Science-policy Interface in the Pro-poor Response to COVID-19 in Africa: Lessons for post-pandemic planning

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Science-policy Interface in the Pro-poor Response to COVID-19 in Africa

Lessons for post-COVID planning

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Abstract

There is growing evidence on the role of science in political processes to shape policies that respond to societal needs. This requires that adequate attention is paid to the science-policy interface, particularly dialogues between scientific, technological communities as well as the policy process. This supports the goal of the science-policy interface to jointly develop evidence-based solutions for various societal challenges. Yet, this interface is multifaceted, with various models pursued in different contexts posing varied outcomes, especially for the poor who suffer most from the impacts of global challenges such as COVID-19 and other pandemics and shocks. Through questionnaire interviews, case studies, and science-policy dialogues convened during the African Research and Impact Network International Conference on COVID-19, this paper assesses the models of science-policy interface that have been applied to respond to COVID-19 in four African countries (Malawi, Ghana, Nigeria and Kenya) and the implications for the poor. Our insights reveal that the pandemic has exposed and re-enforced the traditional top-down science-policy linkages where politically aligned expert committees are set up to inform decisions on COVID-19. A plethora of decisions resulting from this expert model has widely been driven by what is happening elsewhere, narrow epidemiological trends, i.e. infection rates, and globally established narratives around flattening the infection curve but with little attention to the holistic socio-economic contexts of African communities, especially the poor. Ultimately, emergency policy directives involving lockdowns and secession of movements are not fit for purpose for most African contexts. These have caused devastating impacts on the poor, including loss of jobs, loss of businesses, gender inequalities, and overall long-term poverty. In responding to the emergency directives and in the bid to survive, local communities in the four African countries have developed new survival strategies and locally driven solutions to counter not only the health effects of the pandemic but also the socio-economic impacts. Some of the solutions present spaces for home-grown innovation and opportunities for bottom-up science-policy models that are pro-poor in the face of COVID-19.

Keywords: COVID-19, COVID-19 response, science-policy, pro-poor planning, Africa

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1. Introduction

The COVID-19 pandemic presents a great global challenge with detrimental health and socio-economic impacts. In Africa, since the beginning of the pandemic, there were concerns from the World Health Organization (WHO) and other commentators that the pandemic could spread and cause greater damages owing to the continent's weaker research/information systems as well as unstable socio-economic safety nets (OECD, 2020). This concern has been severe for most informal settlements in Africa's cities, where the majority are poor and lack access to basic amenities such as water, sanitation, and even information to support the required behavioural change against the pandemic (ARIN, 2020b).

While the continent has recorded relatively low infection cases and deaths to date than had been anticipated, the experience of the continent reveals that there is a huge opportunity for the continent to boost its resilience to future pandemics through strengthening the science-policy interface across multiple levels. More particularly, resilience can be strengthened by supporting the most vulnerable groups in society who are at high risk of such pandemics. In the context of this paper, the science-policy interface is defined as an intersection between science and policy where scientific knowledge is the main input for policy-making and where science is called upon to develop solutions for societal problems (Killen, et al., 2020; van den Hove, 2007). Science is understood broadly as the application of knowledge through research, technology, various forms of innovation, and types of knowledge (both tacit, codified, and indigenous) (Hanlin, et al., 2021). We draw from earlier work by Martin (2019; 2012), who deciphers the development of science-policy work to reflect current development characterised by the terms 'innovation', 'technology', 'research and development'. We argue that the role of the science-policy interface is critical in driving both technological and innovation processes, including societal outcomes. Innovation in this paper is understood as the technical, social, and economic process that leads to the translation of ideas, new products, and processes to create value and purpose (Fagerberg, 2004; Kraemer-Mbula & Wamae, 2010). We emphasise the need to pay attention to the science-policy interface dialogues between scientific, technological communities as well as policy processes. While scientific evidence[1] is one of the strategic inputs for policy-making (Gluckman, 2016, p. 969), it is not the only one, as diverse forms of knowledge and multiple actors (Caraça, et al., 2009) exist. Therefore, science[2] provides useful evidence on what works or not in a manner that informs decisions that aligns with the needs of society and particularly the poor. Throughout Africa, the pandemic has invoked various policy responses – both emergency and long-term policy priorities informed by different forms of evidence spanning across various knowledge sources.

[1] A wide variety of information at different stages of a decision-making process that incorporates both hard research and context-specific analysis, findings from systematic, replicable and objectively conducted observation, measurement and experimentation to support policy processes and ensure policy is based on "what works".

[2] "All forms of knowledge across the science, technology, engineering and mathematics (STEM) fields as well as the equally important fields of the social sciences, arts and humanities" (Hanlin et al., 2021). The authors indicate that science covers all types of knowledge, including indigenous knowledge.

Depending on the type of evidence and the way in which particular evidence is used, the resulting policy decisions could trigger different outcomes for various groups of people and particularly the local communities who already face multiple vulnerabilities from existing challenges such as poverty and poor access to quality health services. Yet insights from scientists and policymakers during the 2020 ARIN International Conference on COVID-19 and lessons for research and policy indicate that the science-policy interface is not a straightforward process. It is complex and characterised by multiple negotiations, including political interests, methodological preferences, regional and global politics and narratives, thus the need to understand better how this interface manifests to implicate decisions and actions, especially for the vulnerable and relatively voiceless groups in the society (ARIN, 2020a).

Across various African countries, the modalities of the science-policy interface vary, marked by both "formal and ad hoc structures" (UNDESA, 2020). African countries have witnessed various innovative pathways through which science is deployed to respond to COVID-19, including rapid response and surveillance, diagnostic, clinical characterisation of cases, trend projection, variate detection and lately vaccine development. Similarly, solution-oriented innovations have been witnessed in various contexts, especially at the grassroots, to support behavioural change (e.g. handwashing, social distancing, wearing of protective coverings, etc.) that have also informed public policy response strategies. More broadly, we have seen the emergence of various forms of science-policy processes such as intra-African research collaboration and dialogues, which include transdisciplinary practices (e.g. constitutions of national committees across sectors to help in emergency response) and wider engagement to resolve divergent views to find collective solutions and to learn as well. The pandemic has also opened new consciousness around rethinking research agendas with societal solutions (Lambert, et al., 2020) and ways in which African researchers can play a larger role in meeting the growing demand for evidence.

Despite the progress made in the realm of COVID-19, African countries still struggle with appropriate knowledge to trigger solutions but also efforts both at the national and at the international level remain challenging. In the African context, lack of evidence, data gaps, insufficient time and resources to test the evidence to establish what works, and lack of interactive evidence platforms are challenges that impede progress in strengthening the science-policy interface (Ruggeri, et al., 2020). Even where systems exist and are established to support this interface (e.g. existence of science experts and science advisory systems), complexities still manifest in ways that necessitate learning and improvement (UNDESA, 2020). These lessons learnt from tackling COVID are critical and posit useful opportunities for the continent to pursue, query, and invoke effective science-policy interfaces beneficial to the poor.

This paper aims to use the experiences of COVID-19 to identify some of the challenges and opportunities that African countries face in using science to inform policies that are beneficial to the poor based on case studies from four African countries. The case studies are part of the initiatives that the Africa Research and Impact Network Fellows have been documenting from November 2020 to July 2021, focusing mainly on; how scientific evidence has been used to respond to the COVID-19: how this evidence has driven an evolution in the

practice of science-policy activity; and how this evolution reflects innovations by actors in science-policy interfaces to inform effective future policies focusing on education, clean energy, health, and agriculture/food systems sectors in the respective countries.

The paper proceeds as follows; the next section provides a theoretical understanding of the science-policy interface based on the literature reviews. Section 3 outlines the methodology employed in this study, while section 4 applies the theoretical understanding to assess Africa's policy response based on case studies from four countries and the implications for the poor. In the last section, we build on stakeholder insights and discussion to identify opportunities and lessons for a more pro-poor science-policy interface. We conclude by identifying the gaps that this work revealed and how this can be taken forward.

