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For and by Communities: An Assessment of Feasibility for a Novel International Healthcare
Program in Rural Ghana and Nigeria

A thesis submitted in partial satisfaction of the requirements for the degree Master of Arts

in

Global Health

by

Rebecca Donham

Committee in Charge:

Professor Victoria Ojeda, Chair
Professor Keolu Fox
Professor Timothy Mackey

2021

The thesis of Rebecca Donham is approved, and it is acceptable in quality and form for publication on microfilm and electronically.

University of California San Diego

2021

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ABSTRACT OF THE THESIS

For and by Communities: An Assessment of Feasibility for a Novel International Healthcare
Program in Rural Ghana and Nigeria

by

Rebecca Donham

Master of Arts in Global Health

University of California San Diego, 2021

Professor Victoria Ojeda, Chair

Residues of Global Health’s origins in tropical and colonial medicine remain central in the framework of international medical outreach—trips in which students and practitioners arrive in other countries to impose health aid. In hopes to redirect such aid in a manner that also builds community autonomy, twenty-six partnering communities across rural Ghana and Nigeria developed a novel healthcare system proposal that impresses community voice as imperative while collaboratively working with international volunteers. This thesis seeks to exemplify this framework of community-driven efforts by working at the request of these communities to investigate the legal frameworks and technological precedents salient to the implementation of

their program proposal. A grey literature review of legal documents from Ghana, Nigeria, and the United States, as well as a review international codes and technologies, finds that the proposed program is both feasible and supported by the current infrastructures related to all healthcare governances. While further steps are required to initiate the proposed program, the example it leaves is one towards a community-driven framework.

1. Introduction

1.1. Intentionality

Academic staples of Global Health have come a long way since their origins in tropical and colonial medicine. Research done upon individuals and international aid done for individuals-- both of which were often marred if not directly based in political and economic agendas of exploitation and oppression-- however, remains as more than an artifact of the past. Current colonial ideologies, unsurprisingly, still exist at large in insidiously innocuous aspects of education. While this topic deserves far more than a brief disclaimer and periodic mentioning's throughout this thesis, it is imperative I set the stage for the reasonings behind this thesis' selective scope, finely tuned to do its best in contributing towards an undertaking in separating education and the systemic colonial othering of the peoples and communities it seeks to describe.

The intentionality of thesis is not to scholastically dive into the nuances of the peoples it pertains to, but to rather explore the specific inquiries they request for themselves—more specifically the current resources, tribulations, and desires pertaining to their community's healthcare system. This work is not *about* a community, but both for and with them. My work as a student and an outsider is instead to depict a system and infrastructure of plausible technologies and political precedents that may frame and aid in the fruition of the system that the communities have collectively sought to create.

These systems were kindly shared with me as I am a partner to the 26 rural communities in Nigeria and Ghana, with whom I share a preexisting partnership with via remote dialogue through a non-governmental organization. Over the past year, I've been fortunate to work with individuals, primarily entrepreneurs who are woman-identifying, in their requests for technical support in initiating a sustainable source of income for their families and community. The

women reach out to me or a member of my team, requesting for specific help in grant writings, permit fulfillment, and/or enterprise planning, among many other steps to begin and operate their business. Our team stays in contact with our partners through their personal emails and through community members hired by our team to work in part as a community representative liaison between their town hall meetings and international partners primarily based in UK and US. In staying in contact with the women, either through business-related check-in calls or friendly correspondence emails, we hear of the successes and heartbreaks of the people and communities. More frequently, we've been hearing of untreated injuries, neglected illness, and loss of life in our partner communities; and, naturally, an immense increase in request for medical aid.

The women share a vicious cycle of health and wealth in their communities: if the owners, their worker, or worker's dependent falls ill or injured, their removal from the workforce is, among the humanitarian suffering, is an immediate and long-term loss of livelihood. With the lost income on both the community and family level, it becomes more difficult to pay for the associated expenses of healthcare and the transportation necessary to arrive to a place of treatment, often in the city centers. At least one woman in each of the 26 partnering communities independently requested healthcare support. Specifically, healthcare that was centralized to their community, impervious to brain drain, and consistent. Many of the communities experienced international medical aid for a few weeks through the summer and expressed gratitude, but a clear longing for year-round care that matched the realities of their lifestyles and took into account what was most salient to them.

In hoping to help bring about this community-driven, autonomous, sustainable, and culturally-competent healthcare, I remotely met with the representatives of each community in rural Nigeria and Ghana to get a better idea of the system their communities were hoping for.

Each representative had conducted their own survey, study, and/or town hall meeting¹ that reflected how they best felt would be representative of their community's desires and needs. In culminating the information across the 26 communities, many overlaps existed in terms of the structure and kinds of desired care presented. The requests were organized into five main components for the healthcare system that could be intertwined with the international healthcare aid they were already periodically receiving. The finalized program centered around redirecting the forces of international healthcare aid that partially hindered autonomy towards it instead aiding autonomy in their own self-designed healthcare program.

In most academic papers or interventions, the focus might be on the culmination of the community's needs and desires—the researcher imbedding into the culture, gathering data, and probing community member's for their insights—to then nearly unilaterally deem what solutions the community clearly needed. But this is how most healthcare aid within these 26 partnering communities has been done in the past, leading to ineffective and even problematic outcomes. In hopes of shedding light what may be beneficial, the scope of this thesis will center only around the scholastic inquiry of how current laws and technologies within global health may allow for the exact implementation of the communities' requested healthcare program. This thesis will thus utilize the community needs assessment and focus scope solely into the context, precedents, and feasibility of allowing for the political/legal permissibility and technological aid of bringing the proposed medical program into fruition. This thesis is written in great gratitude to engage in a small portion of these community's mission per their requests to later build a program of their own making.

1.2. Current Systems of International Medical Outreach

¹ It is important to note that town hall meetings include the vast majority of community members, if not all available within the communities that host them

Current systems of international medical outreach are not of the community's own making. Current medical outreach programs, as a system, fail; Or they at very least succeed in a mission never directly stated and detrimental to the community it intends to aid.

Medical outreach programs' overarching model most commonly consists of a team of volunteers from Western countries to serve a community of their choosing abroad for an average of about two weeks stay¹. The Western team often comprises an assemblage of health professionals, pre-professional students, and lay volunteers with some hierarchical structure where an administrative leader creates the logistical pathway for volunteer travel, room and board, and practice in the communities². The community is propositioned with the ideas of hosting the medical team often with scarce more information or say in program design than the team is arriving to provide aid³. When the team arrives, the community assumes the role of receiver and the international team the role of charitable provider. While little research exists for precise statistics, trainings related to local language, cultural competency and humility, and even medical-related practices are more often than not taught on the spot or not addressed at all and certainly not required in the vast majority of trips^{4,5}. The limited research available on these international medical outreach trips remain indicative of the limited oversight of international health aid.

This burgeoning field has expanded from an average of four million frequent travelers to more than ten million per year between 2009 and 2015 with an anticipated exponential growth thereafter^{6,7}. The visitor's travel costs alone accounted for over \$2 billion in 2014⁸. International medical programs have been institutionalized a system. Over 60% of U.S. medical schools offer short-term medical trips, 52% of pediatric residencies offer international medicine as an elective, and countless religious affiliations, NGOs, schools, and especially private

companies offer highly-priced international medical experiences for any individual able to front monetary and time costs ^{9,10}. The institutions promoting trips emphasize the purpose of the work abroad as altruism towards improving other's lives with a side note to fostering personal growth and opportunity of the participants ^{11,12}. Latent motives of participants include a sense of personal gratification, resume-building, and even requirements imposed by their institute of learning or application ^{5,13}. In essence, international medical outreach programs are centered around the experience of the visiting practitioner, though they effect the patient permanently.

With the medical outreach programs centered around the volunteer's experience, their experience with the community is flattened, one-sided, and incomplete to detrimental effects. The program in its very nature is designed, consciously or not, to ensure participants return home with a sense of satisfaction in their impact on a receiving community, reducing the community to a needy receiver of external care. As Dr. Eric Anderson, professor of public health, stated, "When people visit only the worst part of a country, they don't experience much beyond its helpless stereotype" ². The individual returns to their community, propagating the stereotype of the community they visited, warping the narrative of a dynamic community on an international front.

This perception has very real, tangible impacts. A negative image is a reduction in tourism, thus a deficit in the economy¹⁴; A perception of a dependent region is a reduction the region's power to voice their authority, thus a political undermining when it comes to one's choosing for their own lives; A stereotype of an "undeveloped" or "helpless" community is one that harnesses unpleasant peoples whom must be, by histories of such warped evidence and thinking, lesser in social status and worth than others who do not look like them across the world. These

perceptions of communities propagated by international medical outreach programs are very real threats to innumerate systems and people that know no borders.

Medical outreach trips have more immediate and direct effects on the community. With medical outreach trips providing temporary free aid, the local market of healthcare services becomes momentarily saturated, leaving local practitioners competing with international participants to earn a living and maintain their career. The local practitioner is pigeon-holed into a position of operating alongside participants at a deep cost to income, autonomy, efficiency, and cultural values or into relocating to an area where volunteers do not infiltrate, often nearby city centers where there are generally a sufficient number of healthcare workers or better-funded positions aboard¹⁵. In this system, the local practitioner either loses key aspects of their position in making room for visitors or is pushed into a new location, even outside their home country, forcibly contributing to the nation's brain drain¹⁶. Naturally, when the visiting participants return home again, the host community will be left with even fewer working professionals than prior to the program's outreach.

