Project UpReach:
Sustainable and Mobile Primary Health Care Delivery with Clinical Data Harvesting Development in Ghana: a Model for Medically Underserved People in Developing Nations

Project Summary

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Project UpReach

Abstract

The Project UpReach strategy is to substantially improve health care access and availability with an emphasis on primary medical care, integration of newly available technologies and mobile delivery systems, fidelity of care with a very specific scope of practice to underserved and remote populations, and establishing global diagnostic and clinical consultation partnerships with medical education and biomedical research. The general goal is to reduce excessive levels of infant mortality and maternal mortality, increase progress toward the eradication of specific conditions such as River Blindness, and to anticipate the predictable increase of geriatric care with clinical and baseline data for delivering geriatric care to populations where there has previously been little attention to the health care needs of the elderly. These efforts are expected to lead to public health stability in rural areas where new resources are under development and to stabilize the availability of a labor force; all of which are essential toward the developmental goal of increasing Ghana's role as a partner nation, rather than a recipient client for both humanitarian and economic development. Our emphasis is on delivery and sustainability to Ghana's poorest and most underserved populations.

Project UpReach is designed to improve Ghana's health status through the development of a predictable and available primary care services system to rural remote populations where the current health system infrastructures are desperately inadequate. The strategy is unlike any previous design incorporating elements of telemedicine, mobile medical (primary care and triage) and public health teams using high technologies because it incorporates a business plan that would, we believe, become sustainable and independent of charitable or governmental subsidies after an initial start-up period of 5-7 years. In addition we believe that the introduction of this system to Ghana, as a model for other African and developing nations, would assist the stabilization of health manpower at all levels, and reduce the burden on stationary regional, district, mission and teaching hospitals. The strategy includes developing information systems and to monitor and supervise the system and the communities that it serves for full documentation of need and progress, and establishing sustainability with global partnerships for medical research and development and graduate medical education.

Technologies that are currently available would link patients to medical resources and consultation; such teams could be located anywhere with contemporary communication technologies. Field teams, with proper training and supervision, could deliver the majority of direct patient care and associated services, including health education. The field teams would also facilitate triage and referral. Priorities for Project UpReach have been drawn from the expertise and insights of Ghanaian leadership in both governmental and mission health systems. These medical and system needs were determined in a national study of Ghana's health administrators that was conducted in May and June, 2007 and is just now in a final phase of data collection.1,2,3 There is no doubt that the government of Ghana and the mission health systems of Ghana will welcome the effort. It is recognized as indigenously specific to stated needs of Ghana's health leadership. The sustainability model rests on the harvesting of data for the benefit of global interests in medical and biomedical research and teaching.

Project UpReach

Introduction

Ghana, like much of Sub-Saharan Africa, faces continuing challenges to economic and human development because health care and primary prevention efforts have not demonstrated sufficient effectiveness to provide population and labor force stability. Unlike most of Africa, however, Ghana's political and social structures have demonstrated that this peaceful nation can undergo political transitions that are democratic and Ghana has been the hallmark of stability and hope on a continent where civil wars, political turmoil, environmental and human exploitation are often the norm. Ghana stands alone as a nation with a moral posture and dignity among African nations, resulting in global recognition of leadership and hope. The legacy of Kofi Anon, most recently Secretary General of the United Nations and John Kufour, current President of Ghana and immediate past Chair of the African Union are just two examples of the highly visible leadership that Ghana has offered to the continent and to the world.

