

CASE 1

Vanishing Volunteers: The Use of Implementation Research to Improve Support for Community Drug Distributors in Côte d'Ivoire

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“There is no point in waiting to define all the barriers before starting because most of the barriers will only be found after the start of the program. If you wait until you know everything, you simply don’t do anything.”

— Dr. William Foege, President and Co-Founder
of the Task Force for Global Health

Dr. Emmanuel Koffi let out a long sigh as he leaned back in his chair and covered his eyes with his hands. As he sat with his eyes closed, he could hear the soft pattering of raindrops emanating through the open window of his second floor office at Côte d'Ivoire's Ministry of Health and Public Hygiene. The rainy season was currently in full swing. Emmanuel immersed himself in the peaceful atmosphere and took this brief yet welcomed a moment of tranquility to gather his thoughts. It had been quite a stressful morning. He had just finished reading the latest field reports from his district managers who were spearheading the latest round of mass drug administration (MDA) in rural communities across the N'Zi region. Completely eliminating lymphatic filariasis from his country was turning out to be more difficult than he had anticipated. “You'd think giving out free medication to get rid of one of the most debilitating diseases known to humankind would be easy,” he thought to himself. Not only were the rains causing numerous logistical problems for his district managers, but the turnout from community members was poor in several areas. Reflecting on his lengthy experience as a neglected tropical disease (NTD) program manager with the Ministry of Health and Public Hygiene and his experience organizing two previous MDAs in the region, Emmanuel supposed he should not have been surprised. Unfortunately, there frequently were several challenges and logistical issues associated with the timing of annual MDA campaigns. With so many anti-malarial and vaccination programs running simultaneously throughout the country, his NTD programs often took a back seat. There were a few times throughout the year when the district health centres could spare resources and personnel to help him run the program. He also expected that the turnout from community members would be low, likely because they were more concerned about the recent flooding.

What Emmanuel was not expecting, however, was that in the latest MDA far fewer experienced volunteers, also known as community drug distributors (CDDs), had signed up to help distribute antifilarial medication than in previous years. The report he had been reading earlier mentioned that district managers were suffering from volunteer shortages and needed to intensify their recruitment efforts. Emmanuel knew he was already asking a lot from his volunteers by taking them away from their farm work to help with the medication distribution and offering nothing in return but gratitude and a small sum of money to cover any costs incurred during the

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distribution. He also knew that, without their help, it would not be possible to conduct his MDA campaigns. Front-line health workers in the region were already overworked and there were simply no other sources of trained health human resources available. Furthermore, the previous successes of well-implemented MDA campaigns had demonstrated that community members across Africa generally preferred to receive medication from CDDs who were nominated, selected, or self-volunteered from within the community. Several of these CDDs had spent many years with the program and therefore had extensive knowledge about both lymphatic filariasis and the medications they were distributing. This familiarity and knowledge encouraged the villagers to trust the CDDs, which helped improve program compliance rates. Emmanuel knew that losing these volunteers would be a huge blow to the program.

What could he do stop these CDDs from quitting? Emmanuel had no idea where to start. He knew that he had to devise a way to retain these volunteers, but he was not sure what was prompting them to quit in the first place. Today was August 16, 2018. Côte d'Ivoire was already cutting it close in terms of meeting the 2020 deadline set by the Global Alliance to Eliminate Lymphatic Filariasis (GAELF) for eliminating the disease as a public health problem. Emmanuel began to feel increasingly stressed—he was on a tight schedule and could no longer afford any issues with his MDA campaigns. He needed help but did not know who could provide it. As the program manager for Côte d'Ivoire's NTD elimination and control efforts, he was responsible for solving any problems associated with the programs. As he tried to think of a solution for this lack of personnel, Emmanuel looked over to an NTD information poster hanging on his wall next to the window.

NEGLECTED TROPICAL DISEASES

The World Health Organization (WHO) has classified 20 infectious diseases that are among leading causes of morbidity and disability amongst the poorest of the world's poor as NTDs (Hotez et al., 2007; WHO, 2018b). Among these are diseases such as schistosomiasis, onchocerciasis, soil-transmitted helminthiasis, and lymphatic filariasis (WHO, 2003, 2018b). These tropical diseases are classified as 'neglected' because they have been given relatively low prioritization by international public health organizations compared with other infectious diseases such as malaria, HIV-AIDS, and tuberculosis (also known as 'the big three') (Hotez, Ottesen, Fenwick, & Molyneux, 2006; WHO, 2003). NTDs have also been relatively overlooked by public health professionals because they are frequently found in isolated, rural communities in developing nations and are considered to be far less lethal than 'the big three' (Hotez et al., 2006). NTDs do not affect industrialized nations or the wealthier populations in developing countries; therefore, the pharmaceutical industry has also generally given lower priority to NTD treatment markets (Hotez et al., 2006; WHO, 2003).

Despite rarely causing death among those who are infected, NTDs nonetheless pose one of the greatest threats to the health of the world's most vulnerable populations (Hotez et al., 2006; WHO, 2003). Not only do patients suffer from debilitating physical symptoms throughout their lives, but they are also burdened with considerable economic and social hardships related to their diseased state (Hotez et al., 2006; WHO, 2003). For example, many people who have NTDs are forced to give up work because of their chronic conditions (WHO, 2003). For families already living on very little income, this additional burden can perpetuate an inescapable cycle of absolute poverty, inevitably leading to poor health outcomes in future generations (WHO, 2003). Similarly, the stigma associated with physical disfigurement and other symptoms can lead to social exclusion of those infected with the disease (WHO, 2003). People who have disfiguring ailments often isolate themselves from their community, which can lead to challenges in providing them with treatment (WHO, 2003).