Unfortunately, even though the programs provide medical aid largely free of financial cost to the communities, the non-financial cost of international care remains impactful to communities. International participants often arrive with no cultural knowledge of the community and thus quickly dismiss culturally salient aspects of health as social fact¹⁷. The pluralistic system of folk and traditional healthcare are simplified to solely a focus on the biomedical^{2,18}. Holistic healthcare is lost; Culture is eradicated; Community members are coerced into a system that caters to only one of many aspects of health.

Even with biomedicine being emphasized in these international trips, the quality of biomedical care is generally performed by undertrained and unregulated laypersons. In fact, 53%

of companies arranging international medical outreach trips (catered primarily to pre-health students) indicated the only training participants received were on-the-spot or “just-in-time” training while in the country with which they intended to provide medical care, medications, and medical advice. The use of untrained volunteers to deliver such consequential care would never be allowed in the United States but are often unquestioningly utilized abroad under the implicit assumption that the individual’s country of origin and desire to help is qualification enough to provide care^{3,19}. This concept is rarely questioned, instead silently working as an unassumed social fact, only to be revealed in startling cases. One of the most famous and heartbreaking anecdotes that highlights this perilous social fact arose when a Virginian woman, Renee Bach, with a high school diploma began administering blood transfusions for 940 pediatric Ugandan patients between 2010 and 2015—105 of whom, the court ruled, died from malpractice^{20, 21}. The case, like the many that are similar, is indicative of a number of troubling truths: international medical aid generates a system with which internal biases about peoples can be demonstratively exploited in rapid and tangible ways where the consequences fall unilaterally. "I definitely went to Uganda with, you know, the mindset of a white savior," Renee Bach said. "I think it's impossible to say that any person coming from a developed country, such as America, going to a place that would be considered underdeveloped, such as Uganda, wouldn't have a bit of a white savior complex"²⁰. The international trips as a system thus latently reinforce a skewed notion to correlation between one’s country of origin and their inherent competency. The lack of volunteer training not only generates a system in which patients experience harmful malpractice, but further propitiates a lie about the competency hierarchies across nations. Though international medical trips implicitly assert it, a volunteer’s country of origin and ostensible sense of

beneficence does not serve as qualification to provide legitimate care to individuals on a medical nor sociopolitical front.

The issue of inauthentic care is furthered in the system's limitations for participants to regulate themselves. The nature of short-term medical trips in particular make it difficult to track the ongoing progress of a patient and the effectiveness of a given intervention. Embedded in this is the assumption--but lack of tangible insurance-- that the community received long-lasting, quality care. Evermore latent is the potential for a wary participant to become less precise in their aid, deliver less than quality care that will neatly stay with the community even as the participant departs and the community is not communicated with until the next trip is scheduled. It is a system that leaves participants with only beneficial aspects of the experience, and none of the potential consequences; It is a system that leaves community members as the only ones with "skin in the game" because they are the only ones who must continue to live with the ongoing effects of outsider intervention.

This system of perennial care translates to the larger meta-care of international medical programs who are ostensibly independent in their choice of comings and goings in the host communities. Though many medical missionaries in recent years have chosen to enter into commitment contracts ensuring their seasonal return for a set number of years to a community, there are no protections to ensure international medical care reliably and consistently returns²². On a macro-social level, the limited one-directional communication reinforces the provider-receiver dynamic present in international medical outreach programs. On a logistical level, the unilateral communication means host communities anticipate international aid, distribute resources funding and time accordingly, and may have to readjust such plans instantly when aid either does or cannot arrive. With the COVID-19 pandemic restricting travel, the severity of the

impact of immediate international aid withdrawal from a community have yet to be seen, but are nonetheless projected to be vast and wide-reaching²³.

And while the flippancy that can occur with international medical trips is harmful, the consistency of the trips may be even more detrimental by incentivizing communities to be in apparently poor health. The business of international medical outreach brings in a significant cash flow—about \$2.92 billion worth of labor, supplies, and donations (by U.S. standards) annually²⁴. It only brings in funds if the participants feel that their time was worthwhile. One of the most visually demonstrative ways to ensure the feeling of gratification and retain a customer base is to ensure that patients look like they need intensive help and that the participants are the only ones who can provide it. In one of the most cited examples, orphans in countries in Sub-Saharan Africa—and similarly perceived low-income countries like Nepal—are often the subjects of short-term medical missions. Participants from the global north arrive to take vitals, distribute antimalarials, provide funding, and educate healthy living practices to the thin and ill children living in the orphanage. However, a study in Nepal over two-thirds of the children are not orphans but instead trafficked or coerced by parents who receive small compensation for their child's presence at the orphanages^{25,26}. The study stated that it received reports from nonprofits that orphanage managers in Nepal reached out to traffickers to "bring them children" and similarly reported seeing evidence that orphanage owners deliberately ensure children appear thin and in destitute conditions to attract more aid and higher amounts financial donations. Similar accounts in eleven other countries emerged, including an account from an orphanage director in Haiti, stating "We have lots of money. But if we keep the children thin, when we send pictures to church groups in the United States, they send more money. If we send pictures of children who look healthy, they don't send as much money."^{26, 27} International

medical trips bring income to a community, but such trips only occur if the visitors feel that they made an impact on a community in need and share these experiences with others. A community that doesn't look like it needs medical help will not receive it or the funding that comes along with it, so it is behooving to those who benefit in the community to ensure that the participants see a sickly and needy community.

This addressing of the negative consequences of international medical trips is no condemnation of any one individual or group; It is also not to say that the host community is simply a receiving victim of a flattened dynamic. Medical outreach programs still provide care, create bridges, provide the opportunity for student's to reaffirm a commitment to working in low-resources settings in their home countries and abroad, and notably provide life-saving care in direct and indirect means ^{28,29}.

This is to say, however, that the system of international medical outreach can do better—and needs to. It points out the ironic establishment of improving health by depriving it. It speaks to a run-away system that can be altered to be more beneficial to all if reallocated at any place in its cycle. It simply needs a way out of the cycle and towards a system of community-driven, autonomous healthcare.

Naturally, there are significant hurdles in the way and the limitations to achieving such results. These challenges ought be considered as the resources available, desired, and required by the community in the development of their program to bridge international medical outreach programs with one that also promotes local control and develops autonomy.

1.3. Limitations of Program Development



Figure 1. Image of Rural Community in Ghana; Captured in 2016 and shared with permission from community and appearing community members in left-back; Image selected by Community Representatives as representational image of residential infrastructure the 26 partnering communities

In formulating the program to redirect the efforts of current system of short-term medical trips towards their goal of creating an autonomous healthcare system, the 26 partnering communities across rural Nigeria and Ghana conducted a community needs assessment to articulate the current resources and challenges they foresee in developing such a program: limited production and retention of healthcare professionals in the country, inaccessible healthcare systems that are centralized only to city centers, and sufficient means for connectivity with others and information through rural internet access. The resources and challenges within the community are not static, comprehensive, nor experienced within a lived experience in every way. They are, however, listed by what the members of the community as most salient to consider. This section is intended to provide a general overview of the current infrastructure

needs both giving rise to the specific requests of the community and the aspects of daily life that must be considered when addressing technological supports (*See Figure 1*).

The primary driver of both the proposed program's creation and the influx of international medical trips to the communities is a severe shortage of medical professionals within the rural communities. This is a trend seen across all rural communities in Ghana and Nigeria. About 70% of healthcare workers are located in city centers in Ghana, leaving just 30% of workers across all rural areas despite 44% of the population residing rurally in 2018^{30,31}. Similarly, 51% of individuals in Nigeria resided in rural areas despite an estimated 77% of healthcare workers in city centers or just 23% in non-city centers³². To put this into perspective, the World Health Organization reports that a healthcare force capable of attending to a population's basic health needs is functional with a ratio of or greater than 4 midwives and nurses and 2.3 physicians per 1000 people in the population^{33,34}. Nigeria's physician to population ratio is just 0.375 doctors for every 1000 people and 1.48 nurses and midwives per 1000 in 2009³⁵. Ghana's healthcare team is even slimmer at 0.09 physicians and 0.92 nurses and midwives for every 1000 people in its most recent report from 2010³⁶. Given the limited healthcare workforce overall, those able to treat in rural areas are even more scarce.

