1. What is your understanding about the emergence, spread across countries and scientific understanding of SARS-CoV-2 and COVID-19?

The world emergency showcase how important and call for urgent action and attention which show how skeptical and vulnerable it is. The sooread of covid-19 across different countries have shoe the need to strengthen health system and need for proper personal check up and follow the necessary procedures in order to protect oneself and others from the deadly virus. The inadequacies of some countries have make the mitigation of Covid-19 more high in different countries which have been very a bothering matters.

The scientific understanding of SARS-CoV-2 and Covid-19. The 2019-nCoV causes an ongoing outbreak of lower respiratory tract disease called novel coronavirus pneumonia (NCP) by the Chinese government initially. The disease name was subsequently recommended as COVID-19 by the World Health Organization. Meanwhile, 2019-nCoV was renamed SARS-CoV-2 by the International Committee on Taxonomy of Viruses. As of February 24, 2020, more than 80,000 confirmed cases including more than 2,700 deaths have been reported worldwide, affecting at least 37 countries. The WHO has declared this a global health emergency at the end of January 2020. The epicenter of this ongoing outbreak is in the city of Wuhan in Hubei Province of central China and the Huanan seafood wholesale market was thought to be at least one of the places where SARS-CoV-2 from an unknown animal source might have crossed the species barrier to infect humans.

A pioneering study conducted in the city of Shenzhen near Hong Kong by a group of clinicians and scientists from the University of Hong Kong has provided the first concrete evidence for human-to-human transmission of SARS-CoV-2. This is an excellent example of how a high-quality clinical study can make a major difference in policy setting. Several important clinical features of COVID-19 have also been documented in this study.

First, an attack rate of 83% within the family context is alarmingly high, indicating the high transmissibility of SARS-CoV-2. Second, the clinical manifestations of COVID-19 in this family range from mild to moderate, with more systematic symptoms and more severe radiological abnormalities seen in older patients. Generally, COVID-19 appears to be less severe than SARS.

Third, an asymptomatic child was found to have ground-glass opacities in his lung and SARS-CoV-2 RNA in his sputum sample. This finding of asymptomatic virus shedding raises the possibility for transmission of SARS-CoV-2 from asymptomatic carriers to others, which is later confirmed by others.

Finally, the presentation of diarrhea in two young adults from the same family also suggests the possibility for gastrointestinal involvement in SARS-CoV-2 infection and fecal–oral transmission. The study has set the stage for the control and management of COVID-19. The work was completed timely and the investigators showed great courage and leadership in a very difficult time when the Chinese authority failed to recognize widespread person-to-person transmission of SARS-CoV-2 before January 20, 2020.

Several interesting papers on SARS-CoV-2 and COVID-19 have been published in the past few weeks to report on the evolutionary reservoir, possible intermediate host and genomic sequence of SARS-CoV-2 as well as clinical characteristics of COVID-19. In view of these findings and the urgent needs in the prevention and control of SARS-CoV-2 and COVID-19, in this commentary we highlight the most important research questions in the field from our personal perspectives.

The first question concerns how SARS-CoV-2 is transmitted currently in the epicenter of Wuhan. In order to minimize the spreading of SARS-CoV-2, China has locked down Wuhan and nearby cities since January 23, 2020. The unprecedented control measures including suspension of all urban transportation have apparently been successful in preventing further spreading of SARS-CoV-2 to other cities. However, the number of confirmed cases in Wuhan continued to rise. It is therefore crucial to determine whether the rise is due to a large number of infected individuals before the lock down and/or failure in the prevention of widespread intra-familial, nosocomial or community transmission. Based on the number of exported cases from Wuhan to cities outside of mainland China, it was predicted that there might be more than 70,000 individuals infected with SARS-CoV-2 on January 25, 2020 in Wuhan.

This should be determined experimentally in Wuhan as discussed below and it will reveal whether the real numbers of infected people and asymptomatic carriers are indeed underestimated severely. In addition to viral RNA detection, measurement of IgM and IgG antibodies as well as antigens would be very helpful. Several representative residential areas should be selected for detailed analysis so that a big picture can be deduced. The analysis should include all healthy and diseased individuals within the area with the aim of identifying people who have recovered from an infection or are having an active infection. The ratio of asymptomatic carriers should also be determined.