2. Models of science-policy interface

A number of models on science-policy interface are discussed in the literature. The "science and power model" identified where individual scientists are considered the voice of the scientific community (Doubleday & Wilsdon, 2013). Their role is that of brokerage (UNESCO, 2011) and intermediary functions between science, technology, and innovation, and the political side of decision-making (Wyborn, et al., 2017). While they can be powerful actors in supporting and providing legitimacy to the various solutions, they could skew solutions and emancipate subjectivity becoming bi-partisan (Stirling, 2014). This model is largely applied in experimental fields where scientific design and control experiments to develop solutions to particular societal challenges.

New schools of thought are also emerging, identifying the "expert model", a delegation model where science comes up with answers and the politicians/decision-makers take the answers up (Gluckman, et al., 2021; Koetz, 2011). Scientists carry out scientific research and applied science to come up with a menu of options, and the decision-makers choose the decisions to implement. Various international organisations and agencies employ such models and are usually the "experts" providing solutions to be taken up by the political class – the decision-makers. What this model omits is multiple sources of evidence, including other types of knowledge such as indigenous knowledge (Diver, 2017). The assumption with this model is that the expert has experience and knowledge, thus a deeper understanding of the problem at hand.

Other models include "the model of two worlds", where the scientists (also referred to as researchers) and decision-makers have divergent views (Wyborn, et al., 2017). While they may be focused on solving similar sustainability challenges, their approaches, agendas, and suggestions are completely different. Their approaches and evidence are often misaligned (Wyborn, et al., 2017).

The "pragmatic model" has been developed following Habermasian theory and considers the nexus between "science and politics", opening up to a diversity of views (UNESCO, 2011). Policymakers and scientists/experts are considered co-developers/joint owners of the solutions. Emerging schools of thought define this as a pluralistic model. Here, research

and various forms of knowledge, including tacit and local knowledge, are included for decision-making (Soomai, 2017). In their study Turnheim, et al. (2020) note that developing science-policy interfaces, which they termed as science-policy interactions, require organisational adjustment towards knowledge types and partnerships to have wider engagement. Wesselink, et al. (2013) make a clear distinction between the types of knowledge brought in by the experts and scientific knowledge. They prefer to use 'expertise' rather than 'scientific knowledge' as they argue that the source and character of knowledge used in policy-making varies. Their argument is that expert knowledge includes tacit and experiential knowledge that draws heavily from technical contextual knowledge "to deal with the uncertainty of scientific knowledge" (Wesselink, et al., 2013 p.2).

While these models are well developed and support policymaking through a science-policy interface, none of these models explicitly emphasise the aspect of inclusivity or address the voices of marginalised and poor communities. Integrating the needs of the poor and marginalised in the science-policy interface is gaining recognition in emerging concepts such as the science-policy-society interface (Liberatore, 2001). Balvanera, et al. (2020), Leach, et al. (2020), and UNDESA (2020) have called for the inclusion of diverse views, diverse types of knowledge, and integration of the stakeholders and policymakers to deliver both scientifically and socially relevant outcomes. Given the context-specific nature of challenges, co-construction of more sustainable pathways by the science-policy interface with the inclusion of diverse stakeholders is key (Balvanera, et al., 2020). However, inclusion is broad and could imply inclusion in the processes, views, and decision-making, including at the conceptualisation phase of the processes.

As Taylor and Dewsbury (2019) outline, the process may mean engagement in the language, a "discussions around what engagement means and for whom, as well as what forms of engagement are needed to ensure that diverse voices are included, heard, and served by these deliberations" (p. 12). An engagement with the marginalised voices through civic involvement and learning may support the transformative role of science and policy communications (Scheufele, et al., 2021). This supports inclusion in two ways; science that gathers evidence from those it seeks to address; and developing targeted solutions to marginalised voices. Paying attention to local knowledge and cultural issues might open up new opportunities for policy processes to address (Leach & Scoones, 2013).

3. Methodology

3.1. Conceptualisation of the science-policy interface

The science–policy interface is understood as a social process that comprises relations between scientists and other actors in the policy process. It is an intersection between science and policy where scientific knowledge is the main input for policymaking – science is called upon to develop solutions for societal problems (Killen, et al., 2020; van den Hove, 2007). Science and policy as two domains comprise different stakeholders often supporting co-evolution of knowledge and evidence for decision-making. These systems often have various missions, objectives, and logic (Zondervan, 2006) that are divergent or convergent.

But more often than not, they interact to support decision-making and policy choices that address complex societal challenges.

These interactions support collaborations between policymakers and science for the purposes of informed, evidence-based decision-making (Killen, et al., 2020). Zondervan (2006) argues to the contrary, postulating that the science-policy interface does not exist, and if it does, there is no clear-cut distinction between science and policy. Instead, the processes complement each other. Science needs to understand the perspective of those utilising the insight, that is, policymakers, and, therefore, a more collaborative approach to evidence-based decision-making is required (Killen, et al., 2020; Leach & Scoones, 2013; Ruggeri, et al., 2020). Other scholars have observed that the interface is usually uni-directional but could potentially involve interactivity between and among scientists and experts (Daly, 2016; Killen, et al., 2020). They argue that it is a linear model where policy-making is framed as a problem-solving challenge where knowledge is produced to contribute to use and is usually based on scientific knowledge. Wesselink, et al. (2013) reinforce the non-linearity of the science-policy interface by emphasising that science usually introduces new ideas and provides ammunition in political arguments.

With the COVID-19 pandemic, urgent and robust inputs in scientific research in epidemiology, behavioural science, drugs and vaccines development, and prevention of spread are needed to support response and recovery strategies. The urgency of solutions has been argued as a basis for a linear model of the science-policy interface. In fact, Vallejo and Ong (2020) mention that in a crisis, research protocols and timescales differ from the usual practice of science, calling for various methodologies such as rapid evidence synthesis (see, for example, the Cochrane rapid review method). A trade-off between rapid response and a more holistic approach integrating politics, narratives, and policy is needed (Leach & Scoones, 2013), broadening the focus to a diversity of experts and grassroots voices (Vallejo & Ong, 2020).

Therefore, the key question is how to move away from a linear model of science–policy such as the “science and power model” and the “expert model” towards a science–policy interface that fosters plurality of models and dynamic interactions between processes of knowledge production and decision-making especially during emergencies such as COVID-19. There is a need for a science-policy interface that allows for knowledge exchange and co-production between researchers and decision-makers and consultations with the rural poor to ensure that the poor are central to providing the needed backstopping of policies (Scheufele, et al., 2021; van den Hove, 2007). As such, co-production and inclusive dialogue supported models are central (Balvanera, et al., 2020) to create awareness of societal challenges and needs of the poor and most vulnerable to emergencies (Sarkki, et al., 2019).

It is worth noting, however, that the approach of the science-policy interface is contextual and varies at different scales – and this determines the outcomes of particular science-policy interfacing. At the local level, the objective might be to inform local rules or relationships, and this could mean a relatively low scale of intersection and application, including negotiations and translations of scientific evidence. In many cases, the process of scoping scientific evidence relevant to the local context has meant intense knowledge