The distribution of health professionals is disproportionately centralized to urban city centers. The average distance between rural community center and nearest hospital or clinic in both Ghana and Nigeria is about 10km or a little more than 6 miles^{37,38}. More than 70% of all Ghanaians live over 8 km from the nearest health care provider in Nigeria³⁹. Particularly for potentially fatal but largely preventable mortalities like heart attack, sepsis, snake bite, and hemorrhagic trauma, rapid medical care access can dramatically increase survivability^{40,41}. Ideally, the time window to receive emergency medical care for these conditions is within thirty

minutes of incident or less⁴². The average time to the hospital after incident exposure for rural patients is nearly eight times this optimal window at a more than four hours for response time^{39,41}. Unsurprisingly, once under medical care, survivability starkly increases across all medical fields. This fact is largely understudied in rural Nigeria and Ghana but was greatly supported by a prospective study conducted in 2000 that ensured rapid access to healthcare services for participating pregnant women in rural Ghana. The study found that providing healthcare that was slightly closer to rural communities in Ghana reduced maternal deaths by 50%, neonatal deaths by 18%, and stillbirths by 27% within the year⁴³. The length of time to care is exacerbated by limited mobility of healthcare professionals away from the hospital coupled with rural communities' minimal transportation. One participating woman noted the challenge of otherwise accessing healthcare from her rural community, stating, "These days, it is a joy to deliver in a hospital... But the problem is that there is no transport... Here, the roads are so bad. You wonder whether government cares about us." Another representative hinted at the complex issue of infrastructural challenges, claiming, "Even sometimes the transport cost during emergencies is too high and we are unable to afford [it]. When you ask the vehicle owners why they charge such fares, they tell you the roads are bad so it is not their fault⁴³" And while emergency medical situations highlight the issues of limited access of rural community members to healthcare, the challenges of transportation and connection equally limit the amount of well-person checkups that can occur to maintain health on a regular basis, the refills or prescriptions an individual may account for, and the mental health services that can be accessed⁴⁴.

As such, the issues with the access of healthcare in rural communities can be eased by either increasing transportation access to city centers—and the auxiliary components of safe travel like paved roads, accessible and maintainable vehicles, and consistently safe roadways-- or by

creating pathways of access that allow for the redistributing of mobile healthcare workers to remain in and treat rural communities. The 26 partnering communities chose the latter and requested that the practitioners be closer to the communities, even if one practitioner is mobile between multiple communities on a rotating or on-call basis. As will be outlined in section 1.4 below, the mobile practitioner will serve house-calls where needed with their equipment in tow so that no patient will require transportation or risk the increased likelihood of transmission of a contagious disease to other members of the community within a hospital or clinic. Naturally, such contacting of the mobile practitioner will require internet connectivity.

Internet connectivity is budding within rural Ghana and Nigeria, though it's still largely cost-prohibitive. Current international mobile phone providers have already placed more than 840 km of fiber optic cable throughout Ghana under Google's CSquared company in conjunction with Danish DANIDA funding⁴⁵. Though these efforts may be indicative of future cost-effective programs, the current status of consistent WiFi for all rural communities is logistically out of reach. The price for 1GB of mobile data volume is just over 2 percent of an average monthly income, a steep price for most community members especially for a highly "patchy" connectivity⁴⁶. Additional consistent, cost-effective, and accessible modes of remote connection and internet access require more exploration.

1.4. Community Request: Towards a New Framework of Internationally Collaborative Medicine

The various ideas for the creation of a healthcare program to address healthcare needs, mitigate brain drain, and optimize international aid amalgamated into five cohesive aspects outlined below as created by the partnering communities (*See Figure 2*).

FIVE
COMPONENTS OF

Proposed Program

toward community-driven and community-centric international healthcare models

Designed, created, and requested by 26 partnering communities for the development of an autonomous, holistic, and adept healthcare program in their rural Ghanaian and Nigerian homes

01 Support Local Students

Individuals who are from a community have a greater chance of remaining to serve and providing care that is salient to their community members. The program seeks to support the development of medical professionals from and for their community of origin through scholarships and incentives of geographical retention.



02 International Partnerships

U.S. Institutions, particularly teaching hospitals, will provide an added, optional resource for teaching hospitals in Nigeria and Ghana if requested. This seeks both to supplement the current teacher shortage in Ghana and Nigeria health professional schools and to encourage a robust perception of a dynamic narrative with each country.

03 Collective, Collaborative Medical Trips

Framed like current medical outreach programs, visiting international professionals will work with local practitioners and students as supplemental guides. This point seeks to emphasize mutual learning amongst all program participants as well as the authority and responsibility of patients' wellbeing being that of local, primary practitioners at all times through each "rotation" of visiting participants.



04 Holistic Technological Support

In developing a comprehensive program centered around autonomy, the program will encourage more auxiliary health professionals to share their insights both virtually and in person through joining collaborative teams alongside the medical trips. This is especially related to discussions of novel health technology.

05 Independent Production

Eventually, all supplies will be produced locally and with an emphasis on the practitioner's ability to move to the patient.



Figure 2. Infographic of Proposed Program's five main points of emphasis as designed by 26 partnering communities. Legal and technological precedents explored in this thesis primarily correspond points 02, 03, and 04.

As one (1) of five main points, the program will support students with attending the medical profession of their choosing. The medical professional schools will be the primary educators of the students going through training (for nursing, EMTs, midwifery, etc), but the deficit of medical educators will be supplemented with partnering U.S. institutions.

(2) Partnering U.S. schools and teaching hospitals will remotely communicate with local students, weighing in on their questions and case. For the students in Ghana and Nigeria, the partnership will provide a diverse range of perspectives on cases they are currently working on as a student professional or as a student observer. For the U.S. institutions, the partnership provides a network of case studies for diseases not often seen (one of the primary reasons individuals from the U.S. go on international medical trips specifically to rural communities in developing nations). On a whole, the communication will be divided up amongst many participating partners so that students in Nigeria and Ghana receive frequent communications from various U.S. partners, but so that U.S. partners may only communicate with their international partners perhaps once a week or once a month-- likely taking only the allotted time of "This week's case study" module already occurring via textbooks in most U.S. medical schools and teaching hospitals.

(3) Come summertime (peak international medical trip season), partners will be welcomed to return to their typical medical outreach communities. The emphasis, however, will be placed on working alongside and collectively teaching and learning from local students-- similar to the relationship between residents and attendings in U.S. residency programs. This serves as both a way for locals to receive healthcare and, more importantly, for local students to practice providing care for their own community throughout the summer. While each visiting U.S. team of healthcare professionals will be present in the host nations for an average of two

weeks, another U.S. team will arrive approximately three days before the team's departure-- providing a "rotation" of different medical institutes for differing perspectives and bedside manners for local students' exposure to many different medical professional styles.

(4) Importantly, unlike current programs, this novel program will encourage U.S. medical technicians to join on these two week trips to help educate on medical technological usage, maintenance, and potentially production so that each community has skills needed to engage fully in their own desired healthcare.

(5) Finally, the program hopes to eventually provide seed funding for local entrepreneurs to create their own production of medical supplies-- specifically medical totes for healthcare professionals. The totes will be akin to a U.S. EMT's tote, carrying a mini-mobile clinic specific to their profession (e.g. a midwife carries umbilical cord clamps; a primary care physician packs a pulse-ox and blood pressure cuff). The mobile nature of the healthcare professionals allows for a period of time where they do not require a brick-and-mortar facility, but rather can travel door to door as requested by their community members. This mobile nature not only eases the logistics and impacts of immediate clinic creation, but also provides a system that mitigates the transmission of infectious diseases by encouraging ill individuals to remain in the comfort of their own abodes through their recovery and healthcare professional check in. It further provides the opportunity and incentive for healthcare professionals who wish to open their own practice-- and community members who desire to develop a larger tote business--to have the autonomy to do so.

In the simple mission statement behind it, the proposed program seemingly seeks to redirect the current international medical outreach programs predicated on relative imposition in the community towards a helpful program wherein the communities that face the burden of

international visitors may rightfully hold the power of their fate, set boundaries to preserve holistic health (mental, spiritual, relational) as they find salient, and eventually build a closed system for the option of complete autonomy encompassing all health systems.

With the ideals outlined, the scope of this essay will focus on the healthcare laws and, in lesser extend, the technological precedents that ought be explored to describe the feasibility of the proposed project's points two and three regarding international medical partnerships virtually and in person--and a brief overview of holistic technological support. While each point of the proposed program is significant to the success of the program, this thesis will focus primarily on legal and technological precedents set by points 02 for international partnerships and briefly for point 04 concerning the technology available for connection between international partnering countries. Ideally, two main questions will be answered. Firstly, is the proposed program is logistically possible given the current technology available and legal permittance? Secondly, in intaking the current law's requirements that relate to international healthcare and technology use, what further steps must be accomplished in anticipation of refining and implementing the proposed program? By the completion of this thesis, readers will have an estimated framework of how the proposed program may best proceed in its development given the legal and logistical precedents surrounding it.

2. Methods

There are two distinct reviews of information: current laws of international healthcare information to support the partnership between the U.S. and Ghana and Nigeria; and existing technologies and precedence of technology used in international remote communication. Given the necessity of laws allowing for such a program to occur, the majority of this topic's scope

focuses on the international policy review (See Figure 3). Subsequently, literature reviews for technology and technological precedents are influenced by the legalities pertaining to them for both partnering countries.

