

# Acting now to strengthen Africa's health systems

Five big ideas to safeguard lives in the COVID-19 crisis—and prepare for the future

*This article is a collaborative effort by Bobby Demissie, Peter Okebukola, Tania Holt, Ying Sunny Sun, and Marilyn Kimeu, representing views from across the McKinsey Africa Practice.*



**Africa is starting to see exponential growth** in the number of COVID-19 infections. Decision-makers can use the billions of dollars allocated for the emergency response to save lives now, while also considering how to make prudent investment decisions that build greater health-system resilience for the future.

The full impact of the COVID-19 pandemic in Africa is yet to be known as the outbreak is constantly evolving. At 27 May it had 120,000 recorded cases and 0.02 deaths per 10,000 of the population, compared with 2.2 in Europe. In recent weeks, countries have started seeing exponential growth in the spread of the disease—and the actual number of cases may be even higher.<sup>1</sup> Our research shows a steady correlation between the number of tests and the number of new cases, and with low testing capacity on the continent, the true disease burden may be underestimated. The experience of previous disease outbreaks in Africa suggests that the health impact of COVID-19 could be devastating.

As the pandemic unfolds, so too is an awakening to the deeper challenges facing Africa's health care systems. A broader spectrum of stakeholders is now keenly feeling the consequences of chronic underinvestment and the crisis brings a renewed sense of urgency to create momentum around health system reform and reimagination across the continent.

In this article, we present a framework to inform health-system investment decisions that will enable governments to think about how to respond now and with foresight to Africa's long-term healthcare needs. We explore five big ideas for high-impact healthcare interventions that are widely applicable across all African countries and could deliver immediate and long-term

benefits. Case examples are used to illustrate how governments can achieve maximum return on investment by applying a structured lens to today's challenges.

### **In Africa's challenging health context, consider the acute and long-term impact of investment decisions**

Africa faces a twin health crisis that will be exacerbated by COVID-19: a high existing disease burden and fragile health systems. The continent bears nearly twice the disease burden per capita, measured by disability-adjusted life year (DALY), compared to the rest of the world. Tuberculosis and HIV/AIDS are widespread and Africa accounts for 94 percent of all malaria deaths, while mother and child deaths are fourfold higher than in other regions. These existing comorbidities could worsen the severity of COVID-19 on the continent.<sup>2</sup>

Africa's health systems are already struggling and, in some countries, not sustaining routine service delivery. Several other ongoing epidemics have weakened health systems, including Lassa fever in Nigeria and Ebola in Central Africa. Even in a flattened curve scenario for the COVID-19 pandemic, healthcare systems may be overwhelmed given a shortfall in critical care capacity in Africa. Skilled health workers are in short supply, falling 60 percent below the UN's minimum threshold, while sub-Saharan Africa has only 1 to 5 percent of the ICU beds per capita, compared to European and East Asian countries.

The impact of Ebola on Sierra Leone's health system is an important lesson from the past. The outbreak led to a 23 percent decline in service delivery, around 4,000 additional maternal and neonatal deaths and stillbirths, and around 2,800 more deaths from HIV, TB, and malaria (Exhibit 1).

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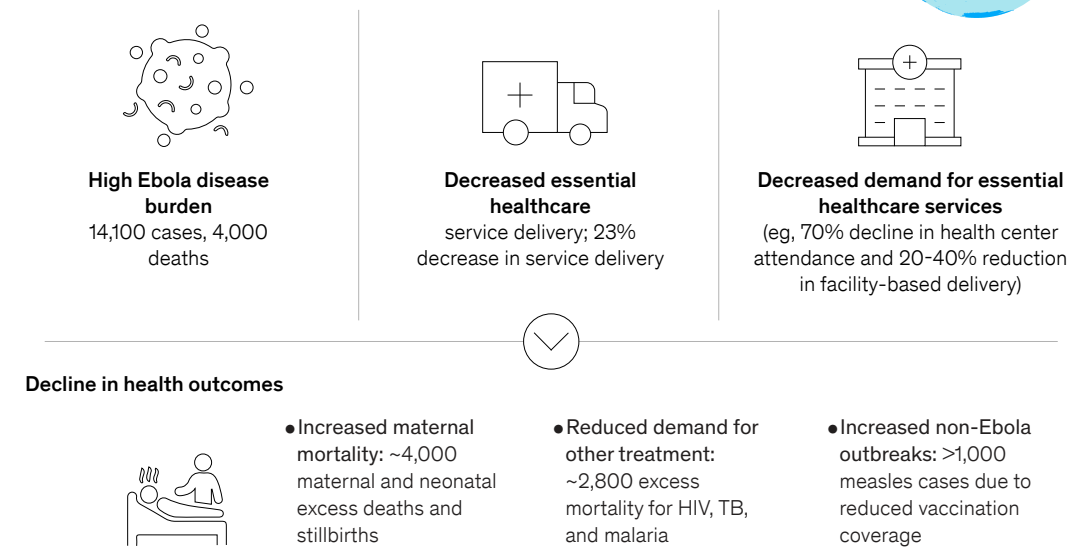
<sup>1</sup> WHO, Africa Centre for Disease Control and European Centre for Disease Control

