THE NIGERIAN ACADEMY OF SCIENCE

Operational Research in Nigeria's Public Health Emergency Response: Lessons from COVID-19

Policy Brief

Introduction

The ongoing COVID-19 pandemic has highlighted the urgent need for improved public health emergency preparedness, and research is integral to achieving this. Operational research is any research producing practically usable knowledge (evidence, findings, information) which can improve the implementation (e.g. effectiveness, efficiency, quality, access) of a plan or program (WHO, 2008). Operational research is one of the approaches for identifying solutions to problems that limit program quality and efficiency, as well as for evaluating the effectiveness of interventions, for possible scale up. In essence, it provides decision-makers with evidence to enable them improve the performance of policies, programs, or interventions.

Key messages

- ***Increase domestic funding for public health research***
- ***Establish technical protocols for research in emergency situations***
- ***Institutionalize mechanisms for preparedness and response to public health emergencies***
- ***Make public health data available in the public domain***
- ***Create an enabling environment for quality research and development in Nigerian universities and research institutes***
- ***Establish surveillance systems for data collection, analysis, and monitoring of trends for policy making***
- ***Promote collaboration among relevant stakeholders***

The Importance of Operational Research in Public Health Emergencies

Research is important in public health emergencies as it provides an accurate understanding of the situation. Even more critical is the need for locally/nationally generated data, which speaks to the national context, and is more relevant. A case in point is the COVID-19 pandemic, where early research, and subsequent recommendations on health interventions in Nigeria, were generated from the United States and European

countries. Some of the 'imported' recommendations were difficult to implement in Nigeria, and many other West African nations, as the socio-economic contexts were much different. This was the case with lockdowns which were/are globally used as control measures but have been challenged in Nigeria and other African countries, given the sheer number of daily income earners, and the inability of governments to ensure adequate palliative measures.

Rationale for the Stakeholders' Forum and Overview of its Objectives

The epidemiological pattern of COVID-19, and the need to customize evidence-informed control policies have shown the importance of developing the capacity to carry out research in the midst of such a health emergency. It is therefore necessary to address challenges in existing research frameworks and so, contribute to developing the capacity of Nigerian scientists to conduct operational research in health emergencies. It is for this reason that key stakeholders - including public health experts, representatives from universities and research institutions, and policymakers from relevant government departments and agencies - were convened in a meeting organized by the Nigerian Academy of Science (NAS). With support from the US National Academies of Sciences, Engineering, and Medicine, a Stakeholders' Forum on *Operational Research in Public Health Emergencies* was held. The rationale for the meeting, which held on Tuesday, 22nd March 2022, in Abuja, Nigeria, was to examine the important COVID-19 research done by the Resolve to Save Lives (RTSL) consortium, and tease out lessons that are applicable to the research landscape in Nigeria. Specifically, the meeting objectives were to:

- Review RTSL survey methodology for COVID-19 research in Nigeria, with a view to strengthening existing frameworks/protocols for operational research in health emergencies
- Identify areas of strengths, weakness, opportunities, and threats in the existing research frameworks/protocols, using the response to COVID-19 as a case study
- Propose recommendations for strengthening Nigeria's capacity to conduct operational research during, and in between public health emergencies.

Current Approaches to Operational Research in Nigeria's Response to COVID-19

Research in Nigeria's Response to COVID-19

Nigeria's response to COVID-19 weighed on subnational research collaboration among agencies such as the National Primary Health Care Development Agency (NPHCDA), Nigerian Institute of Medical Research (NIMR), academic institutions, health facilities, and others, with additional collaboration with international agencies such as the United Nations and World Bank. Bringing all the collaborators under the umbrella

of the Nigeria COVID-19 Research Coalition (NCRC), the Nigeria Centre for Disease Control (NCDC) played the coordinating role.

Despite the challenges of shortage of trained personnel, poor data collection and management structures, inadequate health research infrastructure, and poor funding, Nigeria recorded relative success in integrating scientific research in responding to COVID-19.

Prior to the COVID-19 pandemic, the NIMR had sent several research fellows to the Chinese Center for Disease Control and Prevention, and the Institute Pasteur, Dakar, Senegal, as part of collaborative arrangements for training in molecular diagnosis and pathogen identification techniques for emerging and re-emerging infectious diseases, and to acquire more skills in the use of next generation sequencing. Upon return, they had obtained several skills including primer design for the identification and diagnosis of viruses, targeted and whole genome sequencing, and next generation sequencing for the discovery of viruses and other pathogens. A virus surveillance team was set up in November 2019 to harness these skills in preparation for any disease outbreak in the country. By the time the index case of COVID-19 in Nigeria was detected on February 28, 2020, NIMR was ready to work in collaboration with the NCDC, the Central Laboratory of the College of Medicine (University of Lagos), and the African Centre of Excellence for Genomics of Infectious Diseases (ACEGID), to undertake the sequencing of the SARS-CoV-2 from the index case (NIMR, 2020). Also, the NCDC created a national COVID-19 research agenda, as well as a national register of COVID-19 research in Nigeria.

