

## **Evidence decision-making policy practice in emerging pandemics and epidemics threats preparedness and response operations in Africa**

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## Abstract

Quality evidence-based decisions and strategies are critical and valuable tools in strengthening health systems policies, strategic priorities action plans and comprehensive care delivery management. Our finding showed that there is scarcity of local/national and internal effective evidence-based and management strategies for informed decision making based on the disease or health epidemics nature, extend, ecological and geo-location of pandemics and epidemics crises burden and impacts. Evidence-based programs or projects are crucial in evolving pandemics and/or (Ebola, meningitis, Cholera and influenza) epidemics persistent morbidity and mortality/ case fatality reduction or prevention; as well as on poverty and inequity alleviation within the vulnerable population and citizenry over time. This paper assesses implications of evidence-based on health systems surveillance and monitoring systems, preparedness and emergency response gaps and needs in improving care delivery uptake and usefulness, coverage and effectiveness in Africa. Furthermore, the article advocates for quality, access to and uptake of knowledge-based policy-decision making and practice improvements in building efficient and standardized surveillance, preparedness and response approaches. Also, in enriching data sharing and inclusiveness through understanding the links between poverty, poor health and inequity related emerging infectious diseases epidemics in Africa. Leveraging on cumulative lessons learnt experiences and innovations in integrating participatory knowledge-based policies and approaches is paramount in fostering vulnerable population awareness and engagement, skills empowerment collaborative productivity and sustainable healthy solutions and measures. Strengthening new partnerships, alliances, and networks requires collaborative and quality evidence policy decisions, appropriate and reliable monitoring and evaluation systems approaches and strategies in improving local preparedness and emergency response capabilities against future emerging infectious diseases epidemics and fast-tracking poverty alleviation knowledge-based livelihoods and health solutions for impact. Furthermore, integrated, participative partnerships and collaborative responsibilities, cost effective and reliable evidence health financing and budget allocation, and targeted capacity development aiming at reducing and averting the burden of poverty related emerging threats and epidemics preparedness and response programs in African countries.

**Key words:** evidence, poverty, health, financing, allocation, integrated, participative partnership, collaboration, responsibility, infectious diseases, epidemics, Africa

## Introduction

Globalizing health challenges and health solutions are no longer a luxury but an urgency and joint venture of both developed and developing countries. The growing interest and popularity around more collaborative and co-productive way of formulating evidence translation (ET) research should be balanced with some of the challenges [1]. This includes asking the question whether all research endeavours lend themselves to this approach. Some might argue, for example, that new drug development does not require collaboration with the eventual care providers and stakeholders [2]. However, perhaps the answer to this question for some would rest on what gets counted as science, although any applied research may also receive the same criticisms about generalizability, universality and objectivity. However, there may be research agendas, or incremental and discrete research studies within these agendas, that require collaborative and participative partnership [1,2].

There is very scanty, coordinated and coherent local/national and internal evidence-based programs or projects based on the grouped specific health or disease epidemics nature, extend of threats and impacts. There is an urgent need for innovative local or national programs or projects implementation aiming at emerging epidemics and infectious diseases morbidity and mortality/fatality reduction or prevention; as well as on poverty and inequity alleviation within the vulnerable population and citizenry over time [3,4]. Building and maintaining new, proactive and productive partnerships and collaboration to public health needs and demands require new momentum and leadership commitments and investments efforts, which is currently poorly advocated and neglected by governments, policy-makers and programs implementers across Africa [2,5,6]. Strengthening translation capabilities to ease of access on the use of information for quality, effective and reliable evidence understanding of the mechanisms that influence decision making is essential for devising strategies that encourage the effective use of information in decision making processes within the array of programs performance metrics associated with research [7,8]. More generally, mobilizing resources to undertake any type of

research takes time to establish, by which time, the clinical/service question may have become less relevant or even redundant, clinical and implementation themes, had created silos, and reduced the opportunities for interaction, communication given attention to vulnerable or at-risk groups [4,9,10].

Leveraging on multisectoral and intersectoral collaboration for greater health coverage and impact through income-generating actionable knowledge opportunities in sustainable livelihoods policy and programming financing and budgeting in health, disease and poverty reduction strategies that specific communities and health outcomes monitoring outlays [3,6,11].