<sup>2</sup> "Groups at higher risk for severe illness," Centers for disease control and prevention, <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/groups-at-higher-risk.html>.

## The impact of Ebola on Sierra Leone’s health system is an important lesson from the past



### Case example: Sierra Leone Ebola Outbreak



Source: Global Delivery Programs Working Session, CDC, WHO, United Nations Foundation, McKinsey analysis

To date, over \$160 billion has been made available for the COVID-19 response across East, Central, West, and Southern Africa—80 percent of it from public and donor sources and 20 percent from private sources.<sup>3</sup> The lessons of the past, where outbreak responses have led to declining health outcomes in other areas, create a compelling case for donors and governments to consider using the funding for COVID-19 to control and address the spread of the disease and build long-term resilience in health systems.

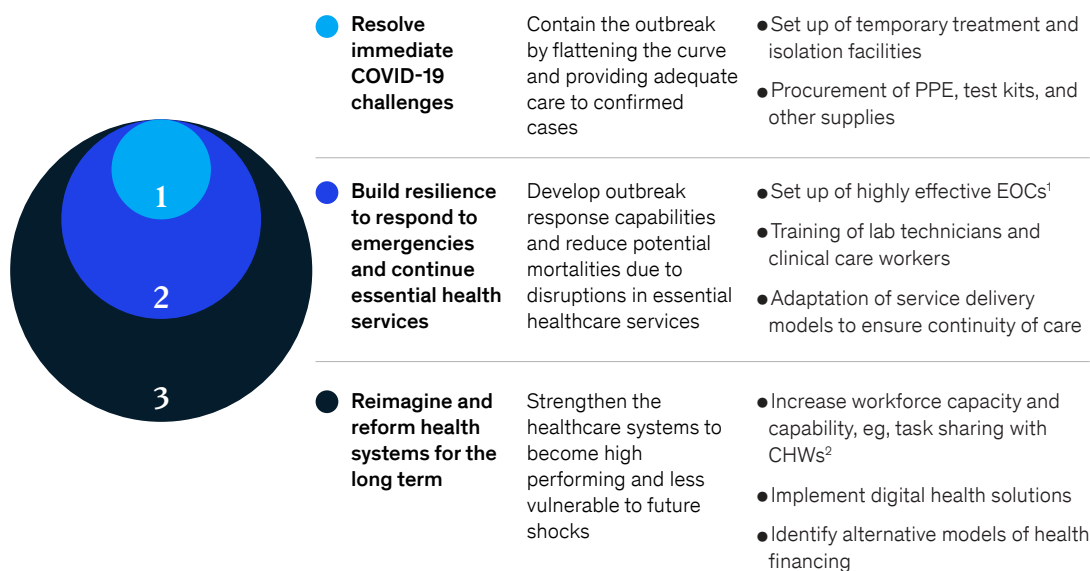
To guide spending choices, we suggest a decision-making framework that groups intervention investments into three imperatives (Exhibit 2). With health systems at different levels of maturity, investment decisions would need to be tailored to the local context, and decision makers should give particular attention to investments that do not only address the immediate COVID-19 challenge.

A catalogue of illustrative interventions mapped against each of the three imperatives can be found in the Appendix.

<sup>3</sup> <https://public.tableau.com/profile/devexdevdata#!/vizhome/COVIDFundingvisualisation/COVID-19funding>; [https://ec.europa.eu/echo/news/coronavirus-eu-provides-support-horn-africa-region\\_en](https://ec.europa.eu/echo/news/coronavirus-eu-provides-support-horn-africa-region_en)

## Countries could consider both the acute and long-term impact of investments when designing potential interventions

### The 3 imperatives



- 1 Emergency operations centers.
- 2 Community health workers.