The analysis should also be extended to detect RNA and antigen of influenza viruses. The activity of seasonal flu in Wuhan also reached a peak at the beginning of 2020. It will be of interest to see whether the flu season had ended and how many people having a fever now are actually infected with influenza virus. Precision control measures for SARS-CoV-2 should be tailor-designed for high-risk groups based on the results of this analysis. Differentiating people having a flu and preventing them from infecting with SARS-CoV-2 in a hospital setting might also be critical.

The second question is how transmissible and pathogenic is SARS-CoV-2 in tertiary and quaternary spreading within humans. Continued transmission of SARS-CoV-2 in Wuhan suggests that tertiary and quaternary spreading has occurred. Compared to the primary and secondary spreading during which SARS-CoV-2 was transmitted from animal to human and from human to human, has the transmission rate increased and has the pathogenicity decreased? Alternatively, is the virus less transmissible after several passages in humans? Retrospective analysis of all confirmed cases in Wuhan should be very informative. The answers to the above questions hold the key to the outcome of the outbreak. If the transmission is weakened, the outbreak may ultimately come to an end at which SARS-CoV-2 is eradicated from humans. On the contrary, if effective transmission can be sustained, the chance is increased that SARS-CoV-2 will become another community-acquired human coronavirus just like the other four human coronaviruses (229E, OC43, HKU1 and NL63) causing common cold only. The basic reproductive number (R0) of SARS-CoV-2 has been estimated to be 2.68, resulting in an epidemic

doubling time of about 6.4 days. Other estimates of R0 could go up to 4, higher than that of SARS-CoV, which is lower than 2. Determining the real R0 will shed light on whether and to what extent infection control measures are effective.

The third question relates to the importance of asymptomatic and presymptomatic virus shedding in SARS-CoV-2 transmission. Asymptomatic and presymptomatic virus shedding posts a big challenge to infection control.

In addition, patients with mild and unspecific symptoms are also difficult to identify and quarantine. Notably, the absence of fever in SARS-CoV-2 infection (12.1%) is more frequent than in SARS-CoV (1%) and Middle East respiratory syndrome coronavirus (MERS-CoV; 2%) infection. In light of this, the effectiveness of using fever detection as the surveillance method should be reviewed.

However, based on previous studies of influenza viruses and community-acquired human coronaviruses, the viral loads in asymptomatic carriers are relatively low. If this is also the case for SARS-CoV-2, the risk should remain low. Studies on the natural history of SARS-CoV-2 infection in humans are urgently needed. Identifying a cohort of asymptomatic carriers in Wuhan and following their viral loads, clinical presentations and antibody titers over a time course will provide clues as to how many of the subjects have symptoms in a later phase, whether virus shedding from the subjects is indeed less robust, and how often they might transmit SARS-CoV-2 to others.

The fourth question relates to the importance of fecal–oral route in SARS-CoV-2 transmission. In addition to transmission via droplets and close contact, fecal–oral transmission of SARS-CoV has been shown to be important in certain circumstances. Gastrointestinal involvement of SARS-CoV-2 infection and isolation of SARS-CoV-2 from fecal samples of patients are in support of the importance of fecal–oral route in SARS-CoV-2 transmission.

Although diarrhea was rarely seen in studies with large cohorts, the possibility of SARS-CoV-2 transmission via sewage, waste, contaminated water, air condition system and aerosols cannot be underestimated, particularly in cases such as the Diamond Princess cruise ship with 3,700 people, among whom at least 742 have been confirmed to be infected with SARS-CoV-2 plausibly as the result of a superspreading event. Further investigations are required to determine the role of fecal–oral transmission in these cases and within the representative residential areas selected for detailed epidemiological studies in Wuhan as discussed earlier.

The fifth question concerns how COVID-19 should be diagnosed and what diagnostic reagents should be made available. RT-PCR-based SARS-CoV-2 RNA detection in respiratory samples provides the only specific diagnostic test at the initial phase of the outbreak. It has played a very critical role in early detection of patients infected with SARS-CoV-2 outside of Wuhan, implicating that widespread infection of the virus had occurred in Wuhan at least as early as the beginning of 2020.