The celebration of Ghana's 50th Jubilee year of independence from the United Kingdom in 2007 was highlighted by the public announcement on June 18 that high quality reserves of oil were discovered in Ghana's Western Region, after many years of exploration. The celebration was brief, however, because health care problems vex rural and remote populations and Ghana's national health status staggers under a burden of disease and disability that hinders full exploitation of new, or existing economic opportunities. In order to meet the challenges and opportunities for economic and political leadership that Ghana could offer, the health of its own population and the quality of life among its poor must be improved. Much of the future of Africa as a full partner in global prosperity rests on Ghana's shoulders. The Minister of Health from Sierra Leone, Dr. Soccoh Alex Kabia, after meeting with Richard Douglass, has scheduled a high level delegation to Accra to develop models for the rebuilding of health care systems in Sierra Leone's post-war circumstances based on Ghana's general design for government and private sector partnerships. Political and peace making efforts in all regions of Africa are often dependent upon the input and consultation of Ghanaians; a tradition that has extended continent-wide for over 40 years.
Project UpReach is designed to provide a substantial jump start to Ghana's health status through direct support and by establishing predictable and available primary care services to the poorest and most remote populations. It is part of the design, which we believe is unique and a bold departure from more conservative approaches that have been applied in the past. We believe that it will provide a substantial degree of stabilization of essential health manpower availability for isolated population. Essential components include developing information systems and applying existing technologies to monitor and supervise the system and the communities that it serves for full documentation of need and progress evaluation, and establishing sustainability with global partnerships for medical consultation at the clinical level as well as with research and development. The Colleges of Health and Human Services, Business Administration, and Technology of Eastern Michigan University, in concert with a university-wide effort to establish programs for sustainable human development, are in direct collaboration with the Computing and Information Technology and Business departments of Ashesi University in Accra, Ghana to assure both the input of the best technological, epidemiological sophistication to this project while also being highly sensitive and appropriate for the introduction of a large new program of medical care delivery within appropriate indigenous context and sensitivities.

**Strategy Development**

The strategic planning for Project UpReach began in early 2006, based on eight previous years of field research by Richard Douglass and his colleagues at Eastern Michigan University, the University of Ghana, Ashesi University, the Ghana Ministry of Health and the Ghana Health Service. This investment of time and effort produced trusting relationships and access to field information and insights from the leadership that have not been fully released for public consumption. For instance, the "brain drain" has decimated Ghana's supply of qualified physicians and nurses. Being an English-speaking nation has put a premium on Ghanaian physicians to the United States and European nation that substantially exceeds the loss of such talent from non-English speaking source nations. Internal migration for economic opportunity has left rural and remote areas of Ghana without the labor force for economic growth, and with potentially explosive proportions of the remaining populations who are very old or very young. Physician/per capita ratios in Ghana are among the lowest in the world, the infant mortality rate
exceeds 10%, maternal mortality is high and life expectancy is low compared to what it should be in Ghana. Medical triage and emergency transportation systems being absent often means that patients are obligated to travel great distances with either no medical solution available, or suffering a bad medical outcome associated with delayed care. In Ghana there is far too much preventable death and disability.

Global missions through faith-based organizations have been challenged by the emergence of new calls for assistance from wars and natural disasters leaving the traditional mission health systems in Ghana under-financed and unable to compete for charitable support against growing demands of humanitarian needs due to such catastrophes. Ghana's health care needs have been addressed, but clearly not met, with the allocation of governmental resources and subsidies to Catholic and Protestant mission systems, resulting in over-extended and under financed programs, material and physical resources, management, and medical personnel.

The Project UpReach strategy is to substantially improve health care access and availability with an emphasis on highly specific scope of practice primary medical care, establishing global diagnostic and consultation partnerships with medical education and biomedical research. The medical care delivery would ultimately be sustained by the value of the clinical data that we plan to harvest for secondary access by biomedical research centers and pharmaceutical research teams. We believe that by taking such care to the people, without first expecting the poor to travel great distances in order to receive medical attention will lead to a stabilized health profiles of the rural population and the labor force needs of the nation as new natural resources are developed. This would contribute to an increase Ghana's role as a partner nation, rather than a recipient, client nation for both humanitarian and economic development. This goal has been an unrealized public aspiration in Ghana for many years.