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Emmanuel had observed this stigma in his own country. It was not uncommon for individuals living in some small, rural communities to believe that people with diseases such as lymphatic filariasis or leprosy were cursed or had received the disease as punishment for wrongdoing. As such, his district managers found that finding infected people in some rural communities and convincing them to seek treatment could be incredibly challenging.

Patients who have NTDs primarily suffer losses related to disability and morbidity, making it unsurprising that organizations had historically paid little attention to these diseases. Before the WHO's Global Burden of Disease study in 1990, the diseases that typically attracted the most attention from funders and international aid organizations were those that contributed the most to high mortality rates. However, with the turn of the new millennium, that began to change. The Global Burden of Disease study and the subsequent creation of the disability-adjusted life year (DALY) metric allowed funders, researchers, and international health organizations to better understand and quantify the impact that NTDs have on the overall health of populations (Murray, Lopez, WHO, World Bank & Harvard School of Public Health, 1996). At last, comparisons could be made between the health burdens caused by NTDs and those caused by 'the big three'. DALYs have been used to show that the global disease burden from NTDs is one-fourth of that from HIV-AIDS, and nearly equal to that of malaria (Hotez et al., 2006).

In 2012, in recognition of the massive contribution that NTDs make to the disease burden of vulnerable populations in lower middle-income countries, several governments, private pharmaceutical companies, international organizations, and international developmental agencies signed the London Declaration on Neglected Tropical Diseases (Dean, 2001). Spearheaded by Margaret Chan, the former Director-General of the WHO, and Bill Gates, the philanthropic CEO of Microsoft, the meeting led to an agreement to unite efforts to control or eliminate 10 NTDs by 2020 (Dean, 2001). In 2015, the NTDs were further recognized when they were given their own target and indicator under the United Nation's third Sustainable Development Goal (United Nations, 2015; United Nations Development Programme, 2016).

Côte d'Ivoire's government has also recognized the impact NTDs have on the country, and it has made it a formal responsibility of the Ministry of Health and Public Hygiene to implement control or elimination strategies. Ultimately, as the program manager of the very small NTD control department within the Ministry of Health and Public Hygiene, this job fell to Emmanuel. While he and his colleagues had achieved some success in several of their NTD control efforts over the past five years, they remained underfunded and have much more work to do. For the past year, Emmanuel's department put a renewed focus on combatting lymphatic filariasis. However, the issues he was facing now stemmed from his efforts working towards eliminating this terrible disease from his country.

LYMPHATIC FILARIASIS

Lymphatic filariasis ranks second among the leading causes of irreversible and chronic disability worldwide (Dean, 2001; Taylor, Hoerauf, & Bockarie, 2010). It is also considered an ancient disease, thought to have been afflicting humanity since Egypt was ruled by pharaohs (Nunn & Tapp, 2000). Before recent global elimination efforts, the disease was thought to affect more than 120 million people worldwide, with close to 1.2 billion people being considered 'at risk' (Michael, Bundy, & Grenfell, 1996). Approximately one-third of the 120 million people infected were thought to suffer from at least one of the physical and chronic manifestations of the disease (Michael et al., 1996).

Emmanuel looked down to his desk at some of the photos covering the educational pamphlets that his department had recently created about lymphatic filariasis. He frowned in slight

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displeasure at what he saw. Even though he had seen the disease in person many times, the physical symptoms of the disease never failed to make him feel somewhat uncomfortable.

Lymphatic filariasis is characterized by the impairment of proper lymphatic fluid regulation caused by damage of the lymphatic vasculature, leading to the abnormal and painful swelling of body parts (Dean, 2001; Taylor et al., 2010; WHO, 2017). Lymphatic filariasis can sometimes be difficult to detect, however, as many patients go asymptomatic for long periods of time (Taylor et al., 2010; WHO, 2017). While the infection almost never causes death, the horrible disfigurements are incredibly debilitating and have numerous socioeconomic consequences (Dean, 2001; Taylor et al., 2010; WHO, 2017). Patients with symptomatic lymphatic filariasis are often bedridden for weeks and unable to work or attend school, which has negative implications for their well-being (Dean, 2001). In some countries, the physical disfigurement caused by excessive lymphedema can also lead members of rural communities to believe the patient is cursed and ostracize the patient from the community (Dean, 2001). Physical disfigurement and hydrocele can also lead to a loss of social capital, a lower number of marriage prospects, and substantial stigmatization, all of which can negatively influence one's health (Dean, 2001).

There are currently very limited pharmaceutical treatments available to treat those with symptomatic lymphatic filariasis. One of the few effective treatment options available to healthcare providers is a morbidity management and prevention strategy developed by a Brazilian doctor, Dr. Gerusa Dreyer (Dean, 2001). Using simple hygienic and skin care techniques, such as using clean water to bathe affected limbs daily, Dr. Dreyer's method helps alleviate the symptoms of acute lymphedema attacks (Dean, 2001). While Dr. Dreyer's treatment has been instrumental in providing relief to millions of lymphatic filariasis patients, there remains no way to completely cure the disease (Dean, 2001). Instead, public health professionals have turned to preventive chemotherapy using diethylcarbamazine (DEC), ivermectin/Mectizan, and albendazole in their attempts to prevent the transmission of the disease before infection can occur (Taylor et al., 2010).

