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Immediate Healthcare Interventions: A Path to Prosperity in Sub-Saharan Africa

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Abstract

Public health is a perennial problem in sub-Saharan Africa. Extreme poverty and widespread conflict create poor conditions for maintaining human health. At the same time, disease and high mortality rates impede socioeconomic development. To end this negative feedback loop, foreign governments and organizations are pursuing a number of public health initiatives, broadly categorized into long-term interventions and immediate interventions. One striking trend over the past 15 years has been a dramatic shift towards immediate interventions. However, it is unclear whether this shift is the right strategy for solving the public health crisis. Here, I show that immediate interventions have indeed positively impacted socioeconomic conditions in sub-Saharan Africa, initiating a previously uncharacterized positive feedback loop between good health and rising socioeconomic indicators. Using quantitative economic, health, and social indicators as well as case studies, I show that immediate interventions have distinct advantages over long-term interventions when considering ease of implementation. My research not only suggests that the current strategy is working, but also that future public health strategy should continue to focus primarily on immediate interventions to provide maximum, sustained socioeconomic gains while achieving maximum cost-effectiveness.

Introduction

Public health is at once the biggest challenge and the biggest need in sub-Saharan Africa today (Cooke, 2009, p. 1). Numerous cases over the past two centuries have repeatedly shown that while health catalyzes economic and social development, disease and lack of sanitation cause development to stagnate (Alsan *et al.*, 2006, p. 1). Indeed, a striking correlation exists between a country's mortality rate and its stage of economic development, suggesting that the two are intrinsically related (Alsan *et al.,* 2006, p. 5; Ashraf, Lester, and Weil, 2008, p. 1–3). The current situation in sub-Saharan Africa exemplifies this link: disease epidemics, poor living conditions, and high mortality rates converge with feeble subsistence economies, civil and religious wars, and inept governing systems to create

a self-perpetuating cycle of poverty (Cooke, 2009, p. 1). During the 19th and 20th centuries, countries were able to escape this cycle through rising personal incomes and technical advancements, which led to a progressively industrialized economy and healthy populace (Alsan et al., 2009, p. 7). But today, the difficulty of creating new industries and making technological advancements makes escaping the cycle by purely economic means less likely for the foreseeable future (Alsan et al., 2009, p. 7; International Monetary Fund, 2012, p. 1–10).

Improving health is a much more viable alternative for creating economic growth and social harmony in sub-Saharan Africa. Fortunately, prospects for advancing public health are encouraging because foreign funding and assistance can make, and have already made, a direct impact (Cooke, 2009, p. 11). Current efforts by foreign countries and organizations can be broadly categorized into two categories: immediate interventions and long-term interventions. Immediate interventions directly act on health issues and provide rapid impact to the lives of a large segment of the population, primarily through delivery of medicine and equipment. Long-term interventions also have health as a primary goal, but often rely on infrastructural and education improvements that take more time to achieve results.

Over the past decade, the allotment of resources has shifted from a preference for long-term interventions to a preference for immediate interventions (Organization for Economic Cooperation and Development, 2013). At the same time, the development of new technologies, most notably big data and mobile telecommunications, has renewed an interest in long-term investments in health infrastructure and education (Aker and Mbiti, 2010, p. 1–5). This interplay suggests conflicting opinions regarding the relative effectiveness of immediate and long-term interventions in promoting public health and socioeconomic gain.

The United Nations' Millennium Development Goals clearly cite public health as a means of achieving an acceptable level of economic and social development in sub-Saharan Africa (United Nations, 2013). However, the biggest unknown – and one that has not been adequately reviewed in the relevant scientific literature – is which public health efforts during the past few decades have succeeded in making this kind of sustained impact, and which have merely been "Band-Aids" that did not truly solve systemic weaknesses. The answer to this question will determine whether donors over the next decade should prioritize immediate health interventions or long-term investments in health infrastructure.

It may seem that "immediate" interventions imply temporary fixes whereas long-term interventions are the ones that truly make a difference. Here, I argue instead that immediate interventions are permanent, impactful solutions in their own right. Furthermore, I propose that immediate interventions are our best course of action: donors should continue their current support for immediate interventions if their goal is

to make the maximum combined impact on health and development in sub-Saharan Africa. Indeed, immediate health interventions in the region have already made significant improvements in national prosperity, economic development, and societal well-being. Immediate interventions are also more easily implemented than long-term interventions, for two reasons: (1) foreign organizations are more effective at delivering rapid-impact interventions than educational and infrastructural improvements that need to be tailored to the cultures of the target population; and (2) immediate interventions often require less interagency cooperation and fewer resources than long-term interventions do. Thus, rapid-impact public health interventions will bring about socioeconomic development in sub-Saharan Africa as soon as possible.

Evaluating current patterns in public health aid to sub-Saharan Africa

In 2011, foreign nations and NGOs spent almost $10 billion on public health interventions in sub-Saharan Africa (Organization for Economic Cooperation and Development, 2013). Over 85% of this funding was allocated towards immediate interventions, defined by the OECD as basic health services, maternal care, and control of HIV, TB, malaria, and infectious diseases. The remainder was spent on long-term interventions such as family planning initiatives, education programs, health infrastructure, and public health administration systems. This section will provide an overview of the immediate and long-term interventions currently pursued and proposed in sub-Saharan Africa.