Ensuring that knowledge from research drives improvements in healthcare with greater urgency and impact requires greater recognition of co-production alongside more traditional, researcher-driven activity. The evidence co-production emphasizes the importance of engaging and integrating the multiple perspectives of stakeholders that can shape the understanding, and processes of quality evidence production and uptake strategies [10]. Stakeholders coproduction partnership and cooperation requires both an organizational and a resource infrastructure, and, therefore, enabling political environment to foster mutual learning and shared experiences of evidence translation research, clinical and academic partnership network exploration and utilization in providing health for all [4,6,8]. There is an urgent need to understand evidence uptake impact in revamping public health, community seeking and participatory attitudes and behavior to successfully health outcomes and economic benefits. These include the need evidence-based transformation approaches in nurturing stakeholders commitment and investment motivations for evidence care delivery in a meaningful ways through shared agenda that allows collaboration, accountability and transparency over time [12,13,14].

This paper assesses implications of evidence-based health systems gaps and needs in improving care delivery uptake and usefulness, towards promoting innovative coverage and effectiveness surveillance and monitoring systems, preparedness and emergency response in Africa. Furthermore, advancing and improving evidence-based health solutions/choices integration and consumptions should be developed based integrated, participative partnerships and collaborative responsibilities, cost effective and reliable health financing and budget allocation, and targeted capacity development aiming at reducing and averting the burden of poverty related emerging epidemics emergency response.

## Methods

### Literature search strategy

This literature search strategy examined the quantity and quality of public health and epidemiologic monitoring systems, evidence-driven decisions and strategies in emerging infectious diseases epidemics responses and poverty alleviation in Africa. Approved peer-reviewed journals including national and regional reports, evidence and data published were reviewed and analyzed.

### Inclusion criteria and data gathering

Very few evidence-based decision-making pandemics and/or epidemics crisis preparedness and response policies, priorities and strategies, quality, access and usefulness in different in studies in African countries met the inclusion criteria. Due to heterogeneity in local and national health challenges and issues including vertical funded projects, diverse approaches and tools adopted or developed and implemented, either single or integrated programs or management were screened and evaluated [15]. All peer reviewed documented information sources were either written either in French, English or Portuguese and Spanish languages scrutiny and was limited only to full publications up to 31st Dec 2016. Data extraction form was developed to capture all knowledge based decision, priorities and programs and types of interventions planning and implementation. These are grouped based on the disease or health epidemics nature, extend, ecological and geo-location, burden and impacts of implemented programs or projects on morbidity and mortality/fatality reduction or prevention; as well as on poverty and inequity alleviation within the vulnerable population and citizenry over time [16,17].

### Data analysis and interpretations

Quality ratings were performed to inform the descriptive quantitative and qualitative synthesis. The meta-analysis was assessing implications on poverty related threats and epidemics health systems surveillance and monitoring systems, preparedness and emergency response, but also in

care delivery coverage and effectiveness post-programs. All included papers were analyzed on Microsoft Word Excel spreadsheet (USA, Version 2010).

## Results and discussions

### Promoting evidence-based translation into public policies and interventions

Providing the most comprehensive health care service delivery and quality practice and outcomes requires contextual understanding of interface and interactions between human, animals and its environment. Also, building robust engagement and collaboration between care providers and institutions, regulations and laws is critical to enabling evidence access, availability and use for innovative solutions against environment for health/disease risk factors, reservoir and evolving pathogens to antimicrobial resistance across Africa. Health care knowledge management environment with its functionality to acquire, share and operationalize the various modalities of knowledge-based health systems strengthening [19]. Next, the functional and architectural specification of community to national (central or decentralized system) in strategic care decision making support has to be strongly established and used for services info-structure communication and guidelines. This effectuates a synergy between knowledge procurement (data generation and mining) and evidence operationalization (evidence use and management) techniques to generate a suite of strategic evidence-driven decision-support services delivery to improve community awareness and engagement for positive attitude and behaviour to health needs and access to and use [20,21]. There is a need to rethink the possible sources of leverage to improve healthcare access to and coverage delivery in providing a valuable strategic planning and management resource to healthcare policy makers, implementers to field health workers [22].