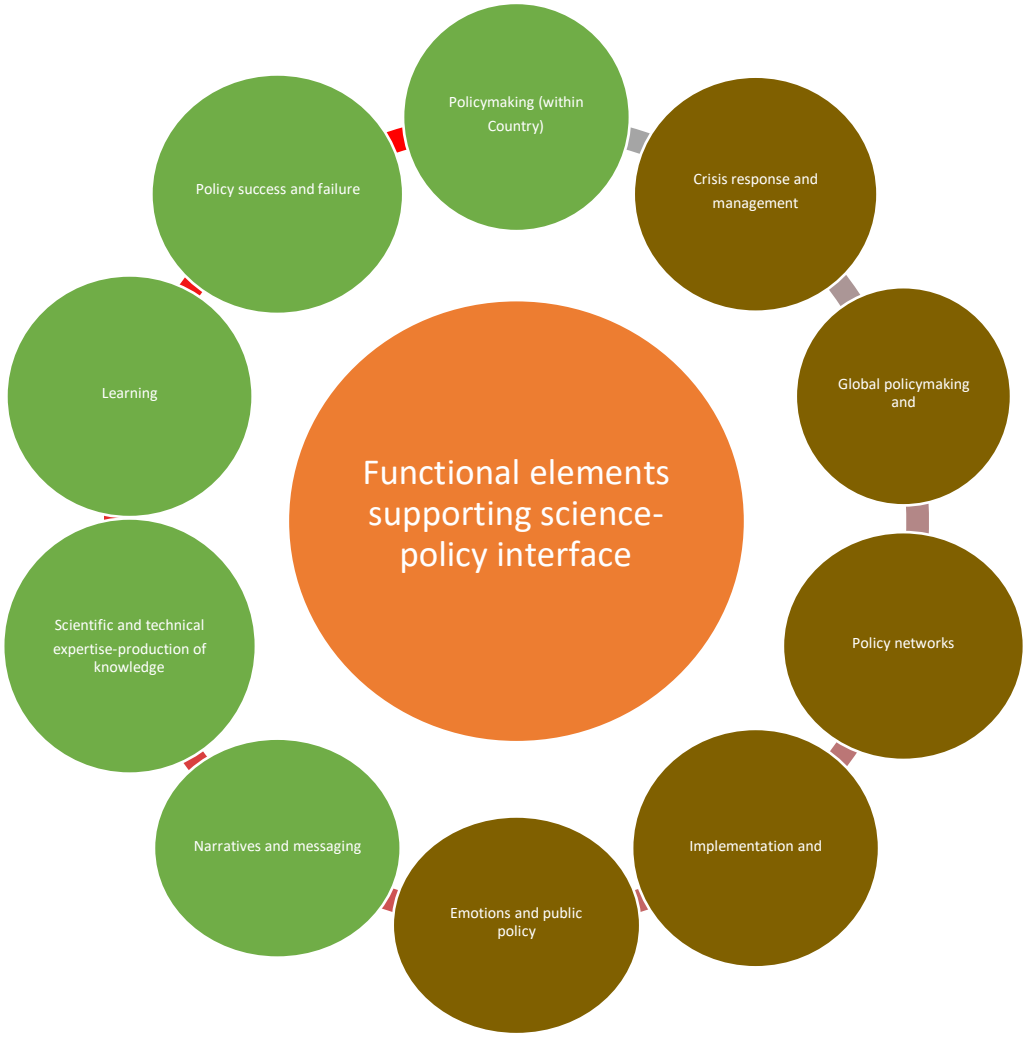
deductions with the potential exclusion of some voices. At the national level, it may inform national legislation and policies where knowledge and decisions can be quite general with little differentiation of voices, while at the international level, it may relate more to various international commitments/agreements where knowledge and decisions can be infiltrated by international political and trade interests (von Maltitz, 2020). What this implies then is that at these different scales and contexts, the instruments and models for the science-policy interface and associated implications vary, although the goal is always to support decision-making in policy processes (von Maltitz, 2020). There is a need to explore the contextual nature of the science-policy interface, how the interactions of the local, national and international scales in decision-making occur, and the outcomes for various groups, especially the poor who require support most during emergencies like the COVID-19. We attempt to provide some broader understanding of the models of the science-policy interface expounding "role of science, evidence and the expertise" (Leach, et al., 2021, p. 9) and their applications at different scales.

In this paper, we have tried to understand and conceptualise the influence of science on policy and practice and how it is used to address pro-poor issues and challenges through various country's case studies. Pro-poor responses in this paper and in the context of COVID-19 is thought out as a process of inculcating scientific temper (and policy) at the grass-root levels and going beyond inclusion to incorporate authentic local knowledge and belief systems and traditions, and supporting the involvement of targeted groups in the science-policy interface for collective decision.

3.2. Analytical framework

We first reviewed the conceptual underpinnings on the various models of the science-policy interface. Through Google search using keywords such as 'science', 'policy evidence', 'science and policy', among others, we identified various typologies of science-policy interface and their applications, including strengths and weaknesses with respect to the African context. Additionally, this initial review enabled us to develop a framework for analysing the case studies. The literature demonstrates that the various science-policy (S-P) models chosen by the governments, whether explicitly or implicitly, are based on functional elements initially proposed by Lasswell 1956. These functional elements could include actors, processes, and interactions in the science–policy realm and recognise the fact that policy outcomes are not just about scientific and technical expertise but also encompass other social elements. Weible, et al. (2020) proposed ten categories that include: (1) national policy-making; (2) crisis response and management; (3) global policy-making; (4) transnational administration; (5) policy networks; (6) implementation and administration; (7) scientific and technical expertise; (8) emotions, narratives and messaging; (9) learning; and (10) policy success and failures. These perspectives, including emotions, narratives networks, crisis response and management, global policy-making and transnational administration, policy networks, as well as implementation and administration, contribute to policy success and failures. It is, however, worth noting that the scope of this paper could not cover all the ten perspectives; instead, we focused on three main perspectives to analyse the case studies.

Figure 1: Science-policy interface framework used for countries comparative analysis.



Source: Weible, et al. (2020).

In other analyses (see Djalante, et al., 2020), the ten perspectives have been segregated into three groupings: a) policy and decision-making; b) communication and perceptions; and c) science and learning to assess the efficacy of governance responses to COVID-19. We, therefore, build on these three groupings borrowing from Lasswell's original framework that discusses policy orientation and outlines distinct stages of the policy cycle (with ten elements as key) directed towards policy processes. We focus on how policy processes in the COVID-19 response in the case countries draw from scientific evidence to produce successes, failures, and lessons. In this case, we integrate and select a set of perspectives (Figure 1 in green) to develop three key areas of assessment that are aligned to the study objectives (Table 1 below). For each of the areas, we generated a set of four indicator questions to aid the assessment, and these were informed by insights from panel discussions on COVID-19 science-policy interface at the 2020 ARIN International Conference on COVID-19. Similar desegregation has been applied by Djalante, et al. (2020) to assess governments' response to COVID -19 in the Association of Southeast Asian Nations (ASEAN).

Table 1: Science-policy interface – perspectives and issues to consider.

Science-policy perspective	**Issues to consider/what this means**
Policymaking and co-production with scientific and technical expertise	The process of COVID-19 policy decision and the role of scientific and technical experts in policy responses with the following indications: ● How is research evidence ushered into decisions? ● What platforms are applied to engage with evidence? ● How do governments invoke scientific and technical expertise? ● Is evidence used for decisions transparently available? ● What roles have communities, especially poor communities, played in structuring decisions? ● How are the poor affected by the resulting decisions? ● How have the poor responded?
Implementation, narratives and messaging	This implies the way in which governments translate decisions into actions. The following questions were included: ● How are policy decisions communicated? ● What messaging is applied, i.e. crisis, proactive, etc.? ● How timely is the information provided? ● Which actor implements what decision?
Policy success, failure, and learning	Who is affected, and to what extent does influence frame success or failure? Success or failure judged as part of decisions, processes, and politics. It is possible to conceive of a spectrum from success to failure and possible learnings: The following questions were included: ● How is success defined and by who?/Who is involved in determining success and at what stage in the policy process? How is learning built into the policy process? ● Whose learning is considered? ● Who is vulnerable, and who is excluded? ● What lessons can be drawn from the process?

Source: Djalante, et al. (2020).

3.3. Empirical case studies

We apply the conceptual framework discussed in the previous section to the empirical insights of science-policy engagements convened by ARIN from April-November 2020 that culminated into an International Conference themed ''Africa in the post-COVID World''[3]. ARIN is a science-policy convening and learning platform bringing together over 100 researchers and policymakers across 36 African countries aimed at promoting research excellence and dialogue on best research and impact practices. The network also successfully convened one of the first science-policy engagements on COVID-19 in Africa, which brought over 200 researchers and private sector players and innovators to discuss

[3]https://www.arin-africa.org/the-africaresearch-and-impact-network-internationalconference-on-africa-in-the-post-covid-19- world-lessons-for-research-and-policy/

lessons that COVID-19 offers to Africa's research and policy[4]. The conference and convening involved presentations, panel discussions, and case study presentations from various African countries. The case studies mainly focused on innovations, policy responses, and the role of knowledge in responding to COVID-19, and lessons from these experiences. Building on the conference, the network is currently compiling over 25 case studies from different African countries focusing on empirical experiences on how COVID-19 has interrupted various health, social, policy, and economic systems of Africa[5]. Building on these 25 case studies, we selected four case studies, i.e. from Ghana, Kenya, Nigeria, and Malawi. The cases were selected based on their relevance to the aim of this paper, i.e. had a focus on decision-making processes in the countries. The selected case studies were further engaged through an in-depth online questionnaire to align details with the objectives of this study, especially; i) the policy-interface strategies that have been adopted; ii) how such focus has supported pro-poor response and addressed concerns around inclusion; iii) how the four countries have leveraged on the science-policy interface to inform both emergency, medium, and long term response to COVID-19 and planning post-COVID; and iv) the lessons thereof. A comparative matrix was applied to compare the various insights from the countries.

