40,41} FELTP and related programs train public health professionals in country in applied epidemiology, surveillance, and public health practice. In Nigeria and South Africa, FELTP staff and trainees were deployed at headquarters and throughout the country to support outbreak response, surveillance, and other critical functions. FELTP residents and graduates were also deployed to support the public health national and regional emergency operations centers in Ethiopia and at the Africa CDC. Nevertheless, the need for individuals with skills in areas covered in FELTP training exceeds the number available.

In addition to clinical and public health workers, participants noted a lack of individuals trained in several disciplines that are increasingly used for forecasting and decisionmaking. These include economic analysis, mathematical modeling, and analysis of big data.⁴²

Some NPHI directors also mentioned the need for development of better “soft skills” in public health leaders and staff. Interpersonal relationship skills, investment in relationships, skills in negotiation, and effectiveness with the media were critical to many aspects of the response. Specific examples included being able to defend positions that might not be perceived as politically favorable to high-level leadership and other stakeholders and being able to negotiate with companies, for example, to ensure worker safety.

The African continent has been recognized as an incubator for new technologies or modifications of existing technologies, with the pandemic providing strong impetus for investment in innovation.⁴³ Widespread use of digital tools may be helpful in reducing the impact of worker shortages in sub-Saharan Africa, but ideally these would be implemented before a pandemic and not in the midst of a response. Even where use of technology has been optimized, workforce capacity needs will remain and continue to grow.⁴⁴

Genomic Capacity Gaps

WHO has long recommended genomics capacity for surveillance of HIV and tuberculosis drug resistance, among

other purposes. The ongoing pandemic has highlighted the need for genomics capacity to be readily available as part of ongoing surveillance efforts.⁴⁵

In December 2020, a consortium including South Africa’s National Institute for Communicable Diseases identified a variant of SARS-CoV-2 (501Y.V2 variant) spreading in several provinces. The challenge is that, in 2020, up to 71% of next-generation sequencers in Africa were concentrated in 5 countries, with most of the capacity being outside country NPHIs. The experience in South Africa, and the inevitability of the emergence of additional COVID-19 variants, highlights the need to build and retain capacity to conduct genomic testing and build strong linkages with other institutions that have this capability. Such capacity is also critical to guide policies related to issues like HIV, tuberculosis, and malaria drug resistance; COVID-19 responses; and preparedness for the next major pathogen of concern.⁴⁵ In addition to having the capacity to analyze genomes, NPHIs need people with bioinformatics skills to interpret data from testing.

Commodities Issues

Gaps in the pipeline and access to critical commodities will remain a challenge for the foreseeable future.⁴⁶ Markets for personal protective equipment, pharmaceuticals, and vaccines for addressing the pandemic are highly concentrated, with most capacity for production in continents other than those in Africa.⁴⁷⁻⁴⁹ Low resource countries have been outspent by richer ones in the international competition for such commodities.⁵⁰ Procurement is further complicated because items to be used together generally have to be purchased individually, often requiring countries to negotiate with multiple vendors. One NPHI director suggested that there should be international leadership to have supplies co-packaged as has happened for HIV and tuberculosis.

In many countries, the private sector and local companies and entrepreneurs have been helpful, and development of local supply chains is being encouraged.^{51,52} In some cases, local production has been highly successful, for example, in the manufacture of test kits and protective coverings in Ethiopia. In others, however, local entrepreneurs and companies have produced or marketed substandard or counterfeit pharmaceuticals and other products.⁵³ Some of these entrepreneurs and companies have links to decisionmakers in government, and NPHI leadership is challenged to ensure the quality of recommended or purchased goods and services.

Addressing Non-COVID-19 Priorities

The interrelationship between noncommunicable diseases, such as hypertension and diabetes, and COVID-19 illness and mortality has brought renewed attention to the burden of noncommunicable diseases in Africa. Before the pandemic, it was estimated that 34.2% of deaths in sub-Saharan Africa were due to noncommunicable diseases.⁵⁴ The need for health systems to focus on treating COVID-19-infected individuals has reduced resources available for prevention and treatment of noncommunicable diseases.⁵⁵

The diversion of personnel and resources, disruptions in health services, and other pandemic issues have also caused declines in diagnosis and treatment of infectious diseases such as tuberculosis and HIV.⁵⁶⁻⁵⁸

Addressing Inequities

Besides highlighting fragilities and limitations in public health and healthcare systems, the pandemic has brought renewed attention to issues of inequities in access to and quality of services and care.^{59,60} In addition to collecting, analyzing, and disseminating data and information about health inequalities, NPHIs and other health agencies are increasingly recognizing the importance of identifying specific and systematic ways to support health for all and ensuring sustainable financing.⁶¹

Limitations of This Assessment

Several limitations of this assessment arose because we focused on innovations and experiences of NPHIs in the midst of the pandemic. For example, data were not available on the effectiveness of the various efforts described by NPHI leaders. Likewise, peer-reviewed literature does not yet (and may never) include studies to support systematic reviews of the kinds of efforts that we report on in this article. Because NPHI leaders were busy, we limited the duration of our listening sessions and, therefore, were unable to cover many topics of interest in depth, such as the impact of COVID-19 on healthcare systems and the relationship to efforts to attain universal health coverage, or to probe in depth about topics such as cross-sectoral relationships. While our information represents important experiences of individual NPHIs, we do not have representative data about NPHI responses, such as might be collected through a survey.

CONCLUSION

Limited investment in public health infrastructure is a global issue. Because of the duration and demands of the COVID-19 pandemic, new systems of data sharing, technological innovations, new approaches to public-private partnerships, and strengthening of public health capacity in areas distal to the central government have been needed. In many countries, NPHIs are providing critical leadership and support in these changes. To the extent possible, the impact of these changes should be documented and critical capacities that have developed during the crisis should be retained. NPHIs and their partners should continue to advocate for sustainable funding from their governments and stakeholders and ensure that the work being done can continue to be leveraged to address ongoing public health issues and mitigate future pandemics.

We are hopeful that among the long-lasting positive aspects of the pandemic response will be sustained investments by governments, private and public partners, and stakeholders to strengthen NPHIs, which will in turn strengthen global health security and preparedness.

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