**What Is After Polio? Priorities & Adaptability in Angola, Ethiopia, Kenya, Nigeria, South Sudan**

**& Somalia**

BY

KATHERINE C. VERGARA
Bachelor of Science, New York University, 2000
Master of Public Health, University of Illinois at Chicago, 2006

THESIS

Submitted as partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Public Health Sciences
in the Graduate College of the
University of Illinois at Chicago, 2019

Chicago, Illinois

Defense Committee:

        Nadine Peacock, Chair and Advisor
        Ronald Hershow, Biostatistics and Epidemiology
        Janet Lin, Emergency Medicine
        Filimona Bisrat, Director CORE Group Polio Project Secretariat, Ethiopia
        Carlton Evans, Universidad Peruana Cayetano Heredia, Peru; Imperial College, London
        UK

This dissertation, along with all my global public health work, is dedicated to my sons

Maximo and George.

# ACKNOWLEDGEMENTS

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| | |
|---|---|
| AFP | Acute Flaccid Paralysis |
| AMREF | AMREF Health Africa |
| BMFG | Bill & Melinda Gates Foundation |
| CDC | United States Centers for Disease Control & Prevention |
| CHW | Community Health Worker |
| cVDPV | circulating Vaccine-derived Polio Virus |
| CGPP | CORE Group Polio Project (Angola, Ethiopia, Kenya, India, Somalia, South Sudan) or CORE Group *Partners* Project (Nigeria) |
| CORE | Collaboration and Resources for Child Survival |
| EOC | Emergency Operations Center (Nigeria) |
| EPI | Expanded Programme on Immunizations |
| MoH | Ministry of Health |
| NGO | Non-Governmental Organization |
| OPV | Oral Polio Vaccine |
| RI | Routine Immunization |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |
| VCM | Volunteer Community Mobilizer |
| WHO | World Health Organization |
| WPV | Wild Polio Virus |

**SUMMARY**

The final chapter of polio is not complete.  But the task of adapting the polio infrastructure is upon us now. Polio eradication has been a shared global priority. The challenge before us lies in defining the next health priority to share. Actively listening to stakeholders revealed a more complex priority: it was not one specific disease.

Based on the use of the Implementation Science conceptual framework to predict implementation success, this dissertation aimed to identify public health priorities to which the built polio infrastructure should be applied, and opportunities to adapt to future health initiatives. Qualitative interviews with polio stakeholders were analyzed for overall trends, by specific socio-ecological level, and by individual country context. "Health Systems & Infrastructure" and "Routine Immunization" were the most frequently occurring priorities that stakeholders identified as the desired focus that should be addressed with the built polio infrastructure**.** Challenging the historic tactic of targeting one disease for eradication, stakeholders called for a broader bolstering of health systems.

The adaptability findings closely reflected and further informed the findings of the shared priorities. Examples and opportunities were associated with the overall identified priorities: Health Systems & Infrastructure and Routine Immunization. Polio stakeholders were aware of and primed for adapting the polio infrastructure to other health priorities. They recognized and even suggested a less siloed approach to public health, harkening to overall health systems bolstering.

Recommendations were developed to be in alignment with the prodigiously shared priority of stakeholders interviewed; to improve Health Systems & Infrastructure, explicitly to address improving the capacity of health monitoring and surveillance.  More specifically, while focusing on improving overall Health Systems & Infrastructure, a recommendation was made to task-shift the built polio infrastructure to address routine immunization, pivoting away from a one disease focus. Lastly, a

**SUMMARY (continued)**

recommendation was made to encourage partners to look more broadly at how polio infrastructure legacy planning can affect larger societal needs.

The momentum and capacity built through the stalwart organizations and individuals engaged in polio eradication should be harnessed to improve diverse public health outcomes.

## I.   INTRODUCTION

Since the discovery of the polio virus vaccine in 1952, through a colossal public health effort,
polio has decreased by 99.9% worldwide ("History of Polio," n.d.) It is the eradication of the last 0.1%
that is simultaneously the most difficult and the most crucial.  If unfinished, the gains of the last 70 years
could be reversed, the global investment of over US$14 billion since 1988 made insufficient, and
unvaccinated populations could be at risk for continued polio outbreaks ("History of Polio," n.d.). The
tasks ahead are two-fold: a) to complete the job of polio eradication and b) to engage in legacy planning.
This study aims to identify stakeholders' public health priorities in the polio high-risk countries of
Angola, Ethiopia, Kenya, Nigeria, South Sudan and Somalia and their desired application of built polio
infrastructure to inform legacy planning and to set the stage for successful implementation of future
interventions.

The United States Centers for Disease Control and Prevention (CDC) has identified one of the
critical pillars of polio eradication legacy as "where feasible, desirable, and appropriate, transitioning the
capacities, processes and assets that the Global Polio Eradication Initiative (GPEI) has created to support
other health priorities" ("Polio Endgame," 2013). Global partners recognize the capacity built from polio
initiatives and are primed to set future goals.

> "Through polio eradication efforts, GPEI partners have learned how to overcome logistical,
> geographic, social, political, cultural, ethnic, gender, financial, and other barriers to working with
> people in the poorest and least accessible areas. The fight against polio had created new ways of
> addressing human health in the developing world—through political engagement, funding,
> planning and management strategies, research, and more" ("What We Do: Polio," 2019).

Assessing priorities and future planning serves to avoid the loss of momentum and public health
capacity.

In 2014-2016, an unprecedented outbreak of the Ebola virus occurred in West Africa ("Ebola
Virus," 2018). There were an estimated 28,600 suspected cases, and of those, an estimated 11,300
people died ("Ebola Virus," 2018). An already stressed healthcare infrastructure was overwhelmed, and

the international global health community was forced to intervene in order to prevent a global pandemic. Billions of dollars were spent responding to the outbreak and creating the infrastructure and community engagement needed to override the disease spread ("Ebola," n.d.). Recognizing the potential for a vaccine to be developed for Ebola, the international community rallied and developed a vaccine. In 2018, there were two outbreaks of Ebola in the Democratic Republic of the Congo in Central Africa. Rapid mobilization of the international healthcare community occurred, and the Ebola Virus (EBV) vaccine was approved by the WHO to assist in the response for the second outbreak. The EBV vaccine, specifically targeting the Zaire strain, was not yet licensed, but it was used on a compassionate basis ("Frequently Asked," 2018). The ring-block vaccination strategy developed from smallpox and polio eradication programs was used for the delivery of the Ebola vaccine. This strategy places cases at the center of the campaign, and health workers vaccinate all people within a radius around the cases, working from closest to furthest away in concentric widening circles. These techniques were initiated for the second outbreak as a component of the outbreak response. Along with the vaccine, the community health best-practices learned from the polio eradication initiative were adopted and are currently addressing the outbreak more rapidly and effectively than the 2015 outbreak. Besides the use of the vaccine, the second EBV outbreak was discovered earlier in its evolution than the West African outbreak due to improved disease surveillance. Although at the time this dissertation was written the outbreak was still ongoing, the number of lives lost was projected as being far less, the timeline of the outbreak shortened, and the total cost was expected to be less.

This outbreak is just one opportunity where aligned health priorities and adaptability, and utilizing the built polio infrastructure can save lives, overall cost, and protect and improve health for potentially millions of people. Diving deeper into the experience and perspective of stakeholders engaged in polio eradication can illuminate where relative priorities exist, reveal further opportunities for adaptability in health interventions, and better plan for the future.

A. <u>Polio background</u>

Poliomyelitis can cause acute flaccid paralysis within a matter of hours of infection and that condition remains irreversible for the lifetime of the individual ("Poliomyelitis," 2019). The comorbidities associated with symptomatic polio are severe, including death, and disproportionately affect individuals in low-resource settings where polio outbreaks occur more frequently in current global patterns.

> "Three indicators, however, are considered of primary importance in determining the likelihood of successful eradication: that effective interventional tools are available to interrupt transmission of the agent, such as a vaccine; that diagnostic tools, with sufficient sensitivity and specificity, be available to detect infections that can lead to transmission of the disease; and that humans are required for the life-cycle of the agent, which had no other vertebrate reservoir and cannot amplify in the environment" (Dowdle, 1999).

Poliomyelitis satisfies all three critical indicators.

In addition to wild polio virus, there exists the threat of circulating vaccine-derived polio virus (cVDPV). In low-resource settings, the oral polio vaccine is used to maximize vaccination coverage; however, this benefit comes with a small risk of circulating vaccine-derived polio virus causing illness. Until polio eradication is achieved, the oral polio vaccine is necessary in many low-resource environments to achieve the greatest possible vaccination coverage. In 1988, the World Health Assembly set a goal to eradicate polio; since then the disease burden has decreased from existing in 125 countries to 3 countries. An estimated 13 million children have been saved from permanent paralysis. In 2016, there were only 35 confirmed wild polio cases worldwide (19 in Pakistan, 12 in Afghanistan), and 5 circulating vaccine derived polio virus cases (3 in Laos, 1 in Pakistan, 1 in Nigeria) ("Circulating Vaccine-derived," n.d.; "What We Do: Polio," 2019). In 2017, there were a total of 19 confirmed wild polio virus cases (7 in Pakistan, 12 in Afghanistan) and 91 circulating vaccine-derived polio virus cases (17 in Democratic Republic of Congo, 74 in Syria) ("Circulating Vaccine-derived," n.d.). Civil conflict

and political upheaval can challenge existing health infrastructure and create polio "sanctuaries" where vaccination coverage and disease surveillance are low.

The vaccine is effective, global polio eradication initiatives are in place, and eradication is in sight. In the race to achieve eradication, measured, evidence-based research and future planning are needed to avoid the loss of public health capacity.

B. Last chapter and obstacles

As of October 2017, three countries still have endemic polio cases: Afghanistan, Pakistan and Nigeria. Additionally, while rare, there are symptomatic polio cases that occur from exposure to circulating vaccine-derived exposure in the environment. There have been circulating vaccine-derived polio virus (cVDPV) cases or importation cases in the Democratic Republic of Congo and Syrian Arab Republic ("Circulating Vaccine-derived," n.d.). Efforts have been made to decrease the oral polio vaccine to contain one or two strains of the virus from the original three strains that were found to be endemic originally. These efforts will continue to decrease the risk of VDPV. The risk, however, will not be eliminated until the need for oral polio vaccine (OPV) is eliminated.

While the study sample was a purposive sample set that included six countries in Africa, it did not include *all* countries worldwide at high-risk for polio outbreaks. However, to be able to focus on the African countries with regard to polio legacy planning was strategically fortuitous. The GPEI concentrates on countries that are "Endemic" polio countries, "Outbreak" countries, and "Key-at-Risk" countries. In this context, "endemic" refers to countries where the indigenous wild poliovirus (WPV) has never stopped; "outbreak" refers to countries where indigenous WPV circulation has stopped but they are affected by outbreaks of imported WPV or circulating vaccine-derived poliovirus; and "key at-risk" refers to countries that are no longer poliovirus-infected, but they remain at high risk of outbreaks.

Of the twenty-four countries in total, sixteen of them are located on the African continent

("Where We Work," n.d.). All of the countries included in the purposive sample where on the focused

list, except for Angola which previously had been on the list.  Thus, focusing on the legacy of the polio

infrastructures in the African context allowed for an intensive analysis where transition planning is most

critical. (See Figure 1.)
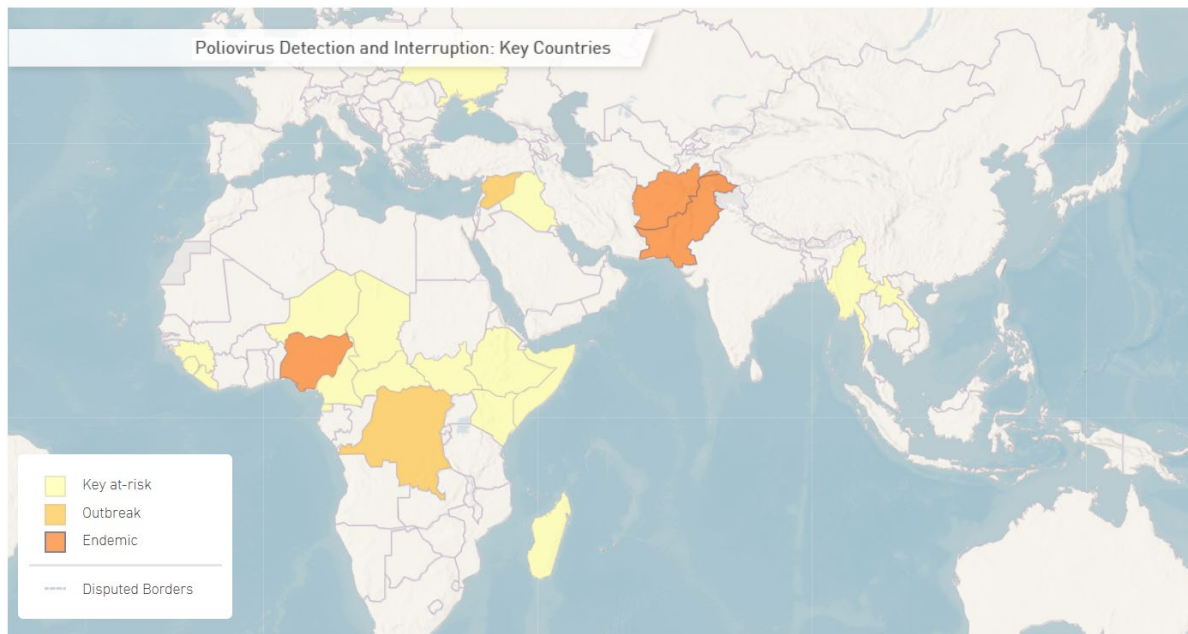


Figure 1. WHO Poliovirus Detection and Interruption: Key Countries
("Polio now," 2016)

In the African context, there remain staggeringly large populations of unvaccinated people and

hard-to-reach areas where disease surveillance is nonexistent (Poy et al., 2017, p. S226-S236). Obstacles

are vast.  Funding reductions, civil unrest, competing health needs, complacency, interruptions in cold

chain, loss of human resource capacity, and massive migratory populations, especially throughout the Horn of Africa region, all pose threats to eradication.

Additionally, as long as the polio virus continues to exist <u>anywhere</u>, vaccination against the virus must continue <u>everywhere</u>. If not, the potential for the virus to spread again throughout the world remains.  One imported case of polio virus into an unvaccinated population would be like flicking an open match into the Savannah in the dry season. Despite the race to end the last chapter of the polio virus while wrestling with daunting obstacles, it is incumbent to start planning now to prepare for the future to address other health burdens.

C. <u>Purpose of the study</u>

This study aims to identify stakeholders' public health priorities and desired application of built polio infrastructure to inform legacy planning and to set the stage for successful implementation of future public health non-polio interventions.

1. <u>Specific Aim 1</u>

PRIORITY: Identify and characterize stakeholders' priority health needs for applying the built polio infrastructure to improve future health outcomes. To accomplish this, I used qualitative data from a midterm program evaluation of partners engaged in a secretariat structure, or a small coordinating body aimed to bring stakeholders together, to achieve polio eradication.  I explored the extent to which similar priorities existed across different stakeholder organization levels (multilateral international organizations, national ministries of health, civil society organizations, and community level partners) and high-risk country contexts.

2. <u>Specific Aim 2</u>

ADAPTABILITY: Determine opportunities for adaptability of the built polio infrastructure to address stakeholders' self-identified future health priorities. I analyzed qualitative data from

stakeholders to find shared examples where the polio infrastructure was already being adapted to other health needs, and for shared suggestions of how it could be adapted in future opportunities. I predicted that existing priorities have clear opportunities for combined health interventions.

D. <u>Significance of the study</u>

The success to-date with achieving 99.9% elimination of polio worldwide has been partly due to an extensive and ongoing collection of quantitative polio-related data. Tracking immunization coverage rates, acute flaccid paralysis (AFP) surveillance rates, and supplementary immunization campaigns have been critical to identifying risk and progress towards polio eradication. There exists, however, a relative paucity of simultaneous qualitative data but more importantly it is the richness of the data surrounding perspectives from the partners involved in polio eradication that is lacking.

In contrast to the large quantitative body of polio data available, there are limited contemporary qualitative perspectives from multi-level stakeholders involved in some of the highest-risk polio eradication settings. In peer-reviewed scientific journals, of the 24,209 articles published on polio only 91 of those focus primarily on qualitative data. The electronic PubMed database was searched for key words "polio" and then compared to "polio" and "qualitative" (1950-2018). While the disparity of qualitative articles is vast, the deficit lies in missing the opportunity to understand partners' engagement and experience in the polio eradication initiative. The coordination of this public health effort requires immense quantitative tracking and data analysis to inform progress. While the emphasis on quantitative epidemiology is imperative to achieve eradication, qualitative data from the extensive partners involved is also a needed component.

Knowledge gaps exist in stakeholder-perceived competing health priorities and opportunities for combined health intervention adaptability. Qualitative data can help to elucidate shared priorities and places where health interventions can be adapted to achieve multiple health outcomes. Evaluating the

perspectives of the diverse stakeholders can reveal opportunities for creating shared priorities that can lead to more successful implementation of health interventions.

Stakeholder perspectives on polio and other health priorities, intervention strategies, and attitudes towards polio programs can affect the progress towards determined outcomes. Including qualitative data in the global polio picture can lead to a better understanding of obstacles and ultimately help to better define and plan for post-polio health interventions. Just looking at the *numbers* related to polio eradication will miss the rich network of relationships, assessment of needs and perspectives that can be harnessed to address other health burdens.

Legacy planning, i.e. transitioning the polio infrastructure and assets to other health initiatives, is critical at this stage to avoid the loss of public health momentum experienced after the eradication of smallpox. While the success of smallpox eradication was profound, harnessing the capacity to address next health issues could have been improved. "The experience of smallpox eradication in 1980 demonstrates that the assets from a global health initiative can disappear very quickly" (Cochi, Hegg, Kaur, Pandak, & Jafari, 2016, p. 279). Henderson and Chan also stress the success in the past eradication programs. "Tens of millions have been spared death and disability. In programs built on the successful concepts of smallpox eradication, polio and guinea worm are themselves nearing eradication" (Henderson, 2011, p. D8). The WHO estimates of polio vaccination coverage worldwide have exceeded expectations (Chan, 2014, p. 1698).

However, it was not until 1988 that the Global Polio Eradication Initiative coalesced to confront this shared priority. At that time, polio was paralyzing 1000 children worldwide per day ("History of Polio," n.d.). How many more would have been spared in the 40-year gap between now and the last smallpox case if smallpox legacy planning had been better informed and executed? As we race to accomplish the next eradication, it is imperative that we do not repeat this trajectory on the heels of success. Okwo-Bele and Cherian assert that "appropriate operational research, to inform future

immunization policies and practices, and to overcome obstacles and bottlenecks to achieve universal coverage with immunization" is immediately critical (Okwo-Bele & Cherian, 2011, p. 79).

Already the opportunity to apply strategies developed from smallpox eradication and near polio-eradication have been called upon to address current disease threats. While Ebola outbreaks have occurred since 1976, earlier ones paled in comparison to the lives lost and cost incurred in the 2014-2016 outbreak in West Africa ("Ebola Virus," 2018). Rapid development of an Ebola vaccine created another critical defense in addressing outbreaks. In 2018, an Ebola outbreak in the Democratic Republic of the Congo started, and as of January 2019, there were 628 cases and 383 deaths ("Ebola Situation," 2019). Set again in a location with limited infrastructure, insecure areas, and dense populations the outbreak had the potential to surge as the 2014-2016 outbreak did in Sierra Leone, Liberia, and Guinea. Instead, the techniques of polio vaccination campaigns were employed distributing ring-block vaccinations around suspected and confirmed cases (Levy et al., 2018, p. 787). Additionally, the community health workers engaged in polio eradication as well as the polio infrastructure were lateralized to control the outbreak and adapted to addressing the outbreak. This example emphasizes the importance of learning from stakeholders that have been engaged in polio eradication, listening to their perspectives on how to apply the built polio infrastructure and embracing an approach focusing on adaptability.

## II.  CONCEPTUAL FRAMEWORK

A.  <u>Integrated Implementation Science Secretariat-SocioEcological Scheme</u>

Future planning with multi-level, large organization and diverse stakeholders is complex. Framing the relationships and standing on principles found in implementation science while recognizing the context of public health stakeholders can set the stage for successful interventions.  The utility of this conceptual framework helps to recognize the context of each partner's perspective and capabilities. Understanding the complex context of the partnerships can lay a groundwork for applying the Consolidated Framework for Implementation (described below). Identifying and aligning priorities can facilitate relative priority as well as reveal opportunities for adaptability for combined health intervention.  The following section will first describe the integrated model and then further explain the components of the model below. (See Figure 2.)

The stakeholder levels are nested in concentric ovals in the socio-ecological model relationship, emphasizing the contextual significance when determining health priorities. All of the stakeholders enter the secretariat structure in the center of the visul scheme, representing where communication, collaboration, task-sharing, and microplanning occur.  In this tailored model, the products of the secretariat partnership aim to develop relative priority and opportunities for adaptability. The overall goal of this integrated framework model is to visualize the complex environment within which stakeholders' priority health needs will be identified and opportunities for adaptability can be determined. Components of the model are explained below.

B.  <u>Consolidation Framework for Implementation Research</u>

Several aspects of the Consolidation Framework for Implementation Research (CFIR) inform the path forward for polio legacy planning.  "The CFIR provides a menu of constructs that can be used as a practical guide for systematically assessing potential barriers and facilitators in preparation for

**Integrated Implementation Science Secretariat Socio-Ecological Scheme**

Socio-Ecological Context

Polio Eradication Stakeholders

International Multi-& Bi-lateral Orgs.

International Civil Society

National Ministries of Health

Local Civil Society

Community

Individual

Collaboration Structure

The Secretariat Model

Implementation Science Pillars

Relative Priority

Adaptability

Outcomes

Polio Eradication

Legacy Planning

Figure 2. Integrated implementation science secretariat socio-ecological scheme

implementing an innovation and providing theory-based constructs for developing context-specific logic

models or generalizable middle-range theories" ("Constructs," 2019). An integrated implementation As

previously stated, the polio vaccine is effective, global polio eradication initiatives are in place and

eradication is in sight.  Planning now for the implementation of future public health needs can help to

avoid a loss of momentum when polio eradication is achieved.

1. Relative Priority

Organizational and business science contexts can advise ways to construct next steps in the polio context.  First, establishing a 'relative priority' amongst stakeholders has been found to be a significant predictor for implementation effectiveness ("Constructs," 2019). "When relative priority is high, employees regard the intervention as an important priority rather than a distraction from their 'real work'" ("Constructs," 2019). In the public health sphere, there exist continuous competing priorities. One USAID stakeholder in the study dataset expressed the importance of addressing local priorities, "Give people ability to talk. Accord them the respect to be heard. That is what they want… no road, no vaccine in this community" (USAID stakeholder, Nigeria). They were referring to a community in Nigeria that collectively refused to accept the polio vaccine for all children, which was a high priority for the government.  They leveraged the government's desire to increase vaccine coverage toward their local priority of having the government take action and build the road they had been asking for to link the community to the market.

Stakeholders may not have been charged with a full-time job to solely address polio-related issues.  Their 'real work' may encompass larger primary health care strategies. In the case of some civil society organizations, stakeholders may not be charged with specifically medical or public health outcomes at all.  For example, religious organizations often have primarily faith-based and faith-promoting programs. Polio, or any other disease burden, could be perceived as unrelated to the charge of the organization.  Additionally, developing priorities can occur in the inner or outer setting. This refers to developing priorities with stakeholder voices (inner setting) versus having priorities mandated to an organization from outside (outer setting). Defining polio eradication efforts as in line with the organization's foundational mission from an inner setting can help to establish a relative priority.  Polio eradication efforts done by the organization and by individuals within the organization would then be

perceived as a priority rather than a task competing for attention. Polio immunization campaigns then become opportunities to achieve work-related goals.

The higher the relative priority of implementing an intervention, the more effective the implementation is likely to be (Helfrich et al., 2007, p. 279-303). The inner setting in this context would be defined as when more than one level of stakeholder voice, and hopefully several, come to the table for health program planning. For example, when key stakeholders from WHO meet with national MoH officials that would be considered an "inner setting". Likewise, a planning meeting with community health workers and local civil society organizations would also be considered an "inner setting". An external setting would be defined as any one stakeholder meeting, planning, and deciding health priorities without the perspectives of other stakeholder entities. For example, decisions made at an international civil society based in the United States without listening to local stakeholders would be defined as external.

In a recent post-Ebola outbreak study,

> "The most frequently made recommendation was the integral use or involvement of the community. Across the study, respondents clearly articulated the need for communities to be active participants in an intervention rather than being conceived as passive recipients of a service delivered by outsiders… Most importantly, the community engagement instilled a sense of trust in both the vaccine and the vaccine campaign, and communities repeatedly confirmed that it was this that had led them to accept the vaccines… Extended community engagement, health promotion, and risk communication must mitigate the challenges faced, proactively encourage utilization and in so doing, ensure that communities are at the center of future policy and programing" (Bedford et al., 2017, p. 89).

Incorporating the community level in the inner settings when developing health interventions can improve implementation success.

2. Adaptability

Authors addressing a wide range of subjects from biological evolution to organizational effectiveness have emphasized the importance of adaptation to changing environments as an important component of success.

"According to Darwin's Origin of Species, it is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is one that is able best to adapt and adjust to the changing environment in which it finds itself" (Megginson, 1963, p. 3-13).

This concept is relevant for health interventions as well. Adaptability in this context will refer to the degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs. An intervention that can be easily modified to adapt to the setting is positively associated with implementation (Gustafson et al., 2003, p. 751-76). Many health interventions can be altered slightly to encompass additional health needs without great additional burden. For example, a vaccine-focused intervention to vaccinate a remote village twice a year could, with little additional effort, also provide health education training on water, sanitation and hygiene during the same visit. One USAID stakeholder in the study dataset from Nigeria expressed,

"In any intervention, you have to look at the health plan. The federal (level) sets policy. The state (level) adapts it to the state. The local government (level) one influences the other then puts it in place. The model of the secretariat model is aligned with the structure of the government of Nigeria – they engage on all three of those levels. That strata is the model that everyone should (be) invite(d)" (USAID stakeholder, Nigeria).

Adapting interventions can bolster implementation success.

C. Socio-ecological model

My path to find the theoretical framework that best informs the aim of this study has been long. The socio-ecological model seems to be broad enough to encompass the significant barriers to global polio eradication, yet still provide a framework that accurately describes the landscape and suggests reciprocal causation (behavior both affects and is affected by multiple levels of influence) (National Cancer Institute, 2005, p. 21).

Multilateral shared prioritization; collaboration with national governments; addressing competing health priorities with national Ministries of Health; establishing the infrastructure to distribute; establishing and maintaining the cold chain necessary for vaccine, procurement, awareness

building, community sensitivity and local leader buy-in; and family/social structure acceptance all need to occur first in the space surrounding the individual. The socio-ecological model for me depicts the layered, nested nature of these relationships.

I came to the decision to embrace this model through two main avenues: scholarly investigation considering other public health frameworks; and field experience over the last nineteen years in Peru, India, and six countries in Africa. In the broader literature on public health theory, two main categories emerge to classify contemporary theories: explanatory theory and change theory. Explanatory theories "describe the reasons why a problem exist," while change theories "guide the development of health interventions" (National Cancer Institute, 2005, p. 5). The ecological perspective, for me, bridges both of these categories. Also, I do tailor the ecological perspective to fit my understanding and to better frame implementation of polio programs. For example, the multi-level social-ecological model traditionally has nested factors that begins with the community and grows outward with encompassing circles of inclusive factors.

I think that when I embrace the social determinants of health as an explanatory theory driving this study, the individual factor is de-emphasized; however, it still is an important level to include when considering health behaviors (Marmot & Wilkinson, 2006). In this model, I include the "individual" as the nucleus of the concentric circles, and grow outward with local civil society, national ministries of health, international civil society, and international multilateral organizations even though the purposive sample set did not include interviews at this level. (See Figure 3.) Health choices of the individual, including the vaccine hesitancy, can have significant effects on the success of a health initiative. Additionally, recognizing the health priorities at the individual level can contribute to improved implementation. Regrettably, the study did not include interviews with individual beneficiaries, and thus must utilize the perspectives of the other stakeholder levels to represent and indirectly infer individual priorities.
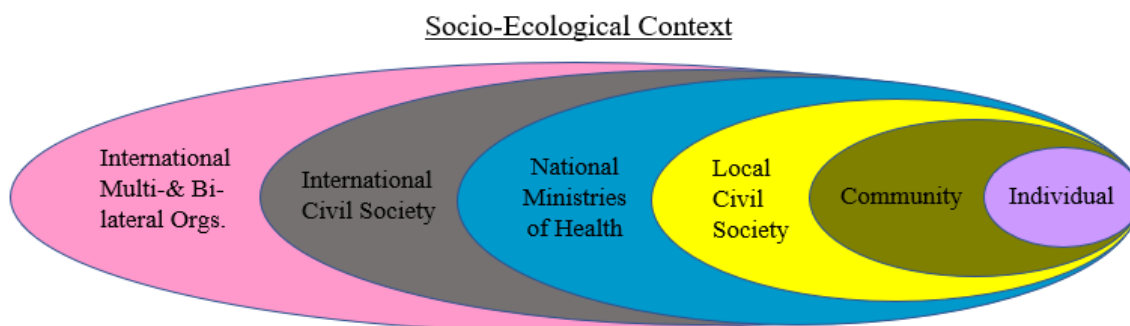
Figure 3. Socio-ecological context

Polio stakeholders at different levels of the model include the following:

*International Multilateral or Bilateral Organizations* – World Health Organization, UNICEF, United States Centers for Disease Control & Prevention

*International Civil Society* – Rotary International, Bill & Melinda Gates Foundation, AMREF Africa Health, CARE International, Save the Children, Catholic Relief Services, American Refugee Committee, CORE Group Polio Project, American Red Cross, World Vision, International Rescue Committee

*National Ministries of Health* – National Ministries of Health

*Local Civil Society* – BioAID, Tchikos, Kenyan Red Cross, Ethiopian Evangelical Church Development & Social Services Commission, Pastoralist Concern

*Community* – Community Health Workers, Volunteer Community Mobilizers

Other theories have offered helpful perspectives to consider. "A theory presents a systematic way of understanding events or situations" (National Cancer Institute, 2005, p. 4). Ultimately, the Health Belief

Model is very helpful when I apply the concepts to community perceived susceptibility, severity, benefits, barriers, cues to action and self-efficacy rather than applying it to the individual. (National Cancer Institute, 2005, p. 13). In doing this, it also shifts the responsibility to the systems-level for me rather than placing seeming fault on the individual. The Transtheoretical (Stages of Change) Model sketches out the process of change in ways that can offer wonderful direction for intervention development, but again I feel that it needs an overlay of the social determinant of health model with circular feedback loops on each stage to make it more useful. (National Cancer Institute, 2005, p. 15). I do not believe the Precaution Adoption Process Model offers anything useful beyond what the Transtheoretical Model already offers. It is too focused on a linear, one-directional path to change that I do not believe models the complexities of real life. Community Organization and Participatory Models do value frames of social networks and support, locality development, social planning and action. Sociocultural Environment Logic Framework seems to include aspects that I value, like equity and social justice, but the pathways to the outcome of "healthier communities" is vague and can occur in ways not represented in their model. The socio-ecological model is not the newest conceptual model, nor is it the oldest, but it most closely aligns (with some tailoring) with my understanding and approach to public health.