The role of the National Catholic Secretariat, Department of Health, and the medical care that has been traditionally offered in Ghana by the Catholic Church is central to the success of Project UpReach. Because of the stated mission of the Secretariat to serve the needs of the poorest and most vulnerable, it is frequently true that the only health care resources to the most remote and underserved populations are those offered by the Church. The majority of care to
both Christian and Muslim populations in rural Ghana is largely dependent upon the facilities and outreach services of the Catholic missions. But because of profound fiscal shortages, the Catholic systems have become increasingly dependent on governmental resources for administration, medical personnel, transport services, maintenance, and other aspects of ongoing service availability. Subsidies to the Catholic and other missions have depleted resources for government facilities at the district and regional levels. Many hospitals and clinics in the Catholic system, just as in the government system, have no physicians at all, leaving patients in need to seek care at great distances with few sources of appropriate transportation. Hospital administrators in our field research have indicated that large proportions of their transport budgets are devoted to transportation of patients to facilities where physicians are available.\(^1\)

Because fixed-site facilities force patients to assume transportation responsibility for reaching medical care, rural populations experience unacceptable delays in the receipt of medical care, or fail to receive adequate primary care, chronic disease monitoring or post treatment observation and aftercare services, the principal strategy of Project UpReach is to focus on mobile teams within a carefully designed scope of practice who will predictably, and faithfully, extend the reach of hub hospitals, polyclinics and health centers to villages and small towns where over two thirds of Ghana's population lives. These teams would use excellent and field-tested equipment, the best digital imaging and diagnostic technologies, and remote connectivity to diagnostic centers and medical education centers that are partnered with Project UpReach for mutually advantageous objectives. Providing good medical care to remote populations, while taking advantage of information technologies to demonstrate and teach graduate medical students is feasible and a win-win relationship. Technologies that are currently available would link patients to medical resources and consultation; field teams, with proper training and supervision, could deliver the majority of care and facilitate triage and referral.

**Establishment of Priorities**

Priorities for Project UpReach have been drawn from the expertise and insights of Ghanaian leadership in both governmental and Catholic health systems. Given the mission of the Church in Ghana, the geographic emphasis initially is in rural and remote areas in the
Northern, Central and Eastern Regions where we have established strong partnerships with potential hub hospitals. Maternal and child health, basic health monitoring, immunization, physical medicine and orthopedics, public health education, and a growing need for geriatric care are priorities that are based on morbidity and mortality patterns, given limited data at the clinical level. Health informatics and information systems ranging from advanced diagnostics to paperless medical charts and medical records are high priorities in Ghana and these priorities are considered essential to establish measurable needs, measurable objectives, and strategic goals. Project UpReach could lead the way to demonstrations of the efficacy of these modern tools for medical practice and health system management. The medical and system needs and the urgent need for the upgrading the professional management of hospitals and clinics were determined in a national study of Ghana's health administrators that was conducted in May and June, 2007; and is just now in a final phase of data collection.\textsuperscript{1,2,3}

In 2008 the Regional Hospital in Tamale, the largest city in Ghana's Northern Region with a substantial majority Muslim population will be transformed into Ghana's third Teaching Hospital; this provides Project UpReach with a unique opportunity to establish mobile primary care delivery in this Region as part of the strategic planning of this new resource. Our colleague Dr. Ken Sagoe, who has strongly supported Project UpReach for all of the last year of development, will be the senior administrator of the Tamale Teaching Hospital.

\textbf{IT and mobile unit technology applications}

In Ghana it essential to redefine the medical care delivery models that support stationary facilities and professional convenience instead of emphasizing the patient and the community. Travel to medical care for most of Ghana requires hours or even days instead of minutes as it is in most of the developed nations. Services that are delivered to the communities on a basis that is predictable and faithful to the patients improves access and breaks down the physical, economic, and psychological barriers to care. Primary care, thus delivered, is more effective and can result, we believe, in better community level outcomes. We believe that mobile primary care delivery can reduce the prevalence of medical crisis and acuity of need. If primary care can replace a proportion of medical crisis management, we are certain that such delivery systems
would provide confidence in care rather than a continuous sequence of emergent conditions with bad outcomes. In addition, the latest information technologies that are already field tested in the most challenging circumstances, can take the best diagnostic and monitoring systems to the patients, increasing the quality of diagnosis, medical management, and after care supervision. River Blindness, a perpetual source of permanent disability that damages Ghana's future, is effectively diagnosed via remote examination of digital images. With increased access to diagnosis, existing efforts toward eradication of this disease would be greatly enhanced. All of these essential ingredients to successful medical care are largely absent in Ghana today.

