Shisong Cardiac Center: Kumbo, Cameroon

Scholarly Report submitted in partial fulfillment of the MD Degree at Harvard Medical School

Date: 3 May 2018

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Scholarly Report Title: Shisong Cardiac Center: Kumbo, Cameroon

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Abstract

TITLE: Shisong Cardiac Center: Kumbo, Cameroon

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Purpose: To characterize the business and operational models of Shisong Cardiac Center, a heart hospital in Kumbo, Cameroon and to identify how it has managed to deliver high quality, specialized surgical care since 2009 despite its contracted financial and workforce capacity.

Methods: Descriptive analysis with key informant interviews from Shisong Cardiac Center, the World Bank and the Ministry of Public Health.

Results: Shisong Cardiac Center is able to generate annual profits, but it does so through its robust fundraising efforts to cover expenses. Its highest expenses stem from procurement of surgical materials and medications. Even with only one surgeon, the potential capacity at Shisong is 480 operations a year, yet only 100 operations are performed, suggesting that labor is not the ultimate bottleneck; rather, it is patients' inability to pay.

Conclusions: A surgical operating model reliant on donated funds can generate a profit, but it is highly inefficient. On the labor side, commuter care cannot replace the bandwidth and reliability of a local workforce. Attracting Diasporans home with competitive salaries and benefits to then boost local training is a viable path. As for addressing financial inefficiency, a dual effort from the private sector to maximize contribution margins for heart surgery through cheaper sourcing of surgical materials and medications and the public sector to reduce out-of-pocket payments is needed. Shisong should consider innovating to generate new streams of revenue while waiting for the government's anticipated launch of national health insurance.

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Glossary of abbreviations

LMIC – Low- and middle-income countries

MDG – Millennium Development Goals

WHO – World Health Organization

Section 1: Student role

Given that I am from Cameroon and Sister Jethro met my father through official capacities at the Cameroonian Professional Society Annual Congress in Houston, TX in 2015, I conceived the idea of the project, secured all the interviews, and conducted the interviews when I went home to Cameroon the following summer. Dr. Schulman helped with the design in terms of making sure all the key player were included in the interviews and that the interview questions would help get an answer to the initial objective. I transcribed the raw data from audio recordings and wrote up the paper. Dr. Schulman read the drafts and gave feedback for edits.

A link to the paper follows: https://hbr.org/product/shisong-cardiac-center-kumbo-cameroon/317085-PDF-ENG

Section 2: Methods

Non-anonymized semi-structured interviews were conducted with a co-founder of Shisong Cardiac Center (Sister Alphonsa Kiven), the Chief Executive Officer of Shisong (Sister Jethro Nkengelfac), the nurse supervisor at Shisong (Julius Peter Mbiydzenyuy, RN), Shisong's cardiac surgeon (Dr. Mve Mvondo), two World Bank representatives in Cameroon, and the Minister of Public Health in Cameroon (His Excellency Andre Mama Fouda). All but one interview was audio-recorded and transcribed by hand. The interview with the Minister of Public Health was conducted via email.

Appendix 1. Shisong Cardiac Center: Kumbo, Cameroon

Born from the dream of a philanthropic Italian who lost his sister to heart disease and a Cameroonian-based Italian priest surrounded by patients dying due to a lack of cardiac care, Shisong Cardiac Center has made remarkable strides. It has grown from an institution with no operating room or surgeon in 2005 to one of the primary cardiac surgery referral centers for Central Africa today. The journey has been long and challenging. The obstacles encountered along the way and the lessons learned from them highlight the challenges of bringing advanced surgical care to an emerging market economy. Given the tremendous need across the globe for specialty care services to address the explosion of non-communicable (non-infectious) diseases, how can Shisong sustain and scale thisinitiative?

Background on Global Surgery Burden

Historically, an overwhelming majority of deaths in low- and middle-income countries (LMIC) stemmed from communicable (infectious) diseases, such as malaria, tuberculosis and HIV/AIDS. Accordingly, the Millennium Development Goals (MDG) urged local, national and international groups to undertake vertical, or disease-based, interventions to tackle communicable diseases. Over the past fifteen years, the MDG have propelled the transition in burden of disease from overwhelmingly communicable to a mix of communicable and non-communicable diagnoses. Today, LMIC face enormous health and economic losses at the hands of non-communicable diseases, with surgical diseases comprising one-third of the global burden of disease.[1]

At the current level of surgical care, 128 low-to high-income countries will face an average projected
GDP loss of $20.7 trillion dollars from untreated surgical conditions between 2015 and 2030 (1.25% of GDP).[2] The magnitude of this unmet need is made more evident when considering that the estimated total costs of scaling up surgical care in the 88 LMIC with the highest estimated GDP losses from untreated surgical conditions would be substantially lower at $300-$420 billion from 2012-2030.[3]

Drawing from WHO's Global Health Estimate, researchers found that with a world

population of 6.9 billion in 2010, a minimum of 321.5 million inpatient surgical procedures were needed, or 4,664 procedures per 100,000 people, to achieve adequate surgical care delivery. In Central sub-Saharan Africa, where the country of Cameroon is located, that minimum is actually 6,255 procedures per 100,000 people, while it currently provides only 1,912 per 100,000.[4] Clearly, there is much work to be done.