Current immediate interventions: Provision of health services and control of infectious diseases

Food aid, postnatal care, and chronic disease treatment have long been mainstays of the public health effort in sub-Saharan Africa. More interesting, however, is the global response to the HIV/AIDS epidemic, which has provided a blueprint for immediate interventions against disease in sub-Saharan Africa. Since the early 1990s, foreign policymakers have realized the need to focus their HIV/AIDS response on lowering both the mortality rate and the infection rate (Abdool Karim et al., 2013). Two interventions are commonly employed: mandatory HIV testing and provision of antiretroviral therapies. In South Africa, millions of people have undergone HIV testing, which has helped to identify those who need treatment, and in other countries, HIV testing is a standard part of maternal care (Coovadia et al, 2009). Programs such as PEPFAR, the U.S.'s HIV/AIDS aid program to sub-Saharan Africa, have focused on providing antiretroviral drugs to patients with a CD4+ cell count below a certain minimum threshold; these therapies have improved the quality of life and drastically extended life expectancy for millions (Cooke, 2009, p. 2–4). These largely successful responses to the HIV/AIDS epidemic have

been a blueprint for responding to epidemics of other diseases, including polio, malaria, and TB.

Infectious diseases are prime targets for public health efforts because eradication is relatively cheap and can provide an immediate and permanent social, psychological, and economic boost to the population (Cooke, 2009). One proposal has been to eradicate the endemic parasitic diseases known as neglected tropical diseases (NTDs). NTDs afflict hundreds of millions of Africans and lead to "stigma, disability, disablement, and ill health" that sustain extreme poverty across entire villages and regions. Unfortunately, donors and foreign governments often overlook NTDs in favor of the "big three" infectious diseases: HIV, malaria, and TB (Molyneux, Hotez, and Fenwick, 2005, p. 1068–69). It is estimated that 500 million Africans could be lifted from the scourge of NTDs at the cost of 40 cents per person per year, significantly less than the $200 per person per year required to pay for antiretrovirals that keep HIV in latency (Molyneux, Hotez, and Fenwick, 2005, p. 1066). Completely eradicating NTDs could potentially raise the standard of health at an extremely low cost compared even to other immediate interventions.

Current and proposed long-term interventions: Education, quantitative capabilities, and infrastructure

The premier long-term intervention is to change the culture of health, a strategy sometimes referred to as "health promotion." It revolves around the tenet that both individual and societal participation in healthcare are crucial (Kickbusch, 2005). Over the past few decades, this strategy has been used to great effect to cooperate with religious groups and governments in overcoming obstacles to vaccination. It has also shifted the focus of education in sub-Saharan Africa towards two main populations: youths and females. Youth are important not only because "children under 15 years of age . . . account for 41% of the population" in sub-Saharan Africa, but also because they can be educated about healthy living strategies, which they can then bring back to their families. Women are important because female education and literacy have "repeatedly been shown to . . . result in better family health and lower infant mortality and morbidity," even in nations without formal health policies (Kickbusch, 2005). Altogether, by focusing on the human challenges, and not just the logistical challenges, public health organizations are working to permanently embed health awareness into the lifestyles of current and future generations of sub-Saharan Africans.

Other researchers argue that quantitative approaches to public health in sub-Saharan Africa are necessary to facilitate informed decision making by physicians, patients, and healthcare officials. One proposal, currently in its early stages, is the implementation of reliable, quantitative diagnostic testing to reduce the prevalence of clinical misdiagnoses. Currently, lab equipment to perform objective diagnoses is scarce, and even where

laboratories are accessible, infrastructure constraints and untrained personnel lead to misplaced samples, inadequate testing, and inaccuracy (Petti *et al.*, 2006). Another project in progress is the development of national health management systems to facilitate "effective clinical management . . . effective functioning of health facilities . . . [and] strategic policy-making and resource allocation" (AbouZahr and Boerma, 2005). Given that resources are tightest in the nations of sub-Saharan Africa, it makes sense to provide public health officials with data that allow them to distribute resources such as vaccines, anti-smoking advertisements, and healthcare workers as optimally as possible (AbouZahr and Boerma, 2005). However, both projects rely on having enough workers and technicians trained to analyze, interpret, and act upon this incoming flood of data. Consequently, governments are developing local training and education programs to fulfill this need (AbouZahr and Boerma, 2005; Petti *et al.*, 2006).

Infrastructure is another long-term investment traditionally considered key to a stable, reliable public health system (Moten, Schafer, and Montgomery, 2012). Adequate roads must be built to transport medicine and equipment, and enough hospitals and hospital beds must be constructed to serve the population. Additionally, a reliable power grid ensures continuity of care in hospitals, and a dependable telecommunications system eases transmission of diagnostic data, dialogue between physicians and patients, and monitoring of the public health system (Moten, Schafer, and Montgomery, 2012). China, in particular, has focused its public health efforts in Africa on building infrastructure. Over the past two decades, China has not only funded the construction of numerous hospitals and malaria clinics throughout the continent, but also instituted training programs to provide African health workers with courses on HIV/AIDS treatment, hospital management, and health reform (Freeman and Boynton, 2011). Despite these improvements to infrastructure, rates of access to roads in sub-Saharan Africa remain three times less than in the rest of the world. Moreover, the electrification rate across the continent is only 24%, compared with 40% in the rest of the developing world, and there are only 1.5 hospital beds per 1,000 people compared with 8.3 in developed countries (Foster et al., 2009; Ndulu and Niekerk, 2005). Clearly, more work still needs to be done.