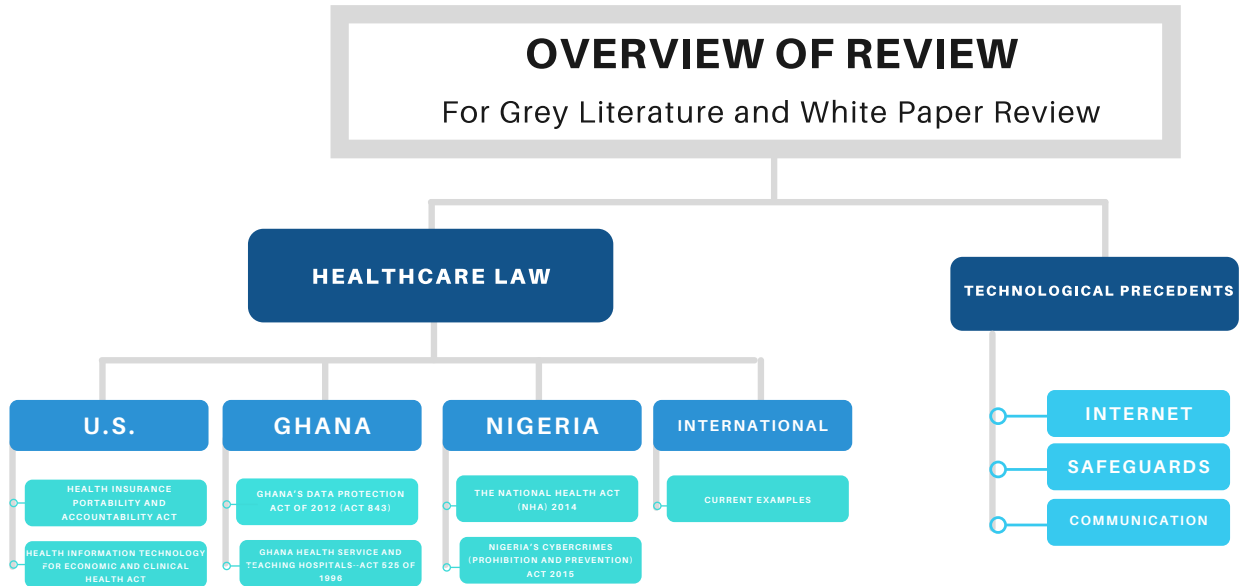


Figure 3. Infographic of Overview of Grey Literature Review and White Paper Review explored in this thesis

2.1. Current Healthcare Laws

The intersecting countries requires a distinct literature review pertaining to laws of each, overarching international laws, and previous precedents set by examples of similar multinational collaborative medical partnerships.

The U.S. holds well-documented policies for the protections of private health information of its own citizens, but the subtle legalities outlined for U.S. citizen's engagement in other country's medical cases ought to be thoroughly pursued. A grey literature review of current federal laws like HIPAA and HITECH are reviewed along with their white papers. This was accomplished through thorough review of HIPAA 1996, HIPAA, P.L. 104-191 and its most recent 2019 update as well as Health Information Technology for Economic and Clinical Health Act HITECH, Title XIII of Division A of P.L. 111-5. The laws are reviewed with specific

consideration to legal frameworks encouraging or blocking U.S. citizen access of personal patient information exchange from non-U.S. partnering countries. These laws are reviewed in their entirety with no known exclusions, in addition to the HIPAA Administrative Simplification for summary. Such components are intended to explore overarching guidelines for U.S. engagement. On a similar but more protective personal note, common tort laws in reference to medical malpractice are explored in a brief grey literature review.

On the side of releasing patient information to partnering countries, Ghana's Data Protection Act of 2012 (Act 843). The grey literature review encompasses the act in total, with special focus on sections "Right of Individuals." Ghana's multi-inclusive Data Act encompasses a diverse set of information, some of which is relevant to the protection of patient information, but which does not necessarily address all necessary aspects of potential considerations for the program. To create as robust an understanding of Ghana's protections for its citizens, a further literature review is conducted through Ghana's primary health service agency: The Ghana Health Service (GHS) is a Public Service body established under Act 525 of 1996. The mandates and functions outlined are reviewed with specific focus on essence of the laws through the "Code of Ethics."

Nigeria's policies also undergo extensive grey literature review. The National Health Act (NHA) 2014 is reviewed through white papers, with Section 28 (2) reviewed in full for exploration on the details of authorization for patient's dispensing of their information for purposes of research, studying, or teaching. A final review of Nigeria's Cybercrimes (Prohibition and Prevention) Act 2015 is detailed in relation to the program's utilization of remote technologies to convey private patient information.

After a complete review of independent country laws pertaining to the receiving or transmitting of patient health information, a global perspective on policy is reviewed. A literature review pertaining to precedents from current international medical outreach groups is intended to analyze any potential governances for medical sharing between countries. It also serves an exploratory function to map potential restrictions and regulations the program must follow, steps or permits it must ensure, and provide guidance for possible regulating bodies.

These modulated reviews intend to provide a robust depiction of the innerworkings of existing frameworks. In understanding the mechanisms at play, the proposed program may both be ascertained as feasible for implementation and be guided and shaped through adherence to such legalities. This knowledge in turn holds further insight into the requirements for the technological components of the program's interface.

2.2. Precedent of Remote Technologies

The program's core function is underlined by a strong, virtual communication across countries. The logistics of this task are contingent on the availability and reliability of resources in each partnering country, the technology's level of maintenance and repair, and the ease of user interface that requires minimal education for use. The implementation of technology that satisfies these conditions is abundant and can serve as a model with which this program's technology may also implement or build upon for its own need. A literature review coupled with grey literature review of websites for innovations will be conducted in search.

3. Results

Table 1. Summary Table of Applicable Laws and International Precedents for Proposed Program; *International Code of Medical Ethics is not a law, but a voluntary adoption of set principles for morally upstanding medical practices across borders

Country of Origin	Law	Finding
United States	Health Insurance Portability and Accountability Act	Two distinct options for sharing relevant information occur with different protections for patients and practitioners: <ol style="list-style-type: none"> 1. Sharing patient-identifying information at the patient's explicit and written consent to a specified third party. This data requires specific safeguards. 2. Anonymizing and de-identifying patient information to become training and educational information that does not require patient consent for sharing and may be shared liberally to many parties without specification.
	Health Information Technology for Economic and Clinical Health Act	Patients are protected in their right to access their own health information. Further, they are ensured timely notification should any of their protected health information be breached.
Ghana	Ghana's Data Protection Act of 2012 (Act 843)	Two distinct options for sharing relevant information occur with different protections for patients and practitioners: <ol style="list-style-type: none"> 1. The patient may authorize the sharing of their information that includes identifying information. This data would require safeguards to protect the patient including notifications transference to a new party with description of which data is to be shared, why the data is to be shared, and with whom the data is to be shared with. Certain data, however, may never be shared including individual's religious or philosophical beliefs, ethnic origin, race, trade union membership, political opinions, sexual life, or criminal behavior. 2. The data controller may share information pertaining to the patient's case with patient-identifying information omitted that does not require patient approval.
	Ghana Health Service and Teaching Hospitals--Act 525 of 1996	Teaching hospitals are independent from the regulations set by the Ministry for government health centers. The independent, internal system may grant credence for the expansion of the proposed program to generate scholarships for local students who agree to train and later teach in the teaching hospitals.
Nigeria	The National Health Act (NHA) 2014	Any updates to the healthcare system, including newly-acquired health technology or additional programs such as the one proposed, requires prior approval from the National council in Health. The Ministry will continue to monitor the healthcare quality, confidentiality, and security.
	Nigeria's Cybercrimes (Prohibition and Prevention) Act 2015	Breaches in patient health information and breaches in patient-practitioner confidentiality direct potential penalties to the service provider.
International Precedents	International Code of Medical Ethics*	Healthcare workers ought morally abide by four main underlying principles in all of their work without prejudice: <ol style="list-style-type: none"> 1. Obligation to care 2. Respect of patients' consent 3. Patient information confidentiality 4. Serve in patient's best interest

3.1. Current Healthcare Laws

3.1.1. Originating in the United States

3.1.1.1. Identifying Law Applicability

Current laws that have originated within the United States cannot be assumed to be applicable to the framework set forth by the Ghanaian and Nigerian community members; This is to say that it is not initially reasonable to assume that laws that pertain to U.S.. citizen's protected health information (PHI) applies to Ghanaian and Nigerian citizen's PHI that is being analyzed on U.S. soil (*See Figure 4*).

Thus, prior to examining U.S. law's guidance on the communication of Ghanaian & Nigerian PHI, it must first be confirmed that the current laws originating within the U.S. do in fact hold precedence. This fact of relevance of the laws is explicitly outlined within HIPAA's "covered entities and business associates" section 45 CFR 160.103⁴⁷. In essence, this section states that the act does not explicitly regulate the patient nor their health information, but rather regulates the covered entities that interact with the PHI. Such entities relevant to this project are the healthcare providers like the doctors who are transmitting patient (even international patient) health information in an electronic form⁴⁸.

TERMS AND ACRONYMS

As defined throughout this thesis



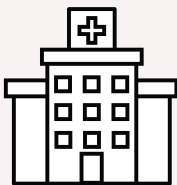
- 1 PROTECTED HEALTH INFORMATION (PHI)**
Materials that articulate a patient's health status and identity that must be handled with confidentiality and supported by safeguards to ensure their security



- 2 ELECTRONIC HEALTH RECORD (EHR)**
Digital file containing secure medical information related to a patient's health status and identity, often including patient contact information, vaccination history, medical scans, diagnosis, prescriptions allergies, and medical history; Also referred to as Electronic Medical Record (EMR).