Innovative collaborative approach that involve and engage knowledge producers and knowledge users can be timely and much needed in maximum engagement and use by potentially multiple knowledge user communities, including patients, careers, researchers, policy-makers, practitioners, and managers [2,5,23]. However, this may raise issues about power, politics and perceptions require careful understanding and respect of rights and laws and comprehensive negotiation to get to the point of being able to have productive conversations and engagement on

potential operational issues and challenges [19,20]. For example, the different perspective stakeholders, setting methods for supporting knowledge-based decision-making in an innovation process. Also increasing the inter-relationships between information, invention and innovation are more and more difficult to control due to the ever increasing amount, diversity and complexity of available information. These challenges can be tackled through the use of evidence databases (ED). Explored as a scientific field, the ED methodology incorporates a number of different aspects of knowledge management such as scientific discoveries, structural knowledge exploration, treatment of weak signals and innovative conception methods [24,25]. However, the most important aspect of the use into appropriation of information by leaders of large policy-makers and health professionals' as well global community mass information widely distributed and readily accessible. However, the question as to whether particular information can be appropriated for use is not adequately addressed by either current management practices by professionals and academic community [26]. Hence, evidence managers need to be aware that information from their domain is only one of the sources available to leaders. The system of appropriation makes use of intuition to improve and refine the processes that help govern the use of information and to create new sources of anticipative information. Managing knowledge differently, through the knowledge drive and results or outcomes oriented goals from community, affected populations, mentors and mentees should together define the knowledge threshold to be shared and set off to do so in a sprint like manner. This did not only distribute evidence more widely, but also produced explicit rather than evidence idleness [8,12]. Eventually, evidence management and sharing process thus became responsible to drive the shared behavioural changes and best practices with an understanding at the same time, important to improve of the overall preparedness, emergency response to care service delivery for impact [17,27].

### **Value of evidence-based contextual translation and applications**

The value and relevance of research relies in respecting and understanding the contexts of the interpretation and application of research findings. Whilst there needs to be a sufficient dose of mutual respect, understanding each other's roles, contexts and contributions. Bridging the boundary of knowledge brokers and facilitators to open access knowledge navigators and practice in all spheres require adequate awareness and empowerment from academic and other

capacity development players, and also connecting different constituencies together [28]. Further, the potential to demonstrate quick wins and impact was dependent on the nature and quality of the existing relationships between researchers, community, policy-makers and other stakeholders' collaboration. As such, it is clear from this study along with our experiences of working in or evaluating different programs in infectious diseases and emerging epidemics (malaria, HIV, Ebola), that collaboration does not occur in a vacuum or without some prompting or promoting across Africa [2,3,16,20,28]. Equally, it cannot be assumed that either researchers or knowledge users have weak knowledge and skills translation capabilities to be western expert or consultant collaborators in improving data collection, reporting, use and disseminate; mechanism for evaluation and monitoring systems of indicators to fit the new focus on priority outcomes including addressing cross-cutting issues and challenges [1,4,7,29].

Translation of knowledge-based in meeting the public needs, aspirations and expectations should be made clear at the outset, but understanding and trust may develop over time through seeing tangible benefits/gains from the collaborative endeavor [8,9]. Moreover, mutual and participative learning and better appreciation about each other's perspectives and contributions may lead to optimization on the full capacities and potential of all stakeholders to better preventive and curative processes and outcomes through the generation of more relevant and applicable knowledge. Increasing mutuality knowledge endeavor to tackling public health issues within multiple communities' perspective and wide range of stakeholders across patient, family, public, service, charitable and political sectors is achievable and rewarding healthy and socio-economic outcomes. Some of which may only become apparent through the co-production of knowledge over time. Each stakeholder group will bring a different cognitive and emotional representation on that issue, shaped by different experiences and interests[23,25]. In this sense, a shared understanding of the nature of research and potential contributions to the research process has also to be considered within a dynamic context of different stakeholders' mental models, which can be used to deconstruct and advance the knowledge problem towards potential solutions. Engaged scholarship in promoting shared open health knowledge and information perspectives in different approaches including cooperation, collaboration or co-production[20]. Hence, the valuing is both codified and other forms of knowledge; the incremental nature of work within the knowledge endeavour; the acknowledgement of the importance of the complexity of the context in which this endeavour takes place; and meaningful stakeholder participation. These perspectives rely on authentic collaboration, partnership and engagement as the context for action. Near and long-term investment plans in rolling out executable roadmaps is necessary for knowledge cost management and resource planning including technical, financial and interdependencies strategies.