Trends in public health spending

A striking trend in global aid for public health in sub-Saharan Africa over the past two decades, based on empirical evidence from the Organization of Economic Cooperation and Development (OECD, 2013), has been the shift from a focus on long-term interventions to a focus on immediate interventions. In 1995, only 42% of funds were spent on immediate interventions; by 2011, that percentage had more than doubled to 86% (see figure 1).

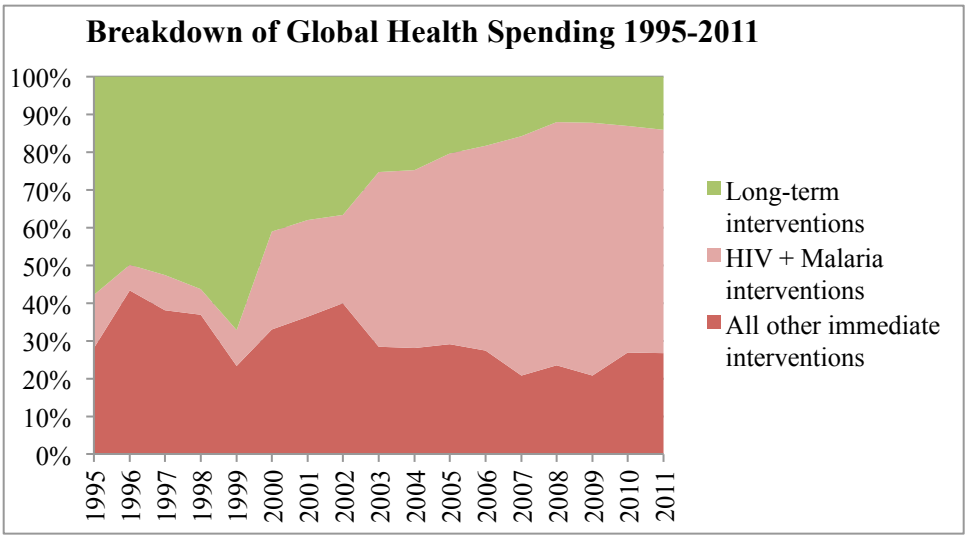

FIGURE 1. Between 1995 and 2011, the breakdown of global health funding has shifted from majority long-term (green) to majority immediate interventions (both shades of red) (Organization for Economic Cooperation and Development, 2013).

Over the same timeframe, the total amount committed to public health in sub-Saharan Africa grew sixfold, from $1.5 billion in 1995 to over $9.6 billion today, a 15-fold increase over the total amount allotted to immediate interventions. One explanation for this escalation in funding for immediate interventions was the explosion of aid for treatment of HIV/AIDS and malaria. In 1995, spending on HIV/AIDS and malaria made up only 14% of total expenditures, around $200 million. By 2011, HIV/AIDS and malaria spending had peaked at over 65% of total expenditures, around $6.1 billion. Interestingly, if we do not consider the money committed to HIV/AIDS and malaria, the percentage of funding for other immediate interventions has still also followed the general trend over the past 15 years, from 33% in 1995 to 66% in 2011 (see Figure 2).

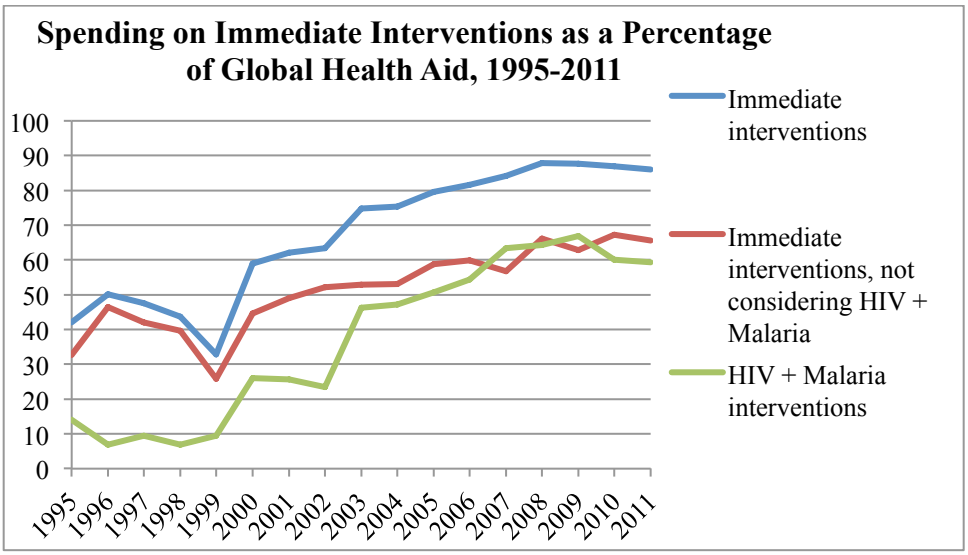

FIGURE 2. The proportion of global funds dedicated to immediate interventions, even after subtracting out all funds earmarked for HIV and malaria (green line), has risen substantially between 1995 and 2011 (Organization for Economic Cooperation and Development, 2013).