D. Secretariat structure

Structurally, the partnerships in this study relate to one another in a secretariat model. This model employs a coordinating body, or a small group aimed to bring stakeholders together to set, align, plan, and achieve outcomes moving toward an overarching goal. Stakeholders interviewed for this study are organized in a time-tested model for effective collaboration.

> "The CORE Group secretariat model has met success in 14 different countries to fight malaria, pandemic flu, polio, and improve maternal and child health. The secretariat team officially extends the resources and expertise of multilaterals and local governments. This small team of experts serve as a neutral, trusted partner. They unite non-governmental organizations to leverage their field expertise and influence at the community level. The CORE group secretariat

model and its respective team is a dynamic network which exponentially increases the impact especially in hard-to-reach populations. Before, international and local partners worked hard to fight polio but not necessarily in the most coordinated and efficient manner. Thanks to the secretariat model, efforts were streamlined, resulting in more than 21 million people annually (in India children under the age of 15yrs)…The secretariat model harnesses the strengths of the partners to maximize the impact on underserved, high-risk populations. The secretariat model provides a neutral, transparent space for efficient collaboration without competition" (CORE group, 2012).

This structure aims to increase collaboration and coordination among multilateral organizations, international and local NGOs, and local governments. Stakeholders interviewed for this study are all engaged in the secretariat structure in Angola, Ethiopia, Kenya, Nigeria, South Sudan and Somalia.

III. METHODOLOGY

The methodology of the study aims to integrate the conceptual framework of implementation science and the structure of the secretariat model while embracing the socio-ecological context of the stakeholders. A purposive sample was taken of polio stakeholders engaged in the secretariat model in six African countries considered at high-risk for a polio outbreak: Angola, Ethiopia, Kenya, Nigeria, South Sudan and Somalia. The original interviews were conducted as part of a larger midterm evaluation for the CORE group polio project where the focus of the evaluation was primarily on the epidemiological outcomes rather than the process. While qualitative data were collected, they were not analyzed as a stand-alone dataset or incorporated robustly into the final report.

A. Study Sample

The sample consists of sixty in-person, qualitative, semi-structured interviews conducted with representatives from international organizations (12), national ministry of health officials (17), international (23) and local (5) civil society organizations, community health workers and volunteer community mobilizers (3). The interviews were conducted between August and September of 2015. These perspectives were from individual stakeholders within their organizations. **The perspectives shared may not represent the overall stated missions and priorities of their organization, but they represent the individual stakeholder's perspectives from their informed position at their socio-ecological level within the organization.**

1. Inclusion Criteria

Eligible study participants were stakeholders engaged in polio eradication efforts and active in the secretariat structure in high-risk African countries: Angola, Ethiopia, Kenya, Nigeria, South Sudan and Somalia. Involvement included a range of activities and responsibilities including, but not limited to, administering polio vaccines, planning, programming, cold chain support and maintenance, funding, AFP surveillance, community health worker training, organization, primary healthcare, administration,

and funding. The map below shows the African countries included and the number of interviews collected in each country context. (See Figure 4.) All interviews were conducted in the respective countries, except for Somalia. Somali stakeholders were interviewed in Nairobi, Kenya at the United Nations Africa Headquarters due to security restrictions.
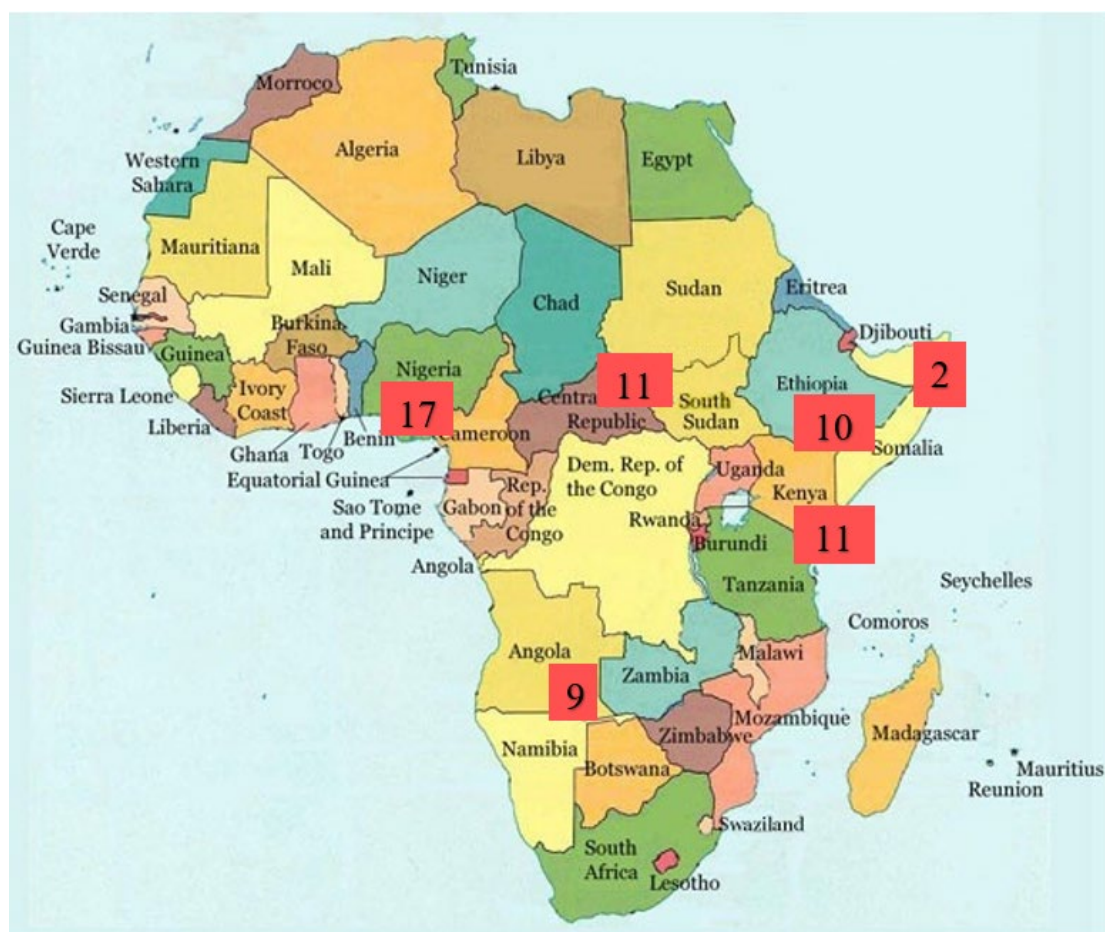


Figure 4. Map of Africa with number of sample set interviews

The following table shows all included stakeholder interviews by stakeholder socio-ecological level and country context. (See TABLE I.)

## TABLE I. STAKEHOLDERS BY COUNTRY AND SOCIO-ECOLOGICAL LEVEL

| Country | International Multi-or Bilateral orgs. | International Civil Society | National Ministry of Health | Local Civil Society | Community |
|---|---|---|---|---|---|
| **Angola** | UNICEF | World Vision | MoH Nat'l Public Health Dept. | Tchikos | Community Health Worker |
| | WHO | CORE Group | MoH Nat'l Polio Project | | |
| | | | Luanda Immunization Section | | |
| **Ethiopia** | UNICEF | CARE | Ethiopian Federal Ministry of Health | Pastoralist Concern | |
| | World Health Organization | AMREF | | Ethiopian Evangelical Church Development & Social Services Commission | . |
| | | CORE Group | | | |
| | | Save the Children | | | |
| | | Rotary International | | | |
| **Kenya** | UNICEF | American Red Cross | Nat'l Ministry of Health | Kenyan Red Cross | Community Health Worker |
| | World Health Organization | Catholic Relief Services | MoH Disease Surveillance Research Unit | | |
| | | CORE Group | Sub-county MoH office | | |
| | | International Rescue Committee | | | |
| **Nigeria** | USAID | Save the Children | Nat'l Emergency Operations Center | | Volunteer Community Mobilizer |
| | CDC | Rotary International | MoH Primary Healthcare | | |
| | | Catholic Relief Services | EOC Kano State | | |
| | | CORE Group-National | EOC Borno State | | |
| | | CORE Group-Kaduna | EOC Kaduna State | | |
| | | CORE Group-Abuja | EOC Yobe State | | |
| | | | MoH Borno State | | |
| | | | MoH Katsina State | | |
| **Somalia** | UNICEF | American Refugee Committee | | | |
| **South Sudan** | World Health Organization | Bill & Melinda Gates Foundation | MoH Primary Healthcare | BioAid | |
| | UNICEF | World Vision | MoH EPI & Child Health | | |
| | WHO Debrief meeting for MoH | CORE Group | | | |
| | | AMREF Health Africa | | | |
| | | American Refugee Committee | | | |

Due to the nature of the purposive sample, study sample limitations existed. There was not an equal number of stakeholders from each country represented. Additionally, the stakeholder levels were not equally represented especially regarding the community level. Perspectives from Somalia were the least represented in the sample due to limited access and security risks. The two stakeholders working on polio eradication efforts in Somalia (UNICEF and American Refugee Committee) were themselves based in Nairobi, Kenya due to the security considerations in Somalia.

Another limitation existed in that the countries included do not represent <u>all</u> countries in the world at high-risk for a polio outbreak. In Pakistan, Afghanistan, and Syria the polio virus remains uninterrupted and arguably efforts there are of critical importance, but these countries are not included. Endemic polio virus can be exported from these areas to other locations worldwide with large unvaccinated populations. Each country included in the study is engaged in the CORE Group Polio Project, which brings together stakeholders by the secretariat model. There are also differences, apart from distinct cultural differences, between the countries regarding their polio related statistics. For example, Nigeria had endemic polio cases in 2016 where Ethiopia has not had an endemic case in over a decade. Polio vaccine coverage rates, included in the individual country analysis section, vary between countries as do the challenges to the reliability of each country's administrative data.

To address and include transparency about the differences between countries, I included publicly available country descriptive statistics including population estimations, estimated polio vaccine coverage rates, and the date of the last endemic polio case. This helped to capture important factors to differentiate the country-level public health environments.

2. Exclusion criteria

The original dataset included an additional 18 interviews from stakeholders in India, but these were excluded in this analysis to focus specifically on continental Africa. While threats of importation

still exist in India, the country was certified as "polio-free" by the World Health Organization in 2014 (Chan, 2014).

3. Data Collection

In-person interviews with stakeholders ranging from individual to small group settings were conducted from August to September 2015. Interviews were transcribed verbatim in real-time during the interviews on a laptop computer and same-day cleaning and editing occurred. The qualitative dataset was used in a retrospective data analysis.

B. Analysis

The analysis was driven by the above integrated model aiming to find existing relative priorities and adaptability of health interventions to achieve multi-level stakeholder priorities. A modified Grounded Theory approach to the data allowed for self-identified health priorities to emerge naturally, and further classification of the responses to develop iteratively (Glaser & Strauss, 1967).

One component of an adapted Strengths, Weaknesses, Opportunities, Challenges, Achievement Analysis, or SWOCA Analysis, was used within the qualitative tool (included as an appendix). The traditional SWOT model was adapted to include "Challenges" instead of "Threats" and included "Achievements" as the last step, thus calling it a SWOCA (Dess, McNamara, & Eisner, 2016). These adaptations were made to set a better tone during the interviews with stakeholders. Instead of ending with threats, or in this case "Challenges", which highlight the obstacles standing in the way of progress, the interviews ended with "Achievements" so as to focus on the gains that have been met despite the often-overwhelming obstacles. Especially in the context of polio eradication, the obstacles included enormous challenges of poverty, insecurity, and bleak global financial and political trends. The adapted model was adopted to not only reveal the progress experienced by stakeholders but also to support a constructive and positive approach to addressing public health challenges with hope.

Since the focus of this analysis was on shared priorities around legacy planning and adaptability, the most relevant transcript passages were responses to the "Opportunities" section of the interview guide. The question of specifically asking what stakeholders' desire to address next was found in this section. Verbatim, the question was asked, "How best should the infrastructure built through the polio program be used?" Looking at where relative priorities already started to align was of interest, as well as where they diverged. Opportunities for adaptability also emerged with similar health burdens and similar health intervention structures.

All transcripts were loaded and analyzed within Dedoose, a password-protected qualitative data analysis software program. All transcribed interviews were assigned a numerical identification that indicates in which country the interview took place and the chronological order of the interview in that country. For example, Ethiopia was country "01" and the fifth interview in Ethiopia is labeled "01-005". Transcripts were coded and re-coded as themes emerged and codes evolved according to the study code definitions. Descriptors have been developed and linked to all transcripts indicating country context (Angola, Ethiopia, Kenya, Nigeria, Somalia, South Sudan) and stakeholder level (International multilateral & bilateral organization, International civil society, National Ministry of Health, local civil society, and community level).

1. Code categories, codes, and descriptors

Initial codes emerged through the analysis embracing a Grounded Theory approach. Themes that naturally emerged from stakeholders' responses to inquiry about a post-polio public health environment informed the initial family and sub-family codes. The coding process, as with most qualitative analysis, evolved continually through an iterative process. The code book was approached as a "living document," open to adaptation and dynamism.

Codes were developed in a hierarchical structure, with higher-level codes referred to as "parent" codes, and lower-level ones designated as "child" or "grandchild" codes. Two parent codes were developed to related to the specific aims 1) Relative Priority and 2) Adaptability. Then under those parent codes, child code categories were created, and child codes were created to identify stakeholder-identified priorities for which the built polio infrastructure should be applied. Furthermore, grandchild codes were developed when needed for more specific differentiation.

Parent Code →Child Code Category → Child Code → Grandchild Codes

Example: Parent code: Relative Priority →Child Code Category: Disease →Child Code: Non-communicable disease →grandchild code: Diabetes.

As the transcripts were coded, parent and child codes were collapsed or expanded as the code directory was refined. The transcripts were coded, re-coded, and revised numerous times as the coding process was honed.

Country "descriptors" were also linked to each transcript in the qualitative software. They included Angola, Ethiopia, Kenya, Nigeria, South Sudan and Somalia. All respective interviews were conducted in those countries, apart from Somalia. Due to extreme security concerns, stakeholders working on the Somalia polio eradication efforts were based out of neighboring Nairobi, Kenya. These stakeholder interviews were, however, linked to the descriptor "Somalia" for the purpose of the country-specific perspectives.

Additionally, socio-ecological level "descriptors" were linked to each transcript and included International multilateral and bilateral organizations, International civil society organizations, National ministries of health, Local civil society organizations, and Community. This allowed the qualitative data to be examined both at the individual country level (i.e. only stakeholders in Ethiopia) and at each

socio-ecological level across country contexts (i.e. stakeholders from all of the national ministries of health only).

To explain the findings, it is important to share the codes and major code categories that were developed during the analysis and link them to the study specific aims. The coding and analysis were structured to continually link back to the study specific aims. As the qualitative analysis progressed, four overarching code categories emerged when participants discussed Specific Aim 1- relative public health priorities: Health Systems & Infrastructure, Disease, Health Promotion, and Societal Factors. The table below shows the overarching code categories and the more specific individual codes (child and grandchild codes) that fell into each category. (See TABLE II.)

The same code categories, child codes, and grandchild codes were used to relate to the second specific aim related to Adaptability. In addition to this code structure, a parent code was developed for Adaptability, along with the following child codes: Examples, and Opportunities.

For the analysis, the data were isolated, or filtered, to show the presence of a code and code category for each stakeholder interview. For the individual country report, the dataset was further filtered to only include stakeholders from that country. For the analysis across all country contexts, all interviews were included, and the responses were stratified by stakeholder level.

For overarching trends, data were analyzed for Descriptor (country and stakeholder level) by "codes grid count" in Dedoose. This revealed the responses by country-specific, socio-ecological level for each code within each code category. Code related to a mentioned priority was counted once if mentioned by at least one stakeholder at each socio-ecological level. Additionally, the data were filtered to find key quotes from every country level that highlighted the majority identified priority. Then, the secondary priorities within each code category were filtered to discover and include just exemplary quotes that supported the priority identified.

TABLE II. CHILD CODE CATEGORIES, CHILD CODES, & GRANDCHILD CODES DEVELOPED FOR PARENT CODE "RELATIVE PRIORITY" FOR STAKEHOLDER-IDENTIFIED PRIORITIES

| Child Code Category | Child Codes | Definition |
|---|---|---|
| **Health systems & infrastructure** | | Codes related to the structure built to address health and disease burdens, interrelated agencies initiatives working towards improving population health |
| | Ability to respond to future threats & outbreaks | Planning and preparation for current and/or future health burdens and outbreaks |
| | Accessing hard-to-reach populations | Reaching populations that are difficult to access due to geographical location, cultural identity, insecurity, migratory lifestyles |
| | Cold chain improving or maintaining | Supporting, maintaining, and/or establishing uninterrupted refrigeration of vaccines and medicines from manufacture to distribution to community beneficiaries |
| | Cross-border collaboration | Public health coordination across national borders to address migratory populations |
| | Coordination of multiple partners | Coordination of stakeholders from all socio-ecological levels to ensure efficiency, effectiveness, and decrease duplicity of efforts |
| | Human resources | Building an increased human capacity network with the needed skills to achieve health outcomes, training, health education |
| | Improving communication | Bridging communication gaps between stakeholders at all socio-ecological levels, distributing information on health, programs, and goals across differing cultures, languages, and professions |
| | Microplanning | Program planning between stakeholders to set goals, increase transparency of efforts, and track outcomes |
| | Organizing | Bringing together stakeholders to work together instead of independently on health interventions |
| | Advocacy | Creating greater awareness for health burdens and interventions, promoting involvement and action toward achieving health goals |
| | Financial | Providing funding, assisting in funding allocation, advocating for financial assistance |
| | Health monitoring and surveillance | Tracking disease prevalence and incidence, acute flaccid paralysis surveillance, monitoring population health statistics, health needs assessment |

TABLE II. CHILD CODE CATEGORIES, CHILD CODES, & GRANDCHILD CODES DEVELOPED FOR PARENT CODE "RELATIVE PRIORITY" FOR STAKEHOLDER-IDENTIFIED PRIORITIES (CONTINUED)

| Child Code Category | Child Codes | Definition |
|---|---|---|
| **Health Promotion** | | Codes related to improving health education and promoting health |
| | Decrease maternal & child mortality | Improving health and mortality outcomes from mothers and children over a lifespan, encouraging breastfeeding |
| | Health behavior change | Improving lifestyles to include an aim for improved health across a lifespan, encouraging populations to utilize the health system to support their health, encouraging women to take their children to the health post to get vaccinations, track health, address illness |
| | Health education | Communicating correct health information on disease prevention, health promotion programs, social mobilization, demand creation for health services |
| | Improving sanitation | Promoting improved hand-washing, hygiene, food and water waste management and practices, organizing elimination locations |
| | Nutrition | Improving alimentary intake to support diet |
| | Routine immunization | Promoting the recommended immunizations for children 0-5years old as set by each national ministry of health, this includes all needed polio vaccinations |
| **Disease** | | Codes that focus on addressing disease("Diseases & Conditions," n.d.). |
| | Diarrheal disease | Often food and water-related illness that causes diarrhea and subsequent dehydration |
| | Cholera | Vibrio cholerae infection |
| | Ebola | Ebola virus infection, preliminary vaccine has been developed |
| | Eradication (other than polio) | Focus on eliminating a disease, excluding polio, could include measles, neonatal tetanus |
| | Guinea worm | Dracunculus medinensis parasitic infection |
| | HIV | Human immunodeficiency syndrome, bloodborne viral infection |
| | Malaria | Mosquito-borne parasitic infection |
| | Measles | Measles infection |
| | Meningitis | Viral or bacterial meningitis infection |
| | Neonatal tetanus | Clostridium tetani infection in newborns |

TABLE II. CHILD CODE CATEGORIES, CHILD CODES, & GRANDCHILD CODES DEVELOPED FOR PARENT CODE "RELATIVE PRIORITY" FOR STAKEHOLDER-IDENTIFIED PRIORITIES (CONTINUED)

| Child Code Category | Child Codes | Definition | |
|---|---|---|---|
| | Parasites | Any parasitic infection, excluding malaria and guinea worm | |
| | Pneumonia | Pneumonia lung infection | |
| | TB | Tuberculosis mycobacterium infection | |
| | Trachoma | Chlamydia trachomatis infection | |
| | Typhoid | Salmonella typhi infection | |
| | Non-communicable diseases | Non-contagious, chronic conditions | |
| | | Grandchild code: Ulcers | Ulcerative digestive condition |
| | | Grandchild code: Diabetes | Diabetes mellitis disease |
| | | Grandchild code: Hypertension | High blood pressure |
| **Societal Factors** | | Factors related to large society issues, not related directly with health outcomes but that can significantly affect health and well-being | |
| | Poverty | Improving the state of populations that are extremely poor | |
| | Equity & equality | Improving the equality of services and opportunities, improving societal fairness and impartiality | |
| | Improving gender equality | Decreasing the difference in opportunity and station between men and women | |
| | Primary & secondary education | Improving education for children and adolescents | |
| | Road/water/school infrastructure | Improving civic infrastructure including schools, roads connecting communities and businesses, water distribution and availability | |
| | Security | Improve security related to conflict, political unrest, decrease opportunities for radicalization | |

The aim of the analysis was to find trends in priority across the broad multi-partner stakeholders involved in polio eradication to inform future planning.  Thus, the focus was not to analyze the nuances of the individual stakeholders' responses but rather identify public health priorities that are shared across the broad landscape of stakeholders and across the six country contexts. A macro-view was important to take in this study because the development and execution of health initiatives involving diverse stakeholder levels necessitates the buy-in of complex and differing participants.  To this end, the data were examined by socio-ecological stakeholder level. Value was placed on priorities mentioned at least once by at least one stakeholder at a socio-ecological level.  It was assumed that if a priority was mentioned at least once by at least one stakeholder at a particular socio-ecological level, that the socio-ecological level was primed to consider a legacy plan that would include, if not hinge, on that priority.

In the adaptability analysis, examples and opportunities were excerpted and coded as such and also coded for relation to the codes in the priority section. (See TABLE III.) Then code co-occurrence was assessed to categorize the priorities addressed in the example or suggested opportunity.

TABLE III. ADDITIONAL DEVELOPED CHILD CODES FOR PARENT CODE ADAPTABILITY

| Parent Code | Child Code | Description |
| --- | --- | --- |
| Adaptability | | Instances where public health priorities can be merged in joint initiatives or programs |
| | Examples | Current or past examples of adapting public health priorities, not exclusive of non-polio examples |
| | Opportunities | Opportunities that lend to future adaptability in public health priorities |

There existed a wide range of priorities identified by partners in polio eradication but finding the shared priorities can help to build a cohesive and supported legacy plan. Individual stakeholders or organizations may never be aligned on *all* priorities, but stepping forward together on one, or a few priorities, can result in greater ownership, increased motivation, and more successful implementation.

Additional codes were developed to identify supportive excerpts for the discussion and conclusions. A code for "great quote" was developed to tag stakeholder excerpts that epitomized discussion and conclusion topics. These quotes were used to richly elucidate the findings of the analysis. Quotes pertaining to the findings were included in each analysis section.

# IV.     RESULTS AND FINDINGS

The focus of analyzing this qualitative dataset was to discover trends and themes that emerged from stakeholders.  This approach embraced a Grounded Theory method that aims to allow responses that are uninfluenced or directed by preset assumptions of the researcher (Glaser & Strauss, 1967). Identifying shared priorities that emerged without prompting with a set list of choices allowed the stakeholders to self-identify their main priorities.  In order to recognize trends, the frequency of similar responses was calculated quantitatively as a way of informing the qualitative discussion.

While it is reasonable to assume that stakeholders at different socio-ecological levels may influence the direction of future interventions with greater or lesser weight, equal weight was assigned for the purposes of this study to all stakeholder responses in identifying their chosen priority.  Hierarchy of response weight has often been correlated with financial power.  For example, an international multilateral or bilateral organization such as the BMGF has the power to drive the direction of multi-billion-dollar health interventions.  Likewise, a national ministry of health has the power to set public health policies and programs.  However, the community level often represents "where the rubber hits the road." They are the ones executing the health initiatives on a door-to-door level.  In the polio context, the community health workers are the ones actually giving two drops of polio vaccine to their neighbors. They can critically influence the success of a health plan on an operations level rather than a financial level. The purpose of this research was to <u>equally</u> recognize the priorities of stakeholders regardless of socio-ecological level, thus valuing their input without differing weight.

Additionally, priorities were counted once per interview.  A stakeholder could have identified several priorities within one interview.  For example, they could have mentioned that the built polio infrastructure should next focus on routine immunization and assessing hard-to-reach populations.  In this case, both priorities also received equal weight and were each counted once for that interview.

In the findings below, a check mark was assigned for codes mentioned in an interview. Check density as assessed in each code category, revealing the number of times a code was identified in a code category and within stakeholder level.

For each individual country analyses, the data set of stakeholders was isolated within Dedoose. Then codes that applied to Relative Priority were filtered.

From there, the data were analyzed for "code presence" which identified a code once per interview, regardless of how many times it was included within one interview. Equal weight to each mentioned priority was assigned regardless of emphatic use or length of conversation about the priority. The strength in the data lay in the trends of data that emerged, rather than focusing on the specific communication characteristics of the individual stakeholders. Furthermore, equal weight was assigned regardless of how in-depth the stakeholder expounded on a particular priority. Again, the aim of the analysis was to find trending priorities that existed at multiple levels and country contexts to find common places from which to legacy plan. With a complex network of stakeholders, it is reasonable to assume that some may champion a priority greater than others, but it was finding common ground that was of most importance.

Of sixty transcripts, 42 unique child or grandchild codes were applied under the four overarching code categories related to Relative Priority in 384 excerpts from the transcripts. This represented 42 unique priorities that were identified across the dataset. Additionally, while every stakeholder identified at least one priority, the number of priorities mentioned differed between stakeholders. Each mentioned priority was counted once per interview for the analysis. Fifty-five codes were applied to excerpts identifying examples or opportunities for Adaptability.

As mentioned before, a descriptor for each interview was attached to identify the country where the stakeholder was engaged as well as a descriptor for the socio-ecological level of the stakeholder interviewed. For example, an interview with Catholic Relief Services in Kenya would have the

stakeholder level "international civil society" descriptor and the country "Kenya" descriptor attached. This allowed for the data to be analyzed by socio-ecological level and country or cross-country lenses.

A. Relative Priority

1. Overall priorities findings

This section will focus on the findings of Specific Aim 1 and identify stakeholders' public health priorities and desired application of built polio infrastructure to inform legacy planning. The packed code cloud, a packed display of code application frequency, below represents all the public health priorities identified by stakeholders across all country contexts. The size of the print is correlated with the frequency of the response. (See Figure 5.)
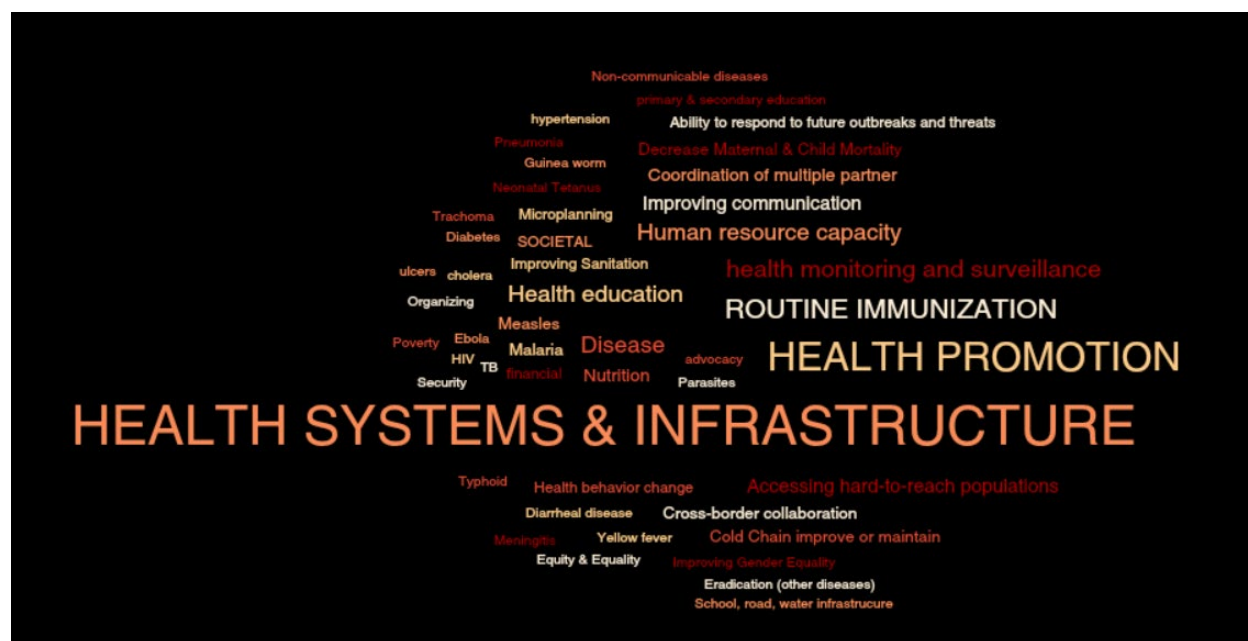


Figure 5. Relatively-sized packed code cloud of priorities overall

**Clearly apparent, "Health Systems & Infrastructure", "Health Promotion", and "routine immunization" were the most frequently occurring priorities that stakeholders identified as the desired focus that should be addressed with the built polio infrastructure.** Of the 60 qualitative interviews, aspects within the Health Systems & Infrastructure code category were identified in 93% (n=56) of the interviews as a priority to which the polio infrastructure should be applied. Within Health Systems & Infrastructure, health monitoring & surveillance was the most frequently identified aspect (60% n=36) and human resources in 51% (n=31). Priorities in Health Promotion were also identified in 93% (n=56) of the interviews, mostly attributed to the specific aspect of routine immunization (73% n=44). Malaria was identified by 32% of stakeholders (n=19) and measles by 25%, respectively (n=15). Societal factors were identified by the fewest stakeholders (15%; n=9), most frequently identifying improving gender equality (7%; n=4) and primary & secondary education (5%; n=3). (See Figure 6)
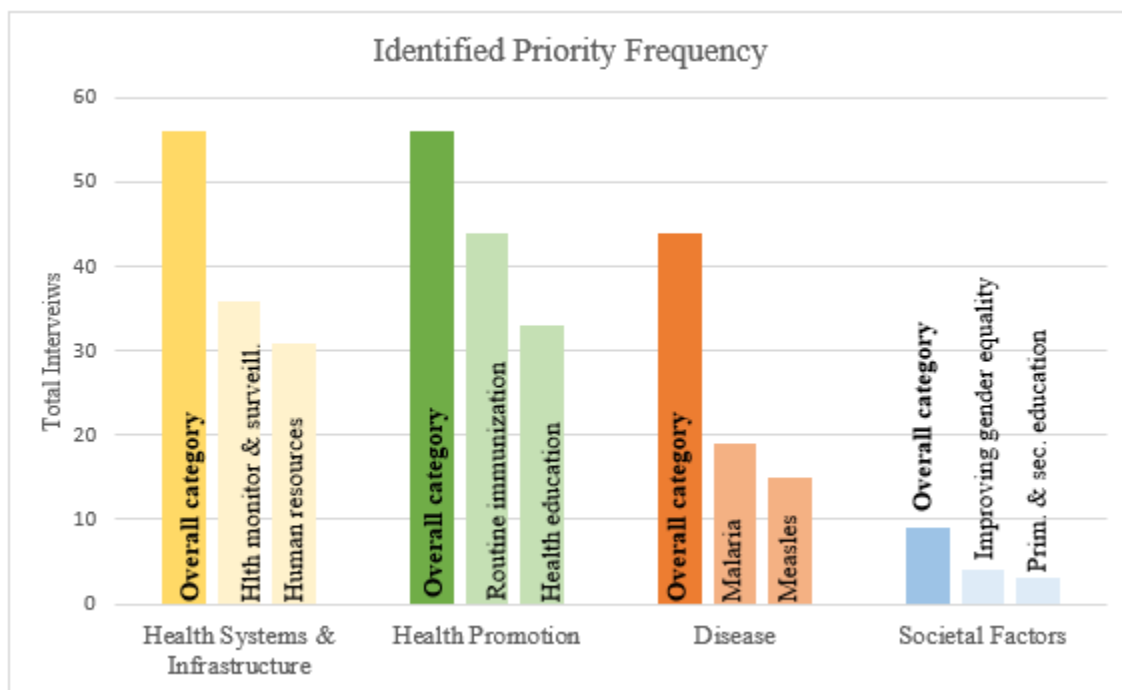


Figure 6. Identified priority frequency

The data analyzed for code frequency yielded the breakdown above.  Each code was counted once if mentioned at least once by a stakeholder. This revealed that overarching priorities already exist across six country contexts and many different levels of stakeholders from which future planning can hinge.