Background on Cameroon's Health System

Tucked into the enclave of Central Africa bordering the Gulf of Guinea, Cameroon is a bilingual country (80% French, 20% English) with 23,344,000 inhabitants (**Exhibit 1**). This population has an average life expectancy at birth of 56 (male) and 59 (female) years, with 43% of the population under age 15. The country is divided into ten regions, which are further broken down into administrative divisions, subdivisions and districts. It is officially classified as a lower middle-income country, with a gross domestic product of $29.2 billion USD in 2015.[5]

Disease Burden

As of 2012, the top five leading causes of death in Cameroon were largely infectious: HIV/AIDS (13.4%), lower respiratory tract infections (12.2%), diarrheal diseases (6%), malaria (5%), and stroke (4.6%). For the illnesses covered under the MDG, mortality ratios have decreased in all fields except for HIV/AIDS (which increased from 145.1 to 147.7 per 100,000 between 2000 and 2012). Under-five mortality decreased from 136 to 95 per 1,000 live births from 1990 to 2013, and from 2000 to 2013, the following ratios also decreased: maternal mortality from 720 to 590 per 100,000, deaths due to malaria from 131.5 to 55.6 per 100,000, and deaths due to tuberculosis in HIV-negative persons from 72 to 35 per 100,000.[6]

The gradual transition from communicable to non-communicable disease is apparent in the increase in mortality from cardiovascular disease, diabetes, cancer, chronic respiratory diseases, and "other NCDs" from 2000 to 2012 for both sexes. Of note, average health expectancy, or the number of years one can expect to live in "full health" without disease or injury, rests about ten years below life expectancy, at only 48 years of age.[7]

Service Provision

Public and Private Health Care Service System

Cameroon's health care system is comprised of both public (66%) and private (34%) healthcare providers, who practice in 180 health districts spread over ten regional delegations.[8] The key players in this health system include public decentralized administrations, private professional organizations, non-governmental organizations (NGOs), community organizations, and technical and financial partners. The total 3,214 health facilities in the public sphere consist of four level one general hospitals (offering the highest level of specialized care), four level two central hospitals, twelve level three regional hospitals, 156 level four district hospitals, 181 level five physician-run health centers (CMA), and 1,801 nurse-run integrated health centers (CSI), also in level five. For its part, the private sector is comprised of religious and secular non-profit and for-profit organizations. As of 2010, the private sector had ninety-three hospitals, 193 non-profit health centers, and 798 for-profit health centers. Auxiliary health infrastructure includes twenty-one medical laboratories, nine drug manufacturers, fourteen private drug retailers, and one public national drug retailer that supplies regional and district level pharmacies.[9]

Figure 1 Cameroon Health System Organization

Level of Organization	Administrative Units	Competencies	Healthcare Facilities	Engagement Structures
Central	Ministry of Public Health	• Policy and Strategy • Coordination • Regulation	• Level One and Two Hospitals • University Teaching Hospital	• Boards of Directors • Management Committees
Regional	Regional Delegations	Technical Support to districts and programs	Level Three Hospitals	Regional Special Funds for health promotion
Local	Health Districts	Program Implementation	Level Four and Five Facilities	District or Local Management Committee

Human Resources for Health

The most recent figure for total physician density in Cameroon is 1.07 per 1,000 population in 2011, which when added to the most recent 2009 figures for nursing and midwifery sum to 1.5 health workers per 1,000 population, well below the minimum WHO recommended 2.3 health workers per 1,000 population.[10,11,12] Per the Minister of Health, Cameroon's 1,842 physicians in 2011 consisted of 1,216 general practitioners, 626 specialists, 39 surgeons and only 3 cardiovascular surgeons.[13] The Lancet Commission on Global Surgery found that with Cameroon's 2012 population of 21.7 million, it had 83 surgeons, 22 anesthesiologists and 151 obstetricians, or 1.2 surgical specialists per 100,000 people.[14] To put this number into perspective, the Lancet Commission estimates the need for at least 20 surgical, anesthetic, and obstetric physicians per 100,000 people for delivery of effective, sustainable surgical care, or twenty times Cameroon's figures.[15] When it comes to strategic planning to bolster this surgical workforce, the Minister of Health defers the major efforts to the Ministry of Higher Education. Out of Cameroon's thirty-nine private and public health professional schools, only six are accredited for medical, dentistry and pharmacology training. Since 2010, these six schools have aimed to train 500 general practitioners, 100 specialist physicians, and 300 pharmacists and dentists annually.[16]

Health Financing

The Fiscal Space

Cameroon's main sources of national revenue are agriculture and oil, but telecommunications, transport and financial services have largely spurred economic growth over the last decade.[17] The country's economic growth rate of 5.9% in 2014 surpassed the average growth rate of 4% over the last decade, and total poverty decreased from 40% in 2001 to 37.5% in 2014. However, rural poverty rates actually increased during this same time period from 52% to 56.8%, suggesting an unequal generation and distribution of economic growth.[18]