This clear shift in strategy, from long-term to immediate interventions, is striking, and it raises the question of whether the recent preference for immediate interventions has catalyzed the social and economic impact we expect of truly successful public health initiatives.

Immediate health improvements catalyze economic and societal well-being

As noted above, the ultimate goal of a successful public health initiative is to have a positive impact on financial and societal well-being, on both the individual and national level. Many scholars have quantitatively confirmed the intuitive belief that rising personal incomes and national GDP, as well as positive social indicators, allow for better health (Alsan *et al.*, 2006). The converse, that improving health directly improves human productivity and welfare, is also intuitive but less rigorously explored. Here, I aim to show that the more rapidly we can implement healthcare improvements, the earlier sub-Saharan Africa will be able to enjoy the resulting economic and societal gains. Under the accepted relationship between health and economic/social indicators, these gains would engender even better health. Thus, immediate interventions in public health initiate a strong positive feedback loop sustaining national development (Figure 3).

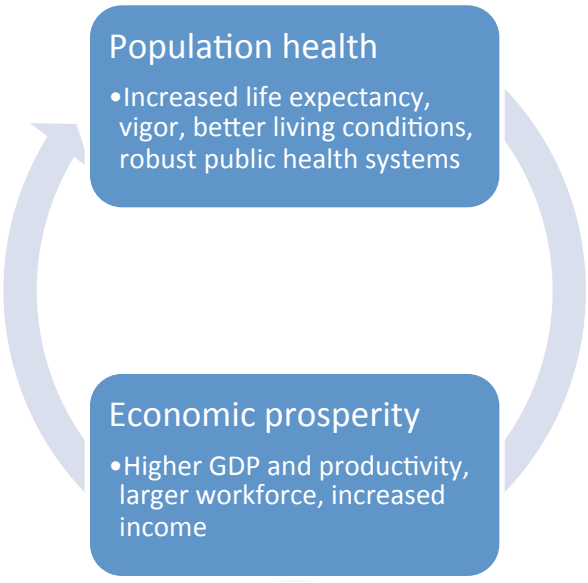

FIGURE 3. A schematic of the positive feedback loop between population health and economic prosperity.

Health interventions facilitate national wealth

Many reports indicate that an individual's wealth and physical health are tightly correlated. People of higher socioeconomic status tend to have lower mortality rates and disease incidence due to better access to healthcare and healthier living environments. This pattern holds regardless of whether they live in developing or developed countries (Cutler, Lleras-Muney, and Vogl, 2008, p. 1–5). However, an evolving body of research has begun to challenge the unidirectionality of this causation, raising the notion that health itself may create economic progress (reviewed in Alsan *et al.*, 2006). Simulations suggest that a 10% higher life expectancy in sub-Saharan Africa between 1995 and 2005, for instance, would have lifted 30 million people out of poverty (Bloom, Canning, and Graham, 2003). More broadly, good health allows people who are at the edge of poverty to work longer hours and steadily improve their financial situation, whereas adverse health situations can bring in unanticipated healthcare costs that reinforce poverty. Simply put, better health allows individuals and families to better contribute to their own economic well-being (see Figure 3).

National GDP also benefits from a healthy population, as evidenced by the clear inverse relationship between a country's life expectancy and its GDP (see Figure 4).

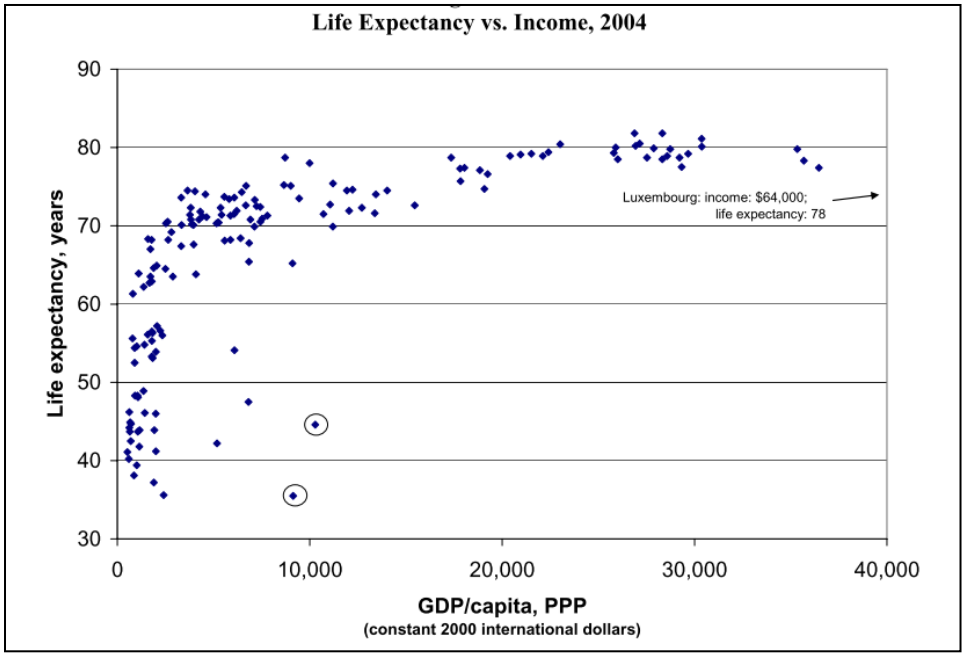

FIGURE 4. Life expectancy and GDP are highly correlated (adapted from Alsan *et al.*, 2006).