The chart below shows all identified priorities within the Health Systems & Infrastructure category. (See Figure 7)
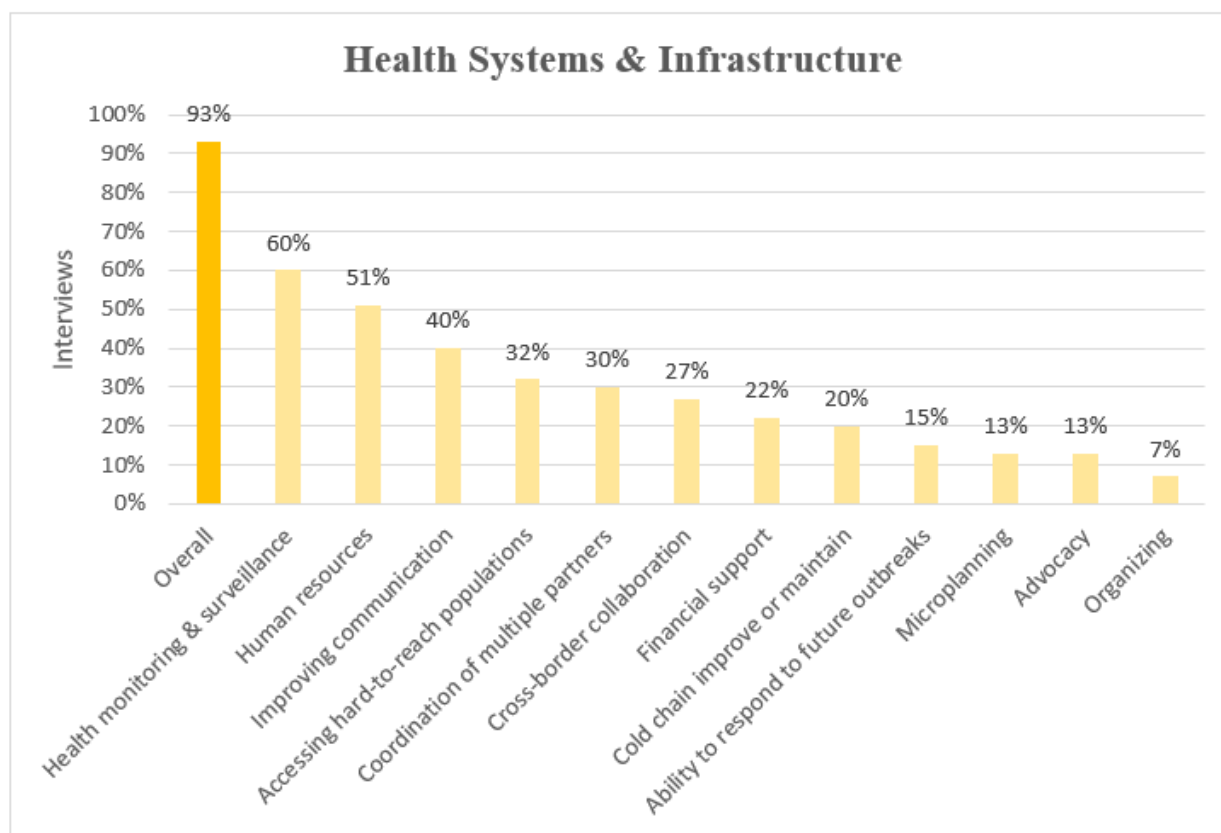


Figure 7. All priorities identified in Health Systems & Infrastructure

While the Health Systems & Infrastructure was identified in 93% of interviews, the specific aspects were spread over several specific priorities needed. The packed code cloud below shows the frequency of priorities with font sizes applied to frequency relative to number of stakeholders who mentioned them within the code category. (See Figure 8.)



Figure 8. Code cloud for Health Systems & Infrastructure priorities

Figure 9 identifies all priorities identified in the Health Promotion category. While the Health Promotion category also identified by 93% of stakeholders overall, there were fewer specific aspects within the category overall. And, as mentioned, the percentage was mostly attributed to the identification of routine immunization as a priority. The following packed code cloud in Figure 10 shows the frequency of priorities with font sizes applied to frequency relative to number of stakeholders who mentioned them within the code category.

Figure 11 identifies all the priorities mentioned in the Disease category. Disease priorities were
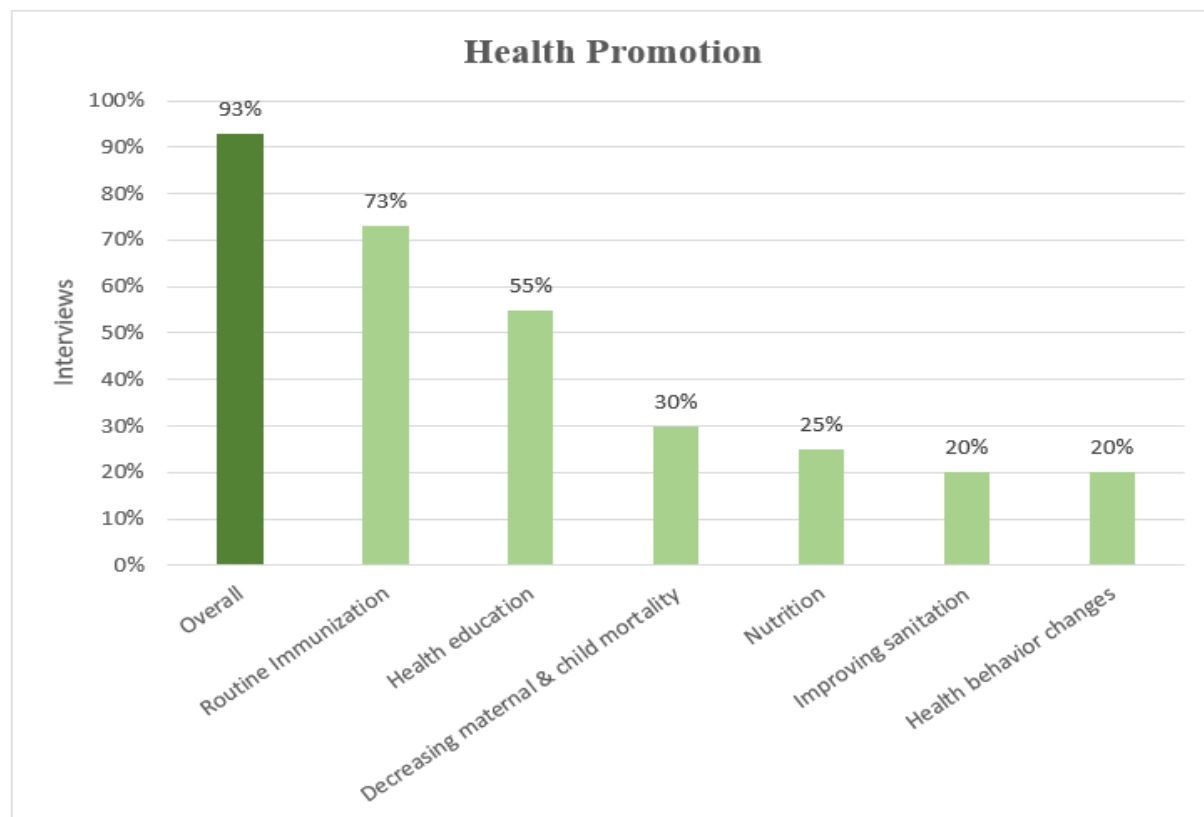
Figure 9. All priorities identified in Health Promotion
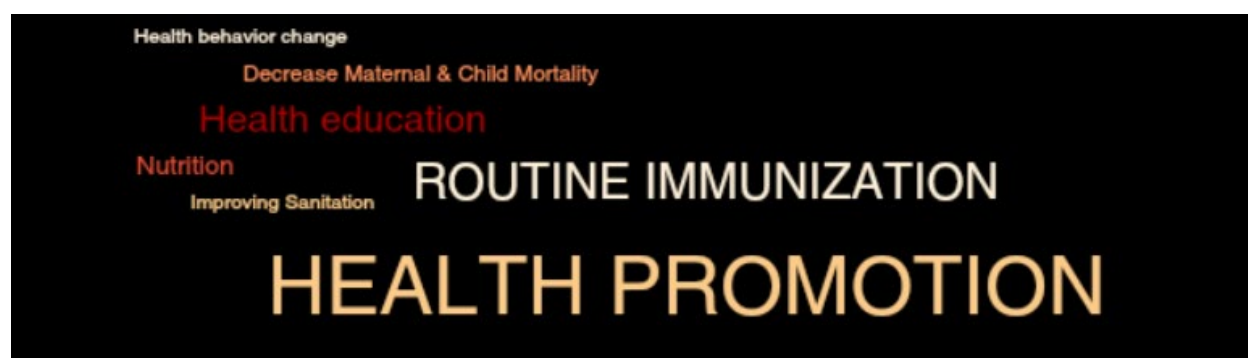


Figure 10 . Code cloud for Health Promotion priorities
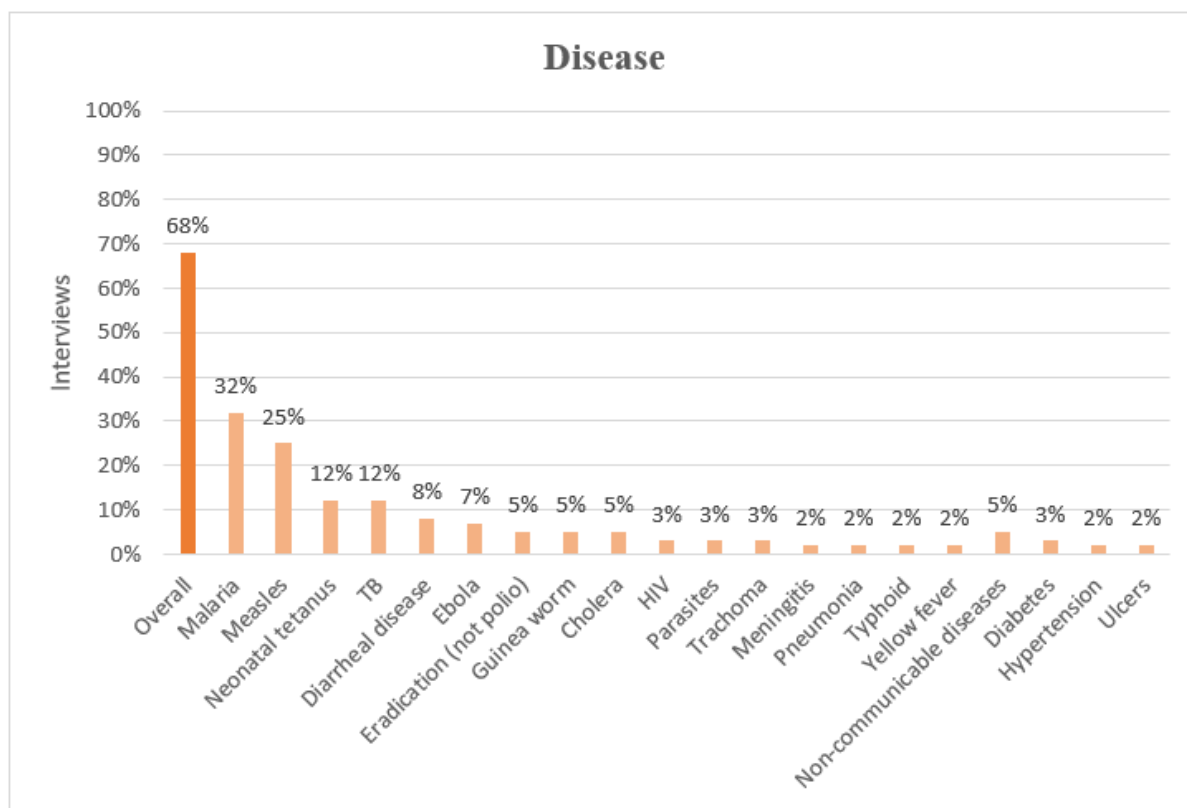
Figure 11. All priorities identified in Disease



Figure 12. Code cloud for Disease priorities

identified by over two-thirds of the stakeholders, but there existed a wide range of diseases mentioned.

As reiterated in the chart, the most agreement fell around malaria and measles. The packed code cloud shows the frequency of priorities with font sizes applied to frequency relative to number of stakeholders who mentioned them within the code category. (See Figure 12.) The chart below identifies the priorities mentioned pertaining to Societal Factors. (See Figure 13.)
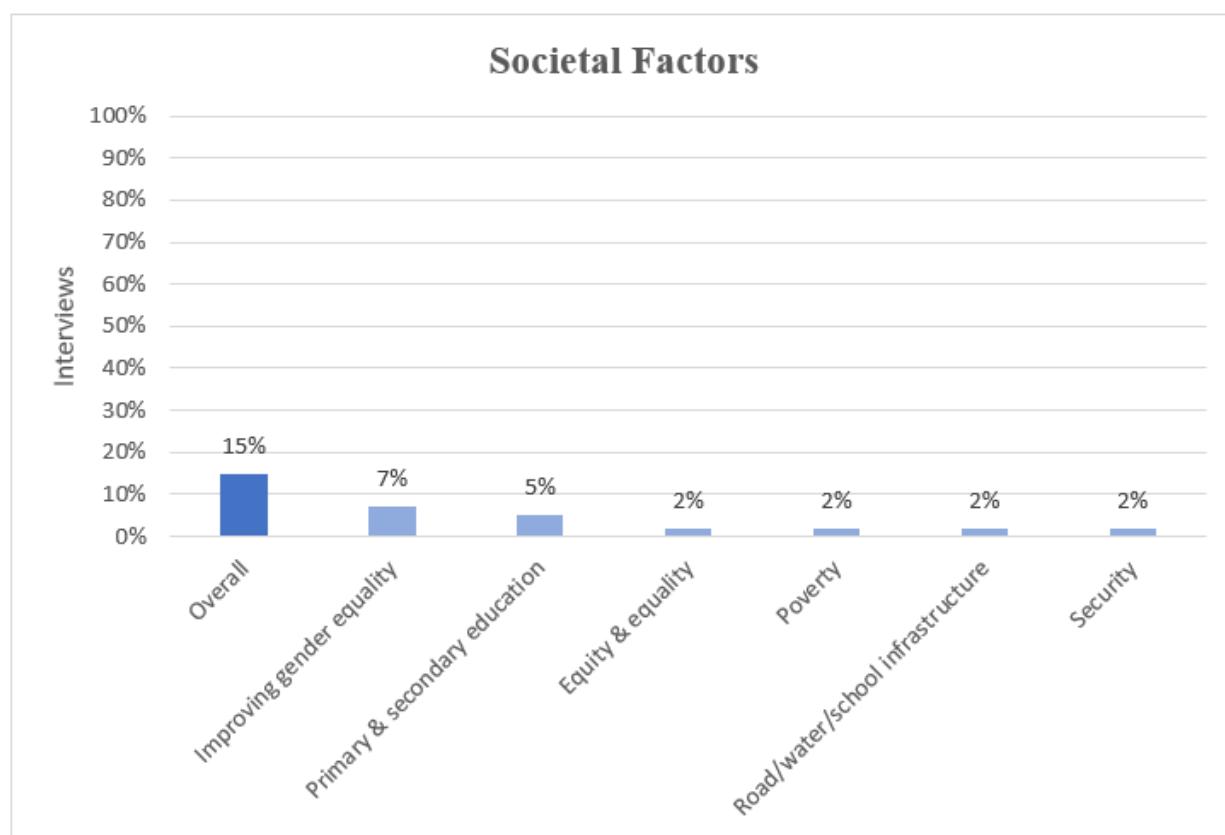


Figure 13. All priorities identified in Societal Factors

While infrequent, the Societal Factors were valued in the analysis and helped to inform the landscape of the health environment. The packed code cloud shows the frequency of priorities with font sizes applied to frequency relative to number of stakeholders who mentioned them within the code category. (See Figure 14.)



Figure 14. Code cloud for Societal Factor priorities

The analysis below aimed to show where broad multi-level agreement may lie and where future planning and initiative can hinge. For this, stakeholder interviews were collapsed into their respective stakeholder levels within each country. There were twenty-four country-specific, socio-ecological levels in total. The code categories are shown in the table below by country and socio-ecological stakeholder level where at least one stakeholder identified priorities for which the built polio infrastructure should be applied. Of the twenty-four country-specific, socio-ecological levels represented in the dataset, 93% identified aspects of Health Systems & Infrastructure. This category was mentioned as a priority in ALL country contexts and ALL socio-ecological levels, except at the community level in Nigeria. Ninety-two percent identified aspects of Health Promotion. Health Promotion was mentioned in ALL countries and ALL socio-ecological levels, except in Somalia by international civil society and the South Sudan

Ministry of Health level. It is more important to recognize that under Health Promotion, routine immunization was identified in 79% of the twenty-four country-specific socio-ecological levels.

Eighty-eight percent of the country-specific socio-ecological levels identified a priority in the Disease category to address. Disease was mentioned in ALL country contexts and ALL socio-ecological levels, except at the International Civil Society level in Kenya and Somalia, or the Community level in Kenya.

Lastly, 33% of country-specific, socio-ecological levels identified Societal factors to which the built polio infrastructure should be applied. While the least mentioned category by stakeholders, Societal factors were mentioned at least once in ALL country contexts, except Angola, and at least once at ALL socio-ecological levels.

The table below shows broadly which code categories encompassed the priorities socio-ecological level stakeholders, separated by country, identified. The specific code RI (routine immunization) under Health Promotion was highlighted to show the most frequent agreement for a specific code. (See TABLE IV.)

With any public health effort involving many stakeholders, there will always be a spectrum of competing perspectives and priorities. There is power in listening to priorities of stakeholders and then being able to adapt and combine future efforts. In discovering shared relative priorities, the data were analyzed to find priorities that were identified across country contexts and across socio-ecological levels.

Public health interventions need to address the felt needs of the population. Implementation science shows that when participant buy-in is high, intervention success increases (Helfrich et al., 2007, p. 279-303). An international civil society stakeholder in Kenya expressed the notion that the established relative priority of polio eradication has led their efforts, "We support "one plan, one budget, one

TABLE IV. CODE CATEGORIES OF IDENTIFIED PRIORITIES BY COUNTRY AND STAKEHOLDER SOCIO-ECOLOGICAL LEVEL

| (n=24) | Health Systems &Infrastructure | Health Promotion | | Disease | Societal Factors |
|---|---|---|---|---|---|
| **ANGOLA** | | | | | |
| | | | RI | | |
| Int'l Multi- or Bilateral org | ✓ | ✓ | ✓ | ✓ | |
| International Civil Society | ✓ | ✓ | ✓ | ✓ | |
| National Ministry of Health | ✓ | ✓ | ✓ | ✓ | |
| Local Civil Society | ✓ | ✓ | | ✓ | |
| Community | ✓ | ✓ | ✓ | ✓ | |
| **ETHIOPIA** | | | | | |
| Int'l Multi- or Bilateral org | ✓ | ✓ | ✓ | ✓ | |
| International Civil Society | ✓ | ✓ | ✓ | ✓ | ✓ |
| National Ministry of Health | ✓ | ✓ | ✓ | ✓ | |
| Local Civil Society | ✓ | ✓ | ✓ | ✓ | ✓ |
| Community | N/A | N/A | N/A | N/A | N/A |
| **KENYA** | | | | | |
| Int'l Multi- or Bilateral org | ✓ | ✓ | ✓ | ✓ | |
| International Civil Society | ✓ | ✓ | ✓ | | |
| National Ministry of Health | ✓ | ✓ | ✓ | ✓ | |
| Local Civil Society | ✓ | ✓ | | ✓ | ✓ |
| Community | ✓ | ✓ | ✓ | | |
| **NIGERIA** | | | | | |
| Int'l Multi- or Bilateral org | ✓ | ✓ | ✓ | ✓ | |
| International Civil Society | ✓ | ✓ | ✓ | ✓ | ✓ |
| National Ministry of Health | ✓ | ✓ | ✓ | ✓ | ✓ |
| Local Civil Society | N/A | N/A | N/A | N/A | N/A |
| Community | | ✓ | ✓ | ✓ | ✓ |
| **SOMALIA** | | | | | |
| Int'l Multi- or Bilateral org | ✓ | ✓ | | ✓ | ✓ |
| International Civil Society | ✓ | | | | |
| National Ministry of Health | N/A | N/A | N/A | N/A | N/A |
| Local Civil Society | N/A | N/A | N/A | N/A | N/A |
| Community | N/A | N/A | N/A | N/A | N/A |
| **SOUTH SUDAN** | | | | | |
| Int'l Multi- or Bilateral org | ✓ | ✓ | ✓ | ✓ | |
| International Civil Society | ✓ | ✓ | ✓ | ✓ | ✓ |
| National Ministry of Health | ✓ | | ✓ | ✓ | |
| Local Civil Society | ✓ | ✓ | | ✓ | |
| Community | N/A | N/A | N/A | N/A | N/A |
| **Totals** | **96%** | **92%** | **79%** | **88%** | **33%** |

N/A = not available in the dataset

enemy". Establishing a relative priority to lead future public health efforts that incorporate end-chapter

polio stages will build on this collective stakeholder group. But the priorities need to be aligned with

people on the ground.

> "One example – She (Community health worker giving polio vaccinations) saw a child that was malnourished, she picked up the case, and (was) assisting with nutrition, treating skin condition and that attracted other non-compliant (vaccination refusal) cases, that they saw that it was not JUST polio" (Ministry of Health stakeholder, Nigeria).

Conversely, some polio vaccine refusals were attributed to a lack of relative priority at the

individual level. When asked why some were resistant to vaccines, a Ministry of Health stakeholder in

Nigeria expressed that parents were concerned with "other health related problems of their children – so

why concentrate on polio?" While the overarching goal of improving the health of the children was

intact, the immediate health priorities of the beneficiaries challenged implementation of the polio efforts.

> "It's ok to say here that polio is the priority, but out there where people are dying. You cannot say that I am only a polio –worker" (UNICEF stakeholder, South Sudan).

These two examples referred to the importance of priorities at the individual level that other stakeholder

levels need to recognize. Insensitivity to local needs is more stark with urgent health needs.

> "Malnutrition is rife because of insurgency. Banks have closed. No pharmacy. We need to listen to their needs. Polio is not food" (EOC stakeholder, Nigeria).

Recognizing relative priorities promotes implementation and can contribute to the cost-effectiveness of a

public health program. If stakeholders and participants believe the intervention is useful and needed,

less time and effort will be needed to convince communities, governments, and supporting organizations

to get on-board.

a. <u>Health Systems & Infrastructure</u>

This category was mentioned as a priority in ALL country contexts and ALL socio-ecological

levels, except at the community level in Nigeria. When collapsed by stakeholder level, the most frequent

priority in the Health Systems & Infrastructure category was human resources. Seventy-percent of

country-specific, socio-ecological levels identified human resources as a priority (n=17 of 24). Second

to that, health monitoring & surveillance was identified in over half of the country-specific, socio-

ecological level (n=14 of 24), and half of the country-specific, socio-ecological levels mentioned cross-

border collaboration and also accessing hard-to-reach populations (n=12 of 24). Table V highlights all

the specific priorities mentioned in the Health Systems & Infrastructure category.

(1) Human Resources

As seen in the table, the most frequently identified aspect of Health Systems & Infrastructure

was human resources. (n=17 of 24) Human resources was identified in ALL countries except Somalia

and was identified at least once at ALL stakeholder levels.

> "A polio vaccination can be given by an unskilled person, but **we need some skilled workers for other things**. For example, there are only 468 midwives in the whole country and 1000 health facilities. So many facilities do not even have a midwife. So, we **need to look at the area of training – human resource development**. Some of the current training we have does not meet the standard" (AMREF stakeholder, South Sudan).

> "We think that since we have been very credible government partner. We think that can continue in the following areas: Nutrition, malaria, EPI. To **look closely at capacity building of the health staff**" (CORE Group stakeholder, Angola).

> "**Build the capacity of the staff**…our staff has a chance to raise awareness in the community" (Ethiopian Evangelical Church Development & Social Services Commission stakeholder, Ethiopia).

> "**Capacity building with human resources. Train, and refresh with trainings**" (Kenyan Red Cross stakeholder, Kenya).

> "We are cornered here in South Sudan in human resources…We are trying as much as we can to deal and manage. Whatever human resources we have, we are managing as best we can on the ground…If you can support us by telling the partners of our **human resources. We need them YESTERDAY**" (WHO stakeholder, South Sudan).

> "**Properly trained people at the health camps**… The tools for documentation need revision…The Volunteer Community Mobilizers to be extended to include AFP (acute flaccid

## TABLE V. ALL PRIORITIES IN HEALTH SYSTEMS & INFRASTRUCTURE

| (n=24) | Ability to respond to fut. outbreak | Acc. hard-to-reach pops. | Cold Chain | Coordination mult. partners | Cross-border collaboration | Human resources | Improving comunication | Microplaning | Organizing | Financial | Advocacy | Hlth monitor & surveillance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANGOLA** | | | | | | | | | | | | |
| Community | | | | | | | | | | | | ✓ |
| Local Civil Society | | | | | | | | | ✓ | | | |
| National Ministry of Health | | | ✓ | | ✓ | | | | | | | ✓ |
| International Civil Society | | | | | | ✓ | | | | | | |
| Int'l Multi- or Bilateral org | | | ✓ | | | ✓ | | | | | ✓ | ✓ |
| **ETHIOPIA** | | | | | | | | | | | | |
| Community | | | | | | | | | | | | |
| Local Civil Society | ✓ | ✓ | | ✓ | | ✓ | ✓ | | | | | ✓ |
| National Ministry of Health | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| International Civil Society | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | | ✓ |
| Int'l Multi- or Bilateral org | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | | | |
| **KENYA** | | | | | | | | | | | | |
| Community | | | | | ✓ | ✓ | | | | | | |
| Local Civil Society | | ✓ | | | ✓ | ✓ | | | | | | |
| National Ministry of Health | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| International Civil Society | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| Int'l Multi- or Bilateral org | | | ✓ | | | ✓ | | | | | | |
| **NIGERIA** | | | | | | | | | | | | |
| Community | | | | | | | | | | | | |
| Local Civil Society | | | | | | | | | | | | |
| National Ministry of Health | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| International Civil Society | ✓ | | | | | ✓ | ✓ | | | ✓ | | ✓ |
| Int'l Multi- or Bilateral org | ✓ | | ✓ | | | ✓ | | | | ✓ | ✓ | ✓ |
| **SOMALIA** | | | | | | | | | | | | |
| Community | | | | | | | | | | | | |
| Local Civil Society | | | | | | | | | | | | |
| National Ministry of Health | | | | | | | | | | | | |
| International Civil Society | | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| Int'l Multi- or Bilateral org | | | | | ✓ | | ✓ | ✓ | | | | ✓ |
| **SOUTH SUDAN** | | | | | | | | | | | | |
| Community | | | | | | | | | | | | |
| Local Civil Society | | | ✓ | | | | | | | | | |
| National Ministry of Health | | ✓ | | | | ✓ | ✓ | | | ✓ | | ✓ |
| International Civil Society | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Int'l Multi- or Bilateral org | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| **Totals** | **33%** | **50%** | **46%** | **42%** | **50%** | **71%** | **46%** | **25%** | **13%** | **33%** | **21%** | **58%** |

paralysis) surveillance --- it can be very simple – but what will they do if they see it" (USAID stakeholder, Nigeria).

"**Volunteer Community Mobilizers** embedding within the societies. That is a huge interest now – to **build the network** and wider health needs. The DHIS is very facility-based but there is community gap that is missing" (CDC stakeholder, Nigeria).

### (2) Health monitoring & surveillance

Health monitoring & surveillance was identified by over half of the country-specific, socio-ecological levels. Moreover, it was identified in ALL countries except Kenya, and at least once at ALL country-specific, socio-ecological levels. (n=14 of 24)

"**Strengthening surveillance**. Identify the gaps. That can translate to other diseases" (CDC stakeholder, Nigeria).

"In South Sudan, we need a **disease surveillance** activity. Or at least contacts in the community" (Gates Foundation stakeholder, South Sudan).

"(After polio) other opportunities?  **Surveillance**. Change the health system to fit the population, instead of making the population change their ways" (Pastoralist Concern stakeholder, Ethiopia).

"My recommendation is that we need to strengthen AFP surveillance. And not just AFP, but **other surveillance** too" (AMREF stakeholder, South Sudan).

Additionally, half of the country-specific, socio-ecological levels identified accessing hard-to-reach populations, and cross-border collaboration (n=12 of 24).

### (3) Accessing hard-to-reach populations

The definition of "hard to reach" encompasses not only geographically remote communities and locations that are difficult to travel to, but also populations with cultural and linguistic barriers, and populations that have health behaviors and practices that are different from those the ministries of health promote.

In low-resource settings, road infrastructure can be limited. Additionally, seasonal changes can

affect the ability to travel especially during a rainy season where flooding prohibit vehicle travel.

> "Hard to reach areas. We agreed to reach them but **sometimes it is impossible – flooding, insecurity, sometimes 7-8 months (they are) cut off**" (CORE Group stakeholder, South Sudan).

Other obstacles can include environmental challenges specific to the region. (See Figure 15.)

> "One of the places …**we had to give the road to elephants for 2-3 hours**" (MoH Primary Healthcare stakeholder, South Sudan).



Figure 15: Elephants in Horn of Africa region, 2015

(4) <u>Cross-border collaboration</u>

Health, as well as disease, does not recognize national borders.  With large migratory

populations and fluid borders, public health stakeholders identified the need to collaborate across

international borders in order to address health needs.

 "Mostly (the) threat of importation and migration. Some other the challenges are cross border. Kenya to Uganda, SS Sudan, Somalia. **We needed a cross border collaboration** for the population. How are we going to support them?  Track them?" (MoH Disease Surveillance Research Unit, Kenya)

"The challenges are for all. The pastoral areas have the major challenge. The people move. …**Is it possible to track the child across the borders**? (The polio infrastructure) may be in a position to overcome this challenge" (UNICEF stakeholder, Ethiopia).