This has also pushed the Chinese authority to acknowledge the severity of the situation. Due to difficulties in sampling and other technical issues in this test, at one point in early February clinically diagnosed patients with typical ground glass lung opacities in chest CT were also counted as confirmed

cases in order to have the patients identified and quarantined as early as possible. ELISA kits for detection of IgM and IgG antibodies against N and other SARS-CoV-2 proteins have also been available more recently. This has made specific diagnosis of ongoing and past infection possible. Particularly, seroconversion for IgM antibodies normally occurs a few days earlier than that of IgG. ELISA reagents for detection of SARS-CoV-2 antigens such as S and N are still in urgent need, and would provide another test highly complementary to viral RNA detection.

The sixth question concerns how COVID-19 should be treated and what treatment options should be made available. COVID-19 is a self-limiting disease in more than 80% of patients. Severe pneumonia occurred in about 15% of cases as revealed in studies with large cohorts of patients. The gross case fatality is 3.4% worldwide as of February 25, 2020. This rate is 4.4% for patients in Wuhan, 4.0% for patients in Hubei and 0.92% for patients outside of Hubei. The exceedingly high fatality in Wuhan might be explained by the collapse of hospitals, a large number of undiagnosed patients, suboptimal treatment or a combination of these. Up to date, we still do not have any specific anti-SARS-CoV-2 agents but an anti-Ebola drug, remdesivir, may hold the promise.

As a nucleotide analog, remdesivir was shown to be effective in preventing MERS-CoV replication in monkeys. Severity of disease, viral replication, and lung damage were reduced when the drug was administered either before or after infection with MERS-CoV. These results provide the basis for a rapid test of the beneficial effects of remdesivir in COVID-19. Other antiviral agents worthy of further clinical investigations include ribavirin, protease inhibitors lopinavir and ritonavir, interferon α2b, interferon β, chloroquine phosphate, and Arbidol. However, we should also bear in mind the side effects of these antiviral agents. For example, type I interferons including interferon α2b and interferon β are well known for their antiviral activity. Their beneficial effects at an early phase of infection are well expected. However, administration at a later stage carries the risk that they might worsen the cytokine storm and exacerbate inflammation.

Notably, steroids have been experimentally used widely in the treatment of SARS and are still preferred by some Chinese physicians in the treatment of COVID-19. It is said to be capable of stopping the cytokine storm and preventing lung fibrosis. However, the window in which steroids might be beneficial to patients with COVID-19 is very narrow. In other words, steroids can only be used when SARS-CoV-2 has already been eliminated by human immune response. Otherwise, SARS-CoV-2 replication will be boosted leading to exacerbation of symptoms, substantial virus shedding, as well as increased risk for nosocomial transmission and secondary infection.

In this regard, it will be of interest to determine whether the report of fungal infection in the lungs of some patients in Wuhan might be linked to misuse of steroids. Nevertheless, the screening of new pharmaceuticals, small-molecule compounds and other agents that have potent anti-SARS-CoV-2 effects will successfully derive new and better lead compounds and agents that might prove useful in the treatment of COVID-19.

The seventh question is whether inactivated vaccines are a viable option for SARS-CoV-2. The chance that SARS-CoV-2 will become endemic in some areas or even pandemic has increased in view of its high

transmissibility, asymptomatic and presymptomatic virus shedding, high number of patients with mild symptoms, as well as the evidence for superspreading events. Thus, vaccine development becomes necessary for prevention and ultimate eradication of SARS-CoV-2.

vaccines are one major type of conventional vaccines that could be easily produced and quickly developed. In this approach, SARS-CoV-2 virions can be chemically and/or physically inactivated to elicit neutralizing antibodies. In the case of SARS-CoV and MERS-CoV, neutralizing antibodies were successfully and robustly induced by an inactivated vaccine in all types of animal experiments, but there are concerns about antibody-dependent enhancement of viral infection and other safety issues. While inactivated vaccines should still be tested, alternative approaches include live attenuated vaccines, subunit vaccines and vectored vaccines. All of these merit further investigations and tests in animals.

The eighth question relates to the origins of SARS-CoV-2 and COVID-19. To make a long story short, two parental viruses of SARS-CoV-2 have now been identified. The first one is bat coronavirus RaTG13 found in Rhinolophus affinis from Yunnan Province and it shares 96.2% overall genome sequence identity with SARS-CoV-2.

However, RaTG13 might not be the immediate ancestor of SARS-CoV-2 because it is not predicted to use the same ACE2 receptor used by SARS-CoV-2 due to sequence divergence in the receptor-binding domain sharing 89% identity in amino acid sequence with that of SARS-CoV-2. The second one is a group of betacoronaviruses found in the endangered species of small mammals known as pangolins, which are often consumed as a source of meat in southern China.