Resource Mobilization

Health care funding in Cameroon arises from public funds, private or out-of-pocket

payments, and international aid. The World Bank estimates the breakdown of health expenditure as over 54% by the patient and family members, 30-33% by the government, and 8-10% by donor organizations.[19] The government directs 8% of its budget to public health care, with 5-6% stemming from the Ministry of Health and the remaining 2-3% contributed by different ministries, such as the Ministry of Defense. With a GDP of $29.2 billion in 2015 and a population of 23.3 million people, GDP per capita is $1,250. 4.1% of GDP is directed towards health, or $51 per capita (representing total public, private and external funding)—a figure 184 times less than total per capita health expenditure of the United States.[20]

Social Health Insurance

There is no widespread national health insurance fund in the country. Limited health coverage exists for certain civil servants, and employer-based health insurance as well as private health insurance schemes for the more affluent are both available. There are no meaningful estimates of these funding sources in terms of total health care spending. The latest figure of 55,000 people insured in April 2008 represents less than 1% of the total population.[21]

Ministry of Public Health's Strategic Plans

Cameroon's Minister of Public Health, Minister Andre Mama Fouda, trained as an engineer and fulfilled roles in both the private and public sectors before assuming his current position nine years ago. He acted as CEO of civil engineering and public works company MAETUR, as well as Vice President and President of the Yaounde III Section of the Cameroon People's Democratic Party followed by Mayor of Yaounde III Commune. With this background in managing public affairs, Min. Fouda now defines, coordinates, tracks and evaluates national health care policies initially put forth by the President of the Republic.

Prior to Min. Fouda assuming his present role, Cameroon had a Sectorial Strategy for Health (SSS) for 2001-2015, including the Millenium Development Goals plus aims to decentralize and reinforce of the healthcare system. However, sub-optimal enforcement of the first strategic plan led to a revision for 2009-2015. That revision focused on three principal axes – health promotion, disease prevention, and healthcare delivery – because of the overall decision

to guarantee equitable and universal access to basic primary care services and priority specialized care. Min. Fouda notes the reduction in the national malnutrition rate to 15% for children less than 15 years of age, tobacco consumption rate to 8.9%, and urban obesity prevalence to 23.5% as some victories in the first axis. As for the second axis, the urban prevalence of hypertension is down to 29.7%, and 59.3% of pregnant women with HIV receive antiretroviral treatment to protect their unborn children. Thirdly, healthcare delivery has improved with the construction of diagnostic imaging and hemodialysis centers in all ten regions, and the establishment of eight regional hospitals including the Emergency Center of Yaounde – CURY (2015), the Obstetric-Gynecologic and Pediatric Hospital of Douala (2015), and the Hospital for Research and Application of Endoscopic Surgery and Human Reproduction (2016).

Despite these successes, Min. Fouda expresses disappointment at the insufficient political engagement and investment in health care, with less than 15% of the national budget allocated toward health; the lack of an integrated approach to financing of the system; and poor legislative and regulatory oversight of the health sector. For the 2016-17 year, the Minister's goals for health promotion and prevention remain constant, but he aims to bolster healthcare delivery by developing a government-based risk-sharing health insurance system to decrease out-of-pocket payments by at least one-third.[22]

Origins of Shisong Cardiac Center

Shisong Cardiac Center sprang from a tragedy that evolved into a tale of fortuitous connections spanning several continents. In 2001, an Italian Catholic priest by the name of Don Claudio Maggioni was mourning the untimely death of his sister from cardiac disease. Consistent with his role in the church, he committed to a mission of alleviating suffering of cardiac patients in less affluent countries. As Shisong Co-Founder Sister Alphonsa Kiven states, "From the experience of the death of his sister, [Don Claudio] wanted to stretch his heart far away." She recounts:

> The story is that Don Claudio, who was the Chaplain of a cardiac hospital in Milan, had this dream of having a cardiac center to help children in any country. He didn't have Cameroon in mind at the beginning. But it just happened as God will do it, that he met the brother of Father Angelo Pagano, who was the Parish Priest in Shisong. It was Father

> Angelo's brother who connected Father Angelo and Don Claudio. Father Angelo then came and shared this story with me. And, I must tell you, my initial reaction was, "No." I was very skeptical because listening to it, it was something new and sounded very big for us. And, I said, "No, we have three big hospitals in Cameroon, and it is not easy to run these hospitals. So, if we take on another project that sounds this big, we might be disappointed or disappoint many people." However, my first meeting with Don Claudio changed my whole heart. I met a man who had a dream hailing from a very compassionate heart, and I felt it was a contagious dream. And, I must tell you, I was right. Over the years, the Cardiac Center has spilled onto unexpected arenas, embracing thousands of other hearts across the globe so that I can today tell you about the globalization influence of the cardiac center. When you said at the beginning that you would like other people to know and to be involved, I just thought to myself, "This is exactly what the cardiac center is trying to do – to get many hearts."[23]

Through his role as Chaplain at Policlinico San Donato, a multi-specialized hospital in Milan, Don Claudio shared his dream of providing surgical cardiac care to help children around the world. Fortunately, his dream fell upon the ears of the brother of Father Angelo Pagano, who was completing missionary work in Cameroon. Once he heard from his brother, Fr. Angelo quickly shared Don Claudio's vision with Sister Alphonsa, the Cameroonian Provincial Superior of the Tertiary Sisters of Francis – the religious order running Shisong Hospital. At first, Sr. Alphonsa was quite skeptical of this idea given her firsthand knowledge of the difficulty of running a big hospital in Cameroon, expressed in her reflections above. However, despite her reservations about taking on a project that could very likely fail, she felt compelled to fly to Milan to meet the man behind the vision, Don Claudio.