"We have jointly developed guidelines for cross-border activities. This is something moving in the right direction. They (the polio infrastructure) are involved with the microplanning. They try to **address how the health facilities coordinate along the border**. We are set to start in Somalia in September. Also, the border with Uganda. You need to have (the polio infrastructure) with Uganda – that is a very critical border. It would be nice to be on the Uganda side as well" (UNICEF stakeholder, South Sudan).

"I think that the cross-border initiative model…**Cross-border needs to continue**. We take pride that we are entrusted to deal with cross-border activities. 'Ok guys, you do this. I do that, this. I do that. We (can) help to synchronize this better. Even though some national coordination is difficult, we can do some **local coordination right at the border**. We are helping Ethiopia and South Sudan to document their progress" (CORE Group stakeholder, Kenya).

"Much will depend on the next steps…They should **focus on the systems and the coordination... Now, we are only looking at the border areas**, (then) you can expand to all of the regions" (American Refugee Committee, Somalia).

"**Support the cross-border collaboration**" (MoH stakeholder, Angola).

b.  <u>Health Promotion</u>

Health Promotion was mentioned in ALL countries and ALL socio-ecological levels, except in

Somalia by international civil society and the South Sudan Ministry of Health level. When collapsed by

stakeholder level, the hierarchy of priorities remained the same as the overall priority frequency analysis

in the Health Promotion category. If stakeholders identified a priority in the Health Promotion category,

they were most likely to identify routine immunization. Seventy-nine percent of country-specific, socio-ecological levels identified routine immunization as a priority (n=19 of 24). Second to that, seventy-one percent of the country-specific, socio-ecological levels identified the need for health education (n=17 of 24). The table below shows all the Health Promotion priorities identified. (See TABLE VI.)

(1) Routine immunization

Reiterated throughout 79% of the country-specific, socio-ecological levels interviewed, routine immunization was a clear priority to which the built polio infrastructure could be applied.

> "**Routine immunization** is the area that MOST needs this model" (Gates Foundation stakeholder, South Sudan).

Routine immunization bolstering was identified as a priority in EVERY country, except Somalia. The Somali stakeholders, while limited in the dataset to only two stakeholders, described obstacles present in Somalia that challenge the capacity for Somalia to even address routine immunization yet.

Many of the priorities identified by the Somali stakeholders were steps needed *before* robust routine immunization can be put into place. Active conflict zones, lack of cold chain, inaccessible populations where even the Somalia government does not have active control informed their self-identified public health priorities. While routine immunization coverage may be a clear future priority, more immediate infrastructure is needed before that priority can be addressed. In every other country-context, however, routine immunization was reported as a priority and desire for the built polio infrastructure to address.

> "We are going to continue with the **routine immunization** – we still have SO much to do" (MoH stakeholder, Angola).
>
> "Future?...When polio eradicated, then shift to **routine immunization**. Continue to bolster routine immunization" (Save the Children stakeholder, Ethiopia).
>
> "We need to focus on the bigger picture - **routine immunization**… Because of the (polio) program, we have built capacity. Other vaccines can utilize the infrastructure" (MoH stakeholder, Kenya).

TABLE VI. ALL PRIORITIES IN HEALTH PROMOTION

| (n=24) | Health Promotion | | | | | |
|---|---|---|---|---|---|---|
| | Decrease maternal & child mortality | Health behavior change | Health education | Improving sanitation | Nutrition | Routine immunization |
| **ANGOLA** | | | | | | |
| Community | ✓ | | ✓ | ✓ | | ✓ |
| Local Civil Society | | | ✓ | ✓ | | |
| National Ministry of Health | ✓ | | | | | ✓ |
| International Civil Society | | | | | ✓ | ✓ |
| Int'l Multi- or Bilateral org | | | | | | ✓ |
| **ETHIOPIA** | | | | | | |
| Community | | | | | | |
| Local Civil Society | ✓ | ✓ | ✓ | | | ✓ |
| National Ministry of Health | | | ✓ | | | ✓ |
| International Civil Society | ✓ | ✓ | ✓ | | | ✓ |
| Int'l Multi- or Bilateral org | | | | | ✓ | ✓ |
| **KENYA** | | | | | | |
| Community | | | ✓ | ✓ | | ✓ |
| Local Civil Society | | | ✓ | ✓ | | |
| National Ministry of Health | | | ✓ | | | ✓ |
| International Civil Society | | | ✓ | | | ✓ |
| Int'l Multi- or Bilateral org | | | | | | ✓ |
| **NIGERIA** | | | | | | |
| Community | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Local Civil Society | | | | | | |
| National Ministry of Health | ✓ | | ✓ | ✓ | ✓ | ✓ |
| International Civil Society | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Int'l Multi- or Bilateral org | ✓ | | | | ✓ | ✓ |
| **SOMALIA** | | | | | | |
| Community | | | | | | |
| Local Civil Society | | | | | | |
| National Ministry of Health | | | | | | |
| International Civil Society | | | | | | |
| Int'l Multi- or Bilateral org | ✓ | | ✓ | ✓ | ✓ | |
| **SOUTH SUDAN** | | | | | | |
| Community | | | | | | |
| Local Civil Society | | | ✓ | | | |
| National Ministry of Health | | | ✓ | | | ✓ |
| International Civil Society | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Int'l Multi- or Bilateral org | | ✓ | ✓ | | | ✓ |
| **Totals** | **42%** | **25%** | **71%** | **33%** | **33%** | **79%** |

"Polio has quite a legacy in place...The only way you can improve is with 100% community involvement. Why can't you **now do this for routine immunization**?? The team is on the ground" (EOC Yobe State stakeholder, Nigeria).

"Start working on legacy for (the polio infrastructure). The resources -what role can it play for the next stage in the country? **Routine immunization**. We need to devote more energy - How can we get more hands to support routine immunization? Routine immunization should be a strategy for (the polio infrastructure)" (National EOC stakeholder, Nigeria).

(2) Health education

As mentioned above, the need specifically for health education was identified by 71% of country-specific, socio-ecological levels interviewed (n=17 of 24).

"Even in nutrition and **health education**, **it is not lack of the food, maybe our knowledge of HOW to use it to feed our children**. They can be a part of that effort. Just a small portion, the tip of the iceberg is polio, we can use (the polio infrastructure) to combat other problems" (Pastoralist Concern stakeholder, Ethiopia).

"It's not just about giving two drops of polio vaccine in the mouths of all the children. **It's about a mother realizing the importance of the two drops** and not just the two drops" (UNICEF stakeholder, South Sudan).

"We have a community health strategy that is not tapped enough. That is the foundation of a health system! You would make better health decisions. The people have low literacy rates. (With) **simple messages like wash your hands**, we can HALVE our health problems in our country. If we can "task shift" (Kenyan Red Cross stakeholder, Kenya).

"Community Volunteer Organizers. Register pregnant mothers. Vaccinated, **educated**, encouraged to give birth at health facility, surveillance, **latrine construction & hygiene education**, Community Volunteers (can) **show how to manage defecation outside and wash hands**" (CORE Group stakeholder, Ethiopia).

c. Disease

Disease was mentioned in ALL country contexts and ALL socio-ecological levels, except at the International Civil Society level in Kenya and Somalia, or the Community level in Kenya. If a disease priority was mentioned, the vast majority of stakeholders identified communicable diseases rather than non-communicable diseases as priorities. Eighty-eight percent of the country-specific, socio-ecological

levels mentioned disease. Of those, twenty-one mentioned a communicable disease (95%). More specifically, country-specific, socio-ecological level interviews were most likely to identify measles and malaria if they identified a specific disease (45% and 42%, respectively). The table below shows all disease priorities identified by country and stakeholder level. (See TABLE VII.)

(1) Measles

To put the measles priorities in context, overall country incidence should be taken into consideration. The  table shows the incidence of malaria in each country context. (See TABLE VIII.) While measles incidence varied widely between countries, it remained the most frequent disease priority mentioned across the dataset. Measles was mentioned at least once in ALL countries and at ALL stakeholder levels, except the community level. It was mentioned by almost half of the country-specific, socio-ecological levels in the dataset (n=11 of 24).

> "There are a lot of opportunities using this model between (the polio infrastructure) and government. Should be able to do the same with other diseases such as **measles** and neonatal tetanus" (MoH stakeholder, Angola).

> "Next (after polio), is **measles**" (UNICEF stakeholder, Somalia).

> "If polio gone, (there are still) neonatal tetanus and many repeated outbreaks for **measles**. They can improve routine immune" (Pastoralist Concern stakeholder, Ethiopia).

> "Contribute to elimination of neonatal tetanus and **measles**" (UNICEF stakeholder, Kenya).

> "Educate mothers to bring children for immunization (against) **measles**, neonatal tetanus, and malnutrition. These are the biggest need in our state" (Save the Children stakeholder, Nigeria).

> "After the (polio) eradication, I think for few years there will be continued surveillance. Number 2, we will suit them to our priorities –**Measles**. Neonatal tetanus. (The polio infrastructure) will play a core role because of their link with the community" (MoH stakeholder, South Sudan).

(2) Malaria

To better contextualize the priority of malaria, overall country incidence was important to consider. "The WHO African Region continues to carry a disproportionately high share of the global

## TABLE VII. ALL PRIORITIES IN DISEASE

| (n=24) | Diarrheal disease | Cholera | Ebola | Erad. (not polio) | Guinea worm | HIV | Malaria | Measles | Meningitis | Neonatal tetanus | Parasites | Pneumonia | TB | Trachoma | Typhoid | Yellow fever | Diabetes (Non-communicable) | Hyper-tension | Ulcers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANGOLA** | | | | | | | | | | | | | | | | | | | |
| Community | | | | | | | ✓ | | | | | | | | | | | | |
| Local Civil Society | | | | | | | ✓ | | | | | | | | | | | | |
| National Ministry of Health | | | | | | | | ✓ | | ✓ | | | | | | | | | |
| International Civil Society | | | | | | | ✓ | | | | | | | | | | | | |
| Int'l Multi- or Bilateral org | | | | | | | | ✓ | | | | | | | | | | | |
| **ETHIOPIA** | | | | | | | | | | | | | | | | | | | |
| Community | | | | | | | | | | | | | | | | | | | |
| Local Civil Society | | | | | | | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | | | | |
| National Ministry of Health | | | | | | ✓ | | ✓ | | ✓ | | | | | | | | | |
| International Civil Society | | | ✓ | ✓ | | | ✓ | | | | | | ✓ | | | ✓ | | | |
| Int'l Multi- or Bilateral org | | | | | | | | ✓ | | ✓ | ✓ | ✓ | | | | | | | |
| **KENYA** | | | | | | | | | | | | | | | | | | | |
| Community | | | | | | | | | | | | | | | | | | | |
| Local Civil Society | | | | | | | | | | | | | | | | | ✓ | | |
| National Ministry of Health | | ✓ | | ✓ | ✓ | ✓ | | | | | | | ✓ | | | | | | |
| International Civil Society | | | | | ✓ | | | | | | | | ✓ | ✓ | | | | | |
| Int'l Multi- or Bilateral org | | | | | | | | ✓ | | ✓ | | | | | | | | | |
| **NIGERIA** | | | | | | | | | | | | | | | | | | | |
| Community | ✓ | | | | | | ✓ | | | | | | | | ✓ | | ✓ | ✓ | ✓ |
| Local Civil Society | | | | | | | | | | | | | | | | | | | |
| National Ministry of Health | | ✓ | ✓ | | | | ✓ | ✓ | | | | | | | | | | | |
| International Civil Society | ✓ | | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | | | | | | | | | |
| Int'l Multi- or Bilateral org | | | ✓ | | | | | | | | | | | | | | | | |
| **SOMALIA** | | | | | | | | | | | | | | | | | | | |
| Community | | | | | | | | | | | | | | | | | | | |
| Local Civil Society | | | | | | | | | | | | | | | | | | | |
| National Ministry of Health | | | | | | | | | | | | | | | | | | | |
| International Civil Society | | | | | | | | | | | | | | | | | | | |
| Int'l Multi- or Bilateral org | | | | | | | | ✓ | | | | | | | | | | | |
| **SOUTH SUDAN** | | | | | | | | | | | | | | | | | | | |
| Community | | | | | | | | | | | | | | | | | | | |
| Local Civil Society | | | | | | | ✓ | | | | | | | | | | | | |
| National Ministry of Health | | | | | | | | ✓ | | ✓ | | | | | | | | | |
| International Civil Society | ✓ | | | | | | ✓ | | | | | | ✓ | ✓ | | | | | |
| Int'l Multi- or Bilateral org | | | | | | | | ✓ | | | | | | | | | | | |
| **Totals** | 13% | 8% | 17% | 8% | 13% | 8% | 42% | 46% | 4% | 29% | 8% | 4% | 21% | 8% | 4% | 4% | 8% | 4% | 4% |

TABLE VIII: MEASLES INCIDENCE BY COUNTRY

| Country | Incidence per 1 million for 1-4 yr olds |
|---|---|
| Angola | 7.0 |
| Ethiopia | 28.8 |
| Kenya | 39.5 |
| Nigeria | 134.6 |
| Somalia | 45.0 |
| South Sudan | 29.9 |

("Measles and Rubella," 2019)

malaria burden. In 2017, the region was home to 92% of malaria cases and 93% of malaria deaths

("Malaria," 2018). Malaria incidence, like measles, varied widely between countries as seen in Table IX,

but was the second most frequent disease identified as a priority across the dataset. Malaria was

specifically mentioned in ALL countries, except Kenya and Somalia, and at ALL stakeholder levels,

except the International Multi- or Bilateral Organization level.

TABLE IX: MALARIA INCIDENCE BY COUNTRY

| Country | Incidence per 1000 at risk |
|---|---|
| Angola | 120.3 |
| Ethiopia | 53.1 |
| Kenya | 85.3 |
| Nigeria | 349.6 |
| Somalia | 60.2 |
| South Sudan | 159.0 |

("Malaria Incident," 2018)

"So, the method of (the) polio (infrastructure) can be used for **malaria**; can be used for tuberculosis. This is the opportunity" (Pastoralist Concern stakeholder, Ethiopia).

"Verify that people are using mosquito nets (to prevent malaria).…It has been a very big challenge for this community because the government stopped picking up trash in the area and that **increased the number of mosquitos**" (Community health worker, Angola).

"In South Sudan, the issues of children and women. Three major issues: **Malaria**. Diarrheal Disease. Pneumonia. These are the priorities for the kids" (AMREF stakeholder, South Sudan).

    d.   Societal Factors

While the least mentioned category by stakeholders, Societal Factors were mentioned at least once in ALL country contexts, except Angola, and at least once at ALL socio-ecological levels. While discovering the majority responses may have the greatest utility to inform future planning, outlier responses were valued and included in the analysis. Characteristic of qualitative research, a richness can be revealed in data that may not represent the majority findings. They can help to color the landscape of the environment being researched. Thus, in this research, outlying responses were included, even if only mentioned by one stakeholder from one country context. Societal Factors were the least mentioned by stakeholders across all countries and stakeholder levels (15% n=9 of 60 total interviews). However, it is notable that stakeholders identified Societal Factors as priorities for which the polio infrastructure, a health-related outcome network, should be applied.

Addressing overarching macro-societal issues may benefit the health of all participants in that society. The aphorism "A rising tide lifts all boats" was originally associated with the concept that improvements in the *general* economy will benefit *all* participants in that economy ("Remarks of Senator," 1960). Furthermore, an economic policy should therefore focus on the general macroeconomic environment. The same notion can be applied to societal factors and public health outcomes. Developing improvements in the *general* society may benefit the health of *all* participants in that society. For example, while not a specific medical condition, poverty and health have been strongly

correlated (Müller & Krawinkel, 2005, p. 279-86; McIntyre, Connor, & Warren, 2000, p. 961-5; Winslow, 1951; *Macroeconomics and Health*, 2001; *Dying for Change*, n.d.). "Health and poverty are inextricably intertwined" (Murray, 2006, p. 923). Improving poverty can affect many public health outcomes (CSDH, 2008; Marmot, Friel, Bell, Houweling, & Taylor, 2008, p. 1661-69).

Specifically, Societal factors were mentioned at the Community level in Nigeria, the Local Civil Society level in Ethiopia and Kenya, the Ministry of Health level in Nigeria, the International Civil Society level in Ethiopia, Nigeria, and South Sudan, and International Multi- or Bilateral organization level in Somalia. Although these responses were not expressed in *every* context, and thus, could be considered outliers in the dataset, their content warrants attention.

If a country-specific, socio-ecological level identified a Societal factor as a priority, they were most likely to mention improving gender equality (n=4 of 8; 50%). The table below shows the Societal Factor priorities identified by country and stakeholder level. (See TABLE X.)

(1) Improving gender equality

Improving gender equality was identified in Ethiopia, Nigeria, Somalia, and South Sudan.

> "Maternal mortality and **gender equality needs improvement**" (Ethiopian Evangelical Church Development & Social Services Commission stakeholder, Ethiopia).

> "Due to the war (the people) did not have access to school. (In) some of the cultures, **females are not allowed to go to school**" (AMREF stakeholder, South Sudan).

> "In Somalia, we are training a few women and they are equal participants. In Afghanistan, (before) you would not ever imagine to use the women but after the (polio) training, men would say, **'She is *almost* a male' so that gained the trust** to enter the house. They (the women) can talk to women" (UNICEF stakeholder, Somalia).

(2) Primary & secondary education

Primary & secondary education was identified as a priority in Ethiopia, Nigeria and South Sudan.

TABLE X. ALL PRIORITIES IN SOCIETAL FACTORS

| (n=24) | Equity & Equality | Improving gender equality | Prim. & sec. education | Poverty | Road/water/ school infra. | Security |
|---|---|---|---|---|---|---|
| **ANGOLA** | | | | | | |
| Community | | | | | | |
| Local Civil Society | | | | | | |
| National Ministry of Health | | | | | | |
| International Civil Society | | | | | | |
| Int'l Multi- or Bilateral org | | | | | | |
| **ETHIOPIA** | | | | | | |
| Community | | | | | | |
| Local Civil Society | ✓ | ✓ | | | | |
| National Ministry of Health | | | | | | |
| International Civil Society | | | ✓ | | | |
| Int'l Multi- or Bilateral org | | | | | | |
| **KENYA** | | | | | | |
| Community | | | | | | |
| Local Civil Society | | | | | | ✓ |
| National Ministry of Health | | | | | | |
| International Civil Society | | | | | | |
| Int'l Multi- or Bilateral org | | | | | | |
| **NIGERIA** | | | | | | |
| Community | | | | ✓ | | |
| Local Civil Society | | | | | | |
| National Ministry of Health | | | | | ✓ | |
| International Civil Society | | ✓ | ✓ | | | |
| Int'l Multi- or Bilateral org | | | | | | |
| **SOMALIA** | | | | | | |
| Community | | | | | | |
| Local Civil Society | | | | | | |
| National Ministry of Health | | | | | | |
| International Civil Society | | | | | | |
| Int'l Multi- or Bilateral org | | ✓ | | | | |
| **SOUTH SUDAN** | | | | | | |
| Community | | | | | | |
| Local Civil Society | | | | | | |
| National Ministry of Health | | | | | | |
| International Civil Society | | ✓ | ✓ | | | |
| Int'l Multi- or Bilateral org | | | | | | |
| **Totals** | 4% | 17% | 13% | 4% | 4% | 4% |

"Community system has improved. The network and capacity has been improved. Community surveillance. You have to go house-to-house, so they pick up other disease issues. Yellow fever or any outbreak. **Integrated surveillance. Take children and track drop-outs from school**. Check child related issues" (International Civil Society, Ethiopia).

"(Community Volunteer Mobilizers are) all women. A man cannot enter a married woman's house unless you are invited. One CVM covers about 500 households (average 4-500 households). A criteria for the Community Volunteer Mobilizer (is that they) must have passed **primary school** so that they can read. They translate the (health information) in local languages" (Save the Children stakeholder, Nigeria).

### (3) Equity & equality

Equity and equality were identified in Ethiopia.

"Just a small portion, the tip of the iceberg is polio, we can use (the polio infrastructure) to combat other problems. Future direction is to emphasis **equity and equality**…They can help **deliver equitable services**" (Pastoralist Concern stakeholder, Ethiopia).

### (4) Poverty

Addressing poverty was identified as a priority in Nigeria.

"People said they have other needs that have not been met –**poverty**, typhoid, ulcers, diabetes, hypertension, diarrheal disease. If they help with those, then they accept polio" (Community health worker, Nigeria).

### (5) Road/water/school infrastructure

Addressing other infrastructure needs including road, water, and school infrastructure was identified in Nigeria.

"Indirectly, the polio program has given the political leaders an opportunity to get into the community on a deeper level. Listen to the peoples' concerns and problems and they can (begin to) address. Deeper needs assessment. If they go with the government, they see that we have **no school, no road, no water**. Polio made the leaders see that and go there" (MoH EOC stakeholder, Nigeria).

(6) <u>Security</u>

Priorities regarding security were identified in Kenya.

"Issues around Al-Shabaab. I can't prove that, but through this work, people know that you are there. **Anti-radicalization**. When the people are on the ground, they share perspectives.  How we can support the anti-radicalization? Sharing information. It is a plus" (Kenyan Red Cross stakeholder, Kenya).

The United States State Department, Office of the Coordinator on Counterterrorism defines "al-Shabaab (The Youth) (as) a violent and brutal extremist group with a number of individuals affiliated with al-Qaida. Many of its senior leaders are believed to have trained and fought with al-Qaida in Afghanistan" (Office of the Coordinator of Counterterrorism, 2008). In 2018, an update to the al-Shabaab terrorist designation was announced.

"The Department of State has amended the designation of al-Shabaab – an al-Qa'ida affiliate in Somalia – to include al-Hijra and other aliases…Al-Hijra, formed in 2008 in Nairobi, Kenya serves as a wing of al-Shabaab. Al-Hijra, which is extensively interconnected with al-Shabaab both organizationally and operationally, consists primarily of Kenyan and Somali followers of al-Shabaab in East Africa. It has openly engaged in al-Shabaab recruiting in Kenya and facilitated travel of al-Shabaab members to Somalia for terrorism purposes" (Office of the Spokesperson, 2018).

The stakeholder in Kenya, familiar with the challenges of the population, identified that public health presence and engagement in these high-risk areas could have a protective effect on the population, simply by "sharing perspectives".  As mentioned, it is difficult to measure and difficult to prove, but extraordinarily important to consider.

2. <u>Socio-ecological level results</u>

After analyzing the data for overall trends, it was important to look at responses across socio-ecological levels to find similarities and agreement. Below the data were examined at each socio-ecological level for each code category, with the exception of the Societal Factors.  Societal factors were

shown last with all socio-ecological levels together to make a more meaningful analysis of the outlying responses.

When stratified by socio-ecological level, similarities exist in identified priorities. While each level has a lens through which they view health and disease approaches, it was interesting that this often did not inform their priorities. For example, the community level may have identified immediate or health outcomes that directly affect just their community --- we need to address neonatal tetanus. But rather the trend for all levels, still, focused on overarching health systems' needs.

    a.   <u>Community level</u>

The dataset was limited in the Community level and had the least number of interviews from stakeholders (n=3). Listening to their perspectives, however, is valuable when approaching health initiative planning. As mentioned, implementation often happens at the community level and their proximity to beneficiaries to assess health needs is critical. The individual level was not represented in the dataset, so the community level perspectives were the closest level connected to the beneficiaries. The most mentioned priority at the community level was health monitoring & surveillance within the Health Systems & Infrastructure category. (See TABLE XI.)

Regarding Health Promotion, improving sanitation, routine immunization, and health education were identified in ALL countries with community level interviews (Angola, Kenya, and Nigeria). Stakeholders at the community level also identified the greatest number of priorities (at least three aspects each) within the Health Promotion category compared to other categories. ( See TABLE XII.)

Community health workers in Kenya did not identify a disease priority, however, both community level stakeholders in Angola and Nigeria identified malaria. (See TABLE XIII.)

TABLE XI. COMMUNITY LEVEL: HEALTH SYSTEMS & INFRASTRUCTURE

| | | Health Systems & Infrastructure | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ability to respond to future outbreak | Accessing hard-to-reach | Cold Chain | Coordination of multiple partners | Cross-border collaboration | Human resources | Improving communication | Microplanning | Organizing | Financial | Advocacy | Health monitoring & surveillance |
| **Community (n=3)** | | | | | | | | | | | | | |
| Angola | n=1 | | | | | | | | | | | | ✓ |
| Ethiopia | n=0 | | | | | | | | | | | | |
| Kenya | n=1 | | | | | ✓ | ✓ | | | | | | ✓ |
| Nigeria | n=1 | | | | | | | | | | | | |
| Somalia | n=0 | | | | | | | | | | | | |
| South Sudan | n=0 | | | | | | | | | | | | |
| **Totals** | | | | | | 1 | 1 | | | | | | 2 |

TABLE XII. COMMUNITY LEVEL: HEALTH PROMOTION

| | | Health Promotion | | | | | |
|---|---|---|---|---|---|---|---|
| | | Decrease maternal & child mortality | Health behavior change | Health education | Improve Sanitation | Nutrition | Routine Immunization |
| **Community (n=3)** | | | | | | | |
| Angola | n=1 | ✓ | | ✓ | ✓ | | ✓ |
| Ethiopia | n=0 | | | | | | |
| Kenya | n=1 | | | ✓ | ✓ | | ✓ |
| Nigeria | n=1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Somalia | n=0 | | | | | | |
| **Totals** | | 2 | 1 | 3 | 3 | 1 | 3 |

TABLE XIII. COMMUNITY LEVEL: DISEASE

| | | Disease | | | | | | | | | | | | | | | | Non-communicable | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Diarrheal disease | Cholera | Ebola | Eradication (not polio) | Guinea worm | HIV | Malaria | Measles | Meningitis | Neonatal tetanus | Parasites | Pneumonia | TB | Trachoma | Typhoid | Yellow fever | Diabetes | Hyperten. | Ulcers |
| **Community (n=3)** | | | | | | | | | | | | | | | | | | | | |
| Angola | n=1 | | | | | | | ✔ | | | | | | | | | | | | |
| Ethiopia | n=0 | | | | | | | | | | | | | | | | | | | |
| Kenya | n=1 | | | | | | | | | | | | | | | | | | | |
| Nigeria | n=1 | ✔ | | | | | | ✔ | | | | | | | | ✔ | | ✔ | ✔ | ✔ |
| Somalia | n=0 | | | | | | | | | | | | | | | | | | | |
| South Sudan | n=0 | | | | | | | | | | | | | | | | | | | |
| **Totals** | | 1 | | | | | | 2 | | | | | | | | 1 | | 1 | 1 | 1 |

b. <u>Local Civil Society level</u>

Local civil societies were present in the dataset for all countries except for Nigeria and Somalia. Local civil society stakeholders had the most agreement around accessing hard-to-reach populations, improving human resources, and health monitoring & surveillance. (See TABLE XIV.)

Regarding the overarching Health Promotion category, ALL local civil society stakeholders in ALL countries where that level was interviewed (Angola, Ethiopia, Kenya, and South Sudan) identified the specific need for health education. (See TABLE XV.)

Amongst local civil society stakeholders, the most agreement fell on malaria as a disease priority. (See TABLE XVI.) Other communicable diseases mentioned included measles, neonatal tetanus, parasites, tuberculosis, and notably, these were only each mentioned once. Additionally, one local civil society stakeholder in Kenya mentioned a non-communicable disease: diabetes.

TABLE XIV. LOCAL CIVIL SOCIETY LEVEL: HEALTH SYSTEMS & INFRASTRUCTURE

| | Health Systems & Infrastructure | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ability to respond to fut. outbreak | Accessing hard-to-reach | Cold Chain | Coordination of multiple partners | Cross-border collaboration | Human resources | Improving comunicaton | Microplan | Organizing | Financial | Advocacy | Health monitoring/ surveillance |
| **Local Civil Society (n=4)** | | | | | | | | | | | | |
| Angola       n=1 | | | | | | | | | ✓ | | | |
| Ethiopia     n=2 | ✓ | ✓ | | ✓ | | ✓ | ✓ | | | ✓ | | ✓ |
| Kenya        n=1 | | ✓ | | | ✓ | ✓ | | | | | | ✓ |
| Nigeria      n=0 | | | | | | | | | | | | |
| Somalia      n=0 | | | | | | | | | | | | |
| South Sudan  n=1 | | | ✓ | | | | | | | | | |
| **Totals** | 1 | 2 | 1 | 1 | 1 | 2 | 1 | | 1 | 1 | | 2 |

TABLE XV. LOCAL CIVIL SOCIETY LEVEL: HEALTH PROMOTION

| | Health Promotion | | | | | |
|---|---|---|---|---|---|---|
| | Decrease maternal & child mortality | Health behavior change | Health education | Improve Sanitation | Nutrition | Routine Immunization |
| **Local Civil Society (n=4)** | | | | | | |
| Angola       n=1 | | | ✓ | ✓ | | |
| Ethiopia     n=2 | ✓ | ✓ | ✓ | | | ✓ |
| Kenya        n=1 | | | ✓ | ✓ | | |
| Nigeria      n=0 | | | | | | |
| Somalia      n=0 | | | | | | |
| South Sudan  n=1 | | | ✓ | | | |
| **Totals** | 1 | 1 | 4 | 2 | | 1 |

TABLE XVI. LOCAL CIVIL SOCIETY: DISEASE

| | | Disease | | | | | | | | | | | | | | | | Non-communicable | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Diarrheal disease | Cholera | Ebola | Eradication (not polio) | Guinea worm | HIV | Malaria | Measles | Meningitis | Neonatal tetanus | Parasites | Pneumonia | TB | Trachoma | Typhoid | Yellow fever | Diabetes | Hyperten. | Ulcers |
| **Local Civil Society (n=4)** | | | | | | | | | | | | | | | | | | | | |
| Angola | n=1 | | | | | | | ✓ | | | | | | | | | | | | |
| Ethiopia | n=2 | | | | | | | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | | | | |
| Kenya | n=1 | | | | | | | | | | | | | | | | | ✓ | | |
| Nigeria | n=0 | | | | | | | | | | | | | | | | | | | |
| Somalia | n=0 | | | | | | | | | | | | | | | | | | | |
| South Sudan | n=1 | | | | | | | ✓ | | | | | | | | | | | | |
| **Totals** | | | | | | | | | **3** | 1 | | 1 | 1 | | 1 | | | | 1 | | |

c. <u>National Ministry of Health level</u>

At the Ministry of Health level, the most agreement was found in the priority of health monitoring & surveillance for the Health Systems & Infrastructure category. It was identified in ALL countries interviewed at the Ministry of Health level. Similar to the overall analysis results, human resources and accessing hard-to-reach populations were also frequently identified priorities. (See TABLE XVII.)

Regarding the Health Promotion category, ALL Ministries of Health identified routine immunization as a priority. (See TABLE XVIII.)

Measles was the most frequently identified specific disease identified at the Ministry of Health level, mentioned in all countries interviewed except Kenya. ALL Ministry of Health stakeholders identified at least two diseases and they only identified communicable diseases. (See TABLE XIX.)