They share about 90% overall nucleotide sequence identity with SARS-CoV-2 but carries a receptor-binding domain predicted to interact with ACE2 and sharing 97.4% identity in amino acid sequence with that of SARS-CoV-2. They are closely related to both SARS-CoV-2 and RaTG13, but apparently they are unlikely the immediate ancestor of SARS-CoV-2 in view of the sequence divergence over the whole genome. Many hypotheses involving recombination, convergence and adaptation have been put forward to suggest a probable evolutionary pathway for SARS-CoV-2, but none is supported by direct evidence. The jury is still out as to what animals might serve as reservoir and intermediate hosts of SARS-CoV-2. Although Huanan seafood wholesale market was suggested as the original source of SARS-CoV-2 and COVID-19, there is evidence for the involvement of other wild animal markets in Wuhan. In addition, the possibility for a human superspreader in the Huanan market has not been excluded. Further investigations are required to shed light on the origins of SARS-CoV-2 and COVID-19.

The ninth question concerns why SARS-CoV-2 is less pathogenic. If the reduced pathogenicity of SARS-CoV-2 is the result of adaptation to humans, it will be of great importance to identify the molecular basis of this adaptation. The induction of a cytokine storm is the root cause of pathogenic inflammation both in SARS and COVID-19. SARS-CoV is known to be exceedingly potent in the suppression of antiviral immunity and the activation of proinflammatory response. It is therefore intriguing to see how SARS-CoV-2 might be different from SARS-CoV in interferon-antagonizing and inflammasome-activating properties. It is noteworthy that some interferon antagonists and inflammasome activators encoded by SARS-CoV are not conserved in SARS-CoV-2.

Particularly, ORF3 and ORF8 in SARS-CoV-2 are highly divergent from ORF3a and ORF8b in SARS-CoV that are known to induce NLRP3 inflammasome activation. ORF3 of SARS-CoV-2 is also significantly different from the interferon antagonist ORF3b of SARS-CoV. Thus, these viral proteins of SARS-CoV and SARS-CoV-2 should be compared for their abilities to modulate antiviral and proinflammatory responses. The hypothesis that SARS-CoV-2 might be less efficient in the suppression of antiviral response and the activation of NLRP3 inflammasome should be tested experimentally.

2. When (date) and how (e.g. official correspondence, phone call, social media) did you learn about key information, alerts or recommendations from global or regional bodies?

The official name of how I learnt more about the key information about global covid-19 is on the popular platform in Nigeria such as NCDC, Know Covid-19, some health NGOs, CNN, Al-Jazera, Worldometer, some science research social media platform and so on. The Recommendation learnts have been so useful that I use some to draft a research know as "Change in Nigerians attitude towards covid-19". I learn a lot of implementation, actions, response, strategy and how they handle different cases Im different countries.

3. What actions were taken by your country, and when, to mitigate the impact of COVID-19?

There are many actions taken by my country (Nigeria) in order to reduce the mitigation of Covid-19 in the country.

From the moment the first case was reported in Nigeria, the Nigerian government and its different agencies initiated several health, economic, security and social responses to contain the disease and its impact on society. One major response is the government-funded N500 billion COVID-19 crisis intervention fund, and enhanced support to states for critical healthcare expenses.

Responding to the outbreak has required the involvement of multiple government institutions and development partners. Highlighted below are some of the key measures Nigeria put in place to respond to the pandemic since the first confirmed case was identified.

Setting up the Presidential Task Force: The Federal Government of Nigeria

The Nigerian Presidency provides leadership for policy direction and activities of the various Ministries, Departments and Agencies (MDAs). With the COVID-19 outbreak, the full machinery of the presidency was deployed in response to the outbreak. The president first banned flights from countries with high rates ongoing transmission of COVID-19 on March 18, 2020, and five days later, announced a total closure of the nation’s airspace and land borders.

President Muhammadu Buhari also announced that federal government grants would be given to fight COVID-19, with NGN10 billion given to Lagos State, as it had the country's highest number of confirmed COVID-19 cases, and a five billion naira special intervention fund to the Nigeria Centre for Disease Control (NCDC), the agency responsible for supporting states in the COVID-19 response, coordinating surveillance of the disease and the public health response nationwide. The NCDC has been developing guidelines and protocols and supporting the accreditation of more laboratories across states in Nigeria.

The Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development was tasked with implementing palliative measures across the country. Some of the measures included the disbursement of four months grants of N20,000 to the poorest households in various states, donation of food items to state governments for onward distribution to citizens and continuation of the school feeding program by giving more than three million households food items through the primary schools their children are enrolled.

On March 9, 2020, the president constituted the Presidential Task Force (PTF) on COVID-19 chaired by the Secretary to the Government of the Federation (SGF), Boss Mustapha, with membership from various MDAs. Since then, the PTF has coordinated a multi-stakeholder response to the pandemic, while providing technical and material support to states to manage the outbreak. The PTF also serves as an advisory body to the president on specific decisions such as imposing and lifting lockdowns and provides daily feedback to Nigerians on the work being done to contain the pandemic through daily media briefings with journalists. Some of the members of the PTF include the Ministers of Health, Foreign Affairs, Information, Humanitarian Affairs, the Director General of NCDC. Dr. Sani Aliyu was appointed as the National Coordinator of the Presidential Task Force on COVId-19.

Furthermore, the PTF coordinates material support from the private sector to the government. The task force recently received a donation of a 300-bed capacity isolation center at the ThisDay Dome donated by Sahara Energy Group and ThisDay Media to assist in the management of confirmed COVID-19 cases. With support from the United Nations (UN) country office, the presidency also set up a COVID-19 basket fund to mobilise resources from various stakeholders for effective response to the pandemic. To better mobilise financial support from businesses, humanitarian organisations and individuals, the President also approved the restructure of the Treasury Single Account (TSA). The Minister of Finance, Budget & National Planning, Zainab Shamsuna Ahmed, said the restructuring involved creating flexibility and building coalitions with banks, while maintaining the sanctity of the TSA.

The PTF has functional similarities with the United States' Corona Virus Task Force, chaired by Vice President Mike Pence, and is the link between the Nigerian presidency and various MDAs, states and citizens in the fight against COVID-19. The PTF is valuable in providing policy direction for this fight. They have been able to provide specific guidelines to various agencies and have facilitated interactions with the international community on Nigeria's behalf.

Responding to the COVID-19 Pandemic: The Federal Ministry of Health

The COVID-19 pandemic is a public health emergency, therefore, the public health response to the outbreak rests with the Federal Ministry of Health (FMOH) under the leadership of Dr Osagie Ehanire.

However, the COVID-19 response has also required a multi-stakeholder, multi-agency collaboration as other relevant MDAs have been incorporated in to contribute their expertise to the response. The FMOH activated a National Emergency Operations Centre (EOC) for COVID-19, which is domiciled at the NCDC. The EOC is leading the national public health response to the COVID-19 outbreak in Nigeria, and is made up of different teams (pillars) responsible for different areas of the response, such as risk, communication, infection prevention and control and case management, with state EOCs leading the response at the state level. The FMOH through the NCDC has led the risk communications, producing health promotion materials in different languages targeting various groups including religious and traditional leaders, as well as self-isolation guidelines for males and females.

The Nigeria Centre for Disease Control (NCDC) is the Federal Ministry of Health (FMoH) agency tasked with responding to infectious disease outbreaks. Other agencies of the FMoH such as the National Institute for Medical Research (NIMR), National Institute for Pharmaceutical Research and Development (NIPRD), and National Agency for Food, Drug Administration and Control (NAFDAC) are also integral parts of the COVID-19 national response by developing and expediting processes for testing and validation of claims of pharmaceutical interventions for COVID-19. The National Primary Health Care Development Agency (NPHCDA) is also providing training and guidance to primary health care teams to ensure continuous provision of services by PHCs in communities during the pandemic.

Testing, Training, Protocols and Surveillance: The Nigeria Centre for Disease Control

The mandate of the NCDC is to prevent, detect and respond to threat of infectious diseases in the country. The agency had over the last few years, built systems and structures to help them to effectively carry out their duties.