- 3 PRIMARY PRACTITIONER**
The health care provider that physically engages with the patient; This provider is local to the patient and assumes responsibility for the patient and patient's case even in the event of international practitioners input



- 4 ENTITY**
The party, typically a hospital, clinic, or practicing group, assuming responsibility under law or informal agreement to complete a specified action

Figure 4. Terms and Acronyms of frequently used terminology in this thesis

3.1.1.2. *Health Insurance Portability and Accountability Act*

With the applicability of the Health Insurance Portability and Accountability Act (HIPAA) established, further investigation into the relevant laws for undertaking the program

were assessed in relation to the Ghanaian and Nigerian patient's rights under the Act, the rights and protections of the U.S. practitioner in relation to the Act, and the potential rights of the primary Nigerian or Ghanaian practitioner that may be plausibly extended implicitly through Act.

3.1.1.2.1. Health Insurance Portability and Accountability Act for Patients

Under the precedent of HIPAA, any U.S. entity carrying out an interaction with PHI is held accountable for said PHI⁴⁹. The act outlines a current framework of patient protections and information safeguardings. These safeguards require one of two possibilities for transmitting PHI. The first possibility of transmitting personal health information electronically allows for the select sharing of the patient's case if it includes any information that could be connected to identify the patient in anyway, including any of HIPAA's eighteen listed personal identifiers (*See Figure 5*). These personal identifiers include patient's name, geographical identifiers, personal dates, contact information, account numbers, biometric identifiers, full-face photographs, and any uniquely identifiable codes^{50,51}. If any of these identifiers or other information that allows for the identification of the patient are to be shared amongst practitioners, the patient must first authorize written permission to share their PHI⁵². In this option, the patient may choose to extend

their case file with their identifying information to the overseas practitioners.

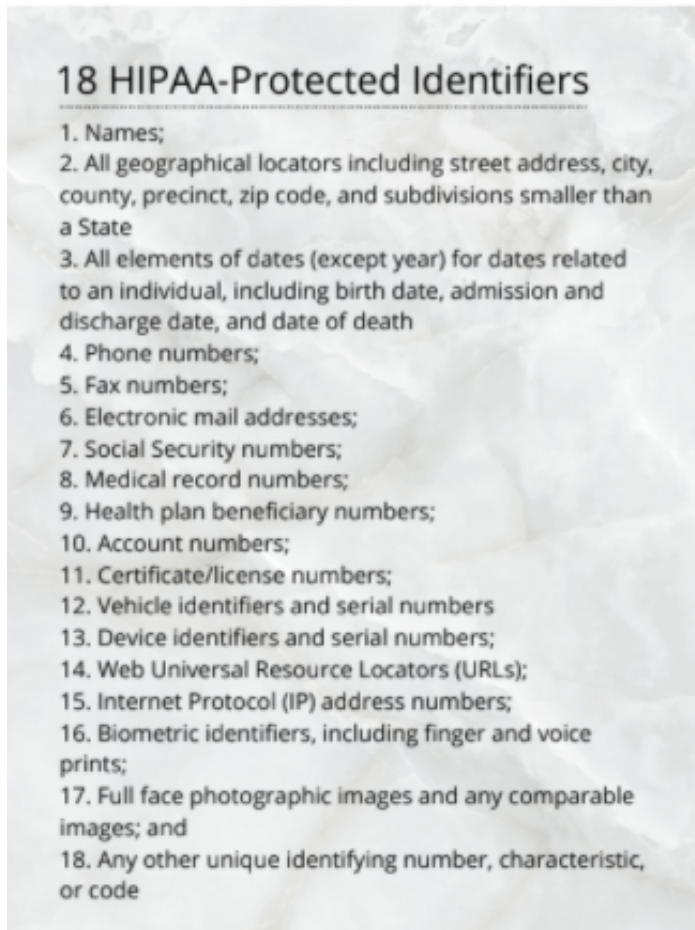


Figure 5. Eighteen patient identifiers as protected by the Health Insurance Portability and Accountability Act (HIPAA), United States, 1996.

The second option for sharing information excludes the sharing of patient identifying information, thus not requiring the patient's authorization. Under this method, the only information shared would pertain to the medical relevancy of the case and not to the holistic inclusion of the patient's self. The relevant medical information that completely anonymizes the patient may be shared freely with the U.S.-based practitioners under the grounds that the information is for teaching and training. Thus the patient's information is not shared and their consent for sharing is not required.

3.1.1.2.2. *Health Insurance Portability and Accountability Act for U.S.
Practitioners*

Under the first possible option that allows for the sharing of the patient's information, the U.S. practitioner would be required to await a signed authorization of permission from the patient. With permission from the patient, the receiving entity of the PHI would be legally obligated to provide necessary protections to ensure the information is safeguarded. Both physical and electronic protection of the data must be ensured and legal responsibilities would accompany the proper sharing and storing of the PHI.

Under the second provided option where the medical information is utilized for teaching purposes, the information may be shared more freely between institutions and with students. The entities would not require patient permission nor be obliged to safeguard or assume legal responsibilities for the information^{54,55}. The information pertaining to the medical aspects of the case could be transmitted directly to U.S. entities without patient involvement, paperwork, or required technological safeguarding software.

3.1.1.2.3. *Health Insurance Portability and Accountability Act for Primary
Practitioners*

In the event that identifiable patient information is transmitted to the U.S., the primary practitioner in Nigeria or Ghana would be required to gain the patient's consent. Naturally, the practitioner would need to describe the rights of the patient and the meaning of their permission for their PHI to be shared. The primary practitioner would be required to send this documentation alongside the patient's file. Despite this work being done by the primary practitioner, the legal onus of consent required through HIPAA would still remain on the U.S. entities.

3.1.1.3. Health Information Technology for Economic and Clinical Health Act

With HIPAA establishing a precedent for PHI exchange, the Health Information Technology for Economic and Clinical Health Act (HITECH) expands on the precedent of safeguarding electronic transmittance of patient's health records. Because the proposed program intends to utilize electronic health records as its sole form of transmittance, the exploration of HITECH's guidelines must be adhered to by U.S.-based entities.

HITECH's original intention was to incentivize medical institutions to more aggressively adopt electronic health records (EHR) while providing a legal framework for the security of these EHR. The framework of protections are extended to all those covered under entities of which are subject to HIPAA⁵⁶. Meaning that even international patients' PHI are subject to the same protections of HITECH of any U.S. citizen's PHI if their information is lawfully held by a U.S.-based health entity.

The same laws of securing patient's PHI exist under HITECH. Notably, should a patient's PHI be breached, HITECH requires the entity to immediately notify the individual of the breach⁵⁷. The patient is also covered in accessing a copy of their PHI in an electronic format⁵⁶.

3.1.2. Originating in Ghana

3.1.2.1. Ghana's Data Protection Act of 2012 (Act 843)

Ghana's Data Protection Act intends to protect individual's privacy of personal data and to regulate the process in which said data is collected, stored, utilized, and shared. While the act speaks generally to all protected personal data, its reach extends to encompass patient information as well. In summation, the act seeks to safeguard the following eight protected factors for every individual: accountability of shared personal information, lawfulness of

processing, insurance of the specification of purpose of sharing personal data, compatibility of further processing with purpose of collection, assurance of accurate quality information, transparency in sharing personal data, insurance of data security safeguards, and consent in data subject participation⁵⁸ (See Figure 6).