In an attempt to improve the estimate of the burden of COVID-19 infection, seroprevalence surveys were conducted by NIMR, NCDC, and their partners in some representative states across the country including Lagos, Enugu, Nasarawa, and Gombe between September and October 2020. Survey findings showed that the rates of infection were higher than those reported through the national surveillance system (NCDC, 2021). This further helped to inform lockdown policies, and other control strategies.

Vaccine research and development (R&D) efforts are ongoing at the NIMR. Cloning and expression of viral proteins are being explored for vaccine development. Collaboration is underway with the vaccine research groups of the National Veterinary Research Institute (NVRI), National Research Institute for Chemical Technology (NARICT), and some universities (University of Jos, and Usmanu Danfodiyo University, Sokoto) to develop innovative vaccine templates for COVID-19 and Lassa fever. A new clinical observational research facility site (at NIMR) for clinical trials has been completed recently. These R&D programmes will need to be strengthened to enhance the capacity of the skilled workforce in vaccine design and development, as well as to increase international support for improved access to technology transfer.

Through effective coordination and collaboration among all key stakeholders, Nigeria can leverage on these successes to further develop the public health emergency research landscape in the country. Better and timely data are essential, moving forward. Training and retention of scientific and research capability are crucial. Surveillance that is systematic, simple, and consistent is required for data collection, analysis, and monitoring of epidemiological trends for policy making. The figure below highlights stakeholders' roles in ensuring evidence-informed policy response to public health emergencies.

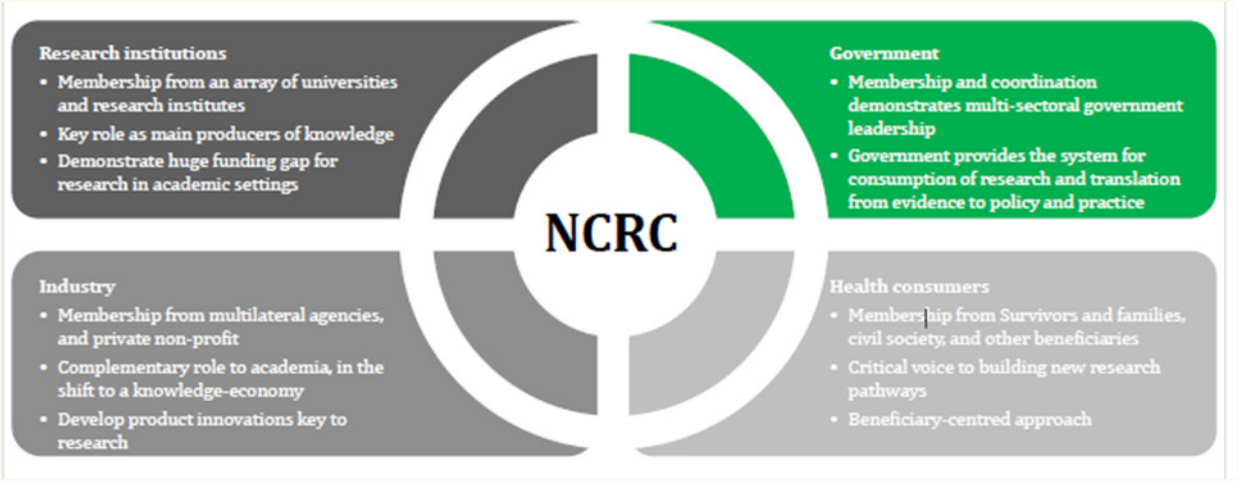

Figure 1: Stakeholders' Roles in Ensuring Evidence-Informed Policy Response: Quadruple Helix Model

Source: Nigeria COVID-19 Research Coalition (NCRC)

RTSL's COVID-19 Research in Nigeria

During the early stages of the pandemic, the RTSL gathered data (social, economic, epidemiological, and population) to help determine the acceptability, impact, and effectiveness of public health and social measures (PHSMs) for COVID-19. The data sources included country and regional briefs, reports, webinars, epidemiological and testing data, surveys, and ad-hoc government analyses (PERC, 2020). The gathered data helped to inform decisions by policymakers on adapting COVID-19 control strategies, and finding the balance between political, social, economic, and health impacts.

More recently, the RTSL Nigeria country office, in partnership with the NCDC and the Federal Capital Territory (FCT Abuja) health authority, conducted a study aimed at identifying bottlenecks in the chain of outbreak response in the FCT. Another study was done to develop a step-by-step framework for teams to use in analyzing and improving their systems of epidemic control for key response activities, including testing, case

investigation, and contact tracing. According to the report, rapid identification of cases, case investigation and isolation, and quarantine of contacts are critical interventions to contain the COVID-19 pandemic. If any step in this chain of events is delayed or incomplete, it would impact the entire system. This research (RTSL, 2021) identified three main challenges to effective COVID-19 response as follows:

- Speed: The speed of testing, case investigation, contact elicitation, and tracing play a major role in the containment and control of the virus, specifically community-level transmission.
- Scale and prioritization: Rapid increase in cases during surge periods can lead to testing delays, and exceed the capacity of public health workers to complete case investigations, obtain information on contacts, and conduct successful contact tracing.
- Completeness: Case investigation and contact tracing can only reduce the rate of disease spread significantly if a substantial proportion of cases are diagnosed, a large majority of their contacts are followed up, and both cases and contacts effectively self-quarantine or self-isolate.