4. Results and discussions

4.1. Comparative analysis of country-specific responses

This section maps the divergent government responses taken by individual countries and discusses these in terms of policymaking and co-production with scientific and technical expertise and local communities, messaging and narratives, and policy success, failure and learning. Generally, all the countries analyses have continued to rely on border closures, travel restrictions, communication and behavioural changes, including working with science advisory systems to provide a more evidence-informed decision-making process given the high uncertainty of the virus. As such, both pre-existing models of consultations have been employed as well as newer ways of generating evidence. We now focus attention on the three areas identified and explore how the four countries have responded to the pandemic, and reflect if and how the various models have been applied. Table 2 provides a summary of findings based on the S-P perspectives and indicators assessed in the four case study countries.

[4] The Africa Research and Impact Network International Conference on Africa in the Post Covid-19 World: Lessons for Research and Policy – Africa Research & Impact Network (arin-africa.org).

[5] Building Africa's Resilience in the Post-COVID-19 World: Lessons for Research and Development Priorities. Edited by Joanes Atela and Mark Pelling – Africa Research & Impact Network (arin-africa.org).

Table 2: Comparative summary of science-policy processes and implications in four case study countries.

S-P perspectives considered	**Kenya**	**Ghana**	**Nigeria**	**Malawi**
Policymaking and co-production with scientific and technical expertise				
How is research evidence ushered into decisions?	Inter-agency communication. Expert consultative meetings	Existence of National technical Coordinating Committee functioning as presidential advisers on health consisting of former experienced workers with World Health Organisation	Presidential Task Force (PTF) consisting of public health stakeholders such as virologists and infectious disease and diagnostic experts	Public health experts support government efforts, including scientists and researchers deemed as experts. This is cascaded down to district, area, and village committees
What platforms are applied to engage with evidence?	COVID-19 Expert Committees	National COVID-19 team led by the Ministry of Health	Presidential Task Force (PTF) on COVID-19	COVID-19 Expert Committees
How do governments invoke scientific and technical expertise?	National Medical Research Centre-(KEMRI) consolidates epidemiological data. Government appoint expert team to deliberate on data to provide expert opinion	The Ministry of health provides relevant research information that is deliberated by the National Technical Committee	Federal Ministry of Health (FMOH) and the Nigerian Center for Disease Control (NCDC) are responsible for the implementation of strategies to track the epidemic, and provision of trainings to local institutions	Public health experts provide advice, and where possible public opinion informs decision-making. For example, Malawi uniquely conducted their elections even after the experts warned against it. This was decided based on a survey carried out by Institute of Public Opinion and Research (IPOR) that found that 77% of Malawians wanted elections to go ahead despite COVID-19.
Is evidence used for decisions transparently available to the public?	No – strictly managed by COVID-19 Secretariat at the Ministry of Health	Public policy is top-down from the Executive President and translated to the regional and local government levels for implementation	Through local governments, although this is coordinated with the state government	The current government has demonstrated public goodwill but yet to be determined once the government ticks one year.

Implementation, Narratives and messaging. This implies the way in which governments translate decisions into actions and included the following questions:				
How are policy decisions communicated?	Daily briefing	Daily and later translated to weekly briefings	Weekly briefings	Daily and weekly briefings
What messaging is applied, i.e. crisis, proactive, etc.?	Messages generally framed as caution, danger, warnings and on the dangers and deaths. Infection rates and number of deaths and recoveries communicated daily. Socio-economic concerns communicated once in a while through presidential address	Preventative measures, wearing of masks, social distancing, keeping safe. Infection rates, death rates, new developments of the virus	Both crisis and more proactive through cash transfers raising funds, economic recovery plans lockdown orders, federal government plans	Risk communication. Community Engagement on the COVID-19 response. Countering spread of fake news on COVID-19. Encourage public to observe recommended measures for containing the pandemic. Fight stigma against suspected COVID-19 cases and promote solidarity among the general population
How timely is the information provided?	Daily briefs	Weekly through press releases	Weekly briefings through media briefings	Weekly briefings through media briefings
Who implement what decisions?	Citizens implement and policy re-enforce	Citizens, various ministries while decisions are subjected to parliamentary processes which may take long	Citizens with both federal government and national government	Citizens reinforced by key government actor; Public Communication Cluster led by Ministry of Information, Civic education and Ministry of Communications Technology

Policy success, failure and learning: Who is affected and to what extent influence frames success or failure. Success or failure judged as part of decisions, processes, and politics. It is possible to conceive of a spectrum from success to failure and possible learnings:				
What roles have communities, especially poor communities, played in structuring decisions?	Implementing behavioural change directives, sources of information, local surveillance, innovating protective kits and sanitation equipment, reporting non-compliance	Receive stimulus packages, support mapping of future scenarios and modelling to support projections of infection rates	Come up with some frugal innovations to support response mechanisms, e.g. making masks, ventilators, etc. Local surveillance, Support identification of the vulnerable	Participated in public opinion surveys to echo their voices
How are the poor affected by the resulting decisions?	Loss of jobs. Loss of businesses. Loss of social networks. Weakened representation in the decision-making space. Gender pressures and inequalities	Increase in poverty and inequalities	Increased hunger, starvation and malnutrition. Unemployment. Increased armed robbery. Gender violence. Mental health challenges	Loss of jobs. Loss of businesses. Loss of social networks. Weakened representation in the decision-making space. Gender pressures and inequalities
How have the communities responded?	Scoping for new social safety nets such as food aid. Handouts from well-wishers. Innovation and realigning enterprises to COVID opportunities	Welcomed ideas of some relief packages like free water, free electricity. Due to bad implementation of these packages and corruption, they have scouted for alternatives like borrowing, seeking support from family and friends, innovation with rudimentary activities	Public disillusioned and not keeping to the government-issued guidelines and recommendations. Looking for social support and economic support from family and friends, religious institutions, etc.	Involved in various programs and initiatives by the government. Are involved as community policing in collaboration with the public communication cluster to report gender-based violence
What lessons can be drawn from the process?	Home-grown solutions critical for building resilience to global challenges with severe local socio-economic impacts	Country's reliance on its human resource for solutions and consultations of experts to bring about solutions although the country is still public policy that is top-down	Large population in Africa but managed the pandemic through appropriate governance structures from national government to federal states	Political landscape is a great influencer in terms of the decisions made that are either pro-poor or not

Source: Authors' own.

4.2. The COVID crisis–emergence, impacts, and responses in the case study countries

The coronavirus disease emerged as a serious life-threatening health challenge that has affected nearly all the countries in the World. The number of infections and deaths are still increasing. The outbreak has greatly damaged global economic growth and caused a certain impact on the environment. Many African countries experienced a decline in economic activity and thus an impact on the country's revenues, particularly taxes (Ataguba, 2020), requiring divisive ways to manage the pandemic. This includes putting the right infrastructure to manage, treat, and contain the pandemic.

Unprecedented measures have been adopted to control the rapid spread of the ongoing COVID-19 epidemic in Africa and globally. From the time the first case was identified in Africa in Egypt and in Kenya (March 13, 2020), various governments isolated their citizens who had come into contact with the first case. As the spread continued, tougher lockdown measures were put in place. These measures included the closure of schools, places of work, borders, complete lockdowns, travel bans, ban on large gatherings, systematic quarantines, increased testing capacity, and strict infection control measures (Lone & Ahmad, 2020). As such, governments were forced to provide stimulus packages to boost their economies, including coming up with measures to support the vulnerable and poor in society. Various governments employed some income relief strategies and support to households affected by temporary workplace closures. Also, governments were forced to react due to the confounding nature of the disease and the urgency to provide response measures by providing quick evidence around this.