Against this backdrop, governments will need to choose where and how to spend their COVID-19 emergency funds to realize maximum impact and value. Next, we explore five breakthrough ideas that could create impact across all three imperatives, with immediate and longer-term benefits. They have been tried and tested in other contexts and are commonly applicable across all African countries.

While the ideas are not new, COVID-19 highlights their importance to a broader set of decision makers and stakeholders. Health issues now have far-reaching and long-lasting consequences for economies and societies and governments, and their developing partners can build real momentum to advance these areas, using the impetus created by COVID-19 to reimagine their approach.

The five ideas for consideration are as follows:

- Idea 1: Build up emergency preparedness and response mechanisms
- Idea 2: Accelerate health financing reforms in Africa to increase budgets and efficiency
- Idea 3: Build consumer-centric digital health ecosystems
- Idea 4: Ensure reliable access to high-quality medical commodities and equipment
- Idea 5: Institutionalize CHWs and rapidly upskill the broader healthcare workforce

We discuss each of these ideas in turn, looking at why they could be important, and how governments could begin to operationalize each strategy.

## Improving Africa's R&D capabilities and innovation adoption

Global actions to combat COVID-19 and find a vaccine are progressing quicker than for any other pathogen in history but shed light on further inconvenient truths about the continent: its inability to develop and manufacture health commodities at scale, and question marks about its readiness to introduce and drive the rapid uptake of new vaccines, therapeutics, and diagnostics that will be needed to get back to a 'new normal'. In fact, in 2016, the region accounted for only 1.1 percent of global investments in health science R&D. Unsurprisingly, there is limited African involvement in the global R&D COVID-19 disease response. Only three clinical trials are currently underway for

vaccines, two in Egypt and one in South Africa.

Lack of R&D investment into innovations is only one part of the challenge. The other is ensuring that they are widely available and adopted. Several challenges have been highlighted in the adoption of previous vaccines and other innovations, for example, the HPV vaccine. These include weak regulation and enforcement, difficult supply chain logistics, limited training and preparedness of healthcare workers, and inadequate coverage and acceptance within communities. Coordinated efforts are therefore required to rapidly prepare African

countries for new COVID-19 technologies, and to increase the continent's global participation in the future development of innovations. While this is not the focus of this article, there are several aspects that can be considered to strengthen Africa's capability. These include increasing investments in R&D and establishing regulation that supports innovation; expanding manufacturing infrastructure; developing training programs to upskill healthcare workers on new protocols; and locally designing community engagement strategies to drive acceptance and administrative approaches to ensure widespread coverage.

### Idea 1: Build robust, well-funded emergency preparedness and response mechanisms

The resources required to respond to health emergencies are complex and expensive, especially when the health system is ill prepared. Around \$3.6 billion was spent during the Ebola response in West Africa but a study on non-Ebola emergency preparedness systems in Chad, Madagascar, and Pakistan showed such capabilities can deliver cost and time savings. These countries saw response times speed up by an average of over a week and savings of up to two times normal levels when such systems were in place.<sup>4</sup>

A number of countries are already implementing emergency operation centers (EOCs) to address the COVID-19 emergency and for those that aren't,

this is an opportune time to pilot and set up such mechanisms to manage the pandemic. Through these EOCs countries will be able to identify gaps, refine, and strengthen their approach as the crisis progresses, while learning important lessons for future responses. These lessons could prove valuable, even if the worst of the pandemic is avoided. Ghana, for example, did not experience an Ebola outbreak but a comprehensive risk and vulnerability assessment carried out during that time ensured the country had stable essential supplies for other outbreaks like yellow fever and cholera.<sup>5</sup> The preparation is making a difference in the country's COVID-19 response too.

Proper investment and nationwide reach are the lynchpins of a well-designed rapid-response system. Governments could benefit from focusing on building infrastructure, developing strategic partnerships, and ensuring that key enablers such

4 UNICEF/WFP Return on Investment for Emergency Preparedness Study, [https://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp272225.pdf?\\_ga=2.41068322.1823815380.1589458619-251506829.1589458619](https://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp272225.pdf?_ga=2.41068322.1823815380.1589458619-251506829.1589458619).