In the case of individuals and their economic well-being, higher national GDP causes better population health, and better health raises national GDP. Healthier workers are naturally more productive. An increase in life expectancy and a decrease in child mortality expand the working-age population, solving the continual problem of workforce shortages due to disease. More government funds can be shifted from acute healthcare costs and productivity losses to research and development or industrial growth (Ashraf, Lester, and Weil, 2008, p. 22–25). This causative link between a healthy population and a healthy national economy is exemplified by the economic benefits created by PEPFAR over the past decade. While the HIV/AIDS pandemic has been estimated to have reduced national GDP by 2–4% annually in African countries, PEPFAR has notched significant improvements in the GDP of the 13 African countries that have been targeted (Organization for Economic Cooperation and Development, 2013). Altogether, theoretical and empirical arguments strongly suggest a bidirectional causative link between a nation's population health and its economic performance.

These lines of evidence help to answer our central question. Has the shift towards immediate health interventions created economic gain, and is it the right strategy going forward? An answer lies in the statistical correlation between health aid and GDP data from the past 15 years. When total health spending in sub-Saharan Africa is correlated with per capita GDP, there is a very strong positive correlation, which lends credence to the link between a country's health and economic indicators (see Figure

5a). When data on health spending is separated into immediate and long-term interventions, the correlation with per capita GDP is much stronger for the amount spent on immediate interventions than for the amount spent on long-term interventions (Figures 5b–c). These data point to the possibility that although both forms of interventions do correlate positively with GDP, long-term interventions require more time to take effect and are inherently riskier than immediate interventions, which are very predictable in their linear effect on GDP.

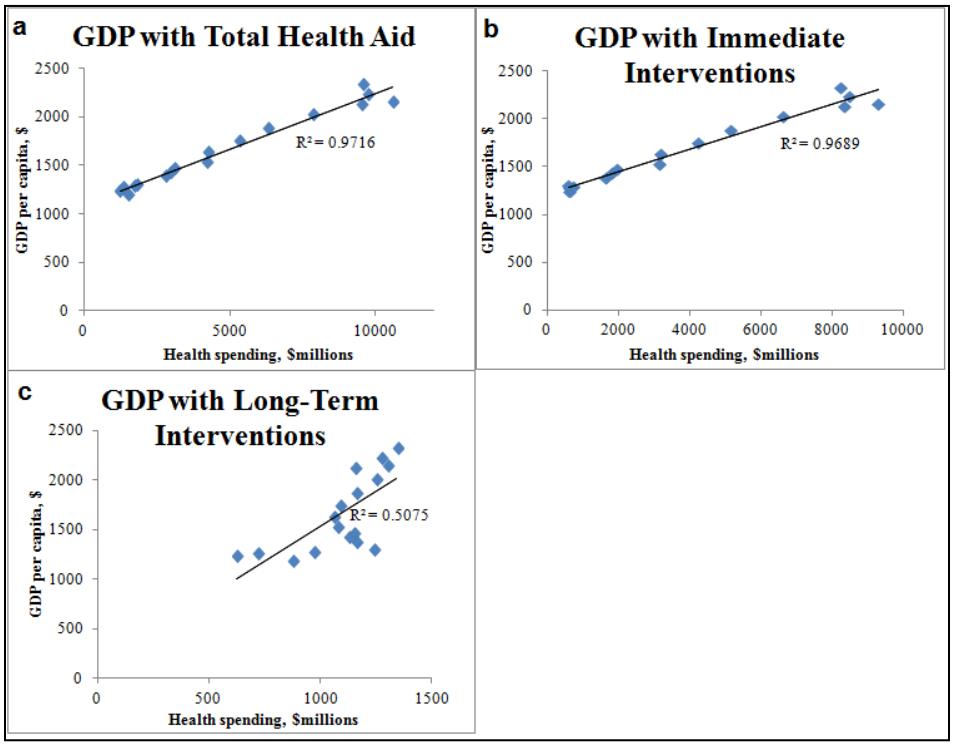

FIGURE 3. Correlations of GDP with a) total health aid, b) funds spent on immediate interventions, or c) funds spent on long-term interventions (Organization for Economic Cooperation and Development). R-squared values provided from linear regression.

These results imply that immediate interventions in sub-Saharan Africa were crucial to the region's economic gains, whereas long-term interventions contributed less, and may require more time to produce an economic effect. The effect of total health aid on GDP was almost wholly driven by the increase in funds dedicated to immediate interventions. Given that donors have limited resources to allocate to public health in sub-Saharan Africa, and given that they want to achieve the maximum economic impact from their efforts, they should continue to support the strategy of immediate interventions going forward.