In all four countries, the emergence of COVID-19 presented a crisis. While countries were momentarily made aware of the dangers of the pandemic as it emerged from Wuhan into Europe and North America, most countries were reluctant to put in place measures. The detection of initial cases in the four countries sounded the alarm and sent leaders, stakeholders, and citizens in these countries into a frenzy, confusion and relatively reactive imaginations of potential consequences and search for emergency management solutions. Consequently, these countries had no other managerial choices but to copy and implement what was happening elsewhere. These included emergency warnings widely informed by the global trends and information from the WHO. For Africa, the case was made worse as WHO sent an alarming warning that Africa could be worse hit by the pandemic[6] given the continent's vulnerability to already existing shocks such as climate change as well as poverty. Indeed in these initial stages, little science was involved in supporting decisions, thus creating a very weak S-P interface at the onset of the pandemic in the four countries. This trend already raises many questions about the effectiveness of the S-P interface in the context of a crisis.

We discuss and compare the science-policy processes based on the three areas and implications from the case study countries below.

[6] https://www.bbc.com/news/world-africa-52323375

4.2.1. Policymaking and co-production with scientific and technical expertise

Although the management of COVID-19 is largely reactionary (due to uncertainties), as mentioned by a number of interviewees in all four countries, the ways in which COVID-19 response have interacted with science, policy, and practice in the countries are numerous. Some aspects of policy planning have been witnessed as the trend progresses.

As the pandemic continued to spread in the case countries, governments began to design policy measures focusing on managing the spread of the virus. As noted by Weible, et al. (2020), during times of crises, various policy pathways are tested, pursued, and assessed in order to respond to the challenge. The emergence of the S-P interface became relatively clearer in the case study countries. Attempts to characterise the above responses reveal diversity around the interactions of the science-policy across countries locally (Table 2 above). These examples provide useful ways to reflect on the contextual nature of the S-P interface and how this is very different at the regional and international levels.

An assessment of the policy planning and the roles of scientific knowledge indicate that the case countries applied a mix of expert and pluralistic policy models, especially through the establishment of expert committees and task forces under the leadership of Health Ministries. The expert committees, task forces, and presidential advisories consisted mainly of government appointees from universities and national research organisations such as KEMRI in Kenya, the Noguchi Memorial Institute for Medical Research of the University of Ghana, and Malawi Liverpool-Wellcome trust clinical research. Led by the Ministries of Health in the study countries, the committees were widely composed of medical research experts who were mainly furnished by epidemiological evidence around infection trends and recoveries.

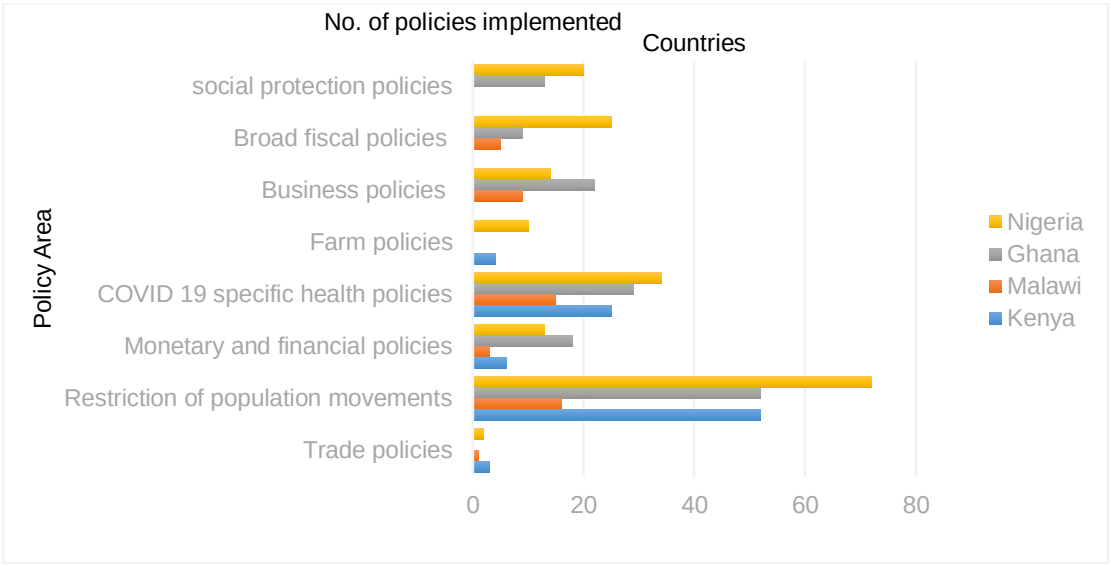
In Kenya, for example, a COVID-19 management tasks-force is in place that includes representatives of health, sub-national governments, education, and other actors, and this task force is spearheading the COVID-19 response by supporting advisory to the President. In Nigeria, the Presidential Task Force (PTF) consists of public health stakeholders such as virologists and infectious disease and diagnostic experts who study, monitor, and evaluate the development of the COVID-19 outbreak and the responses. It is similar in Ghana, where a national COVID-19 team is led by the Ministry of Health at the forefront of influencing the government in decision-making. Others include presidential advisers on health, former experienced workers with WHO, etc. In Malawi, a mix of expert committees made up of public health experts, including scientists and researchers deemed as experts, support government efforts and as a departure from the other countries, this is cascaded down to district, area, and village committees.

These committees would therefore study the trends, especially from the testing laboratories, and apply their interpretations to provide expert opinions to the government. The government would then make daily briefings and periodic adjustments of lockdowns and other decisions. In other words, the expert model of the S-P interface was predominantly applied to generate decisions that were largely harmonised with the public interest through a relatively vague pluralistic approach to managing any public uprising. It

is worth noting that at the sectoral level, however, these S-P models were employed a bit more distinctively compared to the national level processes where public image is key. This demonstrates the potential to use a diversity of options and models where solutions are required. These options can be used/complement each other and strengthen policy science practice.

A major concern has been how policy support has been mobilised through the science-policy interface to alleviate the negative impacts of COVID-19. We provide in Figure 2 (below) a snippet of policies that were introduced in the three countries, including social protection policies. These policies are in line with the international response and various policies that have a direct impact on households. The social protection policies introduced underscore the importance of supporting people's ability to respond to such crises and to enable them to adopt (Vogel, et al., 2021).

Figure 2: No. of policies implemented as of December 2020 in selected countries.



Source: Authors' own, compilation from https://www.ifpri.org/project/covid-19-policy-response-cpr-portal Accessed on March 8th, 2021.

While marred by several limitations, the expert model of policy planning has generated some progressive examples either directly or indirectly, and these could be built further. Positive progress can mainly be seen in the increased investment in health research and health systems in all four countries. In Ghana, for example, the expert committees recommended additional investments in pharmaceutical industries[7] as well as the health institutions to help flatten the curve. As revealed, these examples of modalities are working, and at the time of the interview, Ghana was recording low infection rates attributed to these investments. In Kenya, the committees have provided some expert analyses of the health systems that have led to the realisation of the need to invest in health research and systems. It was particularly noted that most of the "developed hospitals"

[7] https://oxfordbusinessgroup.com/news/covid-19-accelerates-ghanas-e-health-revolution

equipped with necessary facilities are out of reach to the local masses (Barasa, et al., 2020). This meant that people would travel to the cities to access "better health" in an array of public and private hospitals. But with lockdowns, the local government have put measures in place such as hiring more staff and equipping local level hospitals to serve the local people who would previously be left out[8]. A similar approach in South Africa through mobilisation of community health workers (Vogel, et al., 2021) has demonstrated positive progress generated by the S-P interface to the benefit of the marginalised people, an opportunity to look at how development happens and support more pro-poor led development. Further, the interaction of science and COVID-19 in policy planning in all of the four case study countries has informed various stimulus packages, dedicated research grants to support cutting edge research, including mapping of future scenarios and modelling to support projections of infection rates. Such projections have supported ideas around institutionalising measures to curb the spread of the virus, including advisory lockdowns and safe re-opening of schools and economies.