On May 1st, 2001, Sr. Alphonsa met with Don Claudio and Professor Alessandro Frigiola, a cardiac surgeon at San Donato. Don Claudio recruited Dr. Frigiola for this discussion since Frigiola had successfully founded his own cardiac charity organization, *Associazione Bambini Cardiopatici nel Mondo* [Association for Pediatric Heart Disease Patients Around the World]. They agreed to partner on a new cardiac facility at Shisong. As the vision grew, Dr. Frigiola recruited his colleague Dr. Alessandro Giamberti to take over planning for the new hospital. Meanwhile, Dr. Frigiola, Don Claudio, Sr. Alphonsa and Fr. Angelo focused on

fundraising. Don Claudio founded *Associazione Cuore Fratello*, or Brotherly Heart Association. Sr. Alphonsa approached her Tertiary Sisters of St. Francis, and Fr. Angelo approached his Franciscan Order of Friars Minor Capuchin. Together, they set to raise the 4 billion XAF ($6.3 million USD[aa]) needed to construct and equip Shisong Cardiac Center.[24]

To kick off their mission, the four co-founders flew Cameroonian health personnel to Milan for the specialty training that would be needed to staff the new hospital. Cameroonian cardiologists Drs. Ambassa and Cabral trained in pacemaker implantation and diagnostic/interventional catheterization at San Donato, while various cardiac nurses trained as perfusionists, intensive care unit (ICU) nurses, surgical scrub nurses, ward nurses, and blood bank nurses.15 Additionally, since the hospital had not yet been built, the co-founders also flew Cameroonian pediatric patients to Milan for operations.

By 2005, the groundbreaking for the hospital occurred, with technicians flying in from Lebanon, Syria, Saudi Arabia, and Yemen, amongst other countries to help with construction. In November 2009, Shisong Cardiac Center officially opened its doors.

Shisong Hospital's Infrastructure

Located about 300 kilometers north of Douala (the economic capital) and 250 km northwest of Yaounde (the political capital), Shisong Cardiac Center is a health facility within the greater St. Elizabeth Catholic General Hospital (Shisong Hospital) (**Exhibit 2**). The long journey from either capital is not easy, and it requires a sturdy vehicle to course over widely unpaved roads for anywhere from seven to ten hours (**Exhibit 3**).

The 350-bed General Hospital contains multiple wards, two operating rooms, one recovery room, and one ICU. The beds are separated into male and female adult medical wards with fifty-two beds apiece, a surgical ward with five private rooms, a maternity ward with thirty-seven beds, a neonatal room with three incubators, a pediatric ward, a gynecological ward, and a general ward for infections and wounds. The Cardiac Center itself is comprised of two operating rooms and seventy-nine beds: forty in the clinical wards, thirteen in the cardiac catheterization lab, twelve in the cardiac ICU, and twelve in the pre- and post-operative surgical wards (**Exhibit**

[a] $1 USD = 631 Central African Francs, XAF

4).

In addition to the Cardiac Center, Shisong Hospital offers clinical and surgical obstetrics and gynecology, clinical and surgical urology, clinical pediatric care, the Project Hope treatment center for HIV/AIDS, dentistry, ophthalmology, physiotherapy for neurological and orthopedic patients, a tuberculosis treatment unit, a diabetic clinic, diagnostics for x-ray and ultrasound, a general laboratory, a cyto-pathology laboratory, and a Catholic School of Health Sciences for training of nurses, laboratory technicians, nursing assistants and midwives. Moreover, Shisong also offers short-term internships to national and international medical students coming from as far as Italy, the United States, Holland, Russia, Nigeria, England and Germany.

Shisong Cardiac Center, specifically, is equipped with a blood bank facility, a cardiac catheterization lab, a pharmacy, and capabilities to deliver inpatient and outpatient services. The clinical care centers around the following conditions: hypertension, congestive heart failure, valvular abnormalities, congenital heart disease, arrhythmias and cerebrovascular accidents (i.e. strokes). Outpatient activities include outreach cardiac screening tours, initial consultations and follow-up visits, and electrocardiogram, echocardiogram, exercise stress test, Holter monitor and chest x-ray all available for diagnostic purposes. In the inpatient sphere, two cardiologists and one cardiac surgeon perform diagnostic and interventional cardiac catheterizations, pacemaker implantations, and open-heart surgery (**Exhibit 5**). They also staff the ICU for high-risk post-operative cardiac patients. However, there are no Cameroonian cardiac anesthesiologists or cardiac nurse anesthetists so the Center relies on expatriate anesthesiologists to fulfill this function.

Commuting Care Delivery Model

Seven years since first opening its doors, Shisong Cardiac Center has developed into a center with high quality, onsite surgical capabilities. Nonetheless, it has not yet attained an autonomous status, as its existence continues to rely on donations of money, time and surgical expertise from foreign organizations. The cardiac center's potential for growth warrants thoughtful inquiry into avenues by which it can bolster its local resources to achieve this full potential.