IT applications from the beginning will include all of the following:

- Multi-language conferencing to negotiate local access, to resolve potential ethnicity and cultural issues, to establish the medical scope of practice that will be applied by UpReach teams;
- Inventory and supply line management for all disposable and non-disposable medical supplies, pharmaceuticals, equipment, spare parts for vehicles, and for IT connectivity;
- A global network of accessing information for use by clinicians anywhere, connecting patients at the village level in rural Ghana to attending and diagnostic medical personnel;
- A means of managing subsets of collected clinical data for use by medical and pharmaceutical research teams, globally, on a subscription basis. For instance, a panel of 500 hypertensive men, 50+ in age, north of Kumasi for six months could be of interest to a cardiovascular research team working in the pharmaceutical industry.
- Real time management connection to field teams and a central management unit in Accra.
- The ability to deliver large (20 meg pix) images, in highly condensed form, rapidly to diagnostic centers anywhere and, in real time, to provide clinical directions and instructions from diagnosticians and clinicians, globally.
- Comprehensive monitoring of all clinical activity, patient identification with largely illiterate populations, storage and electronic access of patient records for repeat medical needs, detection of potential drug interactions, and instant analysis of familial histories that may have bearing on chronic diseases, certain cancers, allergies, and genetically linked disorders.

System and Political Development

The nurturing of a relationships of trust and respect with The Ghana's Health Service, private medical care systems and the Catholic Secretariat Health Department and the has been the highest priority since May 2007. These months have been spent in continuous dialogue with
the leadership as well as field managers, private contractors, public health specialists, and supply line vendors who are responsible for Ghana's health care delivery. Of particular significance is that in January 2008 the highest leadership of the Secretariat, through Most Rev. Thomas K Mensah, Catholic Bishop of Obuasi, Archbishop Cardinal Turkson, Archbishop of Cape Coast, Dr. Gilbert Buckle, Executive Secretary of the Health Department who have been fully briefed about the possibilities of Project UpReach and the parallel missions of the Secretariat and Project UpReach. In addition, Dr. Elias Sory, Director General of the Ghana Health Service and the top leadership of the Ghana Health Service, have been fully briefed about the substantial possibilities associated with bringing a new level of medical care resource and capacity to Ghana. These briefings have had two consistent and stunning outcomes. First, the meetings have ended with enthusiasm and hope among leaders who struggle to provide adequate care instead of being able to provide extraordinary care. Second, the meetings have led to fruitful and ongoing dialogs and a continuous flow of new ideas and possibilities for the last eight months. These discussions have led to the realization that targeted assistance to the Catholic Secretariat's facilities and services would permit a reallocation of Ghana Health Service resources and personnel back to government hospitals and clinics, resulting in a system-wide improvement of capacity and availability. Frustrated efforts to recruit or retain medical personnel would be reduced by technological communication and information systems that would substantially reduce the need for on-site personnel and simultaneously increase the volume of delivered services. From a personal perspective, it has been a remarkable privilege for me to deliver this message of hope. There is no doubt that the government of Ghana and the mission health systems of Ghana will welcome Project UpReach in this nation. The Public Affairs staff of the U.S. Embassy in Accra has also been briefed and has offered whatever support possible to facilitate this effort.