The S-P advisories have also spurred research and innovation speciality among non-state actors, including Non-Governmental Organisations (NGOs) and local communities and entrepreneurs. In the case study countries, these actors have continuously developed new products such as protective kits, as witnessed in the Kenyan small business sectors. In Ghana, the efficacy of such products has been approved by the Food and Drugs Board. In all four countries, S-P interfaces continue to inform wider drug management, vaccine development, and the generation of scientific data in all the countries to guide sector-specific strategies.

While the S-P interface and resultant policies are widely focussed on the health sector, there are some cases where this interfacing has produced broader socio-economic linkages, especially at the later phases of the pandemic. While indicators such as infection rates remained a key consideration in decisions, socio-economic considerations have been widely advocated for by a range of studies (ARIN, 2020c) and civil society groups that revealed that the pandemic is ravaging the socio-economic fabrics of communities, especially the poor. Consequently, a number of social interventions were put in place, particularly the provision of food to the poor who couldn't afford meals in various countries (Akrofi & Antwi, 2020). In Kenya, for example, free meals were provided to the poor for a certain period of time, and the Kazi kwa Vijana (Swahili for 'jobs for the youth') initiative was also rolled out to help secure unemployed youth, but this was in a number of occasions marred by unsustainability concerns. In Ghana, free water was offered during the lockdown period. While such measures were in place at crucial times, these couldn't be sustained (Amankwaa & Ampratwum, 2020), and as such, in some instances, countries were forced to re-open their economies, further exacerbating the effects of COVID-19 on the poor. What this implies is that these socio-economic policy plans were not practical (and perhaps not backed up by appropriate evidence) but were necessary to support the vulnerable. As Weible, et al. (2020) explains, uncertainties exist, and policy intents can be terminated at the government's

[8]https://www.businessdailyafrica.com/bd/news/covid-19-kenya-begins-hiring-of-6-000-more-health-workers-2285910

discretion. In other words, while some policies are terminated, others are carried forward and implemented.
Overall, while registering some achievements, the predominant expert models had multiple limitations with potentially negative implications. Firstly, interviews revealed that these expert committees were not well known to the public and would be seen alongside the Ministers and/or Presidents during COVID-19 briefings. Secondly, interviews revealed that the public had little knowledge about the role of the experts and where they draw evidence to provide opinions to the Ministers/Presidents. Most of these policies were borrowed from already developed countries that had relatively longer experience with COVID-19, while some were consultative and others top-bottom led. Lastly, it is not clear who was consulted in the process of coming up with such policies and where there were consultations, these mainly happened between experts and government officials in the Ministry of Health. Some of the resultant policies were ultimately challenged. For example, in Malawi, when the President first announced lock down measures, the civil society immediately, through the human rights commission, obtained a court injunction that temporarily lifted the lockdown[9]. The argument provided was that no consultations were carried out with the poorest and most vulnerable, implying a more societal-policy driven effort was needed. The poor for whom most of the policies are designed are often left out and, as a result, continue to be marginalised by the same policy agendas expected to protect them.

Additionally, the focus on epidemiological evidence has meant that most of the resulting decisions are driven by epidemiological aspects such as infection rates. Resulting decisions such as lockdowns, closure and re-opening of schools, places of worship, markets, and airports or easing the restrictions have been purely based on the infection rates and the narrative around flattening the curve as defined by the WHO.

Consequently, the decisions made appear to widely exclude the social and economic implications of the pandemic and especially for the poor who depend on daily wages, small business, or social safety nets. Indeed, consideration came in terms of social safety nets that were implemented to support the poor, but again, these were relatively out of media-driven advocacy[10] where plights of suffering youth, women, and children would be highlighted. At the same time, there was very little scientific evidence on what models of social protection would work for various groups. Instead, a plethora of impact assessment studies in local communities, including the informal settlements in cities, emerged to ideally build a case that COVID-19 is not just a health challenge but a broader socio-economic challenge, especially for the poor.

Part of the challenge is that the expert model of S-P is often invoked during a crisis when quick solutions are sought (Balvanera, et al., 2020). This means that the S-P process is not adequately institutionalised to enable proactive planning and the generation of evidence from a wide range of stakeholders. As noted previously, the initial phases of the pandemic were marred by panic and outright replication of responses from elsewhere, given the lack

[9] https://www.aljazeera.com/news/2020/4/17/malawi-high-court-blocks-coronavirus-lockdown

[10] https://blogs.worldbank.org/africacan/covid-19-africa-how-can-social-safety-nets-help-mitigate-social-and-economic-impacts

of prior planning. In other words, without adequate institutionalisation of an S-P model, the S-P interface becomes weak and vague. Similar cases have been observed in developed countries such as the United Kingdom, where the need to institutionalise science advice systems has been stressed (Vallejo & Ong, 2020). As an example, in one of the four case study countries, the STI Act of Kenya 2013 mentions that such advisory mechanisms will be established, but the implementation is still a challenge. This demonstrates that a number of countries are far from implementing their policies to support scientific advisory mechanisms. Perhaps this is a time to rethink and institutionalise such advisory mechanisms as they have proven to be effective and for science to provide solutions to current challenges.

4.2.2. Policy messaging and implementation

We also investigated how the resultant policies were implemented and what messaging was applied to get them through to the public. During times of crisis, it is prudent to focus on key messages and narratives to influence decision-makers or influence risk perceptions and risk reduction in the public (Weible, et al., 2020).

In all four countries, frequent briefings were adopted. In Kenya, daily briefing by the Ministry of Health was provided, especially on the infection rates and new policy decisions. These daily briefs were coupled with presidential addresses after every cycle of the curfews. A similar approach was witnessed in Ghana, Nigeria, and Malawi, where such daily briefings were translated to weekly briefings (Table 2 above). While this approach supports building confidence in the public by conveying that the government is taking the situations seriously and providing timely information (Weible, et al., 2020), the messaging, accuracy, and trust around relayed information is equally critical (ARIN, 2020a).

In all the countries, the prioritised messaging was generally framed in the context of caution, danger, and clear warnings on the dangers and deaths caused by the pandemic. The crisis framing of messaging was also driven by global perspectives relayed by the WHO warning the World that African countries could be worse hit by the pandemic owing to its weak socio-economic safety nets (OECD, 2020) – an indication of how the international policy process can influence national processes and perhaps create policy controversies. The crisis framing of messaging was often strengthened by predominant epidemiological information around rising or decreasing infection rates as well as death rates. The predominant crisis messaging was often followed by a passionate call on the citizens to embrace behavioural change and avoid behaving normally. In one famous phrase, the Kenya Minister of Health called for citizens to avoid behaving normally as the disease will treat them abnormally:

> *"Fellow Kenyans, this disease is not a joke ….If you continue to behave normally, this disease will treat you abnormally" (Hon Mutahi Kagwe, Kenyan Minister of Health)*[11].

[11] https://www.youtube.com/watch?v=tcJXU5z36zk; https://www.standardmedia.co.ke/ktnnews/video/2000186534/if-we-continue-to-behave-normally-this-disease-will-treat-us-abnormally-health-cs-mutahi-kagwe

According to stakeholders at the ARIN conference, the crisis framing and messaging of policy measures, while helpful in awareness creation, was also meant to whip emotions towards behavioural change. The citizens, including communities especially in urban areas (where the infections rate were reported), were expected to implement these measures through adhering to the government restrictions and also embracing behavioural change such as wearing masks, washing hands, avoiding crowded places, among others. In Malawi, the role of communities in implementing the policy measures was relatively enhanced through a differentiated Public Communication Cluster led by the Ministry of Information, Civic education, and Ministry of Communications Technology. Compared to the other case study countries, the Malawi communication clusters usefully tailored messaging and communication to the needs and circumstances of various groups in the society.

According to Weible, et al. (2020), effective implementation of policy during a crisis requires ideal communication targeted at relevant niches to catalyse differentiated actions with a common goal. Nonetheless, communication in most of the case study countries was largely blanket with the assumption that everyone within the countries had similar understandings of the expectations. This momentarily affected the effectiveness of the policies. The crisis framing worked well initially where everyone became alarmed, was yearning to know more about the situation and embraced homogeneously relayed information about the pandemic. However, with time, most people became reluctant to observe behavioural change. As already highlighted in the policy planning section, the homogenous messaging around infection rates dominated the communication, and with time, most communities were increasingly expecting to hear about how to manage the socio-economic pressures imposed by the lockdowns. Coupled with cases of corruption and misappropriation of COVID-19 funds, the public trust around COVID-19 policies significantly deteriorated, resulting in relatively uncertain situations.