Emmanuel leaned back in his chair, reflecting on all the information he had received about lymphatic filariasis and the other NTDs during his medical training. It was then that he had first become interested in treating and preventing these debilitating diseases. During his short time practicing medicine, Emmanuel had treated numerous patients who had NTDs and had quickly become discouraged about how hopeless it seemed to prevent people from being infected in the first place. This had led him to his current position within Côte d'Ivoire's Ministry of Health and Public Hygiene. During his tenure with the Ministry, he learned from his colleagues about the potential for eliminating some of these diseases and found that they had prioritized lymphatic filariasis for possible elimination from Côte d'Ivoire.

The parasitic worms that cause lymphatic filariasis are particularly vulnerable parasites: they only have one host, they have very inefficient transmission processes, and they have yet to develop resistance to any antifilarial medications. In 1993, high-profile members of the International Task Force for Disease Eradication (Dean, 2001) determined that this combination of factors made lymphatic filariasis an ideal elimination target. The task force was established by Dr. William Foege and Dr. Donald Hopkins, who were both key players in the eradication of smallpox and polio respectively (Dean, 2001). Lymphatic filariasis was one of only six diseases considered by the task force for eradication. However, it was in 1997 that the World Health Assembly pushed the elimination of lymphatic filariasis as a public health problem to the forefront of the global health agenda (Dean, 2001). All that was needed was a united effort from public health professionals, governments, non-governmental organizations, and private corporations to set the plan in motion.

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THE GLOBAL ALLIANCE TO ELIMINATE LYMPHATIC FILARIASIS

Emmanuel continued to reflect. During the early years of his position with the Ministry of Health and Public Hygiene, he was given the opportunity to attend one of the Global Alliance to Eliminate Lymphatic Filariasis' (GAELF's) annual meetings. It was there that he learned about the international efforts of several countries and organizations to eliminate lymphatic filariasis as a public health problem. After returning to Côte d'Ivoire, Emmanuel remembered feeling hopeful that he would be able to use what he had learned to produce a change in his own country. The contrast between his attitudes then and his attitudes now made him smile. Thinking back to the meeting, he recalled what he had learned about the GAELF's history.

The early beginnings of the GAELF can be traced back to 1997, when the CEO of GlaxoSmithKline (GSK), Jan Leschly, sat next to President Jimmy Carter at a charity event in Washington, DC. At the time, Mr. Leschly was looking for a massive philanthropic project that his company could undertake for the new millennium. He expressed this to President Carter, who quickly contacted the former Executive Director for the Carter Center, Dr. William Foege. Coincidentally, Dr. Foege had recently attended a conference where he learned about how GSK's drug, albendazole, could boost the antifilarial efficacy of DEC when the two were taken together. When he heard about Mr. Leschly's desire from President Carter, Dr. Foege expressed his belief that GSK could take on no better project than providing support for the elimination of lymphatic filariasis.

President Carter facilitated the creation of the partnership by inviting scientists and executives from GSK to meet with Dr. Foege and other representatives from the WHO at the Carter Center. The partnership seemed like the definition of a win-win situation; global health professionals could potentially gain a substantial source of medications, which they could use to begin their long-desired elimination effort. At that time, GSK agreed to donate enough albendazole to cover dual-drug therapy treatments for the next 20 years. Upon reaching this agreement, GSK formalized the deal by signing a Memorandum of Understanding with the WHO.

The signing of this historic document attracted the attention of many other organizations who were highly interested in assisting in the elimination effort. Most notable of these was another pharmaceutical giant, Merck, who had already contributed millions of treatments of Mectizan towards the elimination of onchocerciasis. Together the two pharmaceutical competitors agreed to provide billions of treatments free of charge. Other organizations soon lined up to offer support for the growing alliance. Today, the GAELF has grown to represent a myriad of academic partners, NGOs, UN agencies, private companies and national governments. This represents one of the largest public-private partnerships in the history of public health.

Emmanuel sat up suddenly in his chair; he had an idea. Opening the top drawer of the cabinet next to his desk, he pulled out a small leather-bound contact book and searched for the number of the one person who might be able to help him. Dr. Myriam Kouamé was an Ivorian researcher at the University of Abidjan who had spent the past five years conducting research that was instrumental in helping health program managers across Africa with similar problems. Emmanuel had met her after she had presented at last year's annual GAELF meeting. He had been very impressed by how practical her research results were, and how they were used to improve the way health programs were delivered in other countries. He had made a point of noting Dr. Kouamé's contact information after their discussion just in case he needed help improving his own programs. Now seemed like the time. Picking up the phone on his desk, Emmanuel dialed her number.

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MASS DRUG ADMINISTRATION

The Global Program to Eliminate Lymphatic Filariasis (GPELF) was launched by the WHO in 2000 (Ichimori et al., 2014). The program is based on two pillars: interrupting disease transmission by using MDA, and alleviating the suffering of those already infected with the disease through morbidity management and disability prevention (Ichimori et al., 2014; WHO, 2016, 2017).