TABLE XVII. MINISTRY OF HEALTH: HEALTH SYSTEMS & INFRASTRUCTURE

| | Health Systems & Infrastructure | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ability to respond to fut. outbreak | Accessing hard-to-reach | Cold Chain | Coordination of multiple partners | Cross-border collaboration | Human resources | Improving comunicaton | Microplan | Organizing | Financial | Advocacy | Health monitoring/ surveillance |
| **Ministry of Health (n=5)** | | | | | | | | | | | | |
| Angola n=3 | | | ✓ | | ✓ | | | | | | | ✓ |
| Ethiopia n=1 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | | | ✓ |
| Kenya n=3 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Nigeria n=8 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| Somalia n=0 | | | | | | | | | | | | |
| South Sudan n=2 | | ✓ | | | | ✓ | ✓ | | | ✓ | | ✓ |
| **Totals** | 3 | 4 | 2 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 1 | 5 |

TABLE XVIII. MINISTRY OF HEALTH: HEALTH PROMOTION

| | Health Promotion | | | | | |
|---|---|---|---|---|---|---|
| | Decrease maternal & child mortality | Health behavior change | Health education | Improve Sanitation | Nutrition | Routine Immunization |
| **Ministry of Health (n=17)** | | | | | | |
| Angola n=3 | ✓ | | | | | ✓ |
| Ethiopia n=1 | | | ✓ | | | ✓ |
| Kenya n=3 | | | ✓ | | | ✓ |
| Nigeria n=8 | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Somalia n=0 | | | | | | |
| South Sudan n=2 | | | ✓ | | | ✓ |
| **Totals** | 2 | | 4 | 1 | 1 | 5 |

TABLE XIX. MINISTRY OF HEALTH: DISEASE

| | | Disease | | | | | | | | | | | | | | | | Non-communicable | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diarrheal disease | Cholera | Ebola | Eradication (not polio) | Guinea worm | HIV | Malaria | Measles | Meningitis | Neonatal tetanus | Parasites | Pneumonia | TB | Trachoma | Typhoid | Yellow fever | Diabetes | Hyperten. | Ulcers |
| **Ministry of Health (n=5)** | | | | | | | | | | | | | | | | | | | | |
| Angola | n=3 | | | | | | | | ✓ | | ✓ | | | | | | | | | |
| Ethiopia | n=1 | | | | | | ✓ | | ✓ | | ✓ | | | | | | | | | |
| Kenya | n=3 | | ✓ | | ✓ | ✓ | ✓ | | | | | | | ✓ | | | | | | |
| Nigeria | n=8 | | ✓ | ✓ | | | | ✓ | ✓ | | | | | | | | | | | |
| Somalia | n=0 | | | | | | | | | | | | | | | | | | | |
| South Sudan | n=2 | | | | | | | | ✓ | | ✓ | | | | | | | | | |
| **Totals** | | | **2** | **1** | **1** | **1** | **2** | **1** | **4** | | **3** | | | **1** | | | | | | |

d. <u>International Civil Society level</u>

Similar to all of the previous levels, the International Civil Society stakeholders identified health monitoring most.  With the same frequency (all countries except one), identified human resources as a priority. (See TABLE XX.)

In the Health Promotion category, routine immunization was identified by International Civil Society stakeholders in ALL countries, except in Somalia. (See TABLE XXI.)

Different from the previous levels analyzed, malaria was the most frequently identified disease at the International Civil Society level.  It was a priority at this level for Angola, Ethiopia, Nigeria and South Sudan. (See TABLE XXII.) Non-communicable diseases were not mentioned at this stakeholder level. Other communicable diseases mentioned besides malaria were diarrheal disease, Ebola, guinea worm, measles, meningitis, neonatal tetanus, pneumonia, tuberculosis, trachoma, and yellow fever. Eradication of other diseases in general (not polio) was mentioned once.

TABLE XX. INTERNATIONAL CIVIL SOCIETY: HEALTH SYSTEMS & INFRASTRUCTURE

| | | Health Systems & Infrastructure | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ability to respond to fut. outbreak | Accessing hard-to-reach | Cold Chain | Coordination of multiple partners | Cross-border collaboration | Human resources | Improving comunicaton | Microplan | Organizing | Financial | Advocacy | Health monitoring/ surveillance |
| International Civil Society (n=6) | | | | | | | | | | | | | |
| Angola | n=2 | | | | | | ✓ | | | | | | |
| Ethiopia | n=5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| Kenya | n=4 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Nigeria | n=6 | ✓ | | | | | ✓ | ✓ | | | ✓ | | ✓ |
| Somalia | n=1 | | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ |
| South Sudan | n=5 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Totals | | 2 | 4 | 4 | 4 | 4 | 5 | 4 | 2 | 1 | 3 | 2 | 5 |

TABLE XXI. INTERNATIONAL CIVIL SOCIETY: HEALTH PROMOTION

| | | Health Promotion | | | | | |
|---|---|---|---|---|---|---|---|
| | | Decrease maternal & child mortality | Health behavior change | Health education | Improve Sanitation | Nutrition | Routine Immunization |
| International Civil Society (n=23) | | | | | | | |
| Angola | n=2 | | | | | ✓ | ✓ |
| Ethiopia | n=5 | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Kenya | n=4 | | | ✓ | | | ✓ |
| Nigeria | n=6 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Somalia | n=1 | | | | | | |
| South Sudan | n=5 | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Totals | | 3 | 3 | 4 | 2 | 3 | 5 |

TABLE XXII. INTERNATIONAL CIVIL SOCIETY: DISEASE

| | Disease | | | | | | | | | | | | | | | | Non-communicable | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diarrheal disease | Cholera | Ebola | Eradication (not polio) | Guinea worm | HIV | Malaria | Measles | Meningitis | Neonatal tetanus | Parasites | Pneumonia | TB | Trachoma | Typhoid | Yellow fever | Diabetes | Hyperten. | Ulcers |
| **International Civil Society (n=6)** | | | | | | | | | | | | | | | | | | | |
| Angola            n=2 | | | | | | | ✓ | | | | | | | | | | | | |
| Ethiopia          n=5 | | | ✓ | ✓ | | | ✓ | | | | | | ✓ | | | ✓ | | | |
| Kenya             n=4 | | | | | ✓ | | | | | | | | ✓ | ✓ | | | | | |
| Nigeria           n=6 | ✓ | | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | | | | | | | | | |
| Somalia           n=1 | | | | | | | | | | | | | | | | | | | |
| South Sudan       n=5 | ✓ | | | | | | ✓ | | | | | | ✓ | ✓ | | | | | |
| **Totals** | 2 | | 2 | 1 | 2 | | 4 | 1 | 1 | 1 | | 1 | 3 | 1 | | 1 | | | |

e.   International Multi- or Bilateral Organization level

Both health monitoring & surveillance and human resources were the most frequently identified priorities by International Multi- or Bilateral Organization stakeholders.  Health monitoring &surveillance was identified in ALL countries except Ethiopia.  Human resources was identified at this level in ALL countries except Somalia. (See TABLE XXIII.)

In the Health Promotion category, routine immunization was the most frequently identified aspect, mentioned in ALL country contexts except for Somalia. (See TABLE XXIV.)

By far, stakeholders at the International Multi- or Bilateral Organization level identified measles as a priority.  It was identified in ALL countries, except Somalia. Stakeholders at this level mentioned the fewest diseases than any other level.  Only five diseases (all communicable) were mentioned in total: measles, neonatal tetanus, Ebola, parasites, and trachoma. (See TABLE XXV.)

TABLE XXIII. INTERNATIONAL MULTI- OR BILATERAL ORGANIZATIONS: HEALTH SYSTEMS & INFRASTRUCTURE

| | | Health Systems & Infrastructure | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ability to respond to fut. outbreak | Accessing hard-to-reach | Cold Chain | Coordination of multiple partners | Cross-border collaboration | Human resources | Improving comunicaton | Microplan | Organizing | Financial | Advocacy | Health monitoring/ surveillance |
| **International Multi- or Bilateral Organization (n=6)** | | | | | | | | | | | | | |
| Angola | n=2 | | | ✓ | | | ✓ | | | | | ✓ | ✓ |
| Ethiopia | n=2 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | | | |
| Kenya | n=2 | | | ✓ | | | ✓ | | | | | ✓ | ✓ |
| Nigeria | n=2 | ✓ | | ✓ | | | ✓ | | | | ✓ | ✓ | ✓ |
| Somalia | n=1 | | | | | ✓ | | ✓ | ✓ | | | | ✓ |
| South Sudan | n=3 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| **Totals** | | 2 | 2 | 4 | 2 | 3 | 5 | 3 | 2 | | 2 | 4 | 5 |

TABLE XXIV. INTERNATIONAL MULTI- OR BILATERAL ORGANIZATIONS: HEALTH PROMOTION

| | | Health Promotion | | | | | |
|---|---|---|---|---|---|---|---|
| | | Decrease maternal & child mortality | Health behavior change | Health education | Improve Sanitation | Nutrition | Routine Immunization |
| **International Multi- or Bilateral Organization (n=6)** | | | | | | | |
| Angola | n=2 | | | | | | ✓ |
| Ethiopia | n=2 | | | | | ✓ | ✓ |
| Kenya | n=2 | | | | | | ✓ |
| Nigeria | n=2 | ✓ | | | | ✓ | ✓ |
| Somalia | n=1 | ✓ | | ✓ | ✓ | ✓ | |
| South Sudan | n=3 | | ✓ | ✓ | | | ✓ |
| **Totals** | | 2 | 1 | 2 | 1 | 3 | 5 |

TABLE XXV. INTERNATIONAL MULTI- OR BILATERAL ORGANIZATIONS: DISEASE

| | Disease | | | | | | | | | | | | | | | | Non-communicable | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diarrheal disease | Cholera | Ebola | Eradication (not polio) | Guinea worm | HIV | Malaria | Measles | Meningitis | Neonatal tetanus | Parasites | Pneumonia | TB | Trachoma | Typhoid | Yellow fever | Diabetes | Hyperten. | Ulcers |
| **International Multi- or Bilateral Organization (n=12)** | | | | | | | | | | | | | | | | | | | |
| Angola　　　　n=2 | | | | | | | | ✓ | | | | | | | | | | | |
| Ethiopia　　　n=2 | | | | | | | | ✓ | | ✓ | ✓ | | | ✓ | | | | | |
| Kenya　　　　n=2 | | | | | | | | ✓ | | ✓ | | | | | | | | | |
| Nigeria　　　n=2 | | | ✓ | | | | | | | | | | | | | | | | |
| Somalia　　　n=1 | | | | | | | | ✓ | | | | | | | | | | | |
| South Sudan　n=3 | | | | | | | | ✓ | | | | | | | | | | | |
| **Totals** | | | 1 | | | | | **5** | | 2 | 1 | | | 1 | | | | | |

f.　　Societal Factor results for all levels

Within the Societal Factors category, the most agreement fell on improving gender equality. While mentioned infrequently compared to other priorities, it is interesting that specifically improving gender equality was mentioned in three different socio-ecological levels (local civil society, international civil society, and international multi- or bilateral organization level) and four different country-contexts in the dataset (Ethiopia, Nigeria, Somalia, and South Sudan). (See TABLE XXVI.) Other Societal Factors mentioned included improving equity & equality in Ethiopia, primary & secondary education in Ethiopia, Nigeria, and South Sudan, poverty in Nigeria, road/water/school infrastructure in Nigeria, and security in Kenya.

Given that Societal Factors were mentioned at least once at every socio-ecological level and at least once in EVERY country in the dataset, perhaps there is an opportunity to incorporate aspects of improving societal factors whilst addressing a larger shared health priority.

TABLE XXVI. SOCIETAL FACTOR PRIORITIES BY STAKEHOLDER LEVEL

| | Societal Factors | | | | | |
|---|---|---|---|---|---|---|
| | Equity & Equality | Improving gender equality | Primary & secondary education | Poverty | Road/water/ school infrastr. | Security |
| **Community (n=3)** | | | | | | |
| Angola n=1 | | | | | | |
| Ethiopia n=0 | | | | | | |
| Kenya n=1 | | | | | | |
| Nigeria n=1 | | | | ✓ | | |
| Somalia n=0 | | | | | | |
| South Sudan n=0 | | | | | | |
| **Local Civil Society (n=5)** | | | | | | |
| Angola n=1 | | | | | | |
| Ethiopia n=2 | ✓ | ✓ | | | | |
| Kenya n=1 | | | | | | ✓ |
| Nigeria n=0 | | | | | | |
| Somalia n=0 | | | | | | |
| South Sudan n=1 | | | | | | |
| **Ministry of Health (n=17)** | | | | | | |
| Angola n=3 | | | | | | |
| Ethiopia n=1 | | | | | | |
| Kenya n=3 | | | | | | |
| Nigeria n=8 | | | | | ✓ | |
| Somalia n=0 | | | | | | |
| South Sudan n=2 | | | | | | |
| **International Civil Society (n=23)** | | | | | | |
| Angola n=2 | | | | | | |
| Ethiopia n=5 | | | ✓ | | | |
| Kenya n=4 | | | | | | |
| Nigeria n=6 | | ✓ | ✓ | | | |
| Somalia n=1 | | | | | | |
| South Sudan n=5 | | ✓ | ✓ | | | |
| **International Multi- or Bilateral Organization (n=12)** | | | | | | |
| Angola n=2 | | | | | | |
| Ethiopia n=2 | | | | | | |
| Kenya n=2 | | | | | | |
| Nigeria n=2 | | | | | | |
| Somalia n=1 | | ✓ | | | | |
| South Sudan n=3 | | | | | | |
| **Totals** | 1 | 4 | 3 | 1 | 1 | 1 |

g.  <u>Summary for the socio-ecological levels</u>

Looking across socio-ecological levels, the most frequent *categories* where priorities emerged were within Health Systems & Infrastructure and Health Promotion.  The most frequent specific priority was routine immunization.  This enforced the trend found in the overall priority analysis. (See TABLE XXVII.)

Furthermore, across socio-ecological levels the most agreement was found on identifying health monitoring & surveillance as a priority within Health Systems & Infrastructure. Within Health Promotion, all stakeholder levels identified routine immunization as the most frequently identified aspect, except the Local Civil Society level which had the most agreement on specifically improving health education.

There was an interesting finding regarding disease priority when stratified by stakeholder level. At the Community level, the Local Civil Society level, and International Civil Society level, malaria had the most agreement around a specific disease, but at the Ministry of Health level and the International Multi- or Bilateral Organization level, measles had the most agreement on a disease priority across countries.

The Societal Factor category would not suggest an obvious high priority upon which health initiative might hinge.  However, given that Societal Factors were mentioned at least once at every socio-ecological level and at least once in EVERY country in the dataset, perhaps there is an opportunity to incorporate aspects of improving societal factors whilst addressing a larger shared health priority.

This analysis suggests a clear opportunity for adapting a health initiative that combines specifically health monitoring & surveillance, routine immunization including measles vaccination, and a focus on decreasing malaria to encompass priorities found at all stakeholder levels.

TABLE XXVII. SUMMARY OF SOCIO-ECOLOGICAL LEVEL MOST FREQUENT PRIORITY CATEGORIES & SPECIFIC PRIORITIES

| Socio-Ecological Level | Most Frequent Code Category | Most Frequent Specific Code |
|---|---|---|
| Com. Health Workers & Vol. Com. Mobilizers | Health Promotion              (3 of 3) | Routine Immunization           (3 of 3) |
| | | Health education               (3 of 3) |
| | | Improving sanitation           (3 of 3) |
| Local Civil Society | Health Systems & Infrastructure (4 of 4) | |
| | Health Promotion              (4 of 4) | Health education               (4 of 4) |
| | Disease                       (4 of 4) | |
| National Ministry of Health | Health Systems & Infrastructure  (5 of 5) | Health monitoring & surveillance (5 of 5) |
| | Health Promotion              (5 of 5) | Routine immunization           (5 of 5) |
| | Disease                       (5 of 5) | |
| International Civil Society | Health Systems & Infrastructure  (6 of 6) | Health monitoring & surveillance (5 of 6) |
| | | Human resources                (5 of 6) |
| | | Routine Immunization           (5 of 6) |
| International Multi- or Bilateral Organizations | Health Systems & Infrastructure  (6 of 6) | Health monitoring & surveillance (5 of 6) |
| | | Human resources                (5 of 6) |
| | Health Promotion              (6 of 6) | Routine immunization           (6 of 6) |
| | Disease                       (6 of 6) | |

3. Individual country results

It is important to look at each individual country context to understand where they are in progress towards polio eradication and overall vaccination coverage rates to inform the risk of outbreak if cases are imported. Resources of the national ministries of health vary between country as do the size of the populations they serve. Additionally, there are many challenges to population and health data in these country contexts. Not only are there limited resources to obtain complete population census estimates but there are also large migratory populations that can inflate or deflate overall numbers exponentially. In the Horn of Africa, there are an estimated 30 million pastoralists or semi-pastoralists that can travel across unregulated country borders ("Pastoralists: Our Work," 2014). Pastoralists never have a permanent physical location home and rather spend their lives moving their flocks of animals. Semi-pastoralists may stop for periods of time and could have temporary homes for an agricultural season or longer, but they also move over time to better serve their grazing animals. Subsequently, challenges arise in defining a population size and also for healthcare stakeholders to predict and plan for providing services. Additionally, disease surveillance data is extremely difficult.

Taking these challenges into account, population data is included from the United Nations, Statistics Division, Demographic and Social Statistics. These population mid-year estimates are for 2016-2017 and are based on the last available census data for each country (United Nations Statistics Division, 2019). (See TABLE XXVIII.)

As can be seen in the table, the census data vary widely in how current they are. For example, in the case of Somalia, the last census was over 30 years old. Thus, the United Nations Population and Vital Statistics Report was unable to include a reliable estimate. Conflict, political unrest, fluid borders and migratory populations threaten even the most rigorous census estimates.

> "We also have IDPs (internally displaced populations) from South Sudan and the Democratic Republic of the Congo and Uganda in the south" (CORE Group stakeholder, South Sudan).

TABLE XXVIII. CENSUS, POPULATION, GLOBAL POLIO INITIATIVES STATUS

| Country | Last available census | Population estimate (2016-2017) In millions | GPEI country status[a] |
|---|---|---|---|
| Angola | 2014 | 28.3 | Polio-free |
| Ethiopia | 2007 | 94.3 | Key At-Risk[b] |
| Kenya | 2009 | 45.3 | Outbreak[c] |
| Nigeria | 2006 | 193.3 | Endemic[d] |
| South Sudan | 2008 | 11.6 | Key At-Risk[b] |
| Somalia | 1987 (7.1million) | No reliable estimate | Outbreak[c] |

[a] GPEI Country status ("Where We Work," n.d.)
[b] Key at-risk: no longer poliovirus-infected, but at high risk of outbreaks
[c] Outbreak: has stopped indigenous WPV circulation but affected by outbreak of imported WPV or circulating vaccine-derived poliovirus
[d] Endemic: has never stopped indigenous wild poliovirus (WPV) circulation

Even within a country context, there remains misinformation and a frustration on the availability of reliable data.

> "1974 was the last national census. So, the government estimates the population for each province, so when we go to the province, we can vaccinate MORE than the 'population'. And still use the estimate as a reference point" (CORE Group stakeholder, Angola).

Given that the hallmarks of epidemiology stand on the relationship between total number of persons versus the number of persons affected by disease, it is understandable that assessing disease burden would be challenging in these six country contexts. Additionally, assessing vaccine coverage rates (or the percentage of the population that has been vaccinated) is also fraught with difficulties. Notwithstanding, each National Ministry of Health does estimate their vaccine coverage rate.

For the purpose of this study, vaccination coverage rates will be compared for the Polio3 vaccine, which is defined as the "percentage of surviving infants who received the 3rd dose of polio containing vaccine. May be either oral or inactivated polio vaccine" (*Angola: WHO and UNICEF*, 2018). The World Health Organization estimation is included as well as the official estimate which is defined as "estimated coverage reported by national authorities that reflects their assessment of the most likely coverage based on any combination of administrative coverage, survey-based estimates or other data sources or adjustments. Approaches to determine OFFICIAL coverage may differ across countries" (*Angola: WHO and UNICEF*, 2018).

Within all the country reports, the WHO stated on their estimation reports that,

"The WHO and UNICEF estimates of national immunization coverage are based on data and information that are of varying, and, in some instances, unknown quality. Beginning with the 2011 revision we describe the grade of confidence (GoC) we have in these estimates. As there is no underlying probability model upon which the estimates are based, we are unable to present classical measures of uncertainty, e.g., confidence intervals. Moreover, we have chosen not to make subjective estimates of plausibility/certainty ranges around the coverage. The GoC reflects the degree of empirical support upon which the estimates are based. It is not a judgment of the quality of data reported by national authorities" (*Angola: WHO and UNICEF*, 2018).

For the six countries included in this study, grade of confidence description was unable to be calculated. (See TABLE XXIX.)

Despite the many challenges to the data, the coverage rates included above can shed at least some light onto the vaccination coverage rates.  Even adopting the least conservative estimates reveals that Polio3 vaccination coverage falls short in nearly every estimate. It is also critical to recognize that these are national coverage estimates and large variation can occur regionally within one nation. Vaccination coverage is higher in areas that have more access to healthcare.  All the sample set countries have regions that are considered "hard-to-reach" whether for terrain purposes or due to areas where there is active conflict.

TABLE XXIX. POLIO VACCINE COVERAGE RATES BY COUNTRY

| Country | Polio3 Vaccine coverage rate 2017 | |
|---|---|---|
| | WHO percentage estimate | Official govt estimate |
| Angola[a] | 47 | 73 |
| Ethiopia[b] | 76 | 92 |
| Kenya[c] | 69 | 81 |
| Nigeria[d] | 40 | 33 |
| South Sudan[e] | 31 | 58 |
| Somalia[f] | 47 | 64 |

[a] *Angola: WHO and UNICEF*, 2018
[b] *Ethiopia: WHO and UNICEF*, 2018
[c] *Kenya: WHO and UNICEF*, 2018
[d] *Nigeria: WHO and UNICEF*, 2018
[e] *Somalia: WHO and UNICEF*, 2018
[f] *South Sudan: WHO and UNICEF*, 2018

Even in the case of the highest vaccination coverage rate for this sample set, Ethiopia (76% WHO estimate, 92% official government estimate) fears remain related to polio.

"The importation aspect. The situation in Somalia is always a concern for us" (Ministry of Health stakeholder, Ethiopia).

Geographic proximity to other nations in the region with lower vaccination coverage rates and more recent polio outbreaks threaten polio control. Considering the population differences and vaccine coverage rate estimates of each country, while being cognizant of the significant obstacles challenging the acquisition of reliable data, the section below will examine each country individually and the responses to the study from stakeholders in that specific country.

a. Angola country report

Health Systems & Infrastructure and Health Promotion were the categories that most stakeholders identified their priorities for the application of the built polio infrastructure (each category

n=7 of 9). The specific codes within Health Systems & Infrastructure included health monitoring & surveillance, human resource capacity, cross-border collaboration, cold chain improving or maintaining, organizing, and advocacy.  The specific aspects mentioned with Health Promotion were decreasing maternal & child mortality, improving sanitation, nutrition, and routine immunization. The most agreement around a specific code fell on routine immunization (n=6 of 9).  Only five stakeholders mentioned specific diseases (malaria, measles, and neonatal tetanus). (See TABLE XXX.)  The code cloud shows the relative frequency of priorities mentioned in Angola. (See Figure 16.)

### (1) Health Systems & Infrastructure

"Take the opportunity that we have now.  **We need to have our healthcare system that can reach the communities**…(The built polio infrastructure) can take the opportunity to coordinate, to monitor, and build on what already is in place" (Tchikos stakeholder, Angola).

Rather than a specific disease burden, the stakeholders identified that the focus should be on improving aspects of the overall health system in Angola.  From the community level to national level to international level, individuals reasserted the need to advance on health systems bolstering to address overarching health needs.  These priorities were not targeted location or population, but rather improvements from which the entire nation could benefit.

"**Surveillance** can be used for other programs – like measles in future" (WHO stakeholder, Angola).

### (2) Health Promotion

Aspects of Health Promotion were mentioned at least once at all stakeholder levels.

"Encourage prenatal care for all pregnant women, supports full immunization, and encourages/supports any defaulters to complete the routine immunization for their kids. Teach good health hygiene in the house. Ask to see the immunization card. If pregnant women need help getting to the healthpost, escort them… Encourage & verify prenatal care for pregnant women" (Community health worker, Angola).

TABLE XXX. ANGOLA STAKEHOLDERS' IDENTIFIED PRIORITIES

| ANGOLA (n=9) | Health Systems & Infrastructure | | | | | | | Health Promotion | | | | | | Disease | | | | Societal Factors | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stakeholder level | Cold chain improving or maintaining | Cross-border collaboration | Human resource capacity | Organizing | Advocacy | Health monitoring & surveillance | Stakeholders Total | Decrease maternal & child mortality | Health education | Improving sanitation | Nutrition | Routine immunization | Stakeholders Total | Malaria | Measles | Neonatal tetanus | Stakeholders Total | Equity & equality | Improving gender equality | Road/water/school infrastructure | Primary & secondary education | Security | Stakeholders Total |
| **Community (n=1)** | | | | | | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | | 1 | | | | | | |
| *Community health workers* | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | | | | | |
| **Local Civil Society (n=1)** | | | 1 | | | | 1 | | 1 | 1 | | 1 | 1 | 1 | | | 1 | | | | | | |
| *Tchikos* | | | ✓ | | | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | | | | | |
| **National Ministry of Health (n=3)** | 1 | 1 | | | | 1 | 2 | 1 | | | | 2 | 2 | | 1 | 1 | 1 | | | | | | |
| *MoH Nat'l Public Health Dept.* | ✓ | | | | | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | | | | | | | | | |
| *MoH Nat'l Polio Project* | | ✓ | | | | | ✓ | | | | | | | | | | | | | | | | |
| *Luanda Immunization Sect.* | | | | | | | | | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | | | | | | |
| **International Civil Society (n=2)** | | | 1 | | | | 1 | | | | 1 | 2 | 2 | 1 | | | 1 | | | | | | |
| *World Vision* | | | | | | | | | | | | ✓ | ✓ | | | | | | | | | | |
| *CORE Group* | | | ✓ | | | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | | | | | | |
| **Int'l Multi/Bilateral org (n=2)** | 1 | | 2 | | 1 | 2 | 2 | | | | | 1 | 1 | | 1 | | 1 | | | | | | |
| *UNICEF* | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | | | | | | | | | | |
| *WHO* | | | ✓ | | | ✓ | ✓ | | | | | | | | ✓ | | ✓ | | | | | | |
| **Totals** | | | 12 | | | | **7** | | | 13 | | 6 | **7** | | 6 | | **5** | | | | | | **0** |

Figure 16. Code cloud for priorities in Angola



Figure 17. Community members in Angola, 2015

"Strengthening of EPI (Expanded Programme on Immunization), and then use similar set up for other health outcomes" (World Vision stakeholder, Angola).

To reiterate, the specific code in any code category that was mentioned most frequently was routine immunization (n=6 of 9).

"**Improve the quality of routine immunization**" (UNICEF stakeholder, Angola).

Routine immunization was identified at every stakeholder level, except at the local civil society level (n=1).



Figure 18. Community health workers, Angola 2015

(3) <u>Disease</u>

The disease code category was identified at least once at all stakeholder levels and all diseases mentioned were communicable diseases.  Specific diseases mentioned included vaccine-preventable diseases (measles and neonatal tetanus) and one non-vaccine preventable disease (malaria).

"There are a lot of opportunities using this model between (the built polio infrastructure) and the government. (We) should be able to do the same with other disease such as **measles and neonatal tetanus**" (MoH Immunization Section stakeholder, Angola).



Figure 19. Community market in Angola, 2015

(4) <u>Priorities not mentioned</u>

While the qualitative interviews never offered options from which the stakeholders could choose, it is interesting to observe which aspects mentioned in other country contexts were <u>not</u> mentioned in Angola. None of the Angola stakeholders mentioned specifically health behavior change, diarrheal disease, Ebola, eradication of other diseases, guinea worm, HIV, meningitis, non-communicable diseases, parasites, TB, pneumonia, trachoma, typhoid, yellow fever, or cholera. Also not mentioned in the Health Systems & Infrastructure category include the ability to respond to future threats, accessing hard-to-reach areas, coordination of multiple partners, microplanning, improving communication, and financial support. Additionally, none of the stakeholders identified codes in the societal issues code category.  This does not necessarily imply that these aspects of public health would not be priorities of the stakeholders interviewed.  But one can deduce that the aspects they did include were the priorities that at the time of interview and at the forefront of their minds when prompted by the interview to share their perspective.

b.  <u>Ethiopia country report</u>

Stakeholders in Ethiopia identified aspects of Health Systems & Infrastructure most frequently when asked what the built polio structure should be applied to next.  Regarding code categories, aspects (codes) pertaining to building Health Systems & Infrastructure had the greatest number of excerpts identified in the Ethiopia sample subset. They were dispersed over several codes that were defined as components of building Health Systems & Infrastructure (ability to respond to future outbreaks and threats, improving or maintaining the cold chain, cross-border coordination, accessing hard-to-reach populations, coordination of multiple partners, improving communication, human resource capacity, microplanning, organizing, advocacy, financial contribution, health monitoring and surveillance).

The table below highlights the stakeholders' responses to what the built polio structure should be used to address next.  Of the ten interviewed stakeholders, all of them identified an aspect of Health

Systems & Infrastructure and all of them identified an aspect of Health Promotion. Six of the stakeholders mentioned a specific disease or diseases to address and three stakeholders identified a societal issue that should be addressed. While Health Systems & Infrastructure had the most total number of specific items within the code categories identified, it is important to note that routine immunization was the most identified 'specific' code with an overarching code category. Routine immunization was identified as a priority in 80% (8/10) interviews with stakeholders and identified as a priority by at least one stakeholder all socio-ecological levels included in the sample set. (See TABLE XXXI.)

The sample set within Ethiopia did not have community level stakeholder interviews, but of the other levels interviewed, stakeholders from international civil society and local civil society identified routine immunization as a priority. The code cloud below shows the relative frequency of priorities in Ethiopia. (See Figure 20.)

(1) <u>Health Systems & Infrastructure</u>

"Existence on the ground floor is a good platform to **strengthen the system altogether**. …helping to strengthening the surveillance" (Ministry of Health stakeholder, Ethiopia).

"Polio has contributed so much in **strengthening the health system**. It was the only program that was able to reach all the populations. So, it led the way. It has capacity. Outbreak preparedness investigation. Human resource deployed…supporting almost all the health initiatives" (WHO stakeholder, Ethiopia). (See Figure 21.)

(2) <u>Health Promotion</u>

Aspects of Health Promotion mentioned include decreasing maternal & child mortality, health behavior change, improving sanitation, and routine immunization.

"They have the health message, they know the languages, they go to the watering hole, and go to where the people. And on a microphone on a motorbike" (Pastoralist Concern stakeholder, Ethiopia). (See Figure 22.)