5 USAID Global Health Supply Chain Technical Report – Best Practices in Supply Chain Preparedness for Public Health Emergencies, Ghana Ministry of Health: "National Preparedness and Response Plan for the Prevention and Control of Ebola Viral Disease," (2014); Ohene et al. "Assessment of the response to cholera outbreaks in two districts in Ghana," *Journal of Infectious Diseases of Poverty* (2016)

as funding are in place. Where EOCs don't already exist, a first step could be setting up a nationwide EOC network and defining clear structures of governance, accountability, and processes at the sub-national, national, and regional level. Foundational infrastructure could also include an emergency response playbook detailing Emergency Supply Chain (ESC) and surveillance networks, taking a longer-term view beyond the COVID-19 crisis. Strong surveillance networks with robust data and information systems and well-defined trigger mechanisms are critical for emergency planning.

Defining a clear emergency approach can save lives when disaster strikes. Following the 2014 Ebola outbreak, the Democratic Republic of Congo (DRC) implemented a national emergency response system to bolster the country's preparations. When the first positive case of Ebola was identified in 2017, the DRC triggered the swift implementation of emergency protocols. It took 42 days to curtail the Ebola outbreak with only eight total cases and four deaths across the whole of the DRC.<sup>6</sup>

Strategic partnerships and clear decision-making structures are also critical to the speed and efficiency of interventions. Emergency response mechanisms need to have access to the highest levels of national leadership but without limiting decision-making ability at the top structures of government. It's important to integrate key partners from the private and public sector, beyond the Ministry of Health, and build connections with subnational, national, and regional stakeholders to coordinate rapid response. Leveraging partnerships further afield, including regional and global relationships, can bring in best practice approaches. When Nigeria was faced with a serious outbreak of polio, the National Ministry of Health and other partners designed and deployed an EOC to improve collaboration and efficiency among international partners and move toward complete eradication.

Nigeria is on course for eliminating the wild polio virus and increased collaboration and coordination between EOC members has laid a foundation for effective future disease responses. The model was adopted to respond to the Ebola outbreak and is also being used for COVID-19.<sup>7</sup>

The immediate success and future sustainability of these structures may depend upon how COVID-19 funding is used. As well as setting up protected funds for emergencies, governments could also allocate medium-term funding to build and maintain the infrastructure and its ongoing management. Training funds may be needed to build up capabilities within the national health system and ensure that individuals and groups are well prepared for future outbreaks.

## **Idea 2: Accelerate bold health financing reforms in Africa to increase budgets and drive efficiency**

As a result of low levels of health spending, healthcare systems in many countries are struggling to sustain routine service delivery while responding to emergencies. Currently, less than five countries in Africa meet the Abuja declaration target set 19 years ago for 15 percent of public expenditure to be devoted to health.<sup>8</sup> COVID-19 has underscored this shortfall and the negative impacts of a weak health system on the economy and livelihoods, while also revealing the extent to which vertical funding systems cause system fragmentation. Health leaders could prioritize expanding health budgets and accelerate reforms—many of which were already underway before COVID-19 struck. Fully developed health systems have high economic impact: analysis into investment for community health, for example, shows a 10:1 return on investment for every dollar spent.<sup>9</sup>

Governments could start utilizing COVID-19 funding well by introducing strong governance mechanisms and reporting practices that ensure judicious, coordinated spending and transparency

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6 Yong, Ed. "How the Democratic Republic of the Congo Beat Ebola in 42 Days." *The Atlantic* (2017). CDC, "Ebola Outbreak Democratic Republic of the Congo 2014 - 2017"

7 Eradicating polio in Nigeria, McKinsey & Company, February 2016

8 WHO – Public Financing for Health in Africa: from Abuja to the SDGs

9 Financing Alliance for Health

to relevant stakeholders. In addition to public policies, three financing reforms could ensure better-spent health financing beyond the crisis. The first includes appropriate spending practices and budget allocations, as well as reforming the revenue generation process. Alongside increasing state budgets for health care, governments could look at new ways to generate funds, including match funding schemes to secure grants and loans from donor organizations.

A second approach involves pooling funding resources that streamline budgeting and spending practices and eliminate duplication. A pooled funding mechanism proved successful in Rwanda, where reliance on inconsistent donor aid did not allow for long-term health system strengthening investments. The Rwandan government created a donor integration framework with help from the World Bank, which enabled it to secure binding agreements with donors by sharing its annual development strategy and proposed health related projects, with costs and projected timelines. This led to a reduction in the number of parallel administrative systems while improving accountability and delivery through the use of common monitoring and evaluation systems.