Morbidity management and disability prevention can be achieved by operating on patients who have hydrocele and by using treatment methods similar to those developed by Dr. Dreyer for lymphedema (Dean, 2001; WHO, 2016). However, significant progress has yet to be made on the GPELF's secondary objective because the primary focus of many GPELF stakeholders has been first to break transmission of lymphatic filariasis in endemic countries (Ichimori et al., 2014).

The elimination of lymphatic filariasis can only be achieved by preventing person-to-person transmission of the parasite (Dean, 2001), and this transmission can only be broken by treating infected and uninfected individuals with antifilarial medications. This strategy is known as preventive chemotherapy, which essentially eliminates the human reservoir of the disease and prevents mosquitoes from ingesting the parasite when taking blood meals (Dean, 2001; Ichimori et al., 2014). To achieve complete elimination, at least 65% of the people living in areas where lymphatic filariasis is endemic must take antifilarial medication once or twice annually for four to six years (Ichimori et al., 2014; Ottesen, Duke, Karam, & Behbehani, 1997). To help countries achieve this crucial 65% coverage the WHO has adopted and promoted the strategy of MDA, a form of widespread preventive chemotherapy, which was first developed by the Chinese (Hanson et al., 2012; Hotez et al., 2007; Ichimori et al., 2014).

As the phone rang, Emmanuel wondered how he was going to explain the issues with his MDA efforts to Dr. Kouamé. MDA is much more complex than simply driving into a community with medication and giving it to as many people as possible. Before distributing medications, health workers must conduct several health promotion and health education sessions to properly inform, mobilize, and prepare the community to receive the medication (Silumbwe et al., 2017). Securing buy-in from community leaders and members is essential (Silumbwe et al., 2017). Distributors must be trained before the distribution effort to prepare them for delivering the medications and answering any questions from community members (Silumbwe et al., 2017). A great deal of logistics planning must be done to coordinate the efficient delivery of medication and supplies to the community (Silumbwe et al., 2017). Finally, surveillance and monitoring measures must be put in place to track and manage side effects and adverse events, and to determine the overall coverage achieved by the distribution (Silumbwe et al., 2017). From his experience in organizing MDA programs in communities in his own country, Emmanuel knew that these were all essential components to a successful MDA.

Successful MDA strategies also require partnerships between international organizations such as the WHO, the pharmaceutical companies providing the medication, and the ministries of health in the countries where the disease is endemic (Dean et al., 2016; Hanson et al., 2012). Another layer of partnership is required within the public sector of the affected countries because several government stakeholders, such as ministries of transportation and education, need to work together to deliver treatments and mobilize populations (Hanson et al., 2012). Without these intersectoral partnerships, governments cannot hope to attain the coverage necessary to break transmission of the disease. In addition, a significant amount of technical assistance and funding is required to help countries develop and implement successful MDA programs. To achieve the partnerships and organization necessary to conduct these massive distribution programs, international organizations have been working closely with national

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ministries of health to develop national, integrated NTD programs (Hanson et al., 2012). These efforts have allowed the stakeholders to develop models that countries may use to guide the roll-out of their own national NTD programs in an effective manner (Hanson et al., 2012).

Perhaps fittingly, given its pioneering role in the use of the MDA strategy, China was among the first countries to successfully break the transmission of lymphatic filariasis (Molyneux, 2006). The earliest historical accounts of endemic lymphatic filariasis were recorded in Egypt and it is also one of the first countries to have provided substantial evidence that MDA can be used to successfully eliminate the disease (Molyneux, 2006). From 2000 to 2016, the WHO worked with ministries of health from numerous countries to help them develop their own national NTD programs, all of which included MDA as a core component (Hanson et al., 2012). During this time, the GPELF achieved great success. In 16 years, 11 countries had completely eliminated lymphatic filariasis, with nine more completing their preventive chemotherapy treatment and entering post implementation surveillance to prove elimination had been achieved (WHO, 2017). The WHO reports that, during this time, “6.7 billion treatments were delivered to more than 850 million people at least once in 66 countries, considerably reducing transmission in many places” (WHO, 2017). Overall, the number of people at risk of being infected by the disease-causing parasites has dropped dramatically to about 789 million, primarily because of MDA (Hooper, Chu, Mikhailov, Ottesen, & Bradley, 2014). Aside from the successes of MDA in improving health and preventing disease transmission among these populations, the strategy also provides substantial economic benefit (Gedge, Bettis, Bradley, Hollingsworth, & Turner, 2018). The use of MDA to eliminate lymphatic filariasis has been proven to be cost-effective. From 2000 to 2015, it is estimated to have prevented an overall economic loss of about US\$100.5 billion (Gedge et al., 2018; WHO, 2017).

Despite the substantial gains made by the GPELF, there are still significant challenges that threaten the success of MDA in different contexts. The problems with MDA can be categorized either as challenges with coverage (issues related to distribution) or as challenges with compliance (issues related to treatment uptake within the community). National-level challenges include delays in the delivery of medication to communities, the lack of strategies to track or surveil the migration of individuals into hard-to-reach geographical areas, the requirement of governments to respond to outbreaks of other diseases, and constraints related to limited health human resources (Silumbwe et al., 2017). At the community level, challenges with MDA implementation include the strategy used to distribute medications (distribution posts compared with house-to-house), large coverage areas, the limited funding available for social mobilization, and large numbers of households needing coverage (Silumbwe et al., 2017). Finally, at the level of the individual community member, challenges with MDA implementation include ensuring the community is adequately aware of and knowledgeable about the disease, the treatment, and the causes of adverse events or side effects (Krentel, Fischer, & Weil, 2013). Other individual characteristics that can present challenges in terms of receiving and taking medication in MDA include gender, age, urban living, household income, and personal beliefs (Krentel et al., 2013).