Our findings highlight the impact of information and knowledge-based implementation policy and enabling environment on care access and coverage and effectiveness on infectious diseases epidemics and poverty alleviation. These could also be supported by technical assistance through knowledge transfer, scaling up capacity building in pharmaceutical and biotechnological

products production in in sourcing and productivity, improving the performance, promoting favorable policies, incentives and efficient dairy supply chains [2,7,30]. As well as improving the operational efficiency in addressing maternal-child health, malnutrition and poverty alleviation, enhanced contingency knowledge and skills strategies. Moreover by improving on know-how and applied vigilance and community consensus and teamwork implementation for positive psychosocial and behavioural and practices change. Moreover, study and understand the impact of science, technology, and medicine solutions and ways to promote collaboratively and sustainable healthy communities [23,27,31].

### **Strengthening knowledge-based health systems strategies integration and practice in primary healthcare delivery**

Our findings that the lack and scanty of current programs efficiency, quality, and sustainability; and the contextual challenges in scale-up of most pilot projects and programs evidence-based, effective prevention strategies. Ecological niche modeling, disease risk modeling, and spatiotemporal cluster analysis, can inform disease surveillance, control efforts, and impact policy [27,21]. Our focus is to posit ways to apply science to health/disease management policy and actual management or mitigation practices. We illustrated the importance of stable and funded surveillance in generating knowledge for sound policy for intervention or disease control [25,26]. While these two events highlight extreme cases of infectious disease in different ecological niche modeling can provide national level maps of pathogen distributions for surveillance planning. Whereas space-time models can identify the timing and location of significant outbreak events for informing and defining active control and elimination strategies in expand the sustainability of such networks in order to tackle diagnostic and institutional weaknesses while strengthening strong regional partnerships across the continent. No government or organization can address such complex global threats [30,31,32].

We documented that there was an increasing attention on knowledge- or evidence-based care delivery and management approaches and strategies translation by policy-makers and implementers and researchers through the transfer of knowledge and empowerment of generational students and communities in empowerment and capacity development and entrepreneurship. Presumably, still burgeoning and require more funding in quality knowledge production in enhance and improve knowledge use for health and well-being. The evidence implementation and practice is frequently conceptualized and practical gaps within and between knowledge production and applications in communities and cultures varied. Further, the assumption is that research gets produced, and then packaged to make it accessible to non-academics to increase the chances of it being used [25,28]. Arguably this operationalization is becoming increasingly outdated perspective knowledge is generated within its context of use, referred to variously as mode knowledge production, engaged collaboration and participation, interactive research, participatory research [29,30]. Hence we advocate that integrated KT at all

levels is capital and argue that innovative collaborative and participative approaches to knowledge production and use in the context of threats and epidemics disasters must be flexible, scalable, sustainable and cost-effective.

### **Fostering integrated knowledge-based public health (field, clinical and laboratories) capabilities**

Strengthening categorization was based on the nature and characteristics of pathogens or infectious agents causing the emerging infections, which are directly related to the mechanisms and patterns of infectious disease emergence. Capability and capacity are there certain types of people or a particular skill set that would make an individual better able or equipped to engage in research-service collaborative research? Given this type of research takes place in the real life world of practice, there are some general transferable qualities that might be embodied in researchers, such as being: able to wear more comfortable in the field, good communicator with different audiences, able to go with the flow and be adaptable [35]. Whilst maintaining the standards of research rigour, able to manage conflict, be tenacious and creative. From a knowledge user perspective, understanding that expectations are often set by funders, which defines and confines what can be delivered is equally important [2,31]. Qualities required of knowledge users may include patience with researchers about the parameters around what is 'good enough' research, and that there is a need for commitment to engage until completion. It is also important to acknowledge that framing the research endeavour as a collaborative act may not be compatible with some people's worldview or skill set. Some national reference laboratory will also be able to play an important role as part of a regional laboratory network to strengthen regional public health laboratory capacity in providing specific referral functions for public health diagnostic laboratories in other countries that do not have a reference laboratory [7,9,30,32].