TABLE XXXI. ETHIOPIA STAKEHOLDERS' IDENTIFIED PRIORITIES

| ETHIOPIA (n=10) Stakeholder level | Health Systems & Infrastructure: Ability to respond to future outbreaks | Accessing hard-to-reach populations | Cold chain improve or maintain | Coordination of multiple partners | Cross-border collaboration | Human resource capacity | Improving communication | Microplaning | Organizing | Financial | Health monitoring & surveillance | Stakeholders Total | Health Promotion: Decrease maternal & child mortality | Health behavior change | Health education | Improve sanitation | Nutrition | Routine immunization | Stakeholders Total | Disease: Ebola | Eradication (other diseases) | HIV | Malaria | Measles | Neonatal tetanus | Parasites | TB | Trachoma | Yellow ever | Stakeholders Total | Societal: Equity & equality | Improving gender equality | primary & secondary education | Stakeholders Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Community (n=0)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Local Civil Society (n=2)** | 1 | 1 |  | 1 | 1 | 2 |  | 1 |  |  | 2 | 2 | 2 | 1 | 1 |  | 2 | 2 | 2 |  |  |  | 1 | 1 | 1 | 1 | 1 |  |  | 1 | 1 |  | 1 | 2 |
| *Pastoralist Concern* | ✓ |  |  |  |  | ✓ |  |  |  |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ |  |  | ✓ |
| *EECD&SSC* |  | ✓ |  | ✓ | ✓ | ✓ |  | ✓ |  |  | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ |  |  |  |  |  |  |  |  |  |  |  |  |  | ✓ | ✓ |
| **Nat'l Ministry of Health (n=1)** | 1 | 1 |  | 1 | 1 | 1 |  | 1 | 1 | 1 | 1 | 1 |  |  | 1 |  | 1 | 1 | 1 |  |  | 1 |  | 1 | 1 |  |  |  |  | 1 |  |  |  | 0 |
| *Nat'l Ministry of Health* | ✓ | ✓ |  | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ |  | ✓ | ✓ | ✓ |  |  | ✓ |  | ✓ | ✓ |  |  |  |  | ✓ |  |  |  |  |
| **International Civil Society (n=5)** | 1 | 1 | 2 | 1 | 1 | 2 | 1 |  |  |  | 4 | 5 | 3 | 2 | 3 | 1 | 3 | 3 | 5 | 1 | 1 | 1 |  | 1 |  |  | 1 |  | 1 | 3 |  |  | 1 | 1 |
| *CARE* |  |  |  |  |  |  |  |  |  |  | ✓ | ✓ | ✓ | ✓ |  |  | ✓ | ✓ | ✓ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *CORE Group* |  |  |  |  |  | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ |  |  |  |  |  |  |  | ✓ |  |  |  |  |
| *AMREF* | ✓ |  | ✓ |  |  |  |  |  |  |  | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ | ✓ | ✓ | ✓ |  |  |  |  |  |  | ✓ | ✓ | ✓ |  |  | ✓ | ✓ |
| *Rotary International* |  | ✓ | ✓ | ✓ | ✓ |  |  |  |  |  |  | ✓ | ✓ |  | ✓ |  | ✓ | ✓ | ✓ |  |  |  |  |  |  |  |  |  |  | ✓ |  |  |  |  |
| *Save the Children* |  |  |  |  |  | ✓ |  |  |  |  | ✓ | ✓ | ✓ | ✓ |  |  | ✓ | ✓ | ✓ |  |  |  |  |  |  |  | ✓ |  |  | ✓ |  |  |  |  |
| **Int'l Multi/Bilateral org (n=2)** | 1 | 2 |  | 1 | 2 | 1 | 1 |  |  |  |  | 2 |  |  |  |  | 1 | 2 | 2 |  |  |  | 1 | 1 | 1 |  | 1 |  |  | 1 |  |  |  | 0 |
| *UNICEF* |  | ✓ |  | ✓ |  |  |  |  |  |  | ✓ | ✓ |  |  |  |  | ✓ | ✓ | ✓ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *WHO* | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ |  |  |  |  | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ |  | ✓ |  | ✓ | ✓ |  |  |  |  |
| **Totals** | 38 |  |  |  |  |  |  |  |  |  |  | **10** | 23 |  |  |  |  | 8 | **10** | 17 |  |  |  |  |  |  |  |  |  |  | **6** | 3 |  |  | **3** |

Figure 20. Code cloud of priorities in Ethiopia



Figure 21. Jinka community health post, Ethiopia

Figure 22. Motorbike and livestock, Horn of
Africa, 2018

Regarding health education, one civil society stakeholder in Ethiopia explained, "Even in nutrition and health education, it is not lack of the food, maybe our knowledge of HOW to use it to feed our children. They can be a part of that effort" (Pastoralist Concern, Ethiopia).

Another international civil society stakeholder identified a cross-sector Health Promotion opportunity.

"Register pregnant mothers. Vaccinated, educated, encouraged to give birth at health facility,

surveillance, latrine construction & hygiene education. (The) community volunteer (can) show how to manage defecation outside and wash hands" (CORE Group, Ethiopia).

### (3) Disease

The disease code category was identified at least once at all stakeholder levels and all diseases mentioned were communicable diseases included both vaccine-preventable and non-vaccine-preventable diseases (measles, neonatal tetanus, yellow fever, HIV, malaria, parasites, trachoma, Ebola, and tuberculosis).

"I hope that (the polio infrastructure) will be responsive to HIV platform. They are working in the very hard to reach areas – so we want to use their platform there.  We believe mobilizing the community, creating the awareness, immunization and polio in general. We see them as good partners" (Ministry of Health stakeholder, Ethiopia).

### (4) Societal Factors

Interestingly, both local civil society and international civil society stakeholders mentioned Societal Factors as a priority.  While Societal Factors do not seem to be health factors in the direct sense that disease elimination might, the impact of societal factors can be directly related to health outcomes. For example, years of education has been found to delay a young girl's age at her first pregnancy (Glick, Handy, & Sahn, 2015, p. 219-236). There was a direct correlation to a societal factor (education) and an improved health outcome (pregnancy delay).  This societal-health feedback relationship helped to understand why some stakeholders in Ethiopia mentioned improving Societal Factors.

The international civil society level identified that the built polio infrastructure could be used to improve primary education.

 "Community system has improved; the network and capacity has been improved.  Community surveillance you have to go house to house, so they pick up other disease issues. **Integrated surveillance. Take children and track drop-outs from school.** Check child related issues" (AMREF stakeholder, Ethiopia).

The local civil society stakeholders called for improving overall equity & equality and also specifically gender equality.

> "Just a small portion, the tip of the iceberg is polio. We can use (the built polio infrastructure) to combat other problems. Future direction is to emphasize **equity and equality** – (we) can definitely help in that effort. They can help deliver equitable services" (Pastoralist Concern stakeholder, Ethiopia).
>
> "Maternal mortality and **gender equality needs improvement**" (Ethiopian Evangelical Church Development & Social Services Commission stakeholder, Ethiopia).

### (5) Priorities not mentioned

While the qualitative interviews never offered options from which the stakeholders could choose, it is interesting to observe which aspects mentioned in other country contexts were not mentioned in Ethiopia. The only aspect of Health Systems & Infrastructure identified in other countries not mentioned was advocacy. All the Health Promotion aspects developed from the responses in the full all-country dataset were mentioned as least once by at least one stakeholder in Ethiopia. Within the disease category, none of the Ethiopian stakeholders mentioned specifically diarrheal disease, guinea worm, meningitis, pneumonia, typhoid, cholera or any non-communicable disease. Additionally, none of the stakeholders identified poverty, road/water/school infrastructure, or security in the societal issues code category.

This does not necessarily imply that these aspects of public health would not be priorities of the stakeholders interviewed. But one can deduce that the aspects they did include were the priorities that at the time of interview and at the forefront of their minds when prompted by the interview to share their perspective.

### c. Kenya country report

All eleven stakeholders interviewed in Kenya identified at least two, and, in most cases several (average over three), aspects of Health Systems & Infrastructure as priorities for which the built polio infrastructure should be applied. Specific aspects included the ability to respond to future threats,

accessing hard-to-reach populations, improving or maintaining cold chain, coordination of multiple

partners, cross-border collaboration, human resource capacity, improving communication,

microplanning, advocacy, financial support, and health monitoring & surveillance.

All but one of the stakeholders (n=10 of 11) identified aspects of Health Promotion, specifically

health education, improving sanitation, and routine immunization.   Similar to many other country

specific contexts, the routine immunization was the most frequently identified individual code in the data

set (n=10 of 11).

Seven of the stakeholders identified disease aspects that should be prioritized after polio, including

eradication of other diseases (not polio) in general, guinea worm, HIV, measles, neonatal tetanus,

tuberculosis, and cholera.  Additionally, non-communicable diseases were mentioned, once generally by

an International Rescue Committee stakeholder, and once with a specific non-communicable disease

(diabetes) by a stakeholder from the Kenyan Red Cross. Lastly, one stakeholder mentioned a Societal

Factor, specifically security, that could benefit from the built polio infrastructure.  The table below

shows the breakdown of all Kenyan responses by stakeholder level and code category. (See TABLE

XXXII.) The code cloud shows the relative frequency of priorities in Kenya. (See Figure 23.)


(1) <u>Health Systems & Infrastructure</u>

Of the 39 codes identified in the Health Systems & Infrastructure code category by all eleven

stakeholders interviewed, the most frequently mentioned code was health monitoring & surveillance

(n=7 of 39).


> "**Surveillance – the community aspect of surveillance is important**. The health system has
> been devolved, the DHIS (District Health Information System) is very "facility-based. But there
> is community gap that is missing" (Kenyan Red Cross stakeholder, Kenya).

Cross-border collaboration was also mentioned frequently (n=6 of 11) which one could interpret

a reference to surveillance.

# TABLE XXXII.  KENYA STAKEHOLDERS' IDENTIFIED PRIORITIES

| KENYA (n=11) Stakeholder level | Ability to respond to future outbreaks | Accessing hard-to-reach | Cold chain improve or maintain | Coord. of multiple partners | Cross-border collaboration | Human resource capacity | Improving communication | Microplaning | Advocacy | Financial | Hlth monitor. & surveil. | Stakeholders Total | Health education | Improve sanitation | Routine immunization | Stakeholders Total | Eradication (other diseases) | Guinea worm | HIV | Measles | Neonatal tetanus | TB | Trachoma | Cholera | Non-communicable | Diabetes | Stakeholders Total | Security | Stakeholders Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Community (n=1)** | | | | | 1 | 1 | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | 0 | | 0 |
| *Community health workers* | | | | ✓ | ✓ | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| **Local Civil Society (n=1)** | | 1 | | | 1 | 1 | | | | | 1 | 1 | 1 | 1 | | 1 | | | | | | | | | 1 | 1 | 1 | 1 | 1 |
| *Kenyan Red Cross* | | ✓ | | | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Nat'l Ministry of Health (n=3)** | 1 | 1 | | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 3 | 3 | 2 | | 3 | 3 | 2 | 1 | 1 | | | 1 | | 2 | | | 3 | | 0 |
| *Nat'l Ministry of Health* | | ✓ | | | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | | | | | ✓ | | | | |
| *Disease Surveil. Research Unit* | | | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | | | | | ✓ | | ✓ | | | | |
| *MoH Sub-county office* | ✓ | | | | ✓ | | | | | | ✓ | ✓ | ✓ | | ✓ | ✓ | | | ✓ | | | ✓ | | ✓ | ✓ | | | | |
| **Int'l Civil Society (n=4)** | | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 4 | 1 | | 2 | 3 | | 1 | | | | 1 | 1 | | 1 | | 2 | | 0 |
| *Catholic Relief Services* | | | | ✓ | | | | ✓ | | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | | | | | | ✓ | | | | |
| *Int'l Rescue Comm.* | | ✓ | ✓ | | | ✓ | | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | | | | | | ✓ | ✓ | | ✓ | | ✓ | | |
| *CORE Group* | | | | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | |
| *Am. Red Cross* | | | | ✓ | | | | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | | | | | | | | | | | | | |
| **Int'l Multi/Bilateral org(n=2)** | | 1 | | | 1 | | | 1 | | | 1 | 2 | | | 2 | 2 | | | 1 | 1 | | | | | | | 1 | | 0 |
| *UNICEF* | | | | | | | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | | | | | ✓ | | | | |
| *WHO* | | ✓ | | | | | ✓ | | | | ✓ | ✓ | | | ✓ | ✓ | | | | | | | | | | | | | |
| **Totals** | | | | | 39 | | | | | | | **11** | 15 | 8 | 10 | | | | | | 13 | | | | | | **7** | 1 | **1** |

Figure 23. Code cloud of priorities in Kenya



Figure 24. Children during a National Polio Supplemental Immunization Day, Kenya 2015

"Mostly, the threat of importation and migration. Some other the challenges are cross-border - Kenya to Uganda, SS Sudan, Somalia. **We needed a cross-border collaboration of the population.** How are we going to support them? Track them?" (Ministry of Health Disease Research Unit stakeholder, Kenya)

One international civil society stakeholder identified cold chain as a priority, explaining, "In the border…cold chain is a big challenge in the Garissa area. Are the solar frigs reliable?? **The cold chain needs to be supported**" (International Rescue Committee stakeholder, Kenya).

"Among the partners, the Kenyans are going to trust the international partners. Talking on radio. **There needs to be advocacy** – serious…**Communication lines (need) to be open**" (Catholic Relief Services stakeholder, Kenya).

### (2) Health Promotion

There were only three discrete codes mentioned by stakeholders in the Health Promotion code category: health education, improving sanitation, and routine immunization.

"We have a community health strategy that is not tapped enough. That is the foundation of a health system! You would make better health decisions. The people have low literacy rates. **Simple messages like wash your hands - we can HALVE our health problems in our country**. If we can "task shift" things to community volunteer" (Kenyan Red Cross stakeholder, Kenya).

As mentioned above, routine immunization was the most frequently identified individual code identified in the Kenya dataset (n=8 of 11 stakeholders), showing the most agreement around a priority.

"We have serious hard to reach areas, where you can find an 11-year-old that has NEVER had a polio dose. **Routine immunization in (these) areas is less than 50%. We need to look at how we can scale up routine immunizations**" (International Rescue Committee stakeholder, Kenya).

### (2) Disease

Seven of the eleven stakeholders identified a specific disease or diseases which included both communicable and non-communicable diseases. While several Disease priorities were mentioned (n=10), there was little agreement on one specific disease. The frequency of Disease priorities only

overlapped at a maximum of twice per disease priority. One stakeholder identified that the polio

eradication infrastructure should be applied to specifically eradicating another disease.

> "Others can ride on the strength of this program. Hopefully, we can say, What's next? **What else can we eradicated?** Smallpox, guinea worm, and polio. Now, what can we do?" (MoH stakeholder, Kenya)

> "**HIV is the biggest problem**. In the Somali community, (it) has large stigma with HIV – a lot of denial and discrimination. They actually kill the patient. The family and the community suffocate the patient. Maybe help to change the mentality using their own people" (Sub-county MoH office stakeholder, Kenya).

Two stakeholders identified the need to address non-communicable diseases.

> "Non-communicable diseases!  Almost 50% -50% now in Kenya. Example in Garissa, there is a lot of **diabetes**, surprisingly. In a cholera outbreak in refugee camp, (they had) Interagency Health Kit (IHK) (for the) outbreak -- but they don't have any insulin. **The kit has all communicable meds, but what about noncommunicable diseases? Nobody thinks about detection of noncommunicable diseases but observed – I really see that noncommunicable diseases really take a toll on a community.**  At the family level, and economy level, there is not much investment or attention. A simple thing like doing a blood pressure – they don't have a machine" (Kenyan Red Cross stakeholder, Kenya).

> (4)  <u>Societal Factors</u>

Only one of the eleven stakeholders mentioned a Societal Factor, specifically security, that could

benefit from the built polio infrastructure.

> "Issues around al-Shabaab. I can't prove that – but **through this work, people know that you are there**. Anti-radicalization. **When the people are on the ground, they share perspectives. How we can support the anti-radicalization. Sharing information -- it is a plus**" (Kenyan Red Cross stakeholder, Kenya).

As mentioned above within the all-country analysis, the United States State Department, Office of the

Coordinator on Counterterrorism defines "al-Shabaab (The Youth) (as) a violent and brutal extremist

group with a number of individuals affiliated with al-Qa`ida. Many of its senior leaders are believed to

have trained and fought with al-Qaida in Afghanistan" (Office of the Coordinator of Counterterrorism,

2008). In 2018, an update to the al-Shabaab terrorist designation was announced.

Figure 25. Community health workers, Kenya, 2015

"The Department of State has amended the designation of al-Shabaab – an al-Qa'ida affiliate in Somalia – to include al-Hijra and other aliases…Al-Hijra, formed in 2008 in Nairobi, Kenya serves as a wing of al-Shabaab. Al-Hijra, which is extensively interconnected with al-Shabaab both organizationally and operationally, consists primarily of Kenyan and Somali followers of al-Shabaab in East Africa. It has openly engaged in al-Shabaab recruiting in Kenya and facilitated travel of al-Shabaab members to Somalia for terrorism purposes" (Office of the Spokesperson, 2018).

The stakeholder in Kenya, familiar with the challenges of the population, identified that public health presence and engagement in these high-risk areas could have a protective effect on the population, simply by "sharing perspectives".  As mentioned, it is difficult to measure and difficult to prove, but extraordinarily important to consider.

(5)  Priorities not mentioned

While the qualitative interviews never offered options from which the stakeholders could choose, it is interesting to observe which aspects mentioned in other country contexts were not mentioned in

Kenya. The only aspect of Health Systems & Infrastructure identified in other countries not mentioned was organizing. In the Health Promotion category, stakeholders did not specifically mention decreasing maternal & child mortality, health behavior change, or nutrition. Within the disease category, none of the Ethiopian stakeholders mentioned specifically malaria, Ebola, diarrheal disease, meningitis, parasites, pneumonia, typhoid, or yellow fever. Of the non-communicable diseases, Kenyan stakeholders did not mention ulcers or hypertension. Additionally, while one of the stakeholders identified security in the Societal Factors code category, none of the other stakeholders mentioned poverty, primary/secondary education, road/water/school infrastructure, equity, or improving gender equality.

This does not necessarily imply that these aspects of public health would not be priorities of the stakeholders interviewed. But one can deduce that the aspects they did include were the priorities that at the time of interview and at the forefront of their minds when prompted by the interview to share their perspective.

    d.   <u>Nigeria country report</u>

The Nigeria dataset had the largest number of stakeholders interviewed (n=17), with the greatest number in the National Ministry of Health socio-ecological level. Additionally, the dataset did not include stakeholders at the local civil society level within Nigeria.

Nigeria was the only country where aspects of Health Promotion were identified as priorities more frequently (n=16 of 17) than aspects of Health Systems & Infrastructure (n=14 of 17). Codes mentioned in Health Promotion included decreasing maternal & child mortality, health behavior change, health education, improving sanitation, nutrition, and routine immunization. The Nigerian dataset did, however, follow the trend of the other countries (except Somalia) where by routine immunization was a most frequently identified specific health priority identified (n=15 0f 17).

Health System & Infrastructure aspects mentioned included the ability to respond to future threats or outbreaks, accessing hard-to-reach populations, improving or maintaining the cold chain,

coordination of multiple partners, cross-border collaboration, human resource capacity, improving communication, organizing, advocacy, financial, and health monitoring & surveillance.

. Stakeholders identified priorities within the Disease code category with the same frequency as priorities in Health Systems & Infrastructure (n=14 of 17), with the most agreement falling on malaria specifically (n=10 of 17).  Specific Disease priorities mentioned included the following communicable diseases: diarrheal disease, Ebola, guinea worm, malaria, measles, meningitis, neonatal tetanus, typhoid, and cholera.   Three non-communicable diseases were also mentioned including diabetes, hypertension, and ulcers.

Interestingly, Societal Factors, while still the category least mentioned (n=3 of 17), were mentioned by stakeholders at three different socio-ecological levels: community level, national ministry of health level, and international civil society level.  Aspects mentioned included improving gender equality, poverty, road/water/school infrastructure, and primary & secondary education.

The following table shows the breakdown of all Nigerian responses by stakeholder level and code category. (See TABLE  XXXIII) The code cloud shows the relative frequency of priorities in Nigeria. (See Figure 26)

(1) Health Systems & Infrastructure

Within this code category, the most frequently mentioned priority was human resource capacity building (n=8 of 39), followed by improving communication (n=7 of 39) and health monitoring & surveillance (n=7 of 39).

> "The resources – What role can it play for the next stage in the country? Routine immunization – we need to devote more energy. **How can we get more hands to support** routine immunization?" (National EOC stakeholder, Nigeria)

> "**Properly trained people at the health camps**…The tools for documentation need revision…The **Volunteer Community Mobilizers** (VCMs) **(need) to be extended to include surveillance**. It can be very simple but what will they do it if they see it. The VCMs can be a vital platform for other health outcomes. Surveillance. Maternal and child health. **We can leverage this infrastructure**" (USAID stakeholder, Nigeria).

TABLE XXXIII. NIGERIA STAKEHOLDERS' IDENTIFIED PRIORITIES

| NIGERIA (n=17) / Stakeholder level | Health Systems & Infrastructure | | | | | | | | | | | | Health Promotion | | | | | | | Disease | | | | | | | | | | | | | Societal Factors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ability to respond to future outbreaks | Accessing hard-to-reach populations | Cold chain improve or maintain | Coordination of multiple partners | Cross-border collaboration | Human resource capacity | Improving communication | Organizing | Advocacy | Financial | Health monitoring & surveillance | Stakeholders Total | Decrease maternal & child mortality | Health behavior change | Health education | Improving Sanitation | Nutrition | Routine immunization | Stakeholders Total | Diarrheal disease | Ebola | Guinea worm | Malaria | Measles | Meningitis | Neonatal tetanus | Typhoid | Cholera | Diabetes | Hypertension | Ulcers | Stakeholders Total | Improving gender equality | Poverty | Road/water/school infrastructure | Primary & secondary education | Stakeholders Total |
| **Community (n=1)** | | | | | | | | | | | | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | | | | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | | | 1 |
| *Volunteer Com. Mobilizers* | | | | | | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ |
| **Local Civil Soc. (n=0)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Nat'l Ministry of Health (n=8)** | 1 | 3 | 1 | 2 | | 4 | 5 | 1 | 1 | 1 | 4 | 7 | 2 | | 5 | 1 | 4 | 8 | 8 | | 1 | | 5 | 3 | | | 1 | | | | | 7 | | | 1 | | 1 |
| *Nat'l EOC* | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | | | ✓ | | | | | ✓ | | | | | |
| *Primary Healthcare* | | | | | | ✓ | | | | | | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | | | ✓ | | | | | | | | | ✓ | | | | | |
| *EOC Kaduna* | | | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | | | | | | | | ✓ | | | | | |
| *EOC Yobe* | | | | | | | | | | | | | | | ✓ | | ✓ | ✓ | ✓ | | | | ✓ | | | | | | | | | ✓ | | | | | |
| *EOC Borno* | | ✓ | | | | | ✓ | | | | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | | | | | | | | | | | | | | | | | | |
| *EOC Kano* | | | | ✓ | | | ✓ | | | | ✓ | ✓ | | | | | | ✓ | ✓ | | | | | ✓ | | | | | | | | ✓ | | | ✓ | | ✓ |
| *MoH Katsina* | | ✓ | | | | | | | | | | ✓ | | | | | | ✓ | ✓ | | | | ✓ | | | | | | | | | ✓ | | | | | |
| *MoH Borno* | | | | ✓ | | ✓ | ✓ | | | | | ✓ | | | ✓ | | | ✓ | ✓ | | | | | ✓ | | | | | | | | ✓ | | | | | |

TABLE XXXIII. NIGERIA STAKEHOLDERS' IDENTIFIED PRIORITIES (CONTINUED)

**NIGERIA (n=17)**

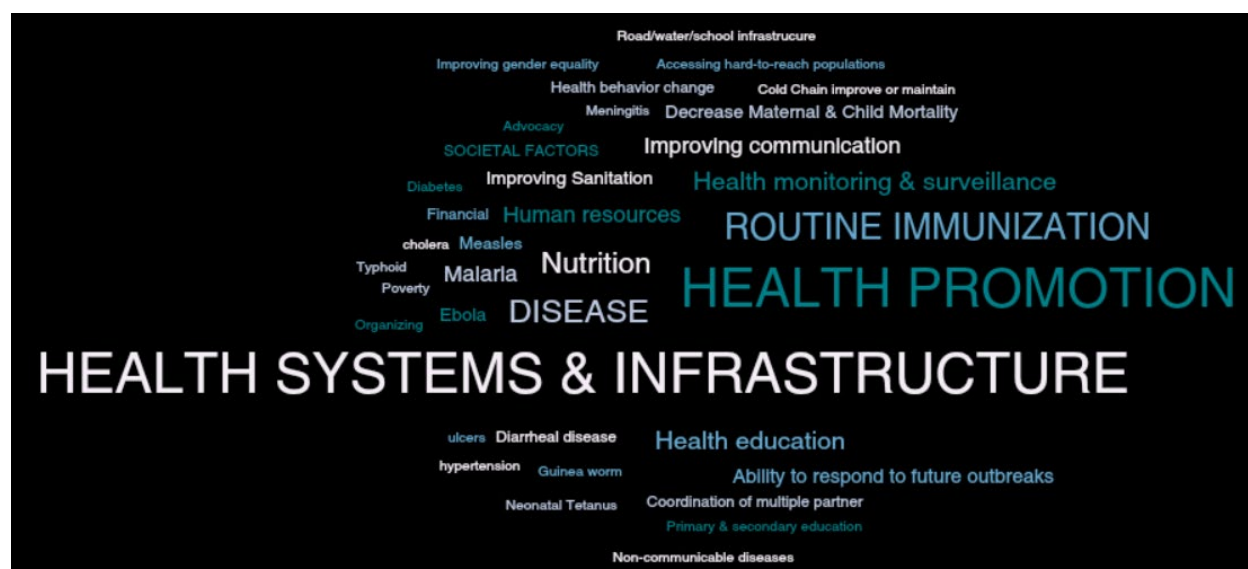| Stakeholder level | Health Systems & Infrastructure | | | | | | | | | | | | Health Promotion | | | | | | | Disease | | | | | | | | | | | | | Societal Factors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ability to respond to future outbreaks | Accessing hard-to-reach populations | Cold chain improve or maintain | Coordination of multiple partners | Cross-border collaboration | Human resource capacity | Improving communication | Organizing | Advocacy | Financial | Health monitoring & surveillance | Stakeholders Total | Decrease maternal & child mortality | Health behavior change | Health education | Improving Sanitation | Nutrition | Routine immunization | Stakeholders Total | Diarrheal disease | Ebola | Guinea worm | Malaria | Measles | Meningitis | Neonatal tetanus | Typhoid | Cholera | Diabetes | Hypertension | Ulcers | Stakeholders Total | Improving gender equality | Poverty | Road/water/school infrastructure | Primary & secondary education | Stakeholders Total |
| **Int'l Civil Society (n=6)** | 1 | | | | | 4 | 2 | | | 1 | 1 | 5 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 1 | 1 | 1 | 4 | 2 | 1 | 1 | | | | | | 5 | 1 | | | 1 | 1 |
| *Save the Children* | | | | | | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | ✓ | | | | | | ✓ | ✓ | | | ✓ | ✓ |
| *Rotary Int'l* | ✓ | | | | | ✓ | | | | | | ✓ | | | | | | | | | ✓ | | | ✓ | ✓ | | | | | | ✓ | | | | | | |
| *Catholic Relief Services* | | | | | | ✓ | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | | | | | | | | ✓ | | | | | |
| *CORE Nat'l* | | | | | | ✓ | | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | | | | | | ✓ | | | | | |
| *CORE Kaduna* | | | | | | | | | | | | | | | | | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | |
| *CORE Abuja* | | | | | | | ✓ | | | | | ✓ | | | | ✓ | | ✓ | ✓ | | | | ✓ | | | | | | | | | ✓ | | | | | |
| **Int'l Multi/Bi-lat org (n=2)** | 1 | | 1 | | | | | | | 1 | 2 | 2 | 1 | | | | 1 | 1 | 2 | | 1 | | | | | | | | | | | 1 | | | | | |
| *US CDC* | ✓ | | ✓ | | | | | | | | ✓ | ✓ | | | | | ✓ | | ✓ | | ✓ | | | | | | | | | | | ✓ | | | | | |
| *USAID* | | | | | | | | | | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | | | | | | | | | | | | | | | | | | |
| **Totals** | | | | | | 36 | | | | | | 14 | | | | 43 | | 15 | 16 | | | | 28 | | | | | | | | | 14 | | | 4 | | 3 |

Figure 26. Code cloud of priorities in Nigeria

"Strengthening surveillance. Identify the gaps. That can translate to other diseases" (CDC stakeholder, Nigeria).

(2) Health Promotion

The resounding priority identified in the Nigerian dataset was concisely stated by a CORE Group Kaduna State stakeholder, "Use polio structures to implement **routine immunization**."

All the stakeholders in the Nigerian dataset except for one mentioned a priority in the Health Promotion code category (n=16 of 17). There were fifty codes linked to the code category with the greatest frequency for one specific code falling on routine immunization (n=15 of 17).

"Polio has quite a legacy in place. What they want is RESULTS. The only way you can improve is with 100% community involvement. Why can't you now do this for **routine immunization**?? The team is on the ground" (EOC Yobe State stakeholder, Nigeria.

"When the Community Volunteer Mobilizers learn, it can easily be translated to the community. **Help with routine immunization** and maternal education" (MoH Borno State, Nigeria).

"The number one is **routine immunization** because if you had strong routine immunization, then you wouldn't have to do campaigns" (CORE Group National stakeholder, Nigeria).

"Even if polio goes away, the system is ready to improve **routine immunization**" (MoH Primary Healthcare stakeholder, Nigeria).

"Looking at the (polio infrastructure), there (are) opportunities that I feel. As the insurgency is decreasing, there is a need to expand with (the polio infrastructure). To link mothers with the health facilities, that will open an opportunity for **routine immunization**" (EOC Borno State stakeholder, Nigeria).

"A lot of capacity has been built in country. The partners in place can help propel Nigeria. **Routine immunization**. Maternal and child health. To use the capacity structures and systems and channel that into other areas" (Catholic Relief Services stakeholder, Nigeria).

### (3) Disease

While several diseases were mentioned in the Disease code category, the most frequently

identified disease priority by all stakeholders was malaria (n=10 of 17).

"(It is) already on the ground. Now, they (polio stakeholders) are engaged in routine immunization. **Malaria** - I see an opportunity for using this network" (EOC Kaduna State stakeholder, Nigeria).

"In Yobe, (there is a) strong Volunteer Community Mobilizer (VCM) network that can implement other disease problems. A very strong platform. VCMs are implementing polio. **Malaria**…Same method to deliver these messages" (CORE Group national stakeholder, Nigeria).

### (4) Societal Factors

As in all country contexts, the least number of stakeholders mentioned Societal Factors as

priorities (n=3 of 17), however they are important, nonetheless. One community level stakeholder

keenly identified poverty as a priority.

"They have other needs that have not been met…**poverty**, typhoid, ulcers, diabetes, hypertension, diarrheal disease" (Volunteer Community Mobilizer, Nigeria).

A stakeholder at the national ministry of health socio-ecological level identified road/water/school

infrastructure as a priority.

"Indirectly, the polio program has given the political leaders an opportunity to get into the community on a deeper level. **Listen to the peoples' concerns and problems** that can be addressed. Deeper needs assessment. If they go with the government, **they see that we have no school, no road, no water.** Polio made the leaders see that and go there" (EOC Kano State stakeholder, Nigeria).

(5) Priorities not mentioned

While the qualitative interviews never offered options from which the stakeholders could choose, it is interesting to observe which aspects mentioned in other country contexts were <u>not</u> mentioned in Nigeria. The only aspect of Health Systems & Infrastructure identified in other countries not mentioned was microplanning. In the Health Promotion category, stakeholders identified all codes mentioned in other country contexts. Within the Disease category, none of the Nigerian stakeholders mentioned specifically the eradication of other diseases (not polio), HIV, pneumonia, parasites, TB, trachoma or yellow fever. Additionally, within the Societal Factor category, none of the stakeholders mentioned equity & equality or security.