Health interventions also facilitate happiness, attenuating social malaise

Currently, the public health crisis in sub-Saharan Africa exists alongside social discord, religious and political conflict, extreme poverty, and weak governance (Cooke, 2009). These social determinants create conditions that promote crime and hinder the development of reliable public health infrastructure and systems, fostering a negative feedback loop between poor health and social malaise. Recent articles have espoused the view that in order to improve public health in sub-Saharan Africa, social factors such as poverty, inequality, discrimination, and unemployment must be targeted (Coovadia *et al.*, 2009). However, just as the relationship between health and economic gain is bidirectional, so is the relationship between health and societal well-being. I argue that improving the state of population health in sub-Saharan Africa would directly reduce crime, extreme poverty, and poor living conditions, creating a positive feedback loop that further benefits health and makes the establishment of permanent public health systems more feasible (see Figure 6).

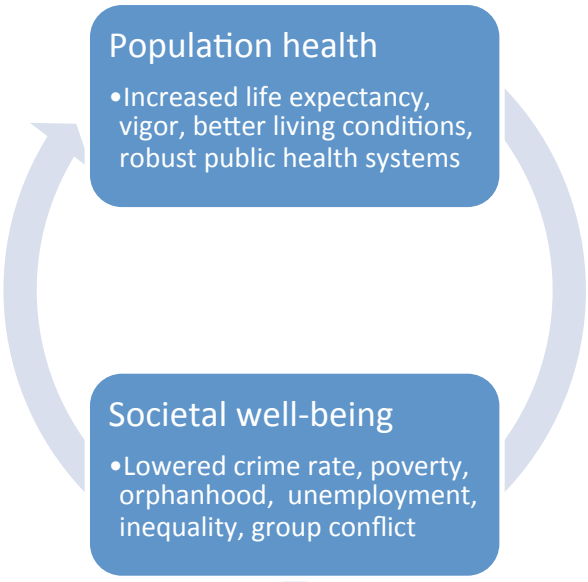

FIGURE 6. A schematic of the positive feedback loop between the same population health improvements and societal well-being.

A paramount concern among health policymakers in sub-Saharan Africa is the negative societal impact of mortality and disability associated with HIV/AIDS and other endemic diseases. One particularly striking example is the orphanhood caused by high HIV/AIDS mortality rates for Africans at childbearing age. It is predicted that by 2015, AIDS orphans will constitute 9–12% of South Africa's total population (Bray, 2003).

Living in an incomplete family unit, compounded with being in extreme poverty, is thought to impede socialization (Bray, 2003). Policymakers worry that as a result of this social disadvantage, orphans may be more likely to join extremist groups and participate in juvenile crime, making them less productive members of society and potentially perpetuating a breakdown in the social fabric (Neilson, 2005; Bray, 2003). Therefore, one immediate benefit of HIV/AIDS interventions would be to prolong HIV latency so that affected parents could raise their children well.

PEPFAR has operated on the premise that HIV/AIDS interventions can have lasting societal effects (Cooke, 2009, p. 2–4). So far, over the ten-year period in which the PEPFAR program has provided antiretrovirals to millions of HIV patients in South Africa, there has not yet been a marked decline in the percentage of orphans as part of the population, perhaps because this statistic is cumulative and does not represent the number of "new" orphans (Meintjes and Hall, 2012). However, South African crime rates have decreased across the board over this timespan, suggesting that PEPFAR, along with other health initiatives, has made an impact beyond simply extending the life expectancies of HIV patients (South African Police Service, 2012). By making immediate interventions to attenuate or eliminate diseases, existing societal damage can be slowed and a drastic positive impact can be made on quality of life in sub-Saharan Africa.

In addition to crime and other social determinants, group conflict is also both a cause and an effect of poor public health in sub-Saharan Africa, and improving public health would reduce its prevalence. War often displaces people from villages and cities, exposing them to lack of sanitation and malnutrition, and raising the potential for injuries from weapons and death from communicable disease (Ghobarah, Huth, and Russett, 2004). In the year 2000 alone, the sub-Saharan African population reportedly suffered 167,500 deaths due to armed conflict, with the majority of these deaths concentrated in the 15–29 year old age range (World Health Organization, 2002). But does the reverse causation apply? Could poor public health and quality of life also drive conflict, implying that improving public health would decrease the prevalence of warfare and conflict?

Several lines of thought from political science support this hypothesis. One of these suggests that many civil wars over the past century were caused not by the abundance, but rather by the scarcity, of prized natural resources, because scarcity perpetuates "underdevelopment" of already poor nations, preventing socioeconomic innovation in times of need and driving armed conflict (Soysa, 2000, p. 113–135). Applying this model to public health, if we consider health as a resource, it is reasonable to argue that countries where health is lacking are "underdeveloped" in terms of the vitality of their population. The resulting lack of socioeconomic innovation can then drive armed conflict in times of crisis. Another perspective proposes that while simple economic inequality is not usually

enough to cause violent conflict, the "horizontal inequality" consisting of social, economic, and ethnic polarization is a significant driver of civil war (Ostby, 2008, p. 143–44). In sub-Saharan Africa, the availability of public health services is heavily dependent on socioeconomic factors, with rural minority populations being much more underserved than urban majority populations (Coovadia *et al.*, 2009). The disparity of health resources could compound with other inequalities to drive civil war. Thus, simply raising the standard of public health in sub-Saharan Africa would be a significant step towards reducing the burden of political and religious conflict in the region.