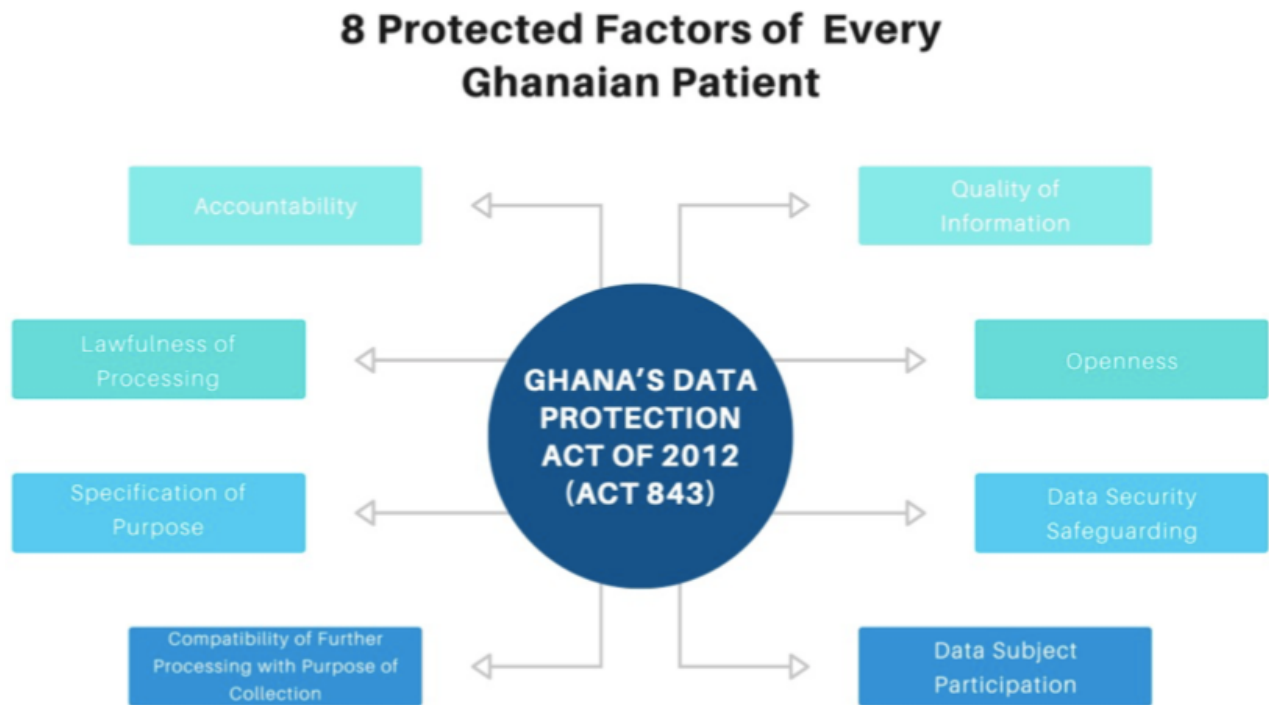


Figure 6. Eight Protected Factors of Every Ghanaian Person per Ghana's Data Protection Act of 2012 (Act 843)

Under this Act, health information is required to be upheld as confidential between the patient and the health professional. The patient health information may be shared if it is deemed as aiding in the purposes of preventative medicine, medical diagnosis, medical research, provisions of care, or to aid in treatment. Such sharing of patient information requires appropriate safeguards for the rights and freedoms of the patient⁵⁹. In each step of transmission, the patient's rights must be observed as outlined in the depicted process below.

Transmission of patient information by electronic or other means requires a written notice, request, or application that is both legible and accessible for potential later reference⁵⁹. The application originates from the data controller, “a person who either alone, jointly with other persons or in common with other persons or as a statutory duty determines the purposes for and the manner in which personal data is processed or is to be processed,” which may be the primary practitioner in this instance⁶⁰. The data controller in turn holds the obligation of informing the data subject—the patient—of the sharing of their information⁶¹. The controller must give the data subject a description of which data is to be shared, why the data is to be shared, and with whom the data is to be shared. This processing, however, is null and void if the information contains identifying information about the patient. In such an instance of sharing identifying health information, the controller is required to not only describe the request of sharing of patient information, but to ensure approved consent from the patient as well. If the patient denies the request to share information, the controller may choose to omit or delete names and identifying information from the personal data and share it without further patient approval⁶¹.

This process of omitting of names and sharing of data without patient approval carries important exceptions. Data may not be shared in any form if not supplied with patient approval if the patient is a child under parental control according to the law. In all methods of sharing patient’s data, certain data is never permitted to be shared; This prohibited data includes the individual’s religious or philosophical beliefs, ethnic origin, race, trade union membership, political opinions, sexual life, or criminal behavior. Non-prohibited patient information may be shared either with patient consent or with the omittance of names and personal identifiers and no consent required.

These guidelines remain the same even with international entities. Section 87 of the Act entitled “International Co-operation” grants authority to share necessary data to lawful international participants who agree to uphold a set of obligations intended to safeguard the information⁶². The international participant must not sell, disclose to an unauthorized individual, nor commit an offense with the patient’s information⁶³. The international entity is thus subject to uphold the same legalities as local requests aforementioned and the patient is protected by the same local safeguards previously outlined.

3.1.2.2. Ghana Health Service and Teaching Hospitals--Act 525 of 1996

Given that the proposed program intends to operate in partnership with Ghanaian teaching hospitals, the guidance surrounding teaching hospital’s ability to support the program ought be explored. Currently, only one federal presiding act regulates teaching hospitals in Ghana. The Act of 525 of 1996, also known as the Ghana Health Service and Teaching Hospitals Act, provides federal guidance for how teaching hospitals are required to engage in the workforce and monitor their internal systems. For the purposes of fulfilling the proposed program’s intended use of teaching hospitals, Section 35 and 36 of Act 525 is heavily investigated.

Section 35 outlines the nature of the desired intent behind teaching hospitals’ function and goal. In essence, it also outlines the rights to autonomy that the teaching hospitals are entitled to⁶⁴.

Section 36 discloses the limitations of a teaching hospital’s function. This section is investigated to ensure that the proposed program is within the rights of the teaching hospital to carry out. In subsection (2), the Act prohibits a contract that exceeds a monetary threshold determined by the Minister in that case in time⁶⁵. No other relevant prohibitions were outlined.

3.1.3. Originating in Nigeria

3.1.3.1. *The National Health Act (NHA) 2014*

The National Health Act (NHA) establishes the framework for the regulation, development, and management of the current national healthcare system and articulates standards that all health systems must abide by.

Section 12 and 13 discuss establishment and regulation of health establishments and technologies, notably, that each must possess a Certificate of Standards in order to operate an establishment, acquire health technology, or increase beds in hospital^{66,67}. This section indicates that prior approval must be received before altering or adding any new components to a current healthcare system by processing the proper paperwork and authorization.

Sections 18 and 19 articulate that the health center must abide by the federal ministry, state ministry, or local government ordinance^{68,69}. This further indicates that the abiding health services must follow suit of quality requirements for health technology and its delivery and receive pre-approval by the National council in Health. The system will also monitor the health services.

Section 21 further enumerates the Ministry's authority in monitoring health personnel. Every health worker must implement measures to minimize injury and damage to person or property, mitigate disease transmission⁷⁰.

Section 26 highlights the confidentiality between patient and worker. This PHI may be shared under numerous circumstances including with written consent from the patient⁷¹. Section 27 states that a healthcare worker may disclose a patient's personal information to another healthcare provider if it is with legitimate purpose in the scope of the interest of the patient's care⁷². Similarly, Section 28 articulates that the healthcare provider may examine another patient's record if it may aid in the patient's treatment or for purposes of studying, teaching, or

research if authorized by the relevant ethics committee or head of health. However, if no personally identifiable information is transmitted, the authorization is not required to share the patient's subsection of their record⁷³. Section 46 permits without prejudice the right for any Nigerian to seek medical investigation or treatment anywhere within or outside Nigeria⁷⁴. The ministry of Nigeria will only intervene in such treatment abroad with referral by the medical board with due diligence and recommendation from the Minister or the Commissioner.

3.1.3.2. Nigeria's Cybercrimes (Prohibition and Prevention) Act 2015

With the ability to transmit information afforded by the NHA of 2015, the ability to transmit PHI securely across borders ought be pursued. The Cybercrimes Act of 2015 speaks generally to the types of data that might be transmitted and the penalties for breaching data confidentiality⁷⁵. Section 29 outlines that the penalty for breaching confidentiality lies with the service provider⁷⁶.

3.1.4. International Precedents

Many existing programs that connect healthcare across countries have generated precedent for the policy frameworks the proposed program is likely to similarly abide by. It should be noted, however, that the only conventions that regulate medical ethics at an international scale exist during wartime and pertain to humanitarian protections; In times of peace, certain international codes attempt to capture the underlying essence of a great number of domestic medical policies, but do not serve as obligatory regulations with legal repercussions. The most prevalent of the recognized codes widely honored by current international medical trips originates from the World Medical Association in 1983 entitled an International Code of Medical Ethics⁷⁷.

The code of ethics draws from previous international texts such as the Geneva Declaration of 1948 that outlines healthcare practitioner's dedication to humanitarianism in medicine thus a care for all peoples; the Nuremberg Code of 1947, which concerns human subjects for medical treatment and experimentations; and aspects of the Geneva Convention of 1949 regarding the right for the wounded and sick to receive treatment. The International Code of Medical Ethics comprises four main principles of health worker obligations that are deemed ethically unsurpassable regardless of geographical or political location ⁷⁸⁻⁸⁰.

The inclusivity of the code is highlighted in the first principle: Obligation of care in which healthcare workers are morally compelled to act in the exclusive interests of the patient without discrimination or prejudice to their financial, political, or heritage groundings. In balancing this obligation for a practitioner to act, the second code relates the requirements for a worker to cease authority to act in the case that a patient denies care. This second obligation spells the duty of a practitioner to respect and uphold a patient's consent in the course of their treatment. Similarly, the practitioner has a duty to ensure the third principle of medical confidentiality. This principle is tempered by rules set in the location of treatment, meaning an overlay of legal requirements set by the local governing body. As such, this principle often loosely includes common legal aspects of confidentiality including a mandatory reporting of privacy breaches. Finally, the fourth principle speaks to a practitioner's scope of practice always being used for the best interest of the patient. Conjunctly, a practitioner must never overstep the scope of their competencies. As a whole, the healthcare worker must do their best by the patient in balancing the risk and expected benefits of any health-related engagement ^{77,79}.