“Allô?” Dr. Kouamé’s voice came through the phone’s receiver. Emmanuel steeled himself for the conversation to come. He just had to convince her to help him determine why CDDs were becoming less willing to volunteer for his MDAs. “Bonjour Dr. Kouamé!” he said, “C’est Dr. Koffi qui vous appelez. Est-ce que vous avez un moment pour parler?”

COTE D’IVOIRE

The Republic of Côte d'Ivoire is located in West Africa, bordering several other countries to its North, East, and West, and bordering the Atlantic Ocean to its South. The capital of Côte d'Ivoire is Yamoussoukro, a major urban centre, whereas Abidjan is the country’s largest city and major economic powerhouse. As a former French colony, Côte d'Ivoire has retained French

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as its official language. After achieving independence from France in the 1960s and enjoying relative political stability until the early 1990s, Côte d'Ivoire has since suffered from several years of political turmoil. In 1999, the elected government was overthrown in a coup d'état, which was followed by two civil wars from 2002 to 2007 and from 2010 to 2011. Currently, a republican government holds power in Côte d'Ivoire, after being re-elected in 2015.

The population of Côte d'Ivoire is approximately 24 million (The World Bank, 2017a). About 51% of the population live in urban centres such as Yamoussoukro or Abidjan, with Abidjan itself home to more than four million people (The World Bank, 2017b). Côte d'Ivoire is classified as a lower middle-income country; however, since the end of its civil wars, it has had a fairly strong economy for its classification. The country's economy is primarily based on agricultural production, with many people working on cocoa and coffee farms as their primary occupation (Central Intelligence Agency, 2017). Côte d'Ivoire has a gross domestic product of about US\$40 billion, 5.7% of which it spends on health (WHO, 2018a; The World Bank, 2017a).

Côte d'Ivoire is divided into 82 health districts. These are geographical areas defined by the health system to provide health care services to a specific population group. As such, health care in Côte d'Ivoire is decentralized to different degrees, with districts reporting to different administrative authorities. The goal of this decentralization is to achieve a compromise between the benefits of receiving funding and support in a centralized fashion, while also having the system diversified at the local level to reflect differences in population needs and expectations. Health districts were created to increase the access of different populations (i.e., rural or urban) to the system. Implementers of health programs, such as NTD control programs, must consider contextual differences among the health districts and they need to tailor program delivery to each district's specific context if they are to be successful (Dean et al., 2016).

The functioning and organization of Côte d'Ivoire's health care system is overseen by the country's Ministry of Health and Public Hygiene (Ministère de la Santé et de l'Hygiène Publique - Côte d'Ivoire, n.d.). Health care in Côte d'Ivoire is primarily publicly funded and delivered; however, the country also has a private health care sector. As with many other lower middle-income countries, Côte d'Ivoire's overall health system has not been able to produce health outcomes to match those of many higher-income countries. The current life expectancy of the average Ivorian is around 55 years of age (WHO, 2018a). In 2013, the country's under-five mortality rate was 100 per 1000 live births, whereas the maternal mortality rate was approximately 720 per 100,000 live births (WHO, 2018a). The top three contributors to the country's overall disease burden (measured in DALYs) are maternal/neonatal complications, 'the big three', and other infectious diseases such as NTDs (WHO, 2018a). The health system currently suffers from a severe shortage of health care professionals and an uneven distribution of health care service providers.

"D'accord. Je te verrai demain. Au revoir!" Myriam said. Smiling, she pressed the 'end call' button on her cell phone. Placing it in her handbag, she looked out the window of the overcrowded bus she was riding to the university. Watching people darting between Abidjan's many buildings in halfhearted attempts to avoid the rain, she reflected on the conversation she had just had with Dr. Koffi. He had sounded quite distressed as he explained the problems he was having with his lymphatic filariasis program. By the end of the conversation, he was all but begging her to help him determine what was happening with his volunteer base. Myriam was quite humbled that he had decided to reach out to her for help. She could not lie to herself; the thought of leading a major research project in her home country in collaboration with the Ministry of Health and Public Hygiene was very exciting. She was only five years into her current appointment at the University of Abidjan, most of which she had spent conducting implementation research on several different health programs across Africa. It was very difficult

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and arduous research. However, the information she had provided to these health programs was always well worth the effort. While these projects were very important to her, she had yet to be part of something as important as the research that was needed to assist Dr. Koffi in Côte d'Ivoire's lymphatic filariasis elimination efforts. With this in mind, Myriam agreed to help Dr. Koffi determine why his volunteer base was shrinking. They were going to meet tomorrow at the Ministry to develop a plan of action.

Shifting her thoughts back to the issue at hand, Myriam realized that she did not envy Dr. Koffi's position in the slightest. She could only imagine how difficult it must be to deliver millions of antifilarial treatments to people across Côte d'Ivoire using a primarily volunteer-based workforce. Leaning her head against the window, Myriam mused over the information Emmanuel had shared about his use of CDDs for MDA in Côte d'Ivoire.