Leadership

In line with the partnership structure that initiated Shisong Cardiac Center, the Board of Directors, or Technical Committee, comprises both Cameroonian and Italian leadership. In terms of day-to-day administrative activities, General Manager Sister Jethro Nkenglefac takes the helm in collaboration with Shisong Hospital's Chief Medical Officer and the Cardiac Center's Head of the Division of Heart Surgery, Dr. Charles Mve Mvondo.

Operational Model

For the first four years after opening, medical cardiology services functioned independently, but for surgical operations, either patients had to be flown out to Milan or Italian surgeons had to fly into Kumbo as there was no Cameroonian cardiac surgeon on staff. This model began to change in 2013 when the cardiac center management recruited Dr. Mve Mvondo to Shisong based on Dr. Giamberti's recommendation. Dr. Mve Mvondo completed high school in Cameroon before moving to Rome, Italy to complete medical school, general surgery residency, and a fellowship in cardiac surgery. It was there that he met Dr. Giamberti.

As the sole local cardiac surgeon at Shisong, Dr. Mve Mvondo necessarily splits his time between clinical and administrative responsibilities. In addition to performing heart surgery, he must also coordinate logistical arrangements for surgical cases that require external teams, handpick and train members of his ancillary team such as the critical care nurses, and strategize about ways to expand the cardiac center. At his side is nurse superintendent Julius Peter Mbiydzenyuy, RN, who trained in Milan. Julius Peter oversees the activities of all of the cardiac nurses and coordinates medical and nursing student internships at Shisong Cardiac Center.

Given its small surgical staff, the cardiac center continues to rely on external aid for support. Three to four times a year, a team of mainly Italian surgeons travels to Shisong for seven to ten days to assist Dr. Mve Mvondo with surgical cases, especially those of pediatric patients with congenital heart anomalies. As the singular cardiac surgeon, Dr. Mve Mvondo clearly acknowledges the benefits of collaboration, including the sharing of knowledge on new technical procedures. However, he still asserts, "I think the first thing the project needs to maintain and do over the long-term is to make all the efforts to have a complete independent

local team." His past experience had already shown him the risks of relying on foreign support when forty operations were cancelled in 2014 due to visiting surgeons' fear surrounding the Ebola outbreak (although there were no confirmed cases in Cameroon). Given the cardiac center's average of one hundred cases a year, those forty cancelled cases represented a significant financial loss and an overall negative health impact on the community.

From Dr. Mve Mvondo's perspective, reliance on foreign teams has also introduced issues with continuity of care at Shisong. After international surgeons leave, staff cardiologists can take charge of medical complications, but Dr. Mve Mvondo must address all surgical complications, even for the patients on whom he did not personally operate. In an attempt to avoid detrimental outcomes from this lack of continuity, Dr. Mve Mvondo often organizes missions back to back, such that one team of surgeons performs the most complicated cases at the beginning of the first week and follows patients throughout that week, with a second team arriving the following week to perform the simpler cases and to serve as surgical backup. Occasionally, Dr. Mve Mvondo requests for the visiting cardiac critical care physicians to stay an extra week after the surgeons leave to assist in follow-up care. For nonemergent, repeat surgical cases, he instructs patients to schedule their follow-up visits and operations to coincide with the return of the visiting surgeons. From a nursing standpoint, working with visiting surgeons who have different protocols for patient management can still present a real challenge in effective patient care and sustaining team morale.

Another key aspect of the cardiac center's operational model is communication, as the language barrier between the Cameroonians and Italians was a tall hurdle to overcome. In addition to the two hundred plus tribal languages spoken in Cameroon, English and French were adopted as the national languages during the colonial period of the late 1960s. But, when the Shisong partnership began, most of the Italian collaborators did not speak French or English, and the Cameroonian staff did not speak Italian, making communication challenging for both parties. Fortunately, over years of working together and with the Cameroonian nurses completing advanced training sessions in Milan, the language of the operating room is now Italian, and everyone can understand one another.

Even with these improvements, however, the core gap underlying this operational model – an insufficient local workforce – is undeniable. In his aim to move toward an independent, self-sufficient health facility, Dr. Mve Mvondo has identified three potential solutions. First, he

proposes sending young Cameroonian general practitioners abroad to complete cardiac surgery and anesthesiology specialties that are not available to them within the country. Second, he highlights the importance of making compelling job offers to Cameroonian specialists who currently practice out of the country. As of now, though, no clear financial strategy exists to make either option viable. The third option is to train Cameroonian doctors in Cameroon so they can specialize among the patient population they will eventually treat. Dr. Mve Mvondo's key reservations with this training plan, however, reflect the same challenges with staffing Shisong Cardiac Center – namely, amassing adequate teaching forces and a large enough patient volume to train young surgeons effectively.

Clinical Performance

Since 2009, post-surgical mortality (within 3 months post-surgery) ranges from a high of 10.6% in the center's inaugural year to 6.7% in 2014-15, with the most recent mortality rate of 7.1% for 2015-16 (**Exhibit 6**). The cardiac center also tracks the inpatient mortality rate for nonsurgical patients, which decreased from 8.4% in the inaugural year to 5.8% in 2013-14, with a 2015-2016 mortality rate of 6.3%. Not included in Exhibit 6, Dr. Mve Mvondo shared that from 2009 until October 21st, 2016, 11 out of 610 patients (1.8%) undergoing heart surgery developed a sternal wound infection. Three of those cases were mediastinitis, and two resulted in patient deaths. Mediastinitis is inflammation or infection of the tissues of the mid-chest. For valve repair in particular (mechanical and bioprosthetic), only 1 out of 267 (0.37%) patients had an endocarditis complication. Endocarditis is inflammation or infection of the inner layer of the heart. Since 2009, only 5 out of 610 (0.82%) patients underwent reoperation, but this exceedingly low rate does not capture those patients who died prior to reoperation or who needed but were unable to afford a second surgery.

