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Executive Summary

Chenla Children's Healthcare is pediatric hospital located inside of a Kratie Provincial Hospital, a government-run provincial hospital in a remote eastern province of Cambodia. Utilizing existing government facilities, medication, supplies, and staff, Chenla provides international-standard medical care to Cambodian children suffering from infectious disease, febrile illness, premature birth, and more. Chenla collects revenue from donors, reimbursement for care provided to Health Equity Fund patients, and patient-paid fees. It uses this revenue to fund an innovative human capital model that rewards employees for longer work hours and more strict accountability.

In the first two years of operation, Chenla has already developed a reputation for providing excellent pediatric training. Chenla has both improved patient care, and positively impacted the finances of the hospital in which it sits: during this time, Kratie provincial hospital has attracted a larger number of pediatric patients, delivered 300+ more babies per year, and collected 66% more HEF funds for adult patients.

Introduction

In 2014, Dr. Bill Housworth was completing his term as the Director of the Angkor Hospital for Children, an NGO-run pediatric hospital in Siem Reap, Cambodia. Bill was reviewing the recently-released results of the Cambodia Demographic and Health Survey and was struck by the statistics about childhood mortality in the eastern provinces of Cambodia: the chance of a child dying before his or her fifth birthday in these provinces was approximately 1 in 12. This rate is 1 in 56 in Phnom Penh and 1 in 180 in the U.S.

Bill sought a meeting with Cambodia's Minister of Health, His Excellency Mam Bun Heng to see whether there was a way for him to help address the problem. The conversation was short and to the point: The minister walked over to a map of Cambodia on the wall of his office and