COMMUNITY DRUG DISTRIBUTORS

To address many of the challenges associated with MDA, including the limited availability of human health resources, national NTD programs across Africa rely heavily on the use of a community-directed intervention (CDI) strategy. The use of a CDI strategy involves the empowerment of a community to take ownership of an intervention and implement it in a manner that they deem appropriate (Amazigo, Leak, Zoure, Njebuome, & Lusamba-Dikassa, 2012; Katarbarwa, Mutabazi, & Richards, 2000). The principles of CDI involve the community discussing the information and intervention plans provided to them by program initiators, designing an implementation approach, evaluating the capacity of the community, gathering resources to implement the intervention, and then creating a plan to implement the intervention (Katarbarwa et al., 2000). After the planning stages of the CDI strategy, the community then takes a central role in carrying out the intervention and monitoring and evaluating the intervention's success (Amazigo et al., 2012; Katarbarwa et al., 2000). The use of well-executed CDI strategies has been shown to be quite effective at improving MDA coverage and compliance in many communities across Africa, and at helping mitigate issues with sustainability, resource shortages, and community buy-in (Amazigo et al., 2012; Gyapong, Gyapong, & Owusu-Banahene, 2001; Katarbarwa et al., 2000; Krentel et al., 2013).

Central to the CDI strategy are the volunteer CDDs who are instrumental in the success of many MDA campaigns. Many communities in Côte d'Ivoire rely primarily on CDDs for distributing vast quantities of antifilarial medication to achieve the coverage necessary for breaking disease transmission. However, the true value of CDDs as a human health resource lies in their inherent effectiveness at ensuring that community members comply with treatment (Corley, Thornton, & Glass, 2016; Krentel et al., 2013). CDDs often have more extensive knowledge about cultural contexts and local languages than international aid workers or national health workers because they are usually volunteers from the community where medication is being distributed (Corley et al., 2016). This makes CDDs effective at educating the community, disseminating information about the disease, and encouraging community participation in MDA programs (Corley et al., 2016). The strategies employed by CDDs to improve a community's uptake of preventive chemotherapy treatments include capitalizing on pre-existing and trusted relationships with community members, directly observing treatment (i.e., watching the person take the medication), taking the medication themselves to prove its safety, and visiting households before the MDA to promote the treatment (Krentel et al., 2013). Although there are many benefits to using CDDs in MDA programs, there are also some inherent risks. For example, in certain African communities, some people are less likely to comply if they perceive the person distributing the medication as unable to do their job well or lacking knowledge about the disease and its treatment (Yirga, Deribe, Woldemichael, Wondafrash, & Kassahun, 2010). Despite this difficulty, the benefits of using CDDs for MDA programs, including the substantially

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lower costs associated with the use of volunteers, arguably far outweigh the risks (Corley et al., 2016).

CONCLUSION

The next day, Myriam met Emmanuel at the Ministry of Health and Public Hygiene. After briefly catching up, they delved into the task at hand. Emmanuel started to feel apprehensive as he learned more about the funding it would require to design and implement this project. His department's budget was already fairly constrained. Fortunately, after inquiring about additional funding sources at the University of Abidjan, Myriam discovered a funding opportunity from the Bill and Melinda Gates Foundation for NTD-related research in Africa that would almost entirely cover the costs of their project. Unfortunately, the grant application to receive this funding was due by the end of the month, so they would have to work quickly to develop and submit a highly detailed and carefully assessed research proposal. By mid-afternoon, they had spread papers across Emmanuel's office and his whiteboards were covered with questions that still needed answers. Who would they need to include in the project and when would they be needed? What research methods should they use for collecting their data? How could they monitor and evaluate the project? Finally, when it was finished, who would need to know the results and how could the results be used? With time being a large constraint, Emmanuel knew he needed to develop a good plan and begin his research project in order to better support CDD volunteers and prevent them from leaving the program. Without these volunteers, the success of future MDAs, as well as Côte d'Ivoire's ability to meet the GAELF's 2020 deadline, would be severely jeopardized.