Third, performance-based financing (PBF) could help maximize the value of each dollar spent and improve the quality of services provided. PBF proved its effectiveness in Liberia after Ebola disrupted its health care system. Those health care centers where PBF was applied saw fewer infections of health workers and were able to open sooner than their counterparts. They experienced a 60 percent increase in attendance for maternal health services and an 18 percent increase in immunizations after the crisis.

Financing reforms have been in motion at the global level and in some African countries in the past decade. How governments are managing COVID-19 funds could allow reforms to happen faster, given the urgency and imperative to use limited funds for maximum impact.

### **Idea 3: Build consumer-centric digital health ecosystems**

Historically, health systems in Africa have been unable to unlock the enormous value of digital resources. Fragmented ad hoc solutions do not follow the entire patient journey, while a vertical focus on programs limits visibility and hence the usefulness of data, restricting workflow and analytics capabilities in steering decisions and measuring impact.

COVID-19 has highlighted the lack of digital readiness for tackling the urgent and coordinated response required. Despite years of investment, few plug and play systems are in place that can be applied to the pandemic. Strategic investment is needed to unlock holistic solutions that can overhaul fragmented and dated health systems, achieving streamlined operations through better knowledge management and full-scale data collection, enabling countries to predict disease outbreaks, identify high risk populations, and improve targeted data-driven clinical decision making.

Achieving such integrated, high-impact solutions might begin by prioritizing quick solutions for the COVID-19 response, while identifying ways in which these could evolve into long term solutions. Governments can start by identifying gaps in current digital systems and then defining a strategy for end-to-end systems strengthening.

Leveraging a range of stakeholder capabilities during the crisis, including private sector and donor partnerships, could enable countries to adapt solutions to their local context and build out capabilities across the eco-system. Dedicated, agile, cross-functional teams and flexible operating models could speed up decision making. Over time, governments could achieve interoperability by connecting flexible applications to a centralized system. The advantage of such a centralized, systematic digital system is well illustrated in Moscow's Integrated Medical Information Analytical System. It stores an

electronic medical record with a full and reliable clinical picture of every patient based on real-time data, helping clinics to observe and distribute the workload among specialists. This has improved on-time access to medical appointments by 60 percent and achieved a 57 percent reduction of in-clinic waiting times for patients, saving an annual \$10 million across the health system.<sup>10</sup>

Finally, countries could also define a clear legal and regulatory framework that includes policies around data governance and privacy, and develop roll out plans that consider the implications for citizens, such as requirements for downloading and using data, training required, and partnering with telecommunications companies for free data access.

#### **Idea 4: Ensure reliable access to high-quality medical commodities and equipment**

Africa faces a severe shortage of medical commodities and equipment due to constrained domestic capacity and supply. The COVID-19 pandemic has shown that the continent is highly dependent on global manufacturing and supply chains, and many African countries found themselves unable to procure PPEs and other essential medical commodities. However, a comprehensive analysis of pharmaceutical manufacturing showed that increased local drug production is feasible in about a half dozen sub-Saharan African countries for some product groups.<sup>11</sup> Ethiopia was the first African country to develop a strategy and plan of action for pharmaceutical sector development, establishing pharma as one of the priority sectors under its Growth and Transformation Plan II (GTP II). It aims to substitute imported essential medicines with locally produced ones as well as producing for export markets, with a target to increase foreign exchange earnings from \$3 million to \$111 million.

Partnerships at the local, regional, and global level will be crucial in the effort to advance manufacturing. Governments could seek

to leverage global partners to build up the capabilities of local manufacturers and engage private sector partnerships to boost technical capabilities and innovation and improve quality standards. Countries may need to upskill their workforces, including through technical and vocational education and training. They could also explore regional trade partnerships and harmonized trade policies that exploit the competitive advantages in different countries. And they could introduce important enablers such as standardized cross-border regulations for rapid custom clearance and regionally pooled procurement mechanisms to benefit from economies of scale.

The COVID-19 pandemic also highlights the benefits of a more sustainable supply chain strategy across the continent and several African countries are already formulating action plans to address the gap in essential commodity supplies. Expanding the scope with a more systematic approach can help build resilient and reformed healthcare systems in the long term. Governments can start this journey by determining their commodity and equipment needs, identifying sourcing opportunities, and developing plans for importation or local production based on a cost/benefit analysis. Strong collaboration at national and regional level as well as advanced logistics across the entire value chain, including digital tools like Logistics Management and Information Systems (LMIS) and close collaboration with the private sector can be critical. Creating a national supply chain nerve center with decision-making power could help drive implementation.