According to Weible, et al. (2020), uncertainty in policy effectiveness can often result in termination or continuation of certain policies or even controversial measures to regain public control. The extent to which the government in this case applied controversial information or non-factual information to regain control of the process is not clear. It's worth noting, however, that we have seen new reports emerging, new waves of infection, and new variants of the virus, all of which have been used to re-invigorate policy measures and to whip the public into policy alignment.

4.2.3. Policy learning and outcomes for the poor

The study also assessed the various outcomes of the COVID-19 policies developed through the various S-P models. While a number of successes have been discussed above, here we provide some learning highlights and what implications these have had on the poor. The case study countries noted a number of learnings. Key among them is that the novelty of the virus allowed for experimentation, and as such, policy learning has brought to light the ability to understand, influence, and address complex policy issues bringing about the needed innovation. Weible, et al. (2020) mention that stakeholders dialogue are one of the ways that bring about learning as they bring about "diverse forms of knowledge – whether scientific, experiential, or value-based – into policy decision making" (p. 234).

In Kenya, learnings included the awareness of the fact that home-grown solutions are critical for building resilience to global challenges with severe local socio-economic impacts. Similar learning was reported in Ghana, where the country's reliance on its human resource for solutions and consultations of experts to bring about solutions was critical. In Nigeria, in spite of the fact that the country has the largest population in Africa, which could be more vulnerable, through pandemic governance and effective communication and coordination at national and federal governments as well as health system investment – largely informed by expertise – the country has managed to contain the virus. In Malawi, the role of enabling the political landscape in influencing pro-poor actions was underscored. These country-specific learnings indicate the contextual opportunities for profiling pro-poor S-P interface, which could be strengthened by some of the universally learning insights provided by stakeholders during the ARIN International Conference and a side event on the impacts of STI indicators in policy uptake (ARIN, 2020a)

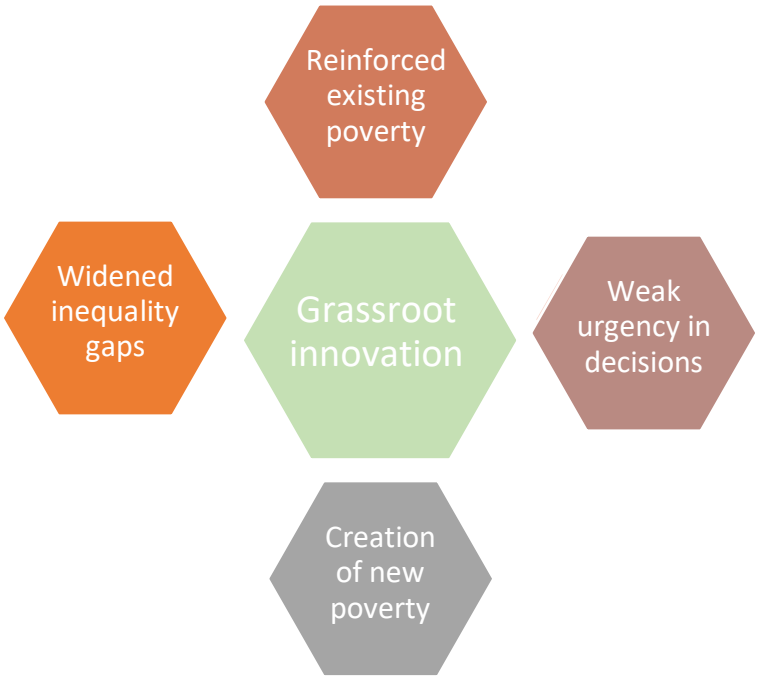
There has also been enhanced S-P dialogues and convenings both at domestic and international levels. A number of policy convenings through webinars, as highlighted in section 3.3 (empirical case studies), were witnessed and have been witnessed across the countries. These convenings are not only sector-specific but have engaged and targeted a wide coverage of the stakeholders, including diverse voices, in a bid to find collective solutions. These convenings have informed the diagnosis of the policy context and aired various policy messages. As to whether these were taken into account in the decision process is another question altogether but what we can highlight is the new sense of consciousness around dialogue and collective efforts. This has created a new sense of policy learning within countries, regionally and continentally. The sharing of experiences on how different countries are tackling the pandemic in its various waves, variants, and forms has been inspiring, the outcomes of these learning notwithstanding. Such learning has further ushered in useful collaborations in research and the resultant success in vaccine development and its administration. For example, Kenya recently launched their COVID-19 vaccination strategy that mirrors that of the UK prioritising front line health workers and security personnel for the first phase, while the second phase up to July 2022 targets the vulnerable, the elderly and adults (above 18 years) with comorbidities (Kyobutungi, 2021). This reflects a relatively high level of policy learning where learning/information is passed from high-level scientific experts but is modified by countries to their contexts and informs response. The case studies also show that stakeholders stressed the significance of domestic systems given the pandemic's impact and limitation on imports and exports, especially when travel bans are executed. The experience in all four countries shows that various communities and innovators emerged to profile solutions that were locally driven and aligned to local needs and abilities. The potential for building such local systems would require a broader narrative change and a shift from viewing innovations through broader conceptual lenses and framing around global competitiveness to intentional support of these local systems through science and policy (ARIN, 2020a).

Overall, these country-specific and universal learnings are critical. They should, however, ideally go beyond superficial learning and be more reflective of past crises to bring about policy choices while being more aware of different political ideologies, etc.

5. Science-policy interface and the role of the poor

Reflecting on the outcomes of the S-P interface with respect to the poor, several points have been made. Figure 3 (below) illustrates the key implications of S-P experiences in the case study countries: old poverty, new poverty, weak urgency and on a more positive note, grassroots innovations.

Figure 3: Key implications that S-P experiences in the case study countries.



Source: Authors' own.

The case studies demonstrate that some of the policies that were aimed at containing infection rates severely affected the socio-economic wellbeing of the poor who are already suffering low-income levels and other vulnerabilities, thereby reinforcing existing poverty. The countries have reported massive job losses and businesses. More broadly, the World Bank Global Economic prospects predict a 5% Gross Domestic Product (GDP) contraction resulting in a significant economic recession (World Bank, 2020) which could push more than 80-100 million people into extreme poverty. While the governments initiated a number of relatively pro-poor social protection measures (Figure 2 above), including measures such as Kazi kwa Vijana in Kenya, free food and water in Nigeria and Ghana, as well as income subsidies in Malawi, sustainability concerns hampered their effectiveness in cushioning the poor.

Other than impacting the existing poor, the policy measures could further create a new cadre of poor people. In all the case study countries, the resultant job and business losses have meant that some people who were relatively above the poverty line are pushed back to poverty, creating a new cadre of poor people. This phenomenon is illuminated by the World Bank, which calls for policy options that recognise the changing profiles of poverty and vulnerability (World Bank, 2020). According to the World Bank, these people are mainly

found in middle-income countries, but from our study, evidence shows that there is an increasing number of people, even in low-income countries, who are sliding back to poverty. For most stakeholders, this is largely a result of a lack of consideration of the socio-economic dimension of COVID-19 from its onset (ARIN, 2020a).

Other implications for the poor include increased inequalities, which has been witnessed across income clusters, gender, and other social classes (ARIN 2021b). Emergency policy directives and lockdowns have widely disrupted value chains of feminised sectors such as food services and home-based care, with 19% more women affected than men (UN Women, 2020). In most African countries, COVID-19 cut off income for over 50% of women-led Micro, Small, and Medium Enterprises (MSMEs) compared to 22% of men-led ventures (Kaberia & Muathe, 2020). In Sub-Saharan Africa, COVID-19 has exacerbated women's economic vulnerability, which is already characterised by systemic gender inequality, including poor access to credits and factors of production due to informality, culture, and market constraints (Ferrant & Thim, 2019). More broadly, a recent OECD survey shows that 75% of women, globally, participate in MSMEs, including those of unpaid care, most of which are highly susceptible to shocks such as COVID-19 (ARIN, 2020d) and climate change (Atela, et al., 2018) and with a 5.9% higher risk of closure than male-owned enterprises (World Bank, 2020).