This International Code of Medical Ethics has been voluntarily adopted by many current international medical outreach organizations. Among them include household names such as

Médecins Sans Frontières/Doctors Without Borders, United Nations Children’s Fund (UNICEF), Joint United Nations Programme on HIV/AIDS (UNAIDS), International Organization for Migration (IOM), and the International Committee of Military Medicine (ICMM) ^{77,81} . While each organization abides by its own obligations and the laws and sanctions of the geopolitical landscape they work in, the base principles of International Code of Medical Ethics remains central to the aid provided in each program.

3.2. Precedent of Remote Technologies

The policies presented are required to be abided by for the proposed program to exist; The technologies that aid it, however, are used to support its ability to thrive. While the program may exist with current infrastructures, the added technologies would allow it to reach a greater potential and with significantly more ease. This section will briefly explore technologies that may aid in the program’s interests. The specific high-profile technologies explored here were selected by the 26 partnering communities with intentions of serving as a partial environmental scan for current technologies that may provide for some of the proposed program’s communication needs.

3.2.1. Internet

The participating communities have an established Wi-Fi to some extent, but reliability and cost-efficiency is the most intensive need. It is likely that the current connectivity is insufficient either in either strength of satellite signal or in distance between satellite and receiver⁸². The need for internet is thus to create a network that is either closer to the communities or stronger to reach the community—both with lower energy required—or through achieving connectivity in a novel way.

3.2.1.1. Google Loons

Google Loons attempted to bring internet connectivity worldwide, particularly to rural and remote areas, through mobile high altitude balloons carrying LTE-enabled antenna within the stratosphere.

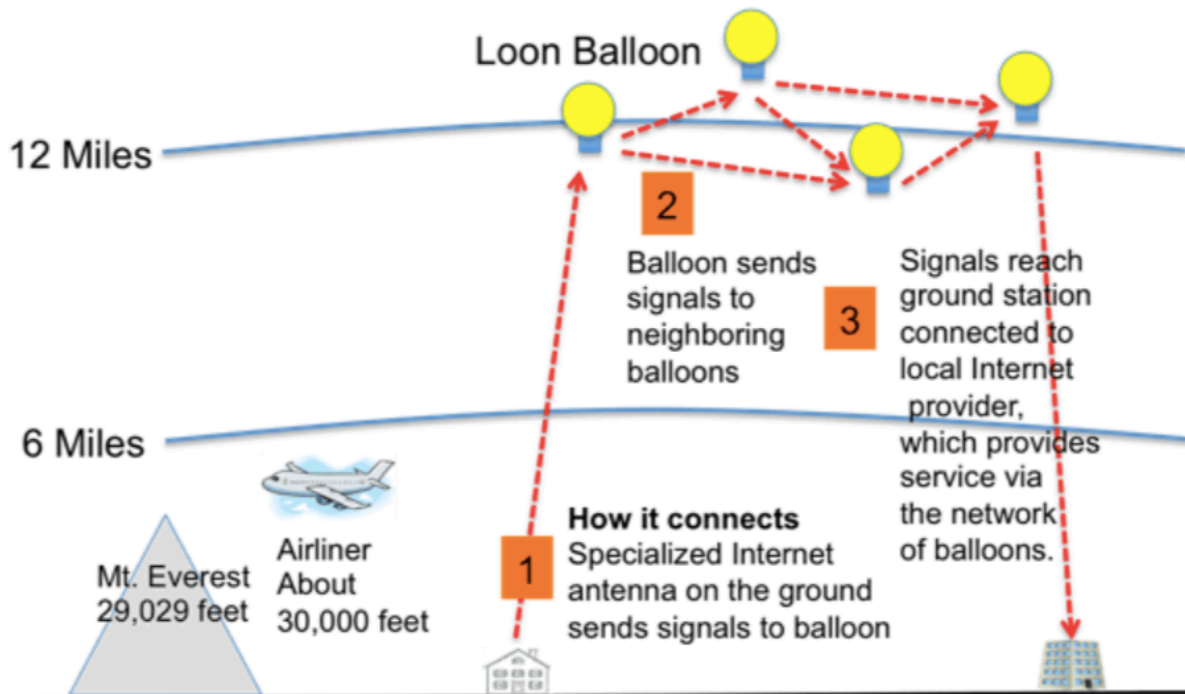


Figure 7. Graphic Depiction of Google Loons Overview. Image courtesy of Mercury News, 2016 ⁸⁶.

The technology is comprised of two parts: the flight system and the internet-permitting payload system. The flight system is most akin to an advanced hot air balloon. Two polyethylene fabrics the size of a tennis court layer over each other to form an interior and exterior balloon. Gasses exchange between the interior and exterior balloons to give lift or drag to the balloon, altering its altitude as needed. The internet-permitting system is comprised of all functions necessary to serve as a mini-cellular tower⁸³. Unlike cell towers that are fixed to the ground, Loons' system captures the added complexity of providing service when both the transponder and receiver being in constant motion. Loons transponder generated a greater signal, capable of delivering internet services over 11,000 square kilometers; exceeding a regular cell tower's coverage by over 200 times⁸⁴. An added complexity is the interference from obstructions-- such

as aircraft, bird migrations, or storms--that may occur between the receiver and transponder. To account for these potential obstructions, Loons are designed to communicate with one other, one loon seamlessly taking over when the other cannot reach the receiver (*See Figure 7*). This multiplicity provides a covered network that can reliably produce accessible internet coverage. The internet coverage presented was presented to partnering rural communities free of cost per its mission to provide accessible internet services for all. In the eight years that the loons were deployed, they were able to connect nearly 100,000 people to stable internet for free⁸⁵.

The affordable nature of Loons for partnering communities, however, did not translate to affordable costs for production. In January of 2021, Loon's parent company announced the closing of Loons development and deployment as a direct result of unmet production costs in a forward-moving sustainable way⁸⁴. The technology and innovative idea, however, remains for future precedents to initiate a new, sustainable internet connectivity service for rural areas.

3.2.1.2. SpaceX Starlink

A novel and sustainable internet connectivity service in fact did emerge, utilizing some basic tenants of Loons combined with tried and true methods of existing technology like satellites. Consisting as a series of mini-low-orbiting satellites, Starlink satellites communicate together to provide global coverage of internet⁸⁷.

By 2019, the first 60 satellites had been deployed, covering about 700,000 paying customers. By 2021, over 1445 satellites are in orbit, providing internet coverage to 10,000 users with many more launches planned for the remainder of the year⁸⁸. Starlink provides accessible, long-term, and cost-effective internet coverage solely to partnering geopolitical bodies primarily within North America, Europe, and Oceania. While the business stated in 2019 that it begins to

make its way to the continent of Africa by extending its services to South Africa, the full extent of its potential implementation northward towards Ghana and Nigeria remain unknown⁸⁷.

3.2.2. Secure Connection of Data

The secure transference of protected health information in a rapid and user-friendly system is essential for the proposed program. The U.S. currently utilizes secure electronic medical records software internal to and paid by their health system. The secure files can be easily transferred across other systems of electronic medical records. Similarly, since 2017, Ghana's Chief of Staff has begun implementing a nation-wide electronic medical record system executed by Lightwave eHealthcare Services. In March of 2021, President Nana Addo Dankwa Akufo-Addo affirmed the progress of the secure digitalization of patient records, stating in the first State of the Nation Address of his second term that 23 of the major health centers and teaching hospitals are already effectively utilizing the E-records and local clinics are continuing development on its front⁸⁹.

Nigeria, however, currently hosts no electronic medical record system, opting for secure paper records transferred by hand. While there is significant push from advocates in the healthcare, national security, and public sector for Nigeria's adoption of an electronic medical record system, no confirmed plans have been accepted by government⁹⁰. Of many proposed options for individual healthcare facilities to utilize a digital record system, the most applicable to the program's interfacing needs is OpenEHR. Pronounced Open-Air, OpenEHR is vendor neutral software that securely stores protected health information and is capable of easy, multilingual sharing internationally. In other words, OpenEHR is a framework model for electronic medical records that can be operated free of monetary cost by nearly any computer for authorized users to upload, download, and share secure health files. Not only does the software

create safe, sharable electronic health records, it also provides a user-friendly organizational system to aggregate and visualize patient data--like BMI changes over time--and population data—like vaccines disseminated in a region. The software also has language translation capabilities⁹¹. Organizations currently utilizing OpenEHR include National e-Health Transition Authority of Australia, the UK NHS Health and Social Care Information Centre (HSCIC), the Slovenian Ministry of Health, the Norwegian Nasjonal IKT organisation, and Brazil. Individual applications of OpenEHR's software can be installed individually via the worldnet^{90,91}.

4. Discussion

4.1. Current Healthcare Laws

In answering the two questions posed—the first regarding the possibility of the program's implementation given the potential of prohibitive laws, the second relating to the potential frameworks set out by the current laws—the proposed program appears to be both permitted and guided by current healthcare laws.