To realize the full potential of local manufacturing and supply chains, governments may also consider providing financial and non-financial incentives to support their strategies, including tax incentives and greater support for private investments. Some countries have potential to build a robust local industry, under the right conditions. It is for public- and private-sector leaders in the region to decide whether to pursue this avenue through sustained and careful effort.

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<sup>10</sup> Transforming global health supply chains through data visibility, McKinsey and Company, May 2020  
<sup>11</sup> *Should sub-Saharan Africa make its own drugs?* McKinsey & Company, January 2019



## Idea 5: Institutionalize CHWs and rapidly upskill the broader healthcare workforce

African countries currently face a critical shortage of health workers, with health workforce availability at less than 10 percent of the estimated need for essential primary care.<sup>12</sup> Countries could adopt a dual strategy to meet the human resources challenges of the COVID-19 crisis and their future health system needs: fully integrate community health workers (CHWs) into the health system, and purposefully upskill the overall healthcare workforce.

While many African countries have defined CHW intervention packages to increase workforce capacity, they are rarely fully implemented and often unable to deliver against the stated program aims due to constraints such as lack of remuneration. Outbreaks such as COVID-19 highlight the benefits of a strong CHW workforce. Countries that have invested in community health systems—such as Liberia—have been able to leverage them for COVID-19 preparedness and response, with CHWs assisting in disease surveillance and community education on sanitization practices.

After mobilizing CHWs for the COVID-19 response, governments can think about how to integrate CHWs into the broader health system, beginning with regulatory frameworks that recognize and formalize the role of CHWs. These should outline minimum requirements for CHW selection, employment terms, clear roles and responsibilities, training requirements, career development progression, funding for payroll, and a professional association to enable indemnification. CHW programs can deliver proven health and socioeconomic benefits. Community health schemes deliver a 10:1 return on investment and 70 percent of the CHW hiring pool is women.<sup>13</sup> The Liberian government partnered with Last Mile Health to design and optimize a CHW program to deliver care in rural areas and, between 2012 and 2015, the number children attended to by skilled workers increased by 50 percent, on average, alongside a 28 percent increase in skilled attendant births.

From a broader health workforce point of view, COVID-19 is making it clear that countries need to have a sustainable approach to ensure all health workers can practice at the top of their license (fully operationalize what each health worker is licensed to do) and that agile tools are available to deliver training. Digital training platforms play a big role in both and while these have had many adoption challenges in the past, and in health systems worldwide, COVID-19 is propelling their adoption. In Austria, digital training programs were deployed virtually in response to COVID-19, with on the job mentoring and supervision in hospitals to create educational resources and training programs to re-skill non-ICU nursing staff. The training program included the proper use of PPE, hygiene practices, and medical waste management and COVID-19 patient management including correct use of ventilators. The same could happen in Africa and help pave the way for better training and coaching programs in the future.



Governments and decision-makers are responding to the COVID-19 crisis with urgency and speed, but if they also think about the next normal, they can begin to consider how to strengthen their underfunded, under-resourced and over-burdened health systems.

By focusing on these five ideas they could accelerate transforming their health systems, build resilience against future disease outbreaks and improve general health outcomes for citizens. Interventions across all three imperatives are important, and stakeholders will need to decide on investments based on their specific country context.

There are clear next steps governments can take to formulate a strategic investment approach in addition to a rapid response one. The first is to assess the current portfolio of interventions and catalogue them against the three-imperative framework, identifying gaps and deciding where to focus across the five ideas. Decision-makers could then take into account urgency, feasibility, health system maturity, and the trajectory of

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<sup>12</sup> Last Mile Health

<sup>13</sup> Financing Alliance for Health

COVID-19, while also ensuring that long-term system strengthening is built into the heart of each intervention. Finally, where broader eco-

system collaboration is needed, ideas should be tested with key stakeholders to build support and momentum towards implementation.

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# Appendix: Mapping of interventions

To guide spending choices, our decision-making framework groups intervention investments into three imperatives:

1. Resolve immediate COVID-19 challenges
2. Build resilience to respond to emergencies and continue essential health services
3. Reimagine and reform health systems for the long term

The following tables show how a number of different interventions align to the imperatives. The list of interventions is not exhaustive.