**Emphasis on Mission Compatibility**

Part of the ongoing discussions with the mission and government health system leadership has focused on the articulation and compatibility, or complementary, relationship between these major sources of care for most Ghanaians. Complimentarity with the Ghana Health Service is explicit in the Catholic Secretariat's vision statement, the Christian Health
Association of Ghana (CHAG), and private sources of care. Project UpReach would establish a working rapport and formalized Memorandum of Understanding with each of these system components before entering the field. Because of relative scarcity, these are not systems that compete. Our purpose would be to provide meaningful care in areas that would most effectively improve health status and the efforts of all collaborating medical care partners. The Ministry of Health and the Ghana Health Service have existing memoranda with mission health systems in full recognition that coordination of resources and medical services are essential while direct competition would be damaging to the fragile health care situation in Ghana.

Level of Need

Ghana's health care delivery systems cannot meet the ongoing needs of over two thirds of her population of more than 22 million people. According to the U.N. Human Development reports of the last six years, Ghana's burden of disease and the disabling consequences of preventable death and disability hinder the nation's chances to achieve its own stated Millenium Goal of becoming a middle class society in the global context. The scarcity of medical resources reaches into all Regions of Ghana, but is most acute and obvious in the northern districts where the mission systems are also most likely to be the only sources of clinical or hospital care. In these regions the services of the Catholic facilities to Muslim and Christian populations is woefully under-resourced, even as these populations may be entirely dependent on these services. Simply stated, it is too easy to die in Ghana from too many medical conditions; for those who survive, given existing medical care and public health programming, it is also hard to live. While Project UpReach is only a small part of the larger solution to Ghana's needs, it is intentionally directed toward the least often served and most medically needy subsets of the nation's population. No other highly technological and sophisticated project has aimed at this particular target in such a way as we are suggesting. No such project has been specifically design to serve the poor.

Ghana represents hope on a continent that suffers. Wars from Sudan to Congo, civil war's aftermath in Sierra Leone and Liberia, and this year's civil unrest in Kenya have left their mark in Ghana by serving as source states for refugees who find help in UNHCR camps that Ghanaians have offered. Leadership at the international level has been provided by Ghana to the rest of
Africa and the world; yet Ghana's population suffers from an inability to compete with the needs of even more oppressed and desperate people in other places. There is a self-conscious dignity in Ghana that hesitates becoming the loudest cry for help. But to sustain its role in the world, and to realize the possibilities of economic prosperity and social stability, Ghana's health care needs and the health status of its citizens must be improved. Ghana's available economic resources are insufficient to make the kind of dramatic improvement that is needed.


Appendix 1 Field Logistics Scheme

General Plan for Delivery:

- Each day the units would visit one to four villages for clinic, monitoring, new patient enrollment, immunization, and other contracted tasks. Each village station will represent 3500-5000 residents. If logistics allow, the teams will return to the hub facility each day; in the alternative the units will be in the field and resident with the vehicles for two to three days per week prior to re-supply and refurbishing.

- Senior village level school teachers will be recruited as local organizers. The responsibilities of these individuals will be to organize weekly visits, make and document appointments, to provide ongoing information and health education materials between weekly team visits, and to represent the effort on an ongoing basis.

- Finger-swipe technology will be used exclusively for patient identification and chart documentation.

- Scope of practice will be specific and limited with specific limitations such as to avoid real or perceived competition with medical practice in private or institutional practice.

Typical practice would include physical examination, monitoring of pregnancies, prenatal care, antenatal care, postnatal care, maternal health, pediatric immunization, screening for endemic infectious and vector-born diseases, specific environmental health monitoring, screening for HIV, other STD, diabetes, hypertension, and other routine health threats, registration of new patients, scheduling appointments and follow-up for missed appointments, triage of emergent or chronic health complaints, facilitation of transport to hub facility for triaged patients, ongoing documentation and evaluation (both process and outcome), input of data for data harvesting effort, GPS mapping of all patients by health status, complaint, and diagnosis.
Ghana is located in West Africa. The nation is approximately the same geographic size as the lower peninsula of Michigan and has over 22 million people; 60% of the population lives in rural villages. Life expectancy is approximately 68; however there is a 10.2% infant mortality rate, unknown prevalence of most geriatric and chronic diseases, and poor health statistics.