The public health research laboratories within the research institutes of ministries of health and universities or even private research institutions are best suited and can play a crucial role in collaborating with the national public health reference and diagnostic laboratories to discover novel pathogens related human diseases diversity. The establishment of novel network scheme can provide more cost-efficient field and laboratory services and ensure a regular flow of laboratory work to maintain the competency of technical staff to produce quality output [3,9,14,20]. Therefore, increased likelihood of epidemic diseases caused by novel pathogens, diagnostic laboratories serving as the primary entry point of investigation should be able to take a more generic approach in pathogen detection, isolation and identification. The traditional existing system of 'compartmentalization' of national disease/pathogen-specific diagnostic laboratories should thus be reviewed and integrated into the national public health infectious disease diagnostic laboratory system. This model would improve cost-efficiency and allow a

more appropriate approach to infectious disease outbreak investigation and control based local and global funding commitments to undertake collaborative research [23,26]

The single or combinations of factors contributing to the emergence of these pathogens, risk factor and potential epidemics vary within each category (bacteria, virus and fungi). Continuous efforts in characterization and classification pests of public health importance required strengthening laboratories capacity based on function, namely, research, reference and analytical, diagnostic and clinical laboratories [23,29,31]. With the last category being sub-classified into primary (community-based) public health and clinical (medical), analytical diagnostic laboratories are very critical in frontline and participative roles for optimal performance. It should be noted that the establishment of robust and reliable etiological agents causing the diseases or outbreaks vary with respect to each category of emerging infectious diseases or zoonosis [2,8,17]. We underscore that the public health preparedness and rapid response needs, especially in evolving local and global threats and outbreaks establishing in both new and old areas worldwide. Likewise, the need for global harmonized and coordinated national public health and laboratory system that integrates different categories of care and allied paramedical and emergency services within and across countries should be closely linked to support rapid emergency care delivery system is imperative.

### **Evidence-based poverty alleviation and sustainable pandemic/epidemics response capabilities and care delivery strategies**

Scaling up knowledge and skills development needs and opportunities in poverty reduction are urgently needed of revamping the enabling environment by increasing international cooperation and partnerships in restructuring global and national health reforms to address contextual realities with ample financial investment and capacity transfer [5,8,13]. Our findings showed that apart from demonstrating the complexity of poverty, knowledge and information should support to achieve poverty eradication by aiming at impacting on and improving the lives of vulnerable population in both rural and urban settings. Interestingly, there has been remarkable rise to record 6.7 per cent GDP growth rate and improved economic performance at the macro-level in the past six years. GDP growth rate consistently rose reaching 6.2 percent in 2002 [14,17]. Structural reforms in a stable social -political environment, underpinned by implementation of the three years of the PRS which focused more on priority social sectors should be strengthening in recuing current challenges including maintaining socio-political stability as the country strives for still higher economic growth, equity and improved quality of life. Increasing investments in other infrastructure such as roads, telecommunications, mining and tourism access should be promoted owing to their impact in increasing inflows and growth of foreign direct investments and domestic revenue effort [13,19,25]. Substantial progress has been noted in the social services and public support services. Significant improvement in performance is evident in areas such as primary education and road network from 2008- to date. Overall, the current levels of evidence-

base access to and uptake of care delivery of services in pandemics/epidemics emergency response require further improvements in quantity and quality investments in scaling up successful knowledge for poverty alleviation interventions should make use of both the tangible and intangible assets found in a poor community in improving the benefits of vaccination programmes stretch beyond immunization and health services and promoting social integration [17,22].