Expanding COVID-19 Testing Capacity

One of the first things the NCDC did even before the first case was training staff on molecular diagnostic capacities. This happened with support from Africa Centre for Disease Control in Dakar. This was followed by setting up of Emergency Operation Centre and network of molecular diagnostic laboratories across Nigeria to increase the capacity for diagnosing COVID-19. The Director of the National Public Health Reference Laboratory in the Federal Capital Territory (FCT) noted in an interview with Nigeria Health Watch that having established molecular diagnostic capacity was instrumental in being able to quickly develop the capacity to diagnose COVID-19. Since February 2020, Nigeria has significantly increased its molecular laboratory network for COVID-19 testing, from two as at February 27 to 28 fully functional laboratories in states across the country. The collaboration between NCDC and state governments, as well as private sector partners such as 54Gene, EHealth Africa, Shell Petroleum and Development Company of Nigeria (SPDC) and Dangote Foundation, amongst other partners, was instrumental to the expansion of the COVID-19 testing capacity.

This resulted in better coordination that enabled better collection and a better, faster testing process. In addition to the samples being collected from people who meet the case definition, active case finding was implemented in communities to identify potential asymptomatic transmitters.

Facilitating Training

The NCDC aggressively improved staff capacity in advanced diagnostics, disease surveillance and response. They also supported states to train public health workers, set up systems for efficient epidemiological data collection and sharing and established Emergency Operations Centres (EOCs) for effective coordination of the response to infectious disease outbreaks. The NCDC is also training health workers on infection prevention and control protocols, sample collection and effective management of COVID-19 patients. These trainings happen both in-person and virtually. In addition to training community groups such as religious and traditional leaders on risk communication in communities across the country, the NCDC risk communications teams also conducted training for military and paramilitary personnel, which will go a long way in making sure people know how to protect themselves, families and colleagues from the disease. These training helped increase the capacity of health professionals to detect COVID019, as well as increased awareness and compliance with the NCDC's #TakeResponsibility Campaign amongst various groups. Rapid case detection played an important role in the early identification and diagnosis of the index case.

Communication for public engagement and surveillance

The NCDC is also coordinating surveillance for the disease, supporting states to carry out contact tracing, collecting and testing samples from suspected cases, and supporting the establishment and accreditation of isolation and treatment centres.

Communication plays a significant role in COVID-19 surveillance by monitoring general conversations and engaging with the public. This is referred to as Event Based Surveillance and made possible by the NCDC Connect Centre. The centre manages the NCDC toll-free line, WhatsApp and SMS platforms.

As part of its risk communications activities, the NCDC in collaboration with other organisations has produced and shared multimedia content, including videos, infographics, and audio jingles, in various languages, targeting different demographics. This has helped increase awareness about COVID-19 and enlightened many Nigerians on how to protect themselves and stay safe. Beyond providing quality information, the communication efforts have actively addressed misinformation and fake news which has been very common since the outbreak started. These efforts have largely leveraged on technology, including automated WhatsApp messages, a dedicated website, and regular online live sessions, with support from social media platforms and Nigerian telecommunication companies sending public health messages to their customers.

The NCDC risk communications pillar has also distributed messages to media platforms across the country and commenced training of journalists and media houses on understanding the technicalities behind reporting on COVID-19.

Funding the COVID-19 response

According to the federal government of Nigeria, it will require $330 million to procure medical equipment, personal protective equipment, and medicines for COVID-19 control. The government has

committed to investing some of this amount, and financial commitments were also made by private, bilateral, and multilateral institutions to raise the remaining funds. The Nigerian state oil company has pledged $30 million for the government's COVID-19 efforts. The European Union has contributed 50 million euros to the basket fund to strengthen the Nigerian COVID-19 response. In addition, the private sector in Nigeria, after being called upon by the governor of the Central Bank of Nigeria, established The Coalition Against COVID-19 (CACOVID). It was launched on March 26, 2020 to help the government to control COVID-19 in Nigeria. CACOVID has raised over $72 million, which will be used for the purchase of food relief materials and to provide medical facilities and equipment in different regions of the country.

The IMF approved $3.4 billion of emergency support to Nigeria to tackle the economic impact of the pandemic. In addition, in order to alleviate the macroeconomic situation triggered by the sudden fall in oil prices, the Nigerian government has borrowed $4.34 billion from the domestic stock market to finance its budget. The Nigerian government also plans to borrow another $2.5 billion from the World Bank and $1 billion from the African Development Bank.

In addition to mobilizing additional funding, the government should also increase the efficiency of its response to the pandemic. Making sure that regular health programs remain well-funded is even more important. For example, immunization financing must be maintained; drops in immunization will have profound long-term impacts. The crisis is also an opportunity for overall integration of health programs.