Based on the RTSL's findings, key steps for quality improvement in pandemic situations include:

- Assemble and train response teams, including players involved in testing, case investigation, and contact tracing
- Define and measure impact indicators, as well as monitoring and reporting mechanisms
- Review indicators and identify areas to be improved upon
- Monitor quality improvement data routinely, identify implementation approaches that have led to improvement, and scale up
- Continue monitoring, and share best practices that improve program effectiveness

This quality improvement approach to epidemic response (through continuous performance evaluation using defined metrics) is essential to containing outbreaks, and strengthening the public health system.

Positioning Nigeria for Research in Public Health Emergencies

Given the severe public health and socio-economic implications of the pandemic, there is a need for research into effective ways to manage the disease in the short and long term. According to the World Health Organization (WHO), experience with past epidemics has underscored the importance of research as an integral element of the response to any epidemic (WHO, 2016). Ultimately, outputs from such research

endeavors need to be shared with relevant stakeholders in science, public health, and policymaking for societal application. Such outputs help to determine the most effective and efficient routes for delivering public health interventions.

Policy recommendations for strengthening Nigeria's capacity to conduct operational research during, and in-between public health emergencies include:

- There is urgent need to increase domestic funding for public health research, and stop over-dependence on foreign funding. It is important to 'build a business-case' for research, so that potential donors are encouraged to provide funding. Also, research activities should be prioritized, taking into account relevant societal needs
- Relevant agencies like the National Bureau of Statistics (NBS) are to ensure that health data is made available in the public domain
- Nigerian research institutes need to be competitive, prepared, and re-positioned for growth in research and development
- Researchers in Nigerian universities need to undertake research that is relevant to the society
- Training and retention of scientific and research workforce are crucial
- There is a need for transparency and accountability, on the part of researchers, in the collection of reliable and timely research data, and communication of the data. Summaries of research should be made available to the public and researchers should be trained on how to communicate research findings in a manner that can be easily understood and used by policymakers
- Surveillance systems should be systematic, simple, and consistent, thereby facilitating data collection, analysis, and monitoring of trends for policy making
- Collaboration across relevant government ministries, departments, and agencies (MDAs) increases the efficiency and effectiveness of research
- Capacity building and knowledge-transfer is important for complex research methodologies, and implementation/translational research
- There is also a need to establish technical protocols for research, to avoid starting new research protocols in the middle of emergency situations
- Mechanisms and platforms that will ensure the translation of lessons learnt, from operational research into actionable plans, for preparedness and response to public health emergencies should be established.

Conclusion

Research is a critical part of the preparedness and response activities to public health emergencies, particularly in Nigeria where they occur relatively often. It is important that research findings are translated into policies and intervention plans, based on new knowledge, and adapted to unique situations. Knowledge and experience acquired over time need to be collated as these would come in handy to address public health emergency cases.

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About the Nigerian Academy of Science

The Nigerian Academy of Science (NAS) is the foremost independent scientific body in Nigeria which was established in 1977 and incorporated in 1986. NAS is uniquely positioned to bring scientific knowledge to bear on the policies/strategic direction of the country and is also dedicated to the development and advancement of science, technology, and innovation (STI) in Nigeria. The aims and objectives of the Academy are to promote the growth, acquisition, and dissemination of scientific knowledge, and to facilitate its use in solving problems of national interest. The Academy strives to do this by:

- Providing advice on specific problems of scientific or technological nature, presented to it by the government and its agencies, as well as private organizations
- Bringing to the attention of the government and its agencies problems of national interest that science and technology can help solve
- Establishing and maintaining the highest standards of scientific endeavours and achievements in Nigeria, through the publication of journals, organization of conferences, seminars, workshops, and symposia, recognition of outstanding contributions to science in Nigeria, and the development of a working relationship with other national and international scientific bodies and academies.

As with national academies in other countries, NAS is a not-for-profit organization with a total membership (since inception) comprising 278 Fellows (who have distinguished themselves in their fields both locally and internationally), elected through a highly competitive process. Some of her members have served as vice-chancellors of universities, directors-general of government parastatals, and ministers in federal ministries. The Academy, given its clout, also has the ability to attract other experts from around the country and internationally when needed. NAS is Nigeria's national representative on such bodies as the International Science Council (ISC – the umbrella body for all science associations and unions) and the Inter-Academy Partnership (IAP – the umbrella body for all national science academies globally). The Academy is a member of the Executive Committees of IAP for Science, IAP for Policy, and IAP for Health and a founding member of the Network of African Science Academies (NASAC).

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