Immediate interventions are also easier to implement than long-term interventions

I have shown how the social and economic benefits of improving public health are significant, and that these benefits would emerge much more quickly with immediate interventions than with long-term interventions, providing sub-Saharan Africa with the social and economic gain it desperately needs as rapidly as possible. The result is a positive feedback loop that drives better health, sustained economic growth, and improved social harmony. Two additional characteristics of immediate interventions should also make them preferable to long-term interventions in the eyes of donors. First, immediate interventions require less interagency cooperation than long-term interventions, so they can be implemented much more quickly. Second, they often do not require customization for different cultures and nations, so rollouts can take advantage of economies of scale to improve cost-effectiveness. The next two subsections will explain these logistical challenges in the context of all public health interventions in general and then provide reasoning for how immediate interventions could minimize the need to overcome these challenges.

Immediate interventions require less collaboration than long-term interventions

An underappreciated problem that plagues public health development today is the lack of collaboration among different entities (Moten, Schafer, and Montgomery, 2012). The problem is twofold. First, independent efforts are not coordinated with each other, diluting their overall impact (Moten, Schafer, and Montgomery, 2012). Second, even if nonprofits do cooperate, other unforeseen factors may not. For instance, efforts to provide HIV patients with antiretroviral drugs may be thwarted because patients are malnourished or cannot successfully complete their course of treatment. In order for public health efforts to make the best use of resources and function properly in resource-poor countries, there must be an "integration of… resources for affordable interventions and the broader fabric of health systems" into "a more productive whole" (Moten, Schafer, and Montgomery, 2012).

It is true that cooperation and integration are required for both immediate and long-term interventions. Delivering medicines on a

continent-wide scale necessitates significant coordination among drug companies, NGOs, and education and health departments (Molyneux, Hotez, and Fenwick, 2005). Changing the culture of health requires cooperation among religious groups, community leaders, educators, and policymakers (Kickbusch, 2009). Making laboratory capabilities ubiquitous would necessitate the convergence of public health officers, doctors, and policymakers to put in place essential infrastructure and training programs (Petti *et al.*, 2006). Also, having a big data-fueled public health system would require that offices at multiple levels tightly integrate their underlying platforms and share data to facilitate useful analysis (AbouZahr and Boerma, 2005). Without collaboration and so-called "pragmatic solidarity" between the relevant parties, any intervention, whether immediate or long-term, will ultimately be futile.

Coordination is more difficult for projects that involve many levels of government, development of new infrastructure, and large changes to people's lives. Thus, the interventions that are most likely to produce success are those that provide maximum health impact while falling under the scope of a small number of organizations, using existing infrastructure, and requiring minimal disruption to the people. In their rapid-impact plan to eradicate neglected tropical diseases, Molyneux and colleagues propose the distribution of 500 million treatment regimens throughout Africa using already-established supply channels, whether through schools, community health initiatives, or the World Food Program (Molyneux, Hotez, and Fenwick, 2005). They emphasize that multiple NTDs could be eliminated at once because the drugs are easily combined into one regimen, and that three of the drugs are already being donated by drug companies. Furthermore, from the patients' perspective, following through with the treatment regimen would not be a significant burden because treatment would be integrated into their daily lives (through food aid programs at home and at school). The ease with which NTDs could be eliminated compares favorably with the extensive coordination across governments, communities, and NGOs required to establish long-term interventions, such as changes to health education, building of roads, electricity grids, and necessary infrastructure, or development of data and laboratory capabilities. Immediate interventions that do not require significant collaboration are therefore ideal as a prime target for donors to maximize the impact of their efforts.

Immediate interventions can be more universally designed than long-term interventions

Every country's social and economic situation is different, requiring different solutions to the foundational problems that plague different countries. When organizations attempt to apply the same public health solution to different situations, failure often results. This failure is most likely to occur for strategies that are culturally and temporally sensitive, such as health awareness, education, and infrastructure programs. An

interesting case study highlights how contextual differences in Uganda and Botswana affected the relative success of HIV/AIDS awareness programs in the two countries (Allen and Heald, 2004). Because Uganda had already been affected by the HIV/AIDS pandemic, awareness programs reached a receptive population actively looking for solutions (Allen and Heald, 2004). On the other hand, because Botswana was still relatively untouched by HIV/AIDS at the time, prevention strategies were taken much less seriously (Allen and Heald, 2004). Had the Botswanan government correctly framed the HIV/AIDS crisis as one of preemption, not response, more of the population would likely have heeded its warnings. Another example of contextual differences is that in traditional societies, written and visual means of communication, which are routinely used by foreign organizations, are much less effective than oral communication in conveying health information. This is not the case in more urbanized regions (Airhihenbuwa and Obregon, 2000). Clearly, health education and campaign programs need to be tailored to the characteristics of each target region to be credible and effective. This adaptation requires a significant amount of work, as well as a nuanced understanding of the region's culture and situation by governments and organizations.