This does not necessarily imply that these aspects of public health would not be priorities of the stakeholders interviewed. But one can deduce that the aspects they did include were the priorities that at the time of interview and at the forefront of their minds when prompted by the interview to share their perspective.

e. Somalia country report

"Decades of civil unrest and protracted conflict in Somalia have weakened the country's governance and health care infrastructure, and routine vaccination coverage is low (<50%). Several areas of Somalia are controlled by anti-Government elements that ban vaccination services, leaving approximately 500 000 children aged <5 years unvaccinated. Furthermore, over 2 million Somalis are internally displaced or live as refugees in neighboring countries" (Eboh, et al., 2018, p. 787).

Due to the civil unrest and insecurity in Somalia, some stakeholders are based at the UN Horn of Africa Headquarters in neighboring Nairobi, Kenya. Interviews were conducted there with UNICEF and American Refugee Committee polio stakeholders.

Figure 27. United Nations Headquarters in Africa, Kenya, 2015.

While the Somalia dataset was the most limited (only two stakeholders), still Health Systems &

Infrastructure was the category where most priorities were identified. Within that category and for all

codes in the Somali dataset, cross-border collaboration and health monitoring & surveillance were the

only codes that were identified by both stakeholders. With the extreme obstacles occurring in Somalia,

health monitoring and surveillance could be considered the preemptive public health priority needed to

inform all other public health needs. It is notable that Somalia was the only country in the dissertation

dataset where stakeholders did *not* identify routine immunization.  Before stakeholders can identify

which diseases or health education topics are needed an evidence-based assessment of health burdens

must be in place before targeted public health interventions are implemented.

Other codes identified in the Health Systems & Infrastructure category included accessing hard-

to-reach populations, improving or maintaining the cold chain, coordination of multiple partners,

improving communication and microplanning.  In the Health Promotion category, the priorities

identified included decreasing maternal & child mortality, health education, improving sanitation, and nutrition.

Within the Disease category, only measles was identified as a specific priority to which the built polio infrastructure should be applied. And lastly, one stakeholder identified a Societal Factor, namely improving gender equality, as a priority. Table XXXIV shows the breakdown of all Somalia stakeholder responses by stakeholder level and code category. The code cloud shows the relative frequency of priorities in Somalia. (See Figure 28.)

### (1) Health Systems & Infrastructure

As mentioned above, both stakeholders identified cross-border collaboration and health monitoring & surveillance. As the UNICEF stakeholder identified, surveillance is a good place to start in Somalia.

> "**Surveillance is NOT banned – but** (in some places) **vaccine is**" (UNICEF stakeholder, Somalia).

> "Much will depend on the next steps. After polio, they should **focus on the systems and the coordination**. The vaccines are there but they are not (having) **cold chain** to bring where it needs to go. Now we are only looking at the **border areas**… (then) you can expand to all of the regions. **And is there a proper surveillance system in place to even detect**?" (American Refugee Committee stakeholder, Somalia)

> "Recommendations – mobilization is one thing…(the built polio infrastructure) **role is critical along the border**. It will be difficult for them and for us" (UNICEF stakeholder, Somalia).

### (2) Health Promotion

The UNICEF stakeholder first identified the following aspects of Health Promotion, "**Antenatal care. Nutrition. Sanitation,**" and also highlighted the need specifically for health education for families.

> "(Using) the same network built -the biggest part - there is not a lot of information in the family. This is a long-term thing. **Information in the family**" (UNICEF stakeholder, Somalia).

TABLE XXXIV.  SOMALIA STAKEHOLDERS' IDENTIFIED PRIORITIES

| SOMALIA (n=2) | Health Systems & Infrastructure | | | | | | | | Health Promotion | | | | | | Disease | | Societal Factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stakeholder level | Accessing hard-to-reach populations | Cold chain improve or maintain | Coordination of multiple partners | Cross-border collaboration | Improving communication | Microplanning | health monitoring & surveillance | Stakeholders Total | Decrease maternal & child mortality | Health education & promotion | Improving sanitation | Nutrition | Routine immunization | Stakeholders Total | Measles | Stakeholders Total | Improving gender equality | Stakeholders Total |
| Community (n=0) | | | | | | | | | | | | | | | | | | |
| Local Civil Society (n=0) | | | | | | | | | | | | | | | | | | |
| Nat'l Ministry of Health (n=0) | | | | | | | | | | | | | | | | | | |
| Int'l Civil Society (n=1) | 1 | 1 | 1 | 1 | | | 1 | 1 | | | | | | 0 | | 0 | | 0 |
| *American Refugee Committee* | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | | | | | | | | |
| Int'l Multi/Bilatrl orgs (n=1) | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 |
| *UNICEF* | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Totals | | | | 9 | | | | 2 | | 4 | | | 0 | 1 | 1 | 1 | 1 | 1 |

Figure 28. Code cloud of priorities in Somalia

       (3) <u>Disease</u>

There was only one mention of a specific disease in the Somali context.

"Next is **measles**" (UNICEF stakeholder, Somalia).

This, again, does not represent that measles is the only disease that needs attention, but the responses

from both stakeholders focused more on macro-health systems needs rather than specific disease targets.

       (4) <u>Societal Factors</u>

The UNICEF stakeholder identified an opportunity to address gender inequality in Somali

through the built polio infrastructure. Gender inequality in Somalia is one of the highest in the world.

"The Gender Inequality Index for Somalia is 0.776 (with a maximum of 1 denoting complete

inequality), placing Somalia at the fourth highest position globally" (United Nations Development

Programme, 2012, p. xviii). Examining education revealed another facet of inequality. According to

UNICEF, "the percentage of primary school participation for girls between 2007 and 2010 was 23%"

("Somalia: Statistics," 2013).

      "In Somalia, we are **training a few women and they are equal participants**. (Like) in
      Afghanistan, (before) you would never imagine to use the women. (After training, the men say)

'She is *almost* a male' so that gained the trust to enter the house. They (the female community health workers) can talk to women" (UNICEF stakeholder, Somalia).

Providing health education and training as well as formally incorporating female participation in community health programs can begin to recognize more diverse gender value societally.

### (5) Priorities not mentioned

While the qualitative interviews never offered options from which the stakeholders could choose, it is interesting to observe which aspects mentioned in other country contexts were not mentioned in Somalia.

The aspects of Health Systems & Infrastructure identified in other countries not mentioned in Somalia were the ability to respond to future outbreaks, human resources, organizing, advocacy and financial support. In the Health Promotion category, stakeholders identified all codes mentioned in other country contexts except for health behavior change and routine immunization. Within the disease category, none of the Somali stakeholders mentioned diarrheal disease, Ebola, eradication of other diseases (not polio), guinea worm, HIV, malaria, meningitis, neonatal tetanus, parasites, pneumonia, TB, trachoma, typhoid, yellow fever, cholera, or any non-communicable diseases.

Additionally, within the Societal Factor category, none of the stakeholders mentioned equity & equality, poverty, road/water/school infrastructure, security, or primary & secondary education. This does not necessarily imply that these aspects of public health would not be priorities of the stakeholders interviewed. But one can deduce that the aspects they did include were the priorities that at the time of interview and at the forefront of their minds when prompted by the interview to share their perspective.

### f. South Sudan country report

"The Ministry of Health is (in) a new government. They are faced with using procedures. Internal financial management and structural health service strengthening…**It's a 4-year-old country!**" (Gates Foundation stakeholder, South Sudan).

All eleven stakeholders in South Sudan identified aspects of Health Systems & Infrastructure as their priorities (n=11 of 11). Additionally, most stakeholders mentioned not one, but several priorities in this category (average=5 per stakeholder). Each priority was counted once per stakeholder interview if mentioned.  In total, there were 57 codes counted in Health Systems & Infrastructure. Specific codes included accessing hard-to-reach populations, improving or maintaining the cold chain, cross-border collaboration, coordination of multiple partners, human resources, improving communication, microplanning, organizing, advocacy, financial support, and health monitoring & surveillance.

Additionally, all stakeholders mentioned a priority in the Health Promotion code category (n=11 of 11).  The total number of priorities mentioned in this category was twenty-six. Specific priorities included decreasing maternal & child mortality, health behavior change, health education, nutrition and routine immunization.

Seven stakeholders mentioned a specific Disease priority which included diarrheal disease, malaria, measles, neonatal tetanus, pneumonia, and tuberculosis.  Lastly, one stakeholder identified two Societal Factors to which the built polio infrastructure should be applied: improving gender equality and primary & secondary education. The table below shows all of the priorities identified in South Sudan. (See TABLE  XXXV.)  The code cloud shows the relative frequency of priorities in South Sudan. (See Figure 29.)

(1)  <u>Health Systems & Infrastructure</u>

Within this category, the most frequently mentioned priority by stakeholders was health monitoring & surveillance (n=10 of 11).

> "My recommendation is that we need to strengthen AFP surveillance. And not just AFP but other **surveillance** too" (AMREF stakeholder, South Sudan).

> "Some areas in conflict states have no AFP (surveillance) in 1.5 years.  So **we are blind** to what is happening there" (WHO stakeholder, South Sudan).

> "**Community-based surveillance is a very tricky**. There needs to (be) coordination with the current system. It has to be very closely aligned with the WHO system for overall surveillance.

TABLE XXXV. SOUTH SUDAN STAKEHOLDERS' IDENTIFIED PRIORITIES

| SOUTH SUDAN (n=11) | Health Systems & Infrastructure | | | | | | | | | | | | Health Promotion | | | | | | Disease | | | | | | | Societal Factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stakeholder level** | Accessing hard-to-reach | Cold chain | Coord. of multi.partners | Cross-border colabor. | Human resource capacity | Improve comunication | Microplanning | Organizing | Advocacy | Financial | Health monitoring & surveillance | Stakeholders Total | Decrease maternal & child mortality | Health behavior change | Health education | Nutrition | Routine immunization | Stakeholders Total | Diarrheal disease | Malaria | Measles | Neonatal tetanus | Pneumonia | TB | Stakeholders Total | Improv. gender equality | Prim. & sec. education | Stakeholders Total |
| **Community (n=0)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Local Civil Society (n=1)** | | 1 | | | | | | | | | | 1 | | | 1 | | | 1 | | 1 | | | | | 1 | | | 0 |
| *BioAid* | | ✓ | | | | | | | | | | ✓ | | | ✓ | | | ✓ | | ✓ | | | | | ✓ | | | |
| **Nat'l Ministry of Health (n=2)** | 1 | | | | 1 | 2 | | | | 1 | 2 | 2 | | | 2 | | 1 | 2 | | | 1 | 1 | | | 1 | | | 0 |
| MoH EPI & Child Health | | | | | | ✓ | | | | | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | | | |
| MoH Primary Healthcare | ✓ | | | | ✓ | ✓ | | | | ✓ | ✓ | ✓ | | | ✓ | | | ✓ | | | | | | | | | | |
| **Int'l Civil Society (n=5)** | 3 | 2 | 4 | 2 | 4 | 4 | 1 | 1 | 1 | 1 | 5 | 5 | 4 | 4 | 2 | 2 | 4 | 5 | 3 | 2 | 1 | | 1 | 3 | 4 | 1 | 1 | 1 |
| *World Vision* | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | | | ✓ | ✓ | | | |
| *CORE Group* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | | |
| *BM Gates Foundation* | | | ✓ | | | ✓ | | | | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | | | |
| *AMREF* | ✓ | | | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | ✓ |
| *Amer. Refugee Committee* | | | ✓ | | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | | | | | | | | | |
| **Int'l Multi/Bilatl orgs (n=3)** | 3 | 1 | 3 | 1 | 2 | 2 | 1 | | 1 | 2 | 3 | 3 | | 1 | 3 | | 2 | 3 | | | 1 | | | | 1 | | | 0 |
| *UNICEF* | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | | | | | | | | | |
| *WHO Debrief meeting for MoH* | ✓ | ✓ | ✓ | | ✓ | | | | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | | ✓ | | | | ✓ | | | |
| *WHO* | ✓ | | ✓ | | | ✓ | | | | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | | | | | | | | | | |
| **Totals** | 57 | | | | | | | | | | | **11** | 26 | | | | 7 | **11** | 14 | | | | | | **7** | 2 | | **1** |

Figure 29. Code cloud of priorities in South Sudan

> The traditional healers, local community members – How are they linking with the system?...Seventy-five percent of the AFP cases in 1991 passed through the traditional healers FIRST. We need to incorporate them in this. **That is critical – that we do not have the linkage broken**" (UNICEF stakeholder, South Sudan).

The need for improved communication was identified by eight of the eleven stakeholders.

> "Data in Horn of Africa is huge challenge in the region. We have come very far but there still remain challenges. **The issue is *sharing* the information**. Who do you send the data to?" (UNICEF stakeholder, South Sudan).

Additionally, human resources were identified as a priority at every stakeholder socio-ecological level in the dataset, except the local civil society level (n=7 of 11). Human resources capacity was limited after the prolonged civil conflict and access to education.

> "I have one data officer. This poor fellow. **The human resource - we have a big problem**. We have 40 qualified midwives (in the whole country). The EPI officers may not be literate. Because the country is so vast – 645k square kilometers. Just under 9 million (people), almost 70% under 30 years old" (MoH Primary healthcare stakeholder, South Sudan).

"We are cornered here in South Sudan in **human resources**. Recruiting, administration and financial issues that make them slow down. We had a focal person leave and it took 1.5 years to fill the position. We are trying as much as we can to deal and manage. Whatever human resources we have, we are managing as best we can on the ground… Support us by telling the partners of our human resources. We need them YESTERDAY" (WHO stakeholder, South Sudan).

Cross-border collaboration was also identified by seven of the eleven stakeholders (n=7 of 11).

"We have jointly developed guidelines for cross border activities. This is something moving in the right direction. They are involved with the microplanning. They try to address how the health facilities coordinate along the border…Also the border with Uganda. **You need to have (the polio infrastructure) with Uganda. That is a very critical border**. It would be nice to be on the Uganda side as well" (UNICEF stakeholder, South Sudan).

One international civil society stakeholder and one international multilateral organization identified the

need for advocacy.

"The main role is **advocacy** at the national level and then state level and the county. Most (needed) is speaking out and sharing the lessons learned. **To speak for those who cannot be heard…Speak on behalf of the voiceless**" (World Vision stakeholder, South Sudan).

(2)  Health Promotion

While decreasing maternal & child mortality, health behavior change, nutrition and routine

immunization were identified, the most frequently mentioned priority by stakeholders in this category

was specifically the need for health education (n=8 of 11).

"It's the need of the people. **It's not just about giving two drops of polio vaccine in the mouths of all the children. It's about a mother** *realizing the importance* **of the two drops** and not just the two drops" (UNICEF stakeholder, South Sudan).

"The community did not understand the importance of vaccine. (We need) house-to-house social mobilization, **educating the mothers**" (World Vision stakeholder, South Sudan).

Different from most other country contexts, routine immunization was not the most frequently

mentioned priority within the Health Promotion category; however, it was identified by the majority of

stakeholders (n=7 of 11).

"**Routine immunization is the area that MOST needs this model**" (Gates Foundation stakeholder, South Sudan).

"It's not only polio. It is **all routine immunization**" (American Refugee Committee stakeholder, South Sudan).

(3) <u>Disease</u>

At least one stakeholder from all of the socio-ecological levels included in the dataset identified at least one specific Disease as a priority (n=7 of 11). As reported above, the following communicable diseases were mentioned as priorities: diarrheal disease, malaria, measles, pneumonia and tuberculosis.

"In South Sudan, the issues of children and women. Three major issues**: malaria, diarrheal disease, pneumonia**. These are the priorities for the kids" (AMREF stakeholder, South Sudan).

"(After polio) then expand --- then **tuberculosis**.  Because it's community-based care" (Gates Foundation stakeholder, South Sudan).

(4) <u>Societal Factors</u>

One international civil society stakeholder in South Sudan identified two Societal Factors: improving gender equality and primary & secondary education.  While they are not considered specific health outcomes, it is clear that addressing these factors would create the opportunity to effect direct health burdens.

"Many facilities do not even have a midwife. So, we need to look at the area of training – human resource development. Some of the current training we have does not meet the standard. Due to the war, **they did not have access to school**. Some of the cultures, **females are not allowed to go to school**. And (concurrently) the males are not allowed to touch a female that is giving birth" (AMREF stakeholder, South Sudan).

(5) <u>Priorities not mentioned</u>

While the qualitative interviews never offered options from which the stakeholders could choose, it is interesting to observe which aspects mentioned in other country contexts were <u>not</u> mentioned in Somalia.

The only aspect of Health Systems & Infrastructure identified in other countries not mentioned in Somalia was the ability to respond to future outbreaks. In the Health Promotion category, stakeholders

identified all codes mentioned in other country contexts except for improving sanitation. Within the Disease category, none of the South Sudanese stakeholders mentioned Ebola, eradication, guinea worm, HIV, meningitis, parasites, trachoma, typhoid, yellow fever, cholera or any non-communicable diseases. Additionally, within the Societal Factor category, none of the stakeholders mentioned equity & equality, poverty, road/water/school infrastructure, or security.

This does not necessarily imply that these aspects of public health would not be priorities of the stakeholders interviewed. But one can deduce that the aspects they did include were the priorities that at the time of interview and at the forefront of their minds when prompted by the interview to share their perspective.

g. Summary of individual country reports

Examining the stakeholders' responses within the country context reveals that there existed clear shared priorities already with the majority of the polio stakeholders from which legacy planning can hinge. However, the analysis through this lens may be most useful to consider when implementing global health initiatives. Recognizing the priorities within each national context and adapting a global health initiative to be sensitive to a national needs assessment can contribute to stronger partnerships and more successful implementation.

In all of the countries, there was a clear call for bolstering Health Systems & Infrastructure by applying the built polio infrastructure. It was the category where country stakeholders most identified priorities, except for Nigeria where aspects of Health Promotion were most frequent. The most frequent specific aspect of Health Systems & Infrastructure identified was the need for health monitoring & surveillance in Angola, Ethiopia, Kenya, Somalia, and South Sudan. In Nigeria, human resources was most frequently identified in this category, followed closely by health monitoring & surveillance and improving communication.

In Angola, Ethiopia, Kenya, and Nigeria, routine immunization was the specific code identified most across all stakeholders. In Somalia, within the Health Promotion category, and in South Sudan, the specific need for health education was identified most frequently; however, routine immunization was identified with the second highest frequency. As mentioned, Somali stakeholders did not identify routine immunization. (See TABLE XXXVI.)

Regarding Disease, the most agreement fell around communicable diseases, specifically malaria and measles. Angola and Nigeria identified malaria more frequently than any other disease. Somalia identified only measles as a specific Disease priority. Ethiopia identified measles and neonatal tetanus equally, and more frequently than any other disease. Measles was mentioned in Kenya; however, guinea

TABLE XXXVI. SUMMARY OF INDIVIDUAL COUNTRY MOST FREQUENTLY IDENTIFIED PRIORITIES

| Socio-Ecological Level | Most Frequent Code Category | Most Frequent Specific Code |
|---|---|---|
| ANGOLA | Health Systems & Infrastructure (7 of 9) | Routine Immunization (6 of 9) |
| ETHIOPIA | Health Systems & Infrastructure (10 of 10) | Routine immunization (8 of 10) |
| KENYA | Health Systems & Infrastructure (11 of 11) | Routine immunization (8 of 11) |
| NIGERIA | Health Promotion (16 of 17) | Routine Immunization (15 of 17) |
| SOMALIA | Health Systems & Infrastructure (2 of 2) | Health monitoring & surveillance (2 of 2) |
| | | Cross-border collaboration (2 of 2) |
| SOUTH SUDAN | Health Systems & Infrastructure (11 of 11) | Health monitoring & surveillance(10 of 11) |
| | Health Promotion (11 of 11) | Health education (8 of 11) |

worm and cholera had more agreement and malaria was not mentioned. And South Sudan identified malaria, measles, diarrheal disease and TB equally and with more frequency than any other diseases. Non-communicable diseases were only identified in Nigeria and Kenya. It is notable that Societal Factors were mentioned in ALL country contexts, except in Angola.

While shared priorities existed, the diverse kaleidoscope of priorities within each country should be considered for a tailored health initiatives. Through the lens of analyzing the individual country data, there emerged clear call to bolster Health Systems & Infrastructure through improving health monitoring & surveillance and human resources and addressing Health Promotion through task-shifting to routine immunization. Employing implementation science strategies may facilitate aligned priorities and future health intervention successes.

B. Adaptability

Specific Aim 2: Determine opportunities for adaptability of the built polio infrastructure after polio eradication is complete to address stakeholders' self-identified future health priorities. I analyzed qualitative data from stakeholders to find shared examples where the polio infrastructure is already being adapted to other health needs, and for shared suggestions of how it could be adapted in future opportunities. I hypothesized that existing priorities have clear opportunities for combined health interventions.

The need for adaptability is clear now and for future health initiative planning.

"It's ok to say here (at the polio office) that polio is the priority, but not out there where people are dying. **You cannot say that I am *only* a polio worker**. This needs to be resolved" (UNICEF stakeholder, South Sudan).

"What future opportunities may be available due to the polio eradication effort? How has this coordinated effort built infrastructure that could be applied to future public health needs? Malnutrition is rife because of insurgency. Banks have closed. No pharmacy. **We need to listen to their needs. Polio is not food**" (National EOC stakeholder, Nigeria).

"We are 100% polio funded – how can we spend the time working on other issues? If we all agree that we can take it beyond polio, we can do it. **Partners beyond polio**" (CORE Group stakeholder, Kenya).

The following section will highlight examples where stakeholders are already adapting health initiatives to address other priorities.

1. Examples of adaptation

Without a specific question asking about adaptation of the built polio infrastructure, stakeholders revealed, unprompted, that this was already occurring and offered suggestions for future adaptation. EVERY country, except Somalia offered an example of how the built polio infrastructure had adapted to other health priorities. There was a total of twenty-four examples shared. Additionally, the examples were shared at least once by EVERY stakeholder level. When analyzed for code co-occurrence, the majority of the examples were associated with the Health Promotion category. The most frequent examples involved how the polio infrastructure was adapted to also address routine immunization.

The second most common category of examples shared involved Health Systems & Infrastructure, specifically about how the polio infrastructure was adapted to improve health monitoring & surveillance. The Disease examples mostly included how malaria was also being addressed with the polio infrastructure. There were no examples of adaptation shared that addressed Societal Factors.

a. Routine immunization

"When we have a (polio) campaign, it's not just a campaign. We incorporate **routine immunization** as well" (WHO stakeholder, Ethiopia).

"Some settlements are more far apart…We talk about polio vaccine: the disease, the transmission, AFP surveillance, signs and symptoms. And measles surveillance, generally about **routine immunization**, and about the major vaccine-preventable diseases" (World Vision stakeholder, South Sudan).

b. Health monitoring & surveillance

"(The) community system has improved. The network and capacity has been improved. Community surveillance - you have to go house to house, so **they pick up other disease issues**" (AMREF stakeholder, Ethiopia).

"(Polio) workers help **track the defaulters** on TB treatment" (Sub-county MoH stakeholder, Kenya).

c. Malaria

"Now we are having less cases of malaria. Why? When workers were talking about polio, they took to the time to talk about malaria at the same time.  Health education. **Polio helped malaria and malaria helped polio**" (Tchikos stakeholder, Angola).

d. Ebola

"The emergency structure designed for polio was deployed to respond to Ebola. (We said) If it gets here it will be explosive! The way we work with partners and how we share info and make decisions, with speed! The polio surveillance team was responsible for the Ebola response teams to track contacts. **The structures, down to the grass roots level developed from polio, were utilized for Ebola response**" (National EOC stakeholder, Nigeria).

e. Improving sanitation, malaria, routine immunization, decreasing maternal & child mortality

"Sanitation. Handwashing. (In) the case of malaria, I expect (it) should come down because we distributed nets and the Volunteer Community Mobilizers helped to teach how to decrease mosquitoes. Access to routine immunization. They track pregnant women. Follow up for antenatal, vaccinate (for) polio, and refer to the health clinics. **I was surprised – how much they do in the field**" (EOC Kaduna States stakeholder, Nigeria).

f. Nutrition

"Yobe State presented a report, **wherever they provided acute malnutrition, we also provided vaccine at the same time**. And now they are all in line with this" (MoH Primary Healthcare stakeholder, Nigeria).

g. Malaria, health education, nutrition

"(The polio infrastructure) is more than 'two drops' (of vaccine). We provide more services: nets for **malaria**, drugs, social mobilization. Food security program now (has the) same benefitting beneficiaries. Food vouchers to vulnerable households" (Catholic Relief Services stakeholder, Nigeria).

h. Malaria, decreasing maternal & child health, improving sanitation, nutrition, routine immunization, health behavior change

"What does (the polio infrastructure) do here? **Helps malaria prevention, breastfeeding, handwashing, malnutrition, promotes antenatal care, tracking of newborns, routine**

**immunization, promotes you go to clinic for giving birth**" (Community health worker, Nigeria).

> i. <u>Routine immunization, improving sanitation, decreasing maternal & child mortality, malaria, nutrition</u>

"We give a flipchart to the (polio) Community Volunteer Mobilizers addressing key household practices. (The) mother (is) looking at the picture while Community Volunteer Mobilizer reads the text:
1. Polio
2. Routine immunization
3. Water and sanitation
4. Importance of breastfeeding
5. Importance of antenatal care
6. Malaria
7. Malnutrition" (Save the Children stakeholder, Nigeria).

> j. <u>Nutrition, routine immunizations, decreasing maternal & child mortality</u>

"(In) the pastoralist community in the eastern part, on the cross border, (they have) 'integrated health care'…They incorporate other healthcare nutrition, screening, consultations, immunization, primary healthcare into that package. In general women want to deliver babies in the community – so we have outreach to catch those children.  We integrate antenatal care…Maternal Child healthcare has benefitted a lot through the integrate. (It) seems to be best tailored for the pastoralist" (CORE Group stakeholder, South Sudan).

In another example adaptation of the polio infrastructure, community health workers combined polio vaccination efforts with health messaging about guinea worm, one of the identified disease priorities by Kenyan stakeholders. During a supplemental immunization campaign for polio in Kenya, community health workers wore lanyards with health messages about guinea worm, a disease priority identified by stakeholders in Kenya. (See Figure 30.)

Like the guinea worm example, many of the examples encompass other public health priorities of stakeholders by using the same human resources and network of partners allocated to the polio infrastructure with very little additional time or financial burden.

2. <u>Opportunities for adaptation</u>

Repeatedly and independently, the interviewed stakeholders identified opportunities where the

Figure 30. Guinea worm health messages worn during a Supplemental Polio Immunization Day, Kenya 2015

built the polio infrastructure could be adapted. There were several identified opportunities for

adaptation suggested by stakeholders (n=33), and they occurred in ALL countries except for Angola.

Additionally, an opportunity for adaptation of the built polio infrastructure was suggested at least once at

every stakeholder level. When analyzed for code co-occurrence, the majority of the suggested

opportunities were associated with the Health Systems & Infrastructure category. The most frequent

examples related specifically to the opportunity to coordinate with multiple partners. Second to Health

Systems & Infrastructure, stakeholders offered future opportunities related to Health Promotion.

Specifically, they suggested opportunities in bolstering routine immunization. The opportunities related

to disease focused on malaria. Regarding Societal Factors, two opportunities were suggested to

improving primary & secondary education and one to address poverty. Many of the suggested

opportunities incorporated addressing several health priorities at the same time.

a. Coordination of multiple partners

"In any intervention, you have to look at the health plan. Federal policy. State – adapt it to the state. Local government. One influences the other, then put it in place. The model of the (polio infrastructure) is aligned with the structure of the government of Nigeria. They engage on all three of those levels. That strata is the model that everyone should be invite(d)" (USAID stakeholder, Nigeria).

b. Routine immunization

"Looking at the (polio infrastructure), the opportunities that I feel. As the insurgency is decreasing, there is a need to expand (the polio infrastructure).  To link mothers with the health facilities, that will **open an opportunity for routine immunization**" (EOC Borno State stakeholder, Nigeria).

c. Routine immunization, malaria

"(The polio infrastructure) already is on the ground.  Now they are engaged in **routine immunization, malaria**. **I see an opportunity for using this network**" (EOC Kaduna State stakeholder, Nigeria).

d. Malaria, tuberculosis

"We have to capitalize on the given ability of the people…We (pastoralists) are an oral-system community.  Because we are used to memorizing information, if you tell them about health education, they will send the message. **So, the method of polio can be used for malaria, can be used for TB. This is the opportunity**.  The barefoot doctors – they have the health message, they know the languages, they go to the watering hole, and go to where the people. And on a microphone on a motorbike" (local civil society stakeholder, Pastoralist Concern, Ethiopia).

e. Primary & secondary education

"Community surveillance. You have to go house-to-house, so they pick up other disease issues. **Integrated surveillance. Take children and track drop-outs from school**. Check child related issues" (AMREF stakeholder, Ethiopia).

f. Human resources

"(Use the) same volunteers used as TB health workers, **cross-programming human resource utilization**" (CARE International stakeholder, Ethiopia).

g. Parasites

 "**De-worming is a problem. You can do both after you vaccinate the kids**.  You have more time.  (You) can do other things" (Pastoralist Concern stakeholder, Ethiopia).

2. <u>Summary of Adaptability</u>

Polio stakeholders were clearly primed for adapting the polio infrastructure to other priorities. Examples of how that is already being done were given in every country, except Somalia. Suggested opportunities were given in every country, except Angola. Examples *and* opportunities were suggested at least once at every stakeholder level.

It was not surprising that examples and opportunities were associated with the country and stakeholder identified priorities: Health Systems & Infrastructure and routine immunization. Many examples and opportunities involved addressing multiple priorities at the same time with the same human resources. Both examples and opportunities related to disease mostly included how malaria was or should be addressed with the polio infrastructure. While there were no examples of adaptation shared that are addressing Societal Factors, three opportunities were suggested.

The adaptability analysis closely reflected and further informed the findings of the shared priorities. Polio stakeholders were aware of and primed for adapting the polio infrastructure to other health priorities. They were ready for the polio legacy transition.

C. <u>Strengths and limitations</u>

One limitation inherent in identifying stakeholders' priorities is that they are dynamic and can change with evolving health needs of any population. While the priorities identified in this study are all health outcomes that are consistently present and not expected to disappear from a list of health care needs, the study was conducted in 2015 and ranking of health needs may have shifted due to new disease outbreaks, civil unrest and urgent needs, private and public funding changes, and economic conditions. A strength of this study is that it aims to create a format and structure to continually engage, reflect, and evaluate in collaboration with stakeholders to evolve with changing health priorities.

The dataset reflected a purposive sample of stakeholders engaged in polio eradication efforts in six high-risk countries but is not an exhaustive sample including all stakeholders, nor does it include all countries that are at high-risk for polio outbreaks. Additionally, the data did not have equal numbers of interviews for each country context nor equal numbers of stakeholders at each socio-ecological level within and between countries.

## V.  CONCLUSIONS

There is still much to do. Justified fear remains in many regions of the world of the real threat of continued polio outbreaks.

> "The Horn of Africa is very concerned. We have surpassed Somalia in unvaccinated children. **Any virus that comes here is like fire**. 3.2 million "under-fives" (children) with four hundred thousand totally unvaccinated" (CORE Group stakeholder, South Sudan).

The final chapter of polio is not complete.  But the task of adapting the polio infrastructure is upon us now.

> "**Sustaining the gains that have been made are critical**" (WHO stakeholder, Ethiopia).
>
> "I would like to emphasize the focus on routine immunization instead of polio by itself.  What are (we) going to do towards (the) end of eradication? **Planning so (we) do not lose momentum**. (We) need a multisector approach" (Ministry of Health stakeholder, Kenya).
>
> "**The key for us is maintaining the momentum**. We need to sustain this because some of these gains are very fragile" (CDC stakeholder, Nigeria).