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REFERENCES

1. Amazigo, U. V, Leak, S. G. A., Zoure, H. G. M., Njebuome, N., & Lusamba-Dikassa, P-S. (2012). Community-driven interventions can revolutionise control of neglected tropical diseases. *Trends in Parasitology*, 28(6), 231–238. doi.org/10.1016/j.pt.2012.03.002
2. Central Intelligence Agency. (2017). Cote d'Ivoire. In *The world factbook*. Retrieved July 4, 2018 from <https://www.cia.gov/library/publications/the-world-factbook/geos/iv.html>
3. Corley, A. G., Thornton, C. P., & Glass, N. E. (2016). The role of nurses and community health workers in confronting neglected tropical diseases in sub-Saharan Africa: A systematic review. *PLoS Neglected Tropical Diseases*, 10(9), e0004914. doi.org/10.1371/journal.pntd.0004914
4. Dean, L., Page, S., Hawkins, K., Stothard, R., Thomson, R., Wanji, S., ... Theobald, S. (2016). Tailoring mass drug administration to context: implementation research is critical in achieving equitable progress in the control and elimination of helminth neglected tropical diseases in sub-Saharan Africa. *International Health*, 8(4), 223–234. doi.org/10.1093/inthealth/ihw031
5. Dean, M. (2001). *Lymphatic filariasis: the quest to eliminate a 4000-year-old disease*. Hollis, NH: Hollis Publishing Company.
6. Gedge, L. M., Bettis, A. A., Bradley, M. H., Hollingsworth, T. D., & Turner, H. C. (2018). Economic evaluations of lymphatic filariasis interventions: A systematic review and research needs. *Parasites & Vectors*, 11(1), 75. doi.org/10.1186/s13071-018-2616-z
7. Gyapong, M., Gyapong, J. O., & Owusu-Banahene, G. (2001). Community-directed treatment: The way forward to eliminating lymphatic filariasis as a public-health problem in Ghana. *Annals of Tropical Medicine and Parasitology*, 95(1), 77–86. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/11235557>
8. Hanson, C., Weaver, A., Zoerhoff, K. L., Kabore, A., Linehan, M., Doherty, A., ... Ottesen, E. A. (2012). Integrated implementation of programs targeting neglected tropical diseases through preventive chemotherapy: Identifying best practices to roll out programs at national scale. *American Journal of Tropical Medicine and Hygiene*, 86(3), 508–513. doi.org/10.4269/ajtmh.2012.11-1589
9. Hooper, P. J., Chu, B. K., Mikhailov, A., Ottesen, E. A., & Bradley, M. (2014). Assessing progress in reducing the at-risk population after 13 years of the global programme to eliminate lymphatic filariasis. *PLoS Neglected Tropical Diseases*, 8(11), e3333. doi.org/10.1371/journal.pntd.0003333
10. Hotez, P. J., Molyneux, D. H., Fenwick, A., Kumaresan, J., Sachs, S. E., Sachs, J. D., & Savioli, L. (2007). Control of neglected tropical diseases. *New England Journal of Medicine*, 357(10), 1018–1027. doi.org/10.1056/NEJMra064142
11. Hotez, P., Ottesen, E., Fenwick, A., & Molyneux, D. (2006). The neglected tropical diseases: the ancient afflictions of stigma and poverty and the prospects for their control and elimination. In: Pollard A.J., Finn A. (eds) *Hot Topics in Infection and Immunity in Children III*. *Adv Exp Med Biol*, 582, 22–33. doi.org/10.1007/0-387-33026-7_3
12. Ichimori, K., King, J. D., Engels, D., Yajima, A., Mikhailov, A., Lammie, P., & Ottesen, E. A. (2014). Global programme to eliminate lymphatic filariasis: The processes underlying programme success. *PLoS Neglected Tropical Diseases*, 8(12), e3328. doi.org/10.1371/journal.pntd.0003328
13. Katabarwa, N. M., Mutabazi, D., & Richards, F. O. (2000). Controlling onchocerciasis by community-directed, ivermectin-treatment programmes in Uganda: Why do some communities succeed and others fail? *Annals of Tropical Medicine and Parasitology*, 94(4), 343–352. doi.org/10.1080/00034983.2000.11813549
14. Krentel, A., Fischer, P. U., & Weil, G. J. (2013). A review of factors that influence individual compliance with mass drug administration for elimination of lymphatic filariasis. *PLoS Neglected Tropical Diseases*, 7(11), e2447. doi.org/10.1371/journal.pntd.0002447

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15. Michael, E., Bundy, D. A. P., & Grenfell, B. T. (1996). Re-assessing the global prevalence and distribution of lymphatic filariasis. *Parasitology*, 112(4), 409–428. doi.org/10.1017/S0031182000066646
16. Ministère de la Santé et l'Hygiène Publique - Côte d'Ivoire. (n.d.). Retrieved June 10, 2018, from <http://www.sante.gouv.ci/welcome/ministere/1>
17. Molyneux, D. H. (2006). Elimination of transmission of lymphatic filariasis in Egypt. *The Lancet*, 367(9515), 966–968. doi.org/10.1016/S0140-6736(06)68404-3
18. Murray C. J. L., Lopez, A. D., World Health Organization, World Bank & Harvard School of Public Health. (1996). The global burden of disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: summary / edited by Christopher J. L. Murray, Alan D. Lopez. Geneva: World Health Organization. Retrieved from http://apps.who.int/iris/bitstream/handle/10665/41864/0965546608_eng.pdf?sequence=1
19. Nunn, J. F., & Tapp, E. (2000). Tropical diseases in ancient Egypt. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 94(2), 147–153. doi.org/10.1016/S0035-9203(00)90252-9
20. Ottesen, E. A., Duke, B. O. L., Karam, M., & Behbehani, K. (1997). Strategies and tools for the control/elimination of lymphatic filariasis. *Bulletin of the World Health Organization*, 75(6), 491–503. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2487030/>
21. Silumbwe, A., Zulu, J. M., Halwindi, H., Jacobs, C., Zgambo, J., Dambe, R., ... Michelo, C. (2017). A systematic review of factors that shape implementation of mass drug administration for lymphatic filariasis in sub-Saharan Africa. *BMC Public Health*, 17, 484. doi.org/10.1186/s12889-017-4414-5
22. Taylor, M. J., Hoerauf, A., & Bockarie, M. (2010). Lymphatic filariasis and onchocerciasis. *The Lancet*, 376(9747), 1175–1185. doi.org/10.1016/S0140-6736(10)60586-7
23. The World Bank. (2017a). Cote d'Ivoire. Retrieved July 4, 2018, from <https://data.worldbank.org/country/cote-divoire>
24. The World Bank. (2017b). Rural population (% of total population). Retrieved July 4, 2018, from <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?end=2017&locations=C1&start=2000>
25. United Nations. (2015). Sixty-ninth session of the United Nation General Assembly. *Draft outcome document of the United Nations summit for the adoption of the post-2015 development agenda*. Retrieved from http://www.un.org/ga/search/view_doc.asp?symbol=A/69/L.85&Lang=E
26. United Nations Development Programme. (2016). Goal 3 targets. Retrieved June 17, 2018, from <http://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-3-good-health-and-well-being/targets/>
27. World Health Organization. (2003). Communicable diseases 2002: Global defence against the infectious disease threat. Retrieved from <https://www.who.int/iris/handle/10665/42572>.
28. World Health Organization. (2016). Global programme to eliminate lymphatic filariasis. Retrieved from http://www.who.int/lymphatic_filariasis/elimination-programme/en/
29. World Health Organization. (2017). Lymphatic filariasis. Retrieved June 10, 2018, from <http://www.who.int/en/news-room/fact-sheets/detail/lymphatic-filariasis>
30. World Health Organization. (2018a). Côte d'Ivoire. Retrieved from <http://www.who.int/countries/civ/en/>
31. World Health Organization. (2018b). Neglected tropical diseases. Retrieved from http://www.who.int/neglected_diseases/diseases/en/
32. Yirga, D., Deribe, K., Woldemichael, K., Wondafrash, M., & Kassahun, W. (2010). Factors associated with compliance with community directed treatment with ivermectin for onchocerciasis control in Southwestern Ethiopia. *Parasites & Vectors*, 3, 48. doi.org/10.1186/1756-3305-3-48