## Mapping governance interventions

		Imperative				
		1	2	3		
						
	Critical interventions				Example interventions	
<b>Co-ordination</b>	Strong coordination at all levels including sub-national		✓		Following the 2014 Ebola outbreak, the government of Democratic republic of Congo effectively implemented a National system to bolster the country's emergency preparedness to quickly activate a coordinated response to any future outbreaks. This system helped the DRC to curtail a 2017 Ebola outbreak in 42 days with only 4 deaths	
	EOCs for emergency preparedness and coordination			✓		
	Advisory groups with key donors/ entities			✓		
<b>Policies and guidelines</b>	Guidelines for safe continuation of essential health services during emergency		✓		Community Health Workers (CHWs) were employed to deliver HIV/TB Rx to avoid reduced demand due to fear and stigma during cholera outbreak in Haiti. CHWs continued to support the system in the long term by providing other primary health services. The government developed policies around the use of CHWs to incorporate them in the national health strategy	
	Policies for health system strengthening and future pandemic response			✓		

Source: CDC, World Bank, WHO data, Advancing Partners and Communities – Haiti Community Health Programs, Expert Interviews







## Mapping financial interventions

		Imperative	
		1 2 3	
	Critical interventions		Example interventions
<b>Increasing available financing</b>	More coordinated funding vs. vertical funding pools for diseases		✓
	Dedicated financing and donations campaign to fund outbreak mitigations e.g., special assistance to vulnerable groups such as cash transfers, provision of basic essential products (food/drugs)	✓	During the Ebola outbreak in Sierra Leone, 50% of donor funding was directed at maintaining continuity in HIV, malaria, TB and other communal disease programs and minimize the burden on the public health systems to treat these diseases
	Transparency and visibility for COVID funding	✓	
	Funding innovative research for Africa e.g. vaccine development		✓
<b>Protecting available financing to ensure efficacy</b>	Emergency funding platform	✓	
	Financial protection policies to preserve access to essential primary healthcare services (e.g., nutrition, water)		✓
	Performance-based financing to foster health system resilience		✓








Source: Press Search, WHO, Sierra Leone Human Resources for Health Country Profile (2016)

## Mapping service delivery and infrastructure

		Imperative				
		1	2	3		
						
	Critical interventions				Example interventions	
<b>Service Continuity</b>	Deliver essential care via existing programmatic systems			✓	India has set up low cost testing booths that use contactless solution to collect testing samples. These booths cost \$250 – \$300, are portable, require minimal manning and the workers require minimal PPE	
	Provide infrastructure to enable peripheral facilities to take up more essential services		✓			
	Institute mobile testing and sample collection	✓				
	Provide Facility modification guidance			✓	Piramal Swathsywa, a public-private partnership, offers free remote medical services to over 30,000 people via a 24 hour call center. The call center is staffed by paramedics, counsellors, and doctors, with paramedics providing basic medical advice and doctors providing specialized advice	
	Apply digital health tools (tele-health online pharmacies) in a systematic and centralized approach			✓		
	Implement acute care emergency response systems (911)			✓		
<b>Service Expansion</b>	Maximize in-hospital space for critical care; convert a portion of non-traditional inpatient beds; increase bed density in existing wards/hospitals; convert under-utilized non-clinical space (e.g. meeting rooms, atriums)		✓		NHS Hospitals are focused on maximising their capacity to treat COVID-19. Treatment capacity is being released through the cancellation of non-critical surgery, day cases and most outpatient clinics. Zesty is supporting hospitals respond to COVID-19 by using their platform to divert patients away to digital modalities where appropriate	
	Pooled testing to conserve resources		✓			
	Leverage nation-wide testing capacity		✓			
	Use pre-fabricated field hospitals		✓			
	Designate COVID-19 specific facilities		✓			
	Ensure readiness to adapt new technology in therapeutics, diagnosis and vaccines			✓		