Outlined by the current laws, there appears to be two potential routes for sharing patient health information. The first route entails the international exchange of PHI; The second route comprises the omitting and non-use of any patient identifiers across nations. The dual methods with which the medical information can be shared allows for increased program choice, however, the simplest and most versatile method is ostensibly the option that classifies the sharing of medical information as for training purposes. In this method, the patient's risk is limited by their nondisclosure of any potentially revealing information and the vulnerability that ensues with international transmittance. U.S.-based practitioners are also unburdened by the need to protect the patient's information and the legal onus that accompanies it. The anonymized data also allows for greater ease in sharing the relevant medical information across institutions, for

example, or even with students in the form of take-home assignments. Finally, this method eases the primary practitioners' workload because it does not require the explanation of U.S. laws of informed consent and subsequent paperwork in order to communicate the medical information. This allows for the primary practitioner's increased focus on interacting with their patient during visits and the increased ease in directly reaching out to U.S.-based entities for early communication.

The laws pertaining to obligations of safeguarding patient information for Ghana and Nigeria are not placed on the entity that grants the permission but instead the receiving institution. In this way, the sharing of patient information abdicates responsibility of the primary practitioner in a sense and instead places the legal onus on the U.S.-based institution that receives it. These considerations should not be taken lightly and ought be reflected upon in connection to the U.S. legalities already in place for these participating practitioners. In this sense, a further emphasis may be placed upon the choice to omit all patient identifying markers, which serve little purpose to the program yet potentially many legal difficulties.

Restated-- for the purposed of the proposed program-- the consequences pertaining to the sharing of protected health information breaches as outlined by all three nation's law appear to outweigh any potential benefit of sharing PHI. While the personal identifying information may prove to grant a larger context of health and hazard exposure to practitioners in the U.S., both the personal repercussions for patients and the legal consequences for practitioners should the PHI safeguards fail are significantly detrimental and plausibly deterring of consenting patients and volunteers who wish to protect themselves and their institutions from the extent of the laws. In considering the program's emphasis on the inclusion of international volunteers, it is important to understand that the use of PHI is likely prohibitive

of volunteers in joining and certainly in feeling secured. While I'm glad to give a full report as requested for the propose program, I must emphasize that the difficulties in utilizing PHI significantly outweigh their use.

With the laws outlining the ability to utilize PHI, further investigation into the frameworks created by current laws can explore potential further steps for the proposed program's implementation. The NHA is one of the first looks into the technological and administrative policies the program must abide by. Given the structure of the law, it is important to note that any change in structure to the current healthcare system, including the use of additional technologies, must first be pre-approved by the Ministry. For the sake of this programs, this infers that proper approval must be reached regarding the program. Outlined by sections 12 and 13, any teaching hospital planning on implementing the proposed program must first submit a request to the Nigerian ministry. Similarly, section 18 and 19 clarify that the desired telemedical communication devises used in the pursuit of medical information exchange, even if a computer, tablet, or smartphone, must first receive a Certificate of Standards. Luckily, these requests seem likely to be granted approval given the essence of section 21 which articulates the need for every health worker to minimize injury and damage to person or property and to mitigate disease transmission as their first and foremost responsibility. Given that the proposed program is designed to do just this, the certificate of standards is likely to be approved prior to the implementation of the program.

Similarly, within Ghana, the program may be implemented after governmental pre-approval, but retains significantly more autonomy in development and comparably less monitoring than required in Nigeria. As outlined in Ghana Health Service Act 525 of 1996, great teaching hospitals that operate under a pre-specified budget may operate nearly independently

under the aforementioned laws. This signified that so long as the hospital does not enter into a contract with a dollar exchange greater than a certain set amount by the minister, the hospital may proceed in its due diligence to carry out the remainder of what it finds best for its internal system. Given that the proposed program does not exchange monetary funds, the only authorization required to initiate a direct line of communication is with the particular teaching hospitals themselves.

Implicitly and importantly, the Act also sets the stage for the possibility of generating a scholarship incentive program for medical students to originate from and return to serve in their respective communities because the teaching hospitals appear so independent in their internal decision-making. The hospitals themselves may be able to provide some financial support to those students to encourage their decision to stay and their ability to influence the healthcare structure of the teaching hospital itself.

Finally, the precedents of current legal guidelines reflect an optional adoption of guidelines for participant framework. Where there are no formal laws, there typically remains the essence of rules, structures, norms, and ways in which individuals and groups conduct themselves to generate some schema of stability, expectation, and personal security when engaging with one another. The International Code of Medical Ethics appeared to solidify these most universal and crucial rules of engagement through extracting the essence of many precedents of previous laws. The four principles for practitioners-- obligation of care, respect for autonomy, upholding of medical confidentiality, and beneficence for patient wellbeing—highlight, in part, the universally salient aspects of the care most individuals would hope to receive, refined over time. The International Code of Medical Ethics manifests these important concepts into a tangible, written form that promotes its adoption into organizations such as Médecins Sans Frontières. The

framework of the code has become near universal across international medical teams, either explicitly referenced or implicit in mission. Thus the adoption of the code or similar values outlined by the code may serve the proposed program well. Ultimately, the proposed program is not only aligned with the essence of international precedents but also exemplifies them with the emphasis of patient-first caring. The international precedents appear to support the actions of the proposed program, which in turn highlights the principles of the salient, universal structures that reflect the approved rules and norms of individuals and infrastructures.

4.2. Precedent of Remote Technologies

The current infrastructures in the partnering communities are sufficient for carrying out the program in a test pilot phase. This allows for a trial period without strict requirements to begin or significant investments to be lost should the program prove ineffective or another program model prove to be more optimal. However, in crafting a general wish list or need for scalability, these current or potential technologies are helpful to consider and to ponder in abstractions into the future as the world continues to shift.

Loons, while it existed, appeared to be an ideal fit for the program. Its reliability and gratis nature signified an optimal solution for its full implementation in the program. While its final retirement is imminent, the precedent it left behind is an encouraging challenge to other technological industries to provide incredible connectivity free to all. Starlink is a promising forerunner, but its current reach and mission statement fall short of immediate implementation for the proposed project. The services provided are done so in a lucrative business model, unlike Loons which set to make a cost-effective charitable model. As such, the services that Starlink provide are contingent on Nigeria and Ghana's independent ability and willingness to pay. This stated, Starlink is an unprecedented service that has technological access to reach nearly all

peoples with no limitations of geopolitical borders. If funding were allotted to provide Starlink for cost-efficient prices, the services would likely be implemented and immediately impactful.

OpenERH, the software capable of secure storing, sharing, and interpreting of protected health data, appears a useful solution to securely sharing important patient information from Nigeria as well as serving as a more efficient and cost-effective means for sharing from Ghana and the United States. While Ghana and the U.S. both have independent forms of electronic medical record systems that are capable of securely transmitting protected information, the transferability across systems may pose challenging in both user-interface and administrative approval of multiple electronic systems being utilized simultaneously. What may serve most optimal for the program's use is a streamlined use of OpenEHR for all program-related record sharing. Given the software capabilities, protections, and cost-effective nature, OpenEHR appears an optimal solution for the transmission of protected health information.

5. Conclusion

With the framework established, the proposed program has no prohibitions in its implementation, but necessary steps must be taken. Overall, the frameworks of the laws amongst all countries allow for the proposed program. More so, the essence of the laws are exemplified by the program. With each law, the underlying intentionality of secure, regulated, accessible, and organized healthcare for all patients emerges universally and is exactly what the proposed program ensures to deliver. To ensure the delivering of the program within the scope of all legal frameworks, certain prerequisites must be finalized before the program is initiated. Firstly, the Nigerian Ministry must be notified. With their approval, the program may begin its contacting of

both sides of the international health partnership in beginning relationships. Simultaneously, the back-work of initiating the technological component will be required.

This is not a full dive into the requirements of the program's initiation and impact, but a grateful component of its process. This thesis is not all-encompassing of the logistical frameworks-- let alone the sociocultural, economic, and ethical considerations that deserve attention--but hopefully helps shed light on it nonetheless. There is also no guarantee that all governing authorities in all places and all times will agree with the application of the laws, the implementation of the program, or the notions of independence and health it promotes; Laws are liminal, intentions are not static nor pure, and the world is both dynamic and nuanced. This report cannot possibly reflect or foresee every possible outcome, even within the narrow scope of the work at hand--but may it nonetheless serve as one possible example, here and now, of a collaborative relationship between global health frameworks—in academic writings, in international medical trips, in presumed narratives, and in implicit frameworks of international programs-- and partnering communities moving forward.

In moving forward with the restructuring of global health frameworks from early years of colonial medicine towards the Millennium Development Goal Eight's mission "to develop a global partnership for development," the proposed program's emphasis for community-driven and internationally aided development will draw more prominence. Similarly, the international communication and collaboration the program may establish can pave new precedents in communication. In its most utilitarian form, such dialogue is a necessary aspect of ensuring the program can function and is worthwhile. In its most idealistic form, it seeks to dismantle power dynamics to a collaborative spirit of comradery and acceptance. In all, it may even help bolster a more nuanced, multifaceted, and dynamic perception of peoples and nations—and the important

structures that arise out of these perceptions, in turn affecting the development of novel structures.

This novel proposed program--as does this thesis-- intends to serve as one potential example of an international partnership that seeks a decolonial framework. It intends to be by and for the community it will affect with collaboration from international partners. It seeks to reorient a system of aid towards a future that may not require it at all.

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