Polio eradication has been a shared global priority.

> "We support 'one plan, one budget, **one enemy**'" (CORE Group stakeholder, Kenya).

The challenge before us lies in defining the next "enemy" to share.  The dedication of the stakeholder organizations and individuals towards the health of their constituents and neighbors is humbling.

> "It is not miracle or magic. It is clear determination to get this (polio eradication) done. **People risk their life to get this done**" (USAID stakeholder, Nigeria).

Charging the same organizations and individuals on the next shared public health burdens is vital.

Actively listening to stakeholders revealed a more complex definition of the future enemy.  And, it was not one specific disease.

A.  Priorities

Recognizing the complex network of stakeholders involved in polio eradication through a socio-ecological lens was critical.  Listening to their priorities is fundamental when preparing to transition the polio legacy. Based on the conceptual framework of Implementation Science, the most successful implementation is attained through finding shared priorities and adaptability. Achieved through the specific aims of the dissertation, public health priorities and adaptations were analyzed for overall trends, stratified by socio-ecological levels and then by country-specific context to find shared priorities and nuances through those lenses.

1.  Overall trending priorities

When analyzed for overall trends, clear shared priorities emerged. Instead of calling for the next global eradication of one disease, the perspectives from stakeholders shared the priority to bolster the health systems overall to address a matrix of health burdens. It was surprising to find that most stakeholders did not identify eradication of the next disease as the next health priority.  The question asked what the built polio infrastructure, a network aimed at ridding the world of one virus, would be best used for.  One could assume that the built infrastructure would be best fit for accomplishing another eradication.  But the qualitative data revealed that the elimination of one disease was not what stakeholders thought best for the next global effort. Stakeholders, rather, recognized that the benefits of improving health systems and infrastructure would better enable the stakeholders to improve health overall or at least to address more than one burden.  Challenging the historic tactic of targeting one disease for eradication, stakeholders called for broader health systems bolstering.

Clearly apparent, "Health Systems & Infrastructure" and "routine immunization" were the most frequently occurring priorities that stakeholders identified as the desired focus that should be addressed with the built polio infrastructure. Of the 60 qualitative interviews, aspects within the Health Systems & Infrastructure code category were identified in 93% (n=56 of 60) interviews as a priority to which the

polio infrastructure should be applied. Within Health Systems & Infrastructure, health monitoring & surveillance was the most frequently identified aspect (60% n=36 0f 60). Second to Health Systems & Infrastructure, within the code category Health Promotion, the specific aspect of routine immunization was identified in 73% (n=44 of 60) of the interviews.

Health Systems & Infrastructure category was mentioned as a priority in ALL country contexts and ALL socio-ecological levels, except at the community level in Nigeria. Health Promotion was identified in ALL countries and ALL socio-ecological levels except in Somalia at the international civil society level and in South Sudan at the Ministry of Health level. Disease was mentioned in ALL country contexts and ALL socio-ecological levels, except at the International Civil Society level in Kenya and Somalia, or the Community level in Kenya.

As the priority category identified the least, the Societal Factors category would not suggest an obvious high priority upon which health initiative might hinge. However, Societal Factors were mentioned at least once in ALL country contexts, except Angola, and at least once at ALL socio-ecological levels. Given that improving gender equality, specifically, was mentioned once in four of the six countries in the dataset perhaps there is an opportunity to incorporate aspects of improving gender equality whilst addressing a larger shared health priority.

This overall trend analysis suggested a clear opportunity for adapting the polio infrastructure to bolster the health systems as a whole, and task-shift polio programs to address routine immunization, health education and improving sanitation to encompass frequent priorities.

2.  Socio-ecological level priorities

Health Systems & Infrastructure also prevailed when analyzed by socio-ecological level. When analyzed for shared priorities amongst individual socio-ecological levels, again, the most agreement was

found on identifying health monitoring & surveillance as a priority within Health Systems & Infrastructure.

Again, all stakeholder levels identified routine immunization as the most frequently identified specific priority, except the Local Civil Society level which had the most agreement on improving health education. Local civil societies across all country-contexts had the most agreement around health education, while the Ministries of Health, International civil society, and International multi- or bilateral organizations had the most agreement of priority on routine immunization. Interestingly, all community level stakeholders interviewed all mentioned routine immunization, improving sanitation, and health education.

Between socio-ecological levels, there was an interesting finding regarding Disease priority. At the Community level, the Local Civil Society level, and International Civil Society level, malaria had the most agreement around a specific disease, but at the Ministry of Health level and the International Multi- or Bilateral Organization level, measles had the most agreement on a disease priority across countries.

The societal category would not suggest an obvious high priority upon which health initiative might hinge. However, given that Societal Factors were mentioned at least once at every socio-ecological level and at least once in EVERY country in the dataset, perhaps again there is an opportunity to incorporate aspects of improving Societal Factors whilst addressing a larger shared health priority.

The socio-ecological level analysis suggested a clear opportunity for adapting the polio infrastructure to bolster the health systems as a whole, and for adapting a health initiative that combines specifically health monitoring & surveillance, routine immunization including measles vaccination, and a focus on decreasing malaria to encompass priorities found at stakeholder levels.

3.  Country-specific priorities

When each country was analyzed independently, Health Systems & Infrastructure again prevailed. In all of the countries in the individual national analysis, again, there was a clear call for bolstering Health Systems & Infrastructure by applying the built polio infrastructure. This was the category where country stakeholders most identified priorities, except for Nigeria where aspects of Health Promotion were most frequent.  The most frequent specific aspect of Health Systems & Infrastructure identified was, again, the need for health monitoring & surveillance in Angola, Ethiopia, Kenya, Somalia, and South Sudan.  In Nigeria, human resources was most frequently identified in this category, followed closely by health monitoring & surveillance and improving communication.

In Angola, Ethiopia, Kenya, and Nigeria, routine immunization was the specific code identified most across all stakeholders. In Somalia, within the Health Promotion category, and in South Sudan, the specific need for health education was identified most frequently; however, routine immunization was identified with the second highest frequency. As mentioned, Somali stakeholders did not identify routine immunization.

Regarding Disease, the most agreement fell around communicable diseases, specifically malaria and measles. Angola and Nigeria identified malaria more frequently than any other disease. Somalia identified only measles as a specific Disease priority. Ethiopia identified measles and neonatal tetanus equally, and more frequently, than any other disease. Measles was mentioned in Kenya; however, guinea worm and cholera had more agreement, and malaria was not mentioned. And South Sudan identified malaria, measles, diarrheal disease and TB equally and with more frequency than any other diseases. Non-communicable diseases were only identified in Nigeria and Kenya.

It is notable that Societal Factors were mentioned in ALL country contexts, except in Angola.

While shared priorities existed, the diverse kaleidoscope of priorities within each country should be considered for a tailored health initiative. Through the lens of analyzing the individual country data, there emerged a clear call to bolster Health Systems & Infrastructure through improving health monitoring & surveillance and human resources and addressing Health Promotion through task-shifting to routine immunization. In Somalia, bolstering the overall systems was a priority which may then *lead* to a clear priority in improving routine immunization. In all other countries, there was a strong priority to address routine immunization now. To reflect the national priorities, tailoring the priority of improved health monitoring & surveillance should take into account the most frequently identified specific diseases within each country setting.

B. <u>Adaptability</u>

The adaptability analysis closely reflected and further informed the findings of the shared priorities. It was not surprising that examples and opportunities were associated with the country and stakeholder identified priorities: Health Systems & Infrastructure and routine immunization. Many examples and opportunities involved addressing multiple priorities at the same time utilizing the same human resources.

Polio stakeholders were aware of and primed for adapting the polio infrastructure to other health priorities. Unprompted, examples of how that is already being done were given in every country, except Somalia. Suggested opportunities were given in every country, except Angola. Examples *and* opportunities were suggested at least once at every stakeholder level.

Stakeholders saw the value in adaptation of health initiatives to address a broader landscape of health needs. Not only were they aware of current examples where the polio infrastructure had been used to address other needs, but they recognized and even suggested a less siloed approach to public health, harkening to overall health systems bolstering.

Both examples and opportunities related to disease mostly included how malaria was or should be addressed with the polio infrastructure. While there were no examples of adaptation shared that are addressing Societal Factors, three opportunities were suggested.

The analysis of the examples and suggestions for adaptation revealed a clear opportunity for adapting a health initiative that combines specifically health monitoring & surveillance, routine immunization including measles vaccination, and a focus on decreasing malaria to encompass priorities found at all stakeholder levels. Polio stakeholders' attitude towards adaptability harkens to a readiness for the polio legacy transition.

C. <u>Recommendations for application of the built polio infrastructure</u>

"De-worming is a problem. You can do both after you vaccinate the kids.  You have more time. **(You) can do other things**" (Pastoralist Concern stakeholder, Ethiopia).

The call to "do other things", informed by multi-level partner priorities, is upon us.

Recommendations were aligned to the prodigiously shared priority of stakeholders interviewed (93%) to improve Health Systems & Infrastructure. Not a specific disease, not an eradication goal, but the bolstering of the systems overall to support the capacity to improve health overall.  Specifically, address improving the capacity of health monitoring and surveillance, identified as a priority by 60% of stakeholders.  Building on the polio infrastructure in place, use the same network of partners to task-shift from surveilling for polio, to monitoring and surveilling for other health outcomes.

1. <u>Community Health Workers & Volunteer Community Mobilizers</u>

Moving forward we must incorporate the same community health workers working on polio eradication to continue their community engagement to address health outcomes in their communities. This would require supporting them with training to identify signs and symptoms of diseases identified

as priorities by stakeholders in their country-specific setting.  This training would address another specific priority, human resources, identified by over half of all stakeholders in this research (51%).

More specifically, while focusing on improving overall Health Systems & Infrastructure, task-shift the built polio infrastructure to address routine immunization, a priority of 73% of stakeholders. Charge the same polio organizations and individuals to address all vaccine-preventable diseases, pivoting away from a one disease focus.  Use the same partnerships and human resources to track and monitor routine immunization coverage rates, access hard-to-reach populations (a priority of 32% of stakeholders), collaborate across international borders (a priority of 27% of stakeholders), maintain the needed cold chain for vaccines (a priority of 20% of stakeholders), and advocate globally and locally for support (a priority of 13% of stakeholders).

Task-shifting to routine immunization will require more training on the community health worker level to administer injectable vs. oral vaccine. However, this would support increasing the human resources capacity (a priority of 51% of stakeholders), simultaneously addressing bolstering Health Systems & Infrastructure, a priority identified by 93% of polio stakeholders interviewed.  This shift will benefit from utilizing the same trust built at all stakeholder levels.  Additionally, in many of these high-risk countries, the community health workers are primarily women. Culturally, they are the only ones allowed to enter the home of other women.  Supporting increasing health education and social capital in the community can address another priority of improving gender equality (a priority of 7% of stakeholders).

2. Local Civil Society Organizations

Invite and encourage the local civil societies to shift from polio to routine immunization support. They are connected to the local community fabric and utilize their voice used for polio social mobilization (included in health education as a priority identified by 55% of stakeholders) to mobilize the community for routine immunization.

3.  <u>National Ministries of Health</u>

Every national Ministry of Health has a routine immunization program or plan with varying levels of national routine immunization coverage rates. All countries fall short of 100% routine immunization coverage; thus, all would benefit from an increased number of stakeholders charged with improving coverage. Ultimately, the global goal is for all national Ministries of Health to be the keystone level at which all routine immunization is organized, data aggregated, programming is accomplished, and implementation is executed. Supporting partners at all levels can strengthen the ability of each national Ministry of Health by addressing routine immunization and working to achieve this in lock-step with the Ministries.  I recommend that Ministry of Health allocated National Supplemental polio Immunization Days, used to catch unvaccinated or under-vaccinated children under five years old, should shift to address other vaccine-preventable disease immunizations given under routine immunization where needed.  The same health monitoring & surveillance networks and supplemental immunization for polio can be applied to measles, for one example.

4.  <u>International Civil Society Organizations</u>

The international civil societies involved in polio eradication already have vast networks of donors globally that have been motivated to decrease health burdens in low-resource settings.  I suggest that task-shifting from one specific disease, polio, to address several vaccine-preventable diseases would be a reasonable modification to their goal.  They could advocate (a priority of 13% of stakeholders) that the global benefits seen in the polio eradication programs could be exponentially achieved when addressing several diseases at the same time.

5.  <u>International Multi- or Bilateral Organizations</u>

I recommend that the international multi- or bilateral organizations, WHO, UNICEF, and the CDC, could benefit from a streamlining of programming.  Instead of approaching polio and routine immunization as two outcomes, reorganization may result in better efficiency and flexibility overall.

Without decreasing personnel, but rather merging functions even further than what is currently done, can support more coordinated momentum forward addressing all vaccine-preventable diseases (a priority of 73% of stakeholders).

6. <u>The Secretariat Structure</u>

I urge that continuing the communication infrastructure between stakeholder levels engaged in polio eradication is critical. This complex web of organizational, professional, and personal relationships has developed over nearly seventy years and its pricelessness cannot be overestimated.

**"If you are doing it alone, you cannot reach as far"** (UNICEF stakeholder, Kenya).

The secretariat structure, whereby stakeholders come together to address health priorities, align goals, plan, and share tasks, challenges and successes, has been integral for twenty years and should be continued. The secretariat model harnesses the strengths of the partners to maximize the impact on underserved, high-risk populations and provides a neutral, transparent space for efficient collaboration without competition. The secretariat structure for these polio stakeholders, the CORE Group Polio Project, can task-shift to coordinate Health Systems & Infrastructure bolstering, specifically through supporting routine immunization. Their time-tested model for effective coordination and collaboration has shown great success in reaching hard-to-reach populations, a priority identified by 32% of stakeholders overall. They strive to improve communication, a priority of 40% of stakeholders. They aim to coordinate multiple partners, a priority of 30% of stakeholders. And, they coordinate cross-border collaboration, a priority of 27% of stakeholders. It would be irrational not to continue and to build upon this public health relationship structure asset.

Everyone in the polio infrastructure is already knowledgeable of the benefits of vaccination against polio. They would need minimal health education, if any, to become advocates for all vaccine-preventable diseases. These partners should be trained to educate about and promote routine immunization in their communities. This would embrace the shared priority of 30% of stakeholders,

mentioned in nearly all countries, to decrease maternal & child mortality. During engagement with the communities, build on the examples given in several countries where several health outcomes are addressed in health education campaigns. Include health education, a priority of 55% of stakeholders, specifically addressing nutrition (a priority of 25% of stakeholders), on improving sanitation practices (a priority of 20% of stakeholders), and accessing the health system (included under health behavior change, a priority of 20% of stakeholders). While this may be incorporated already in individual country or community locations, systematically include standardized health education into routine immunization in planning at all stakeholder levels and all country contexts.

Ongoing training for human resources was already built into the polio infrastructure; thus, continuing this should not significant time or cost burden. Additionally, communities have been primed by the polio infrastructure to trust polio partners and take their recommendations. This, again, supports the environment for effectiveness and efficiency in future initiatives.

To be sensitive to the needs specific to each country, specific diseases should be included in routine immunization programs. This could support nationally specific health priorities in lockstep with larger global goals. A priority in every country and identified by 25% of stakeholders, measles, would be addressed by implementing improved routine immunization. If measles eradication is the next step, implementing that in different country contexts may involve a health promotion component supporting water and sanitation practices in one context, while it may have a neonatal health checkup in others.

Malaria, a priority for every country except Kenya and Somalia and identified by 32% of stakeholders overall, should be in overall health education modules for communities. Use the same community health workers to decrease the incidence of measles through routine immunization, and of malaria through prevention education and treatment. Community health workers could include health messages supporting the use of mosquito nets, decreasing mosquito breeding opportunities, and

including information on signs and symptoms as well as treatment.

Measles and malaria, although incidence rates vary between countries, were the diseases where the most agreement fell across country and stakeholder contexts. A closer look at the country specific data should be embraced when choosing upon which diseases to focus. Based on this dataset, Angola and Nigeria prioritize a focus on malaria. Ethiopia has priorities on measles and neonatal tetanus. Somalia should focus on measles. Kenya prioritized guinea worm and cholera. South Sudan prioritized malaria, measles, diarrheal disease, and tuberculosis. This along with including health information on guinea worm, diarrheal disease, or tuberculosis would also not significantly additionally burden the partners to include in their already built infrastructure ready to address routine immunization. As stakeholders proclaimed, they have the capacity and willingness to "do other things." For example, a vaccine-focused intervention to vaccinate a remote village twice a year could, with little additional effort, also provide health education on other diseases, or on improving sanitation and hygiene during the same visit.

The same procedures of reporting polio routine immunization to the local, national, and international levels can include malaria monitoring. The same human resources could aggregate and share data to all stakeholders. The same international programming to address and respond to fluctuations in incidence can focus on malaria. And the same donors supporting routine immunization, can include decreasing the malaria burden through diagnostics, mosquito nets for prevention, and medication procurement for confirmed cases, just as they supported polio program needs. Stakeholders engaged in polio eradication have continually strived to improve paths towards eradication. For example, moving from oral polio vaccine to inactivated polio vaccine, moving from tri-valent vaccine to bi-valent vaccine, decreasing the opportunity for circulating vaccine-derived polio virus. They now can shift to driving the same innovation on routine immunization as well as malaria –

investigating ways to eliminate the parasite globally, permanently interrupting transmission from mosquitoes to humans, or striving to attain a malaria vaccine.

Lastly, I encourage partners to look more broadly at how polio infrastructure legacy planning can affect larger societal needs.  Supporting training of female community health workers can begin to address gender equality imbalances. Encouraging primary & secondary education to help to build human resource capacity can improve empowerment overall.  Cross-sector initiatives to improve road, water, and school infrastructure can improve accessing hard-to-reach populations while simultaneously affecting the economy and support decreasing overall poverty. Lastly, expanding the reach of the health system infrastructure may mediate the infiltration of radicalization and improve overall security.

D.  Final conclusions

Implementation science hinges on the principle that outcomes are achieved faster and with greater success when parties have consensus on desired outcomes and perceive ownership of tasks and successes.  The best strategy, grounded in Implementation Science, would be to embrace the complex socio-ecological context, listen to the stakeholders and align international overarching goals with local health programs.

The implicit aim for this research is to share the voices of the stalwart stakeholders addressing health burdens for millions of people, even in the face of extraordinary obstacles, and shed light on how we can address and adapt to improve global health burdens.

**"Give people ability to talk. Accord them the respect to be heard.  That is what they want"** (USAID stakeholder, Nigeria).

Through listening to the health priorities of stakeholders, a greater partnership in health can be brokered. My final recommendation is that stakeholders' priorities are listened to, as this dissertation aimed to do.

Listen first.  Then plan.  And, step forward together.

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APPENDICES

APPENDIX A
Qualitative Survey Tool

Country:

Date:   / 09 / 2015

Time:

Interview ID: 00 - 000

Interview Format:

1.  Organization:

2.  Name:

3.  Title:

4.  Email:

5.  What is your role in polio eradication?

6.  What is your relationship to the CORE Group?

7.  Do think CORE has made a meaningful contribution to polio eradication in your country?

8.  Your country has not seen a case of polio since _____.  What do you think was the key to your success in stopping polio?

9.  What role do you think civil society or non-governmental organizations should play in polio eradication?  Do they add anything of value?

APPENDIX A (CONTINUED)

<u>SWOCA</u>

10. Strengths – What have been the strengths or stronger aspects of the national polio eradication program? Prompts to the interviewee to address their specific level (national, local, etc) and varying aspects of organization, infrastructure, partnership with other sectors, partnership with CGPP.

11. Weaknesses – What could be improved in the program? Same prompts used in "Strength" section.

12. Opportunities – What future opportunities may be available due to the polio eradication effort? How has this coordinated effort built infrastructure that could be applied to future public health needs? How best should the infrastructure built through the polio program be used?

13. Challenges – What have been the obstacles preventing more rapid success in polio eradication? What have been the greatest threats to vaccination implementation? How did you respond to those challenges? Or, how are you responding now?

14. Achievements – What have been the greatest achievements of the polio effort in your country (your department, your community, etc)? What has CGPP helped you achieve specifically?

Additional Discussion Questions:

15. *From your perspective, have other health outcomes been effected by the polio eradication effort? Any health outcomes improved? Any health outcomes worsened? (rates of other vaccines, etc)

16. *How, if at all, has the CGPP had an impact that can be felt beyond polio activities? (other than specific health outcomes)

APPENDIX A (CONTINUED)

17. What belief systems did you encounter with regard to vaccination?

     a.  Positive?
     b.  Negative?

18. In every country, there are challenges with regard to data. What are the challenges here?

19. Is there anything more that I should know?

APPENDIX B
Institutional Review Board Determination

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

**Determination Notice**

**Research Activity Does Not Involve "Human Subjects"**

January 30, 2017

Katherine C. Vergara, MPH

Community Health Sciences

4232 Western Avenue

Western Springs, IL 60558

Phone: (773) 504-5283

**RE:**                              **Research Protocol # 2017-0092**
         **"Partnerships in global polio eradication: A qualitative data analysis of public health stakeholders in Angola, Ethiopia, India, Kenya, Nigeria, South Sudan, and Somalia"**

**Sponsor: None**

Dear Ms. Vergara:

The above proposal was reviewed on January 30, 2017 by OPRS staff/members of IRB #7. From the information you have provided, the proposal does not appear to involve "human subjects" as defined in 45 CFR 46. 102(f).

APPENDIX B (CONTINUED)

The specific definition of human subject under 45 CFR 46.102(f) is:

> *Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains

> (1) data through intervention or interaction with the individual, or
> (2) identifiable private information.

> *Intervention* includes both physical procedures by which data are gathered (for example, venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes.  *Interaction* includes communication or interpersonal contact between investigator and subject.  *Private information* includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may readily be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

This study will use an existing data set. The original cross-sectional data were collected by World Vision (US). The data were collected as semi-structured qualitative interviews from August to September 2015. The database does not include any identifying information for individuals.

All the documents associated with this proposal will be kept on file in the OPRS and a copy of this letter is being provided to your Department Head for the department's research files.

If you have any questions or need further help, please contact the OPRS office at (312) 996-1711 or me at (312) 355-2908.

Sincerely,

Charles W. Hoehne, B.S., C.I.P.
Assistant Director, IRB #7

Office for the Protection of Research Subjects

APPENDIX C
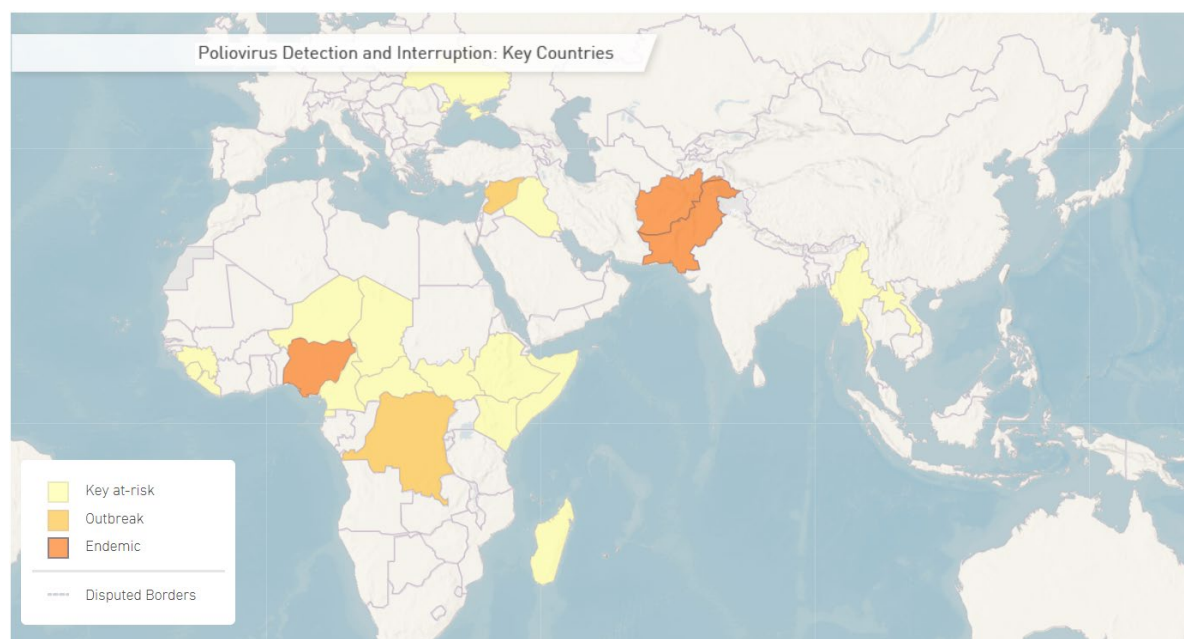Terms of Use for World Health Organization Map



Figure 1. WHO Poliovirus Detection and Interruption: Key Countries

("Polio now," 2016)

# TERMS OF USE

http://polioeradication.org/terms-of-use/

APPENDIX  D
Financial support and collaboration

Facilitated through partnership with World Vision US



Thank you to CORE Group Polio Project and the secretariat groups in Angola, Ethiopia, Kenya, Nigeria, South Sudan and Somalia.

VITA

Katherine C. Vergara

EDUCATION:

Bachelor of Science (*cum laude)*, New York University, 2000

Master of Public Health, School of Public Health, University of Illinois-Chicago, 2006

PhD in Public Health, Community Health Sciences, School of Public Health, University of Illinois – Chicago, 2019

RESEARCH & PROFESSIONAL EXPERIENCE:

*Co-Founder & CEO*, Champion Media Productions LLC, 2018-present

*President & CEO*, K8 Global LLC, Global Public Health Consulting, 2015-present

*Public Health Consultant*, Mid-term polio eradication program evaluation contract awarded by World Vision and USAID, 2015

*Principal Investigator,* Independent research on tuberculosis medication adherence in Peru, 2014-16

*Public Health Researcher,* Department of Epidemiology & Biostatistics, University of Illinois-Chicago, 2017-18

*Production Consultant*, North Atlantic Treaty Organization (NATO) Summit, 2012

*Manager*, National & State Assessment Testing; Math and Science, Inksplash Media, 2009-12

*Scientist*, American Medical Association, Health Disparities, 2007

*Health Literacy Research Associate*, American Medical Association, 2004-05

*Project Coordinator,* Northwestern Memorial Hospital & Lakeside Veterans Affairs Hospital, Cancer Policy Outcomes Research Team, Chicago, IL 2000-02

PRESENTATIONS & LECTURES:

*Guest Lecturer*, Sultan Qaboos University, Muscat, Oman, 2018
Presented to the Medicine and Health Sciences Department on polio eradication partnerships, programs, and policies in six high-risk African nations.

*International Speaker*, Addis Abeba University, Ethiopia, 2018
Presented at the PhD Consortium Seminar on public health polio research

TEACHING:
>
> *Adjunct Lecturer*, University of Saint Francis, 2015-present
> > Courses: Epidemiology, Introduction to Public Health
>
> *Graduate Teaching Assistant*, University of Illinois-Chicago, 2013-17
> > Courses: Global Health Successes, Public Health Systems Policy Management, Public Health Concepts and Practices, Behavioral Science in Public Health

HONORS:
>
> *Summit Delegate,* Centers for Disease Control & Prevention, Millennial Health Leaders, 2016
> *Leadership Scholarship*, American Public Health Association, 2016
> *Fulbright Student Scholar,* The United States State Department, Peru, 2003-04

PROFESSIONAL
MEMBERSHIPS:
>
> American Public Health Association, nationally-elected Student Association Executive Board Treasurer, 2014-2016
> American Public Health Association, member 2015-present
> Fulbright Association – Chicago Chapter, member 2014-present

VOLUNTEER:
>
> *Chicago Triathlon Club,* 2014-present
> *Spanish-English interpreter between patients and doctors*, Chicago Community Health Clinic 2003
> *Disaster Preparedness Volunteer*, Tegucigalpa, Honduras, 2001

LANGUAGES:
>
> English, Spanish

ACCOMPLISHMENTS:
>
> Five-time Marathon runner
> Ironman 70.3 distance triathlete

WEBSITES:
>
> *Champion Media Productions LLC*  www.championproductionco.com
> *Circle of Defense:* a documentary on community health workers in Nigeria and Sierra Leone www.circleofdefense.com

PUBLICATIONS:

Vergara, K. C. (Presenter), Losey, L., Bhui, B.A., Bisrat, F., Kisanga, A., Pinto, A., Solomon, R., Usman, S., Adeosun, O., Ahmad, A., Amos, U., Asres, M.A., Awale, J., Bezabih, L., Choudhary, M., Dey, R., Jemberi, T., Lutukai, M., Mohammed, S., Njofon, W.P., Popoola, J.B., Rakotovazaha, S., Rogie, B., Sapalalo, P., Tesfaye, K., & Ugochuku, M.Z. (2016, November). *Ensuring the right to health through polio eradication: a mixed methods study of best practices in polio eradication efforts in six countries in Africa and India*. Speech presented at American Public Health Association Annual Conference, Denver, CO.

Vergara, K. C. (Presenter), Iberico Lozada, M. M., Tovar, M., Montoya, R., Valiente, B., Rocha, C., Zevallos, K., & Evans, C. A. (2015, November). *Patient-informed policy change: a qualitative study of barriers to free treatment for latent tuberculosis infection in Peruvian shantytowns*. Speech presented at American Public Health Association Annual Conference, Boston, MA.

Vergara, K. C. (Presenter). (2014, November). *Headlamps Attract Huge Bugs: And other essential lessons learned from a public health research project deep in the Amazon jungle*. Speech presented at American Public Health Association Annual Conference, New Orleans, LA.

Vergara, K. C. (Presenter). (2011, November). *The Global Classroom Project*. Speech presented at Fulbright Annual Conference, Washington, DC.

Zevallos, K., Vergara, K. C., Vergara, A., Vidal, C., Garcia, H. H., & Evans, C. A. (2010). Tuberculin skin-test reactions are unaffected by the severity of hyperendemic intestinal helminth infections and co-infections. *The American journal of tropical medicine and hygiene*, *83*(2), 319-325.

Abrams, M. A., Hung, L. L., Kashuba, A. B., Schwartzberg, J. G., Sokol, P. E., & Vergara, K. C. (2007). Health literacy and patient safety: Help patients understand. Reducing the risk by designing a safer, shame-free health care environment. Chicago: American Medical Association Foundation and American Medical Association.

Nelson, J. C., Schwartzberg, J. G., & Vergara, K. C. (2005). The public's and the patient's right to know: AMA commentary on "Public Health Literacy in America: An ethical imperative". *American journal of preventive medicine*, *28*(3), 325-326.

Schwartzberg, J. G., Fleming, M., Oliver, C., Vergara, K. C., & Vangeest, J. B. (2005). Evaluating a health literacy kit for physicians. Studies in Communication Sciences, 5(2), 159-170.

Vergara, K. C. (Presenter). (2005, October). *Raising health literacy sensitivity throughout the healthcare system and the community: A way to maximize the effectiveness of current health promotion and disease prevention practices*. Speech presented at U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 3rd National Prevention Summit, Washington, DC.

Vergara, K. C. (Presenter). (2005, October). *Communication adverse events*. Speech presented at American Academy on Physician and Patient International Conference on Communication in Healthcare, Chicago, IL.

Gibbons (Vergara), K. C. (Presenter). (2002). *Low-literacy intervention for colorectal cancer screening*. Speech presented at The 6th Annual National VA Oncology Symposium, Washington, DC.