Source: Press Search, FastCompany.com

## Mapping commodities and equipment interventions

		Imperative				
		1	2	3		
						
		Critical interventions			Example interventions	
<b>Commodity management</b>	Redistribute commodities from low demand areas	✓			<p>During the Cholera outbreak in Haiti, there was a shortage in chlorine treatment supplies to meet the demand for water purification. This sparked production of chlorine treatments by a local manufacturer scaling up production from one barrel to about 35,000 bottles per week</p> 	
	Refurbish old essential equipment	✓				
	Optimize utilization of at-risk supplies	✓				
	Alternative sample collection methods	✓				
	Promote local manufacturing through PPP's			✓		
<b>Supply chain management</b>	Stockpiling of essential commodities	✓			<p>Botswana's Ministry of Health reformed its Central Medical Stores (CMS), a government agency responsible for supplying drugs and medical supplies, with a target of 97% commodity availability. This has helped promote widespread access to HIV/AIDS medicines, and the government has used its vaccine stores to rapidly halt an outbreak of foot and mouth disease in a neighbouring country</p> 	
	Centralized national supply chain coordination			✓		
	Regional/national aggregation of volumes for procurement			✓		

Source: USAID, "Analytical summary – HIV/AIDS: Botswana," World Health Organization (2017), Avert – HIV Around The World: Sub Saharan Africa (Botswana)






## Mapping workforce interventions

		Imperative				
		1	2	3		
						
	Critical interventions				Example interventions	
Workforce capacity	Rapidly upskill healthcare workers on Covid-19 care	✓			University of Sydney start-up DetectED-X has built a virtual clinical environment to enable clinicians to rapidly learn how to diagnose COVID-19 cases from CT scans	
	Expedite recruitment of healthcare workers to increase capacity	✓				
	Reskill existing workforce for essential healthcare services – e.g. retrain retirees to provide community health services		✓		Project Echo has been deployed to increase the capacity of CHW to diagnose and treat health conditions in rural areas in New Mexico	
	Institutionalize and operationalize the polyvalent <sup>1</sup> community health worker role			✓		
	Import contingency ICU personnel (e.g., from China, Cuba)	✓			In Haiti, recruitment of workers for cholera minimized disruption to non-cholera care. About 10K community health workers (CHWs) recruited and trained in prevention and case detection in remote areas	

<sup>1</sup> Community workers who play multiple primary health roles

Source: WHO, United States Department of State, Expert interviews, Press Search







## Mapping information interventions

		Imperative				
		1	2	3		
						
		Critical interventions			Example interventions	
<b>Case Tracking</b>	Create a comprehensive health systems data bank for monitoring, surveillance and case management		✓		During MERS-COV crisis in 2014, Kingdom of Saudi Arabia rapidly built a public health surveillance system with 16 operational dashboards showing MERS/Ebola preparedness and surveillance status with information also visible on mobile devices	
	Use Advanced analytics for predictions of outbreaks & high risk heat mapping		✓		The Alipay Health continuously tracks locations of users and shares it with central police authorities. A central application determines infection risk from location data and segments users into 3 color codes - "green", "yellow" and "red". Only green users can travel freely. Yellow and red users must conduct testing, quarantine measures or report to authorities	
<b>Commodity Tracking</b>	Strengthen LMIS and HMIS systems beyond program specific data			✓		

Source: Expert Interviews, Press search



## Mapping community engagement interventions

		Imperative				
		1	2	3		
						
	Critical interventions				Example interventions	
<b>Community communication</b>	Institutionalized community engagement		✓		Community Health Workers (CHWs) were employed to deliver HIV/TB Rx to avoid reduced demand due to fear and stigma during cholera outbreak in Haiti. CHWs continued to support the system in the long term by providing other primary health services	
	Communicate essential service availability to ensure demand			✓		
<b>Sanitation and hygiene practices</b>	Cashless transactions		✓		In Kenya, a grassroots organization SHOFKO set up more than 100 handwashing stations in the slums of Nairobi, staffed with volunteers who instruct people to wash their hands when they enter and exit the slums and screen dwellers for potential Covid-19 symptoms	
	Social distancing measures		✓			
	DIY home disinfection solutions			✓		
	Water, sanitation and hygiene services			✓		
<b>Surveillance and contact tracing</b>	Incentivize suspected case reporting		✓		India launched Aarogya Setu app to help trace contacts of infected people and facilitate self screening. The user answers a series of questions. In case answers suggest symptoms, the information will be sent to a government server to take timely steps and initiate the isolation procedure, if necessary	
	High tech temperature sensors		✓			
	Digital contact tracing and symptom tracking			✓		

Source: CDC, World Bank, WHO data, SHOFKO website, Advancing Partners and Communities - Haiti Community Health Programs, Expert Interviews Habitat for humanity; The world's biggest slums, Expert