Finally, the S-P model applied in the case study countries has widely resulted in the exclusion of voices of the poor in decision-making spaces. While this has been a traditional challenge, the experiences with COVID-19 have reinforced that, indeed, the circumstances of the poor can be excluded in the policy planning and execution. The challenge here might not necessarily be about the exclusion but perhaps involves wider concerns around the fact that these local communities are affected the most by the impacts of COVID-19 and are also expected to implement the emergency directive measures. Lack of people-centred consultations with these groups, especially on what they want and what works for them, and a broader lack of transparency in information and resources regarding COVID-19 has significantly weakened the voices of the poor. This is made worse by the fast-changing nature of COVID-19, which has not allowed adequate time for civil society organisations to advocate for the rights of the poor.

On a more positive note, however, the COVID-19 experience in the case study countries has triggered a new wave of grassroots innovations and locally driven solutions. Some cases of such innovations have been addressed in one of the ARIN blog series (Mbeva, et al., 2020). Dubbed 'the last mile networks' and 'last mile innovations', the 'last mile' networks of actors, entrepreneurs, and innovators emerge to develop solutions towards the pressing needs of the vulnerable. In the context of COVID-19, these actors have innovated COVID-19 kits, created awareness, and enhanced pro-poor communication and interpretation of broader policy issues into the local context. A number of these 'last mile' innovations to tackle COVID-19 across have been profiled[12]. In Kenya, for example, some of the actors are working with communities in the informal settlements of Kawangware, Mathare, and Majengo, to identify risk families and provide targeted assistance through direct cash

[12] https://africacenter.org/spotlight/african-adaptations-to-the-covid-19-response/

transfers and food parcels. These actors have also created community champions who promote behaviour change through effective communities and packaging and dissemination of relevant COVID-19 information through arts. Similarly, a number of technical innovations have emerged, including new models of local hand washing machines and small mask manufacturing factories, amongst others. While most of these locally-driven innovations are not new, the fact that they have emerged and have been profiled as critical in providing solutions to a global challenge is a critical outcome of the COVID-19 experience. In the context of the S-P interface, they present new frontiers for rethinking the S-P interface and producing pro-poor policies in the face of shocks. These frontiers could be better supported through enhanced linkage to research evidence as a promising pro-poor pathway. However, the extent to which efforts will be made to ensure that national policy and regulatory framework facilitate long term upscaling of marketing of the innovations and indeed domestic innovation capacity remains unclear (Atela & Ndege, 2020).

5. Summary and conclusion

This paper analyses the importance of the science-policy interface where research, technology, and innovation can support the advancement of policies that respond to societal needs. The COVID-19 pandemic has revealed how science and policy are intertwined, requiring scientific evidence that encompasses technology and innovations to inform policy responses. With this growing momentum for science to inform policy, two clear trends have been elucidated; first, the role of scientific experts in realigning scientific evidence to be useful for policymakers; and second, the wider stakeholder engagement, including pro-poor responses as important to influence policy development.

The paper explored the S-P interface and implications for the poor in four African countries using the case of COVID-19. While this is a work in progress, we highlight the fact that the virus has propelled the science-policy relationship into the public arena, exposing a number of opportunities and challenges. It has resulted in innovations in the science-policy interface and merged understanding of scientists and local people supporting a people's/citizen driven response. The COVID-19 pandemic has supported the rapid evolution of the S-P interface by relying on the expert models, the pluralistic models to support response. This emphasised a need to promote innovation in the science-policy interface by fostering a plurality of models, co-production, and consultations with the poor to ensure that they provide the 'technical' backstopping of policies. The establishment of science-policy committees, to some extent, has supported evidence-based policy actions but then again has been faced with many challenges such as lack of trust and general exclusion of certain important voices and needs, especially of the poor. Further, the narrow focus on health-related evidence, policies, and messages has encouraged siloed ways of tackling global challenges but with negative results and loss of opportunities (expertise, evidence, income, etc.) that could be offered by other sectors. Additionally, the initial stages of the pandemic created panic among policymakers, scientists, and citizens resulting in copy-paste policy measures that were not aligned to the country circumstances and an indication that S-P requires proactive planning and institutionalisation to enhance the effectiveness of decisions in times of crisis.

The S-P models employed subsequently nonetheless registered some achievements, especially in enhancing a better understanding of the health systems and priority health research. These include increased investments in health facilities, personnel, capacity, and research that has resulted in some milestones in dealing with the pandemic. This success is, however, marred by systemic challenges that need to be unlocked to ensure that such gains are sustained and upscaled. First, the need to enhance transparency to the public, especially about the expert committees and their sources of evidence, remains a major bottleneck in the S-P pursuit. In the four case study countries, these committees were not well known to the public and would be seen alongside the Ministers and/or Presidents during COVID-19 media briefings. The citizens had little knowledge about their role or where they drew evidence to provide opinions to the Ministers/Presidents. Second, the need to adopt a multi-sectoral approach to the S-P interface is crucial to enable effective communication with the various audiences. The sector-based approach in addressing COVID-19 has meant that a huge part of the public is losing interest and trust in the information shared by the policymakers. For more poor communities, maintaining a livelihood is just as critical as the infection rates. Several implications on the poor have been reported ranging from loss of jobs, businesses, and income, but one outstanding outcome is the proliferation of grassroots innovations that could steer new frontiers for bottom-up and pro-poor policy planning towards global challenges.

Finally, it is also worth noting that this study has largely explored the S-P interface in Africa using COVID-19 as a case. It has provided a framework that can be used to provide a more in-depth analysis of country experiences and consolidate this further to inform the science-policy debate and create space for stakeholders and knowledge producers to reflect how their work can sustain science-policy cooperation beyond the COVID-19 pandemic. The following lessons can help inform such further work:

i) New frontiers for rethinking the S-P interface: Despite the implications on the poor caused by the policy directives, the case studies also reveal new forms of science-policy governance, especially at the local community levels. Multiple locally driven solutions that have emerged outside the policy process have helped salvage many lives and livelihoods. These experiences present new frontiers for rethinking S-P and producing pro-poor policies in the face of shocks. These frontiers could be better supported through enhanced linkage to research evidence as a promising path to pro-poor S-P interfacing. However, the extent to which efforts will be made to ensure that national policy and regulatory framework facilitate long term upscaling of marketing of the innovations and indeed domestic innovation capacity remains unclear (Atela and Ndege, 2020).

ii) Institutionalised science advisory systems: The COVID-19 case has demonstrated that reactionary, crisis-oriented and ad-hoc science advisories are bound to be less effective in addressing global challenges. Countries need to institutionalise such advisories to offer long term science-policy engagements and planning that accounts for the needs of all, especially the poor.

iii) Sustained S-P dialogue platforms: There is a need for sustainable forums for science-policy dialogues so as to continuously enhance the co-creation of solutions. The ARIN International Conference stressed the need for supporting such dialogues with evidence and data platforms that can enhance the understanding of trends and uncertainties of pandemics through continuous research, generation of evidence, and management to help predict and inform foresight policies (Atela, 2021).

iv) Leveraging the role of non-state actors to complement state capacity in addressing emergencies such as the COVID-19: The state-centric approach to defining the S-P interface provides useful direct policy entry but certainly excludes useful evidence, expertise, and voices from important decisions. Drawing on the stakeholder perspectives at the 2020 ARIN International Conference, stakeholders specifically dubbed some of these efforts as 'last mile initiatives'' that are critical for steering policy implementation, especially by providing information to the poor living in fragile localities where government systems are developing community champions to promote surveillance and feedback (Mbeva, et al., 2020).

v) Calling on policy processes to pay attention to locally-driven innovations: In most of the innovations, calls for these to be locally led have been accentuated by COVID-19, which otherwise would not be a key focus of the current policies. This has highlighted the need to pay attention to locally driven innovations and solutions. It has also cast light that most innovations and breakthroughs come from a more bottom-up approach, are locally-driven and thus have the potential to provide solutions to global challenges. Therefore, science and policy need to interface at the local levels as well as the national levels to ensure that bottom-up innovations are supported.

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