INSTRUCTOR GUIDANCE

Vanishing Volunteers: The Use of Implementation Research to Improve Support for Community Drug Distributors in Côte d'Ivoire

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BACKGROUND

To be implemented successfully, most large-scale public health interventions, such as mass drug administration (MDA) campaigns for the elimination of lymphatic filariasis, require a large extent of human health resources. For several reasons, health workers and volunteer community drug distributors (CDDs) sometimes feel overwhelmed and unsupported in their work, which can cause them to give up their essential roles. In lower middle-income countries such as Côte d'Ivoire, where volunteers tasked with the distribution of antifilarial medications are already in short supply, losing valuable human health resources can ultimately cause MDA programs to fail. As such, it is crucial for implementers to recognize and address any issues with their health intervention plan that may lead to increased attrition among their workforce. Dr. Emmanuel Koffi, one of the neglected tropical disease program managers at Côte d'Ivoire's Ministry of Health and Public Hygiene, recognizes that research is needed to investigate the factors contributing to increased stress and attrition rates among his volunteer CDDs. The steps that he should take to conduct an effective research project, however, remain uncertain. After reaching out to Dr. Myriam Kouamé at the University of Abidjan, Emmanuel has decided that applying an implementation research strategy may be best for this project. Having little experience with this type of research, he has enlisted Myriam's assistance to develop a research plan that will help him identify how he can better support his volunteers. Emmanuel knows that time is short—the 2020 deadline to eliminate lymphatic filariasis in Côte d'Ivoire is fast approaching, and he must act quickly to ensure that the CDDs are well supported if they are to achieve this elimination goal.

OBJECTIVES

1. Adopt a systems-thinking approach to investigate the contextual factors influencing attrition rates and the resilience of CDDs in Côte d'Ivoire.
2. Apply implementation research principles to formulate a research plan to investigate increasing attrition rates among CDDs and identify feasible solutions to improve volunteer motivation and retention.
3. Identify appropriate members of the research team to ensure that there is a multidisciplinary approach
4. Explain the roles and responsibilities of different stakeholders in managing health human resources for MDA in Côte d'Ivoire to determine who to engage in the implementation research process and how.
5. Discuss the challenges associated with conducting implementation research across different contexts and propose strategies to overcome them.
6. Describe how implementation research can be used to improve health equity among people living in lower middle-income countries.

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DISCUSSION QUESTIONS

Before coming to class, learning teams should use the additional resources provided to help them answer the following questions:

1. What is implementation research?
 - a. How can it be used to identify and address the factors you identified above?
 - b. What are some challenges associated with conducting implementation research in lower middle-income countries?
2. Brainstorm a list of contextual factors that could potentially influence the attrition rate of CDDs conducting an MDA in Côte d'Ivoire. What implications could these factors have for the MDA as a whole? Be prepared to share your list with the class.
 - a. Reflecting on your list of contextual factors, what kinds of researchers do you think should be part of the research team and why?
3. Which stakeholders do you think should be involved in the implementation research process?
 - a. At which point during the implementation research process would you involve each stakeholder? Why?
 - b. Which stakeholders would be interested in the results of the research? What aspects of the research would they be most interested in?
 - c. How would you tailor dissemination of the results of your research to each stakeholder?
4. What research methods would you use and what kinds of data would you collect? (e.g., quantitative, qualitative, mixed methods). Explain your reasoning.
5. How do you think implementation research can be used to improve health equity in lower middle-income countries?

The key questions that students will have to consider when they develop their research plan during the in-class exercise are:

1. What is the research question that needs to be answered?
2. What steps need to be taken to answer this question?
3. Which data need to be collected? Who should collect these data?
4. Where will these data be collected (i.e., rural communities, urban communities) and why?
5. What research methodologies can be used to collect these data?
6. How will the findings be used? Who will use the findings?
7. What resources are needed to conduct this research? Who can provide these resources?

KEYWORDS

Community drug distributors; implementation research; lymphatic filariasis; mass drug administration; neglected tropical diseases