Currently, Dr. Mve Mvondo operates at less than twenty percent of what he considers to be the center's full capacity. At just one hundred operations a year, he performs about one case every four days although there are two fully functioning cardiac operating rooms available. Even with the current staffing deficits, Dr. Mve Mvondo thinks that he could complete at least two cases every weekday, 40 cases a month, and 480 cases a year.

If Shisong Cardiac Center's low volume problem cannot be solely tied to inadequate

staffing, what is the source of the problem?

Patient Payment

Shisong offers cardiac surgery at a fixed price of $4,750 per patient. Given Cameroon's low per-capita income and the lack of national health insurance, financing has become a barrier to providing services to patients in a cash-pay model. Of one hundred patients awaiting surgery, roughly twenty percent fund their surgical care through sponsorship, insurance, or their ability to afford out-of-pocket payment.

Unfortunately, over 80% of Shisong's patients do not fall within one of these three categories. Shisong developed the Social Case Office as an integral piece of the financing puzzle. Through this office, patients can seek assistance in finding sponsorship for their care. The Social Case Office has maintained relationships with the Italian co-founders' NGOs – *Associazone Cuore Fratello* and *Associazione Bambini Cardiopatici nel Mondo* as a continuing source of financial support. More recently, the cardiac center has received support from Mi-Do, or Micro Donations, as well as from the Franciscan Mission Outreach in the United States.

Shisong Cardiac Center's main sources of revenue stem from the medical services the facility renders – open-heart surgery, pacemaker implantations, interventional catheterizations and diagnostic imaging studies. But, as mentioned previously, much of this revenue is dependent upon NGO financial support. In 2010, the Tertiary Sisters of St. Francis created the Archbishop Paul Verdzekov Memorial Heart Foundation as a domestic patient financing initiative founded "for sustainability purposes."[25] Sr. Alphonsa focuses much of her efforts on bolstering the Verdzekov Memorial Heart Foundation to make it robust enough to support increasing numbers of patients with each passing year. She describes the fund this way:

> We try to encourage people to be members and make a commitment where every month, maybe you give 1,000 XAF [$1.60] or 2,000 XAF [$3.20] so that it is continuous...If someone makes a commitment of $10 a month, let me say, that contributes a lot, instead of waiting to contribute big sums of money. If you put aside $10, that helps. That is what Mi-Do does in Italy. When you look at the website, there are people who contribute 20 euros a month. So, our dream is to make Cameroonians, or Africans, learn from this initiative. And, I think that with this, it could be sustained into the future.26

Financial Model

Shisong Cardiac Center's annual budget ranges from $1.4 million to $1.6 million USD (**Exhibit 7**).

A testament to the tireless fundraising efforts of the center, however, is the fact that despite its myriad financial challenges, it still achieved a positive margin of $19,000 in this last fiscal year – its highest margin to date.

In addition to the $4,750 cardiac surgery price, each additional cardiac intervention is also provided

at a fixed, bundled price (**Exhibit 8**). The decision to establish bundled prices stemmed from the desire to help communicate the costs of care in the simplest terms possible. The cardiac center sometimes has to unbundle its pricing for specific insurance companies.

Shisong Cardiac Center loses over $3,000 with every pediatric surgery because the estimated cost of performing a standard revision of a congenital heart anomaly, for example, can exceed $7,950 while the patient is only charged the standard $4,750. To add another layer of challenge for Shisong's leadership, the center must bear the additional financial costs of any clinical complications under the fixed price of service. Moreover, the Ministry of Public Health recently declared Shisong Cardiac Center a public utility as recognition for its extensive humanitarian work, but this recognition actually prevents the center from raising the prices of its procedures to increase profits.

An additional source of revenue for Shisong Cardiac Center is the variable quarterly allocations from the World Bank via the Ministry of Public Health for performance-based financing (PBF). This funding does not sponsor surgeries, but rather, it is directed towards specific elements of quality and maintenance of the hospital in terms of staffing, materials and equipment. General Manager Sr. Jethro does not consider this PBF income when planning the annual budget because the allocated funds depend on meeting specific performance metrics attained in the prior quarter, and the center does not yet have the experience to accurately predict revenue from this program.

Current and Future Challenges

In all, multiple components come together to contribute to the success and challenges of Shisong Cardiac Center. The solidarity, goodwill, and humanitarian values upon which the center was founded have sustained this initiative for almost a decade. As mentioned earlier, the center is receiving recognition for its laudable efforts. Sr. Alphonsa explains:

> Recently, they [Shisong Cardiac Center] had an Open Door, an exposition – the Minister was talking about our cardiac center […] The day after the Open Door, the president of Italy was visiting Cameroon, and [Cameroonian President] Paul Biya thanked him for our cardiac center. So that is why I can say it is becoming the pride of the nation. Paul Biya himself has recognized it as a public utility, so you see how it is treasured. Another message that the cardiac center is bringing is that it is merging bridges and creating friendships with different people.

However, difficult access by road, the intensity of care required to treat cardiac disease surgically, patients' insufficient financial means, limited governmental financial support, and Shisong's inadequate access to essential specialty physicians make sustaining this innovative program a continuing challenge despite its success. In spite of these challenges, Co-Founder Sr. Alphonsa finds hope in her favorite African proverb: "Your heart can take you where your feet cannot."

Tables and figures.

Exhibit 1 Location of Kumbo, Cameroon

Source: Casewriter. Adapted from www.lib.utexas.edu/maps/cameroon.html

Exhibit 2 Shisong Cardiac Center, Main Entrance

Source: Casewriter.

Exhibit 3 Road to Shisong in Kumbo, Cameroon

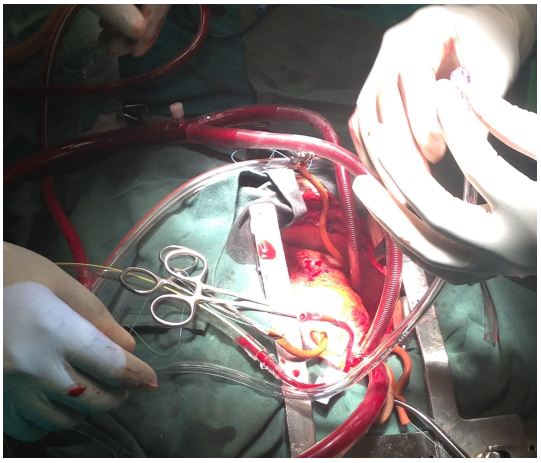
Source: Casewriter

Exhibit 4 Operating Room

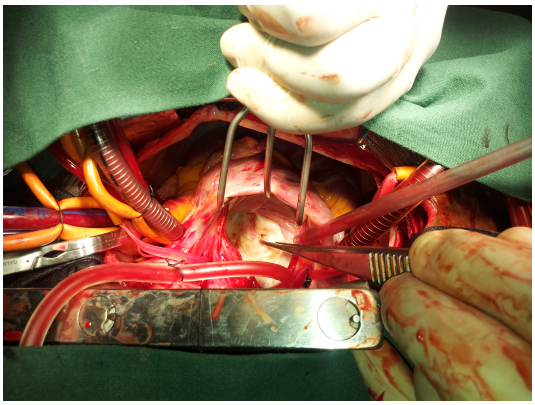
Source: Casewriter.

Exhibit 5

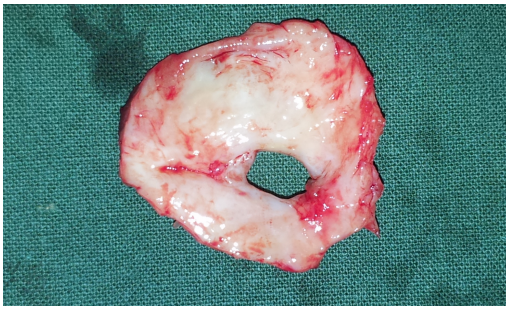
a. Open-heart surgery, mitral valve replacement



b. Stenotic rheumatic mitral valve, pre-resection



c. Stenotic rheumatic mitral valve, post-resection



Source: a. Casewriter
b, c. Company documents

Exhibit 6 Table of Surgery Statistics And Outcomes

iv. Clinical Statistics

Statistics based on Regions, Sex and Age groups.

Activities	Total	Regions											Sex		Age group	
		NW	SW	OU	LT	CE	SU	ES	AD	NO	EN	Other countries	M	F	Adult	Ped
Consultations	550	279	58	90	56	47	3	3	3	4	1	6	234	316	504	46
In-Patients	71	40	3	10	5	5	4	2	0	1	0	0	38	33	63	8
Surgeries	03	0	0	02	0	0	0	0	0	1	0	0	1	2	2	1
Catheterization	03	1	0	1	0	1	0	0	0	0	0	0	0	3	3	0
Pace Maker	04	1	0	1	1	1	0	0	0	0	0	0	1	3	4	0

09 consultations from outside Cameroon: *Nigeria-4, Gabon-2*

Cardiac Centre Statistics since inauguration in 2009

ACTIVITY	2009-2010	2011	2012	2013	2014	2015	2016 Jan	Feb	Mar	Ap	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Progress in 2016	Progress since 2009
Consultation	5956	5420	5268	5246	5976	6.313	567	567	589	554	604	550							3431	37.610
Echo Diagnosis	2423	2470	2357	2520	2705	2.956	320	253	290	242	274	284							1.663	17094
ECG Diagnosis	2464	2263	2132	2307	2476	2.579	299	235	241	218	247	254							1.240	15.495
In-Patients	994	1183	1213	1051	1180	1.342	122	101	83	84	101	71							1565	7.657
In-Patient deaths	83	70	75	61	70	85	05	07	03	08	08	05							36	481
P M Implantation	4	17	17	27	22	37	05	01	03	00	05	04							18	142
Catheterization	58	61	78	55	57	70	08	03	04	03	10	03							31	410
Surgeries	104	103	87	101	60	98	19	06	02	03	14	03							47	599
Post Surgical Deaths	11		07	08	04	7	01	00	01	01	01	00							04	41
Stress Test	0	15	8	6	4	5	00	01	00	01	00	00							02	44
Holter	0	60	62	56	77	70	5	5	04	04	08	02							28	353
Mobile Consultation	0	420	892	1354	3672	3.625	440	284	00	531	274	00							1.529	11.492
I.C.Ds				1	1	1	0	1	00	00	00	00							1	4

Source: Company documents.

Exhibit 7 Revenue and Projected Costs

Revenue

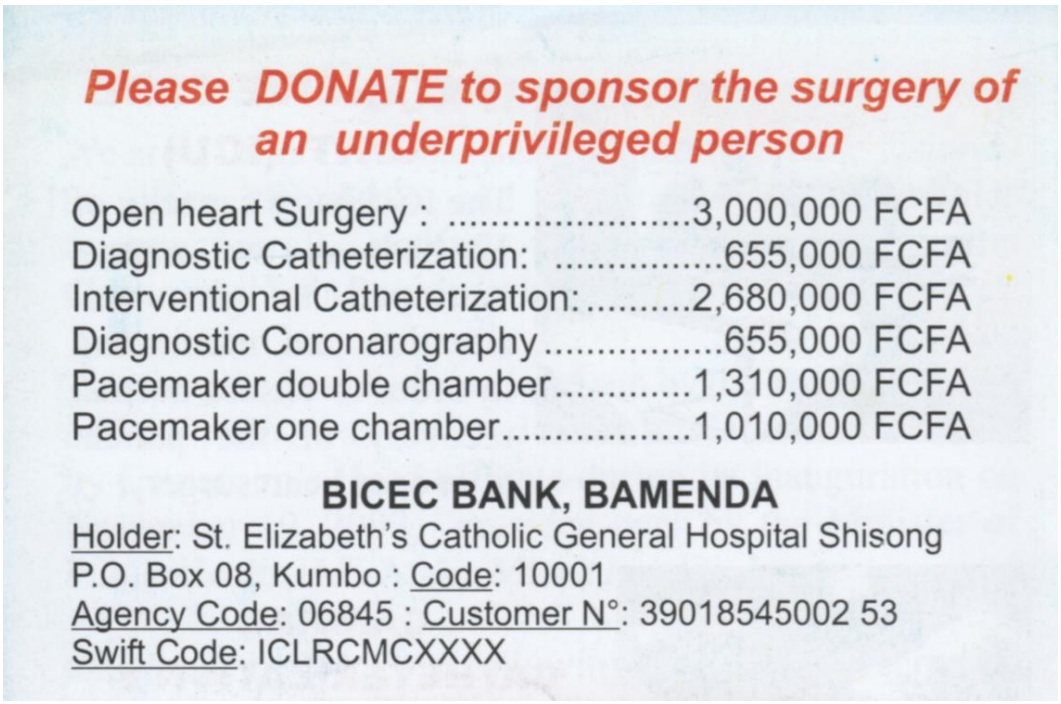
Surgery > Catheterization laboratory > Imaging Diagnostics > Medication Sales > Hospitalization and outpatient consultations > Mobile outpatient activities

Costs

Item	Percentage of Total Projected Costs (Avg: $1,500,000)	Estimated Amount
Surgical instruments & materials	30%	$450,000
Medications	18%	$270,000
Electricity & generator (fuel)	15%	$225,000
Personnel	12-15%	$180,000 - $225,000
Maintenance of equipment	8%	$120,000
Transportation of equipment	5-6%	$75,000 - $90,000
Maintenance of office space & utilities (water, air conditioning)	5%	$75,000
Laboratory	4-5%	$60,000 - $75,000
Total	**97-102%**	**$1,455,000 - $1,530,000**

Source: Company documents.

Exhibit 8 Prices of interventions provided



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Open heart Surgery : .....3,000,000 FCFA
Diagnostic Catheterization: .....655,000 FCFA
Interventional Catheterization: .....2,680,000 FCFA
Diagnostic Coronarography .....655,000 FCFA
Pacemaker double chamber.....1,310,000 FCFA
Pacemaker one chamber.....1,010,000 FCFA

BICEC BANK, BAMENDA

Holder: St. Elizabeth's Catholic General Hospital Shisong
P.O. Box 08, Kumbo : Code: 10001
Agency Code: 06845 : Customer N°: 39018545002 53
Swift Code: ICLRCMCXXXX

Source: Company documents.

Acknowledgements

Fist and foremost, I would like to every participant connected to Shisong Cardiac Center and the broader Cameroonian health system, who agreed to speak with me and provide the information to make this research study possible. Your solidarity is touching to this day.

Additionally, I would like to deeply thank my supervisor and collaborator, Dr. Schulman, for his help designing interview questions and editing my writing to guide my analysis of the great problems facing delivery of specialized surgical care in a low-middle income country.

Two individuals who were key to finalizing this project are my Scholarly Project Mentor, Dr. Stan Finkelstein, whose approval I needed to move forward, and Dr. Dan Palazuelos, my Scholarly Project Reviewer, whose careful review allowed for final submission. Thank you to you both.

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