Documented key causes of poverty in Africa include lack or limited access to information and knowledge directed or mindset perceptions and conditioned choices, reliance on primary commodities exports because of wide fluctuations in prices [29,30]. Moreover, low productivity among people in all sectors because of poor health, low skills levels and inefficient land use. Yet the rich natural resources which are mostly used to enrich elites leading to corrupt practices and diverting development focus, private sector not independent but part of an elite linked system of rent seeking; hostile attitude of many governments towards the private sector, except where they benefit directly [28,30,34]. Furthermore weak and egocentric leadership problems including lack of democracy and culture of patronage and big men chieftain style of ruling, Africa's low population density, lack of critical mass of skilled people to participate in development and urban bias in development to the neglect of rural areas, land holding structures which discourage entrepreneurship and failure to take responsibility to rebuild their own countries including other bureaucracy and socio-economic bottlenecks and challenges 1,5,9,17,19]

Our findings showed that information and knowledge are urgently needs in revamping small business and income generating opportunities, practical information on how to eradicate poverty, self-employment opportunities agricultural knowledge to start agricultural projects [17,20,27]. For vulnerable children including elderly people need more adequate health information and recreational/physical opportunities, financial information 'to know where to get medical insurance loans, skills and know how to manage finances and hygiene information. Also, private sector support, expanded government capital expenditure (infrastructure spending), public works and the recently introduced targeted programmes [7,11,17]. Enterprise development through government tender procurement system, more community based employment creation programs. appropriate labour market policies and programmes to promote employment and the protection of workers, social insurance programmes to reduce risks of unemployment, entrepreneurship support through provision of finance, skills and other support to emerging entrepreneurs administered by various ministries and agencies , ill health, disability and work injury; safety net by providing social assistance and welfare service programmes for the most vulnerable groups with no other means of adequate support[1,2,9,13,17]. Addressing vulnerability and the possibility of relapsing into poverty at community level through micro and area-based schemes to address vulnerability at the community level, including microfinance, and social funds and programmes to manage natural disasters; and ensuring healthy growth and development of knowledge support for poverty reduction strategies. Also renegotiating terms of global trade in boosting national economic growth in increasing sustainable human and social development

indicators and associated production-oriented approaches [6,9,14,38]. Despite varying degrees of interest in what should be counted, statistics related with this are overwhelmingly emphasizing the 'enabling environment towards institutional capacity development and public-private investments on health security, social security, and safety-nets (public wealth transfers, social insurance) [1,3,34,39]. More, there is need for structural adjustment development associated with capabilities and empowerment, social inclusion, participation, rights-based approaches (including those addressing gender, ethnic, and age-related inequalities), livelihoods (cross-sectoral approaches associated to reducing inter-generational inequities (environment), disaster preparedness and rehabilitation (reducing vulnerability to shocks at various levels), peace-making and global prosperity.

## Conclusion

The article advocates for further improvements in quantity and quality investments in pandemics and epidemics preparedness and rapid response research and development (R&D). This is crucial in building efficient, standardized early detection and surveillance systems in generating evidence-based policy-decision making approaches and implications in enriching understanding the links between emerging infectious diseases epidemics, poverty poor health and productivity in Africa. Leveraging of cumulative lessons learnt experiences in development and integrating participatory knowledge-based policies and approaches in fostering population with knowledge, skills empowerment and strengthening new partnerships, alliances, and networks in collaborative and quality knowledge-driven decisions and strategies in improving local preparedness and emergency response capabilities for future emerging pandemics and epidemics crises mitigation and fast-tracking poverty alleviation programs in Africa. Effective public service framework in place to provide foundation for reduction of health and economic disparities, service delivery improvements and poverty reduction, equitable allocation of public resources, and systems of governance as well as the rule of law are democratic, governance and Accountability participatory, representative, accountable and inclusive and promoting social cohesion and justice system. Finally, operational targets for effective systems to ensure universal access to quality and affordable public services and effective systems to ensure universal access to quality and affordable public health services and well-being.

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## Competing interests

Author declares no conflict of interest.

### Contributorship statement

ET conceived the idea and drew the conceptual framework. ET reviewed and assessed all reviews. ET OAO, MG and CWK provide more resourceful information. ET, OAO, MG, CWK and JYN provided more meaningful inputs. All authors read and approved the final version of the manuscript.

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**Legend 1: Systematic literature review of knowledge or evidence-based decisions and strategies in epidemics and poverty alleviation in Africa**