On the other hand, immediate interventions are, by nature, much more universally applicable than long-term health education and awareness programs, allowing them to be deployed much more easily and inexpensively and on a much larger scale. First, food aid, medicine delivery, and disease testing programs instituted by the UN and the WHO are already transnational, and this existing framework can be leveraged to deliver disease-eradicating drugs, medical equipment such as mosquito nets, or infant care (Molyneux, Hotez, and Fenwick, 2005). Second, the issue of cultural sensitivity is less of a factor in nutritional aid and drug delivery programs than it is in health education and awareness programs whose success is wholly dependent on cultural practices, languages, and the community. Third, drug delivery programs are most cost-efficient at economies of scale due primarily to reduced transportation and clinic costs: treating entire villages, regions, and countries at once through a unified program makes the already low per-capita treatment cost even more attractive (Moten, Schafer, and Montgomery, 2012). Taken together, immediate interventions can, by virtue of their widespread applicability, take advantage of existing transnational infrastructure and economies of scale to rapidly impact the health of hundreds of millions of people.

However, two problems plague many health interventions: the opposition posed by religious extremism, and the demographic challenges present in some states. For instance, in northern Nigeria, the polio eradication effort has increasingly been blocked by radical clerics who warn of vaccines as a Western plot to sterilize Muslims (Yahya, 2006). Nigeria's difficulties in eradicating polio in recent years also stem from its uniquely high nomadic population, whose remote location and mobile

nature often impede universal vaccination (Centers for Disease Control and Prevention, 2013). Fortunately, less controversial immediate interventions, such as nutritional aid, provision of mosquito nets, or maternal care, are often met with less political and logistical resistance and can pave the way for future successful vaccination programs. The double-edged sword of the gradual escalation of intervention programs and implementation of diplomatic solutions will hopefully attenuate the political and demographic obstacles to providing the health interventions that are so desperately needed. Unfortunately, it is likely that these challenges will continue into the foreseeable future.

Conclusions

The social and economic factors that underlie a nation's population health status are strongly intertwined. In much of sub-Saharan Africa, poverty, conflict, low education levels, and weak governance exist in a negative feedback loop with poor public health, miring the entire region in a vicious cycle that undercuts socioeconomic development and national well-being. One way of breaking the cycle would be to strengthen socioeconomic determinants, reducing poverty and conflict, raising education levels, and empowering governments. But in this paper, I have shown that poor health itself plays a significant role in perpetuating these inequities. Improving public health would therefore be a path to ending the negative feedback loop and initiating a virtuous cycle leading to the societal and economic development sub-Saharan Africa desperately needs (Figure 7).

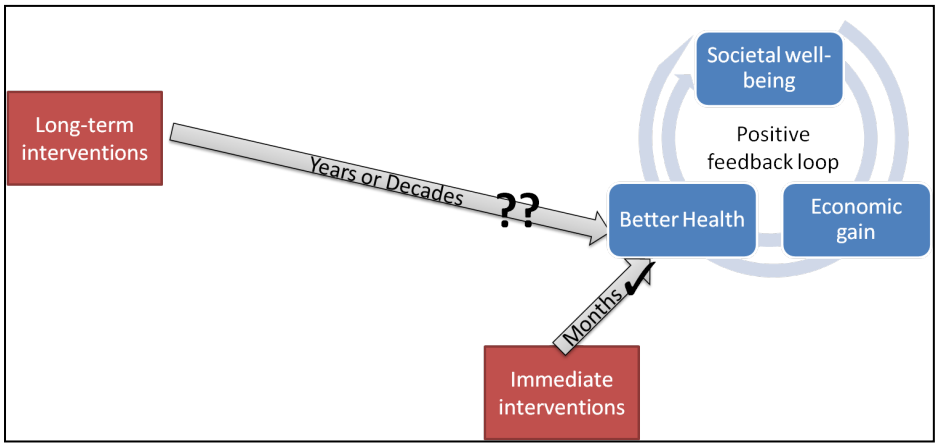

FIGURE 7. The goal of any public health effort is to launch the positive feedback loop of better health, social well-being, and economic gain, diagrammed here. Long-term interventions take years or decades to produce health benefits, and their success is not proven. Immediate interventions act on a much more rapid time scale and are much more likely to result in socioeconomic benefits.

The past 15 years have seen a doubling in the percentage of total health aid designated for immediate interventions, such as parasitic disease eradication, nutrition and maternal care, or HAART programs. This shift in strategy has succeeded in mediating societal and economic development in the sub-Saharan region. I have shown that several lines of evidence support the continuation of rapid-impact interventions. First, immediate interventions create immediate, proven socioeconomic gain. Second, they require less collaboration and therefore are easier, faster, and cheaper to implement. Third, they can generally be rolled out on a continent-wide scale and do not have to be customized for the cultural differences across countries. In the end, I believe that supporting rapid-impact interventions rather than long-term interventions is a win-win for donors and recipients alike: not only are they much simpler to implement, but they also can immediately improve a family and a nation's health, well-being, and economic productivity.

The beauty of immediate interventions in public health is that they initiate a positive feedback loop where economic and social gains occur in tandem with health improvements. Once the cycle has repeated several times, the economic and social foundation will have stabilized to the point where countries can build health education systems and infrastructure for themselves. For countries to develop their own national institutions is preferable, by far, to foreign organizations developing these institutions; NGOs and foreign governments are at their best delivering rapid-impact interventions. Unlike in macroeconomics, where rapid Keynesian interventions may promote immediate benefit yet often cause long-term harm, public health is an arena where even rapid interventions have long-lasting benefits. The sooner we can lift sub-Saharan Africa out of the vicious cycle of poor health and underdevelopment, the sooner it will vault into a self-sustaining cycle of better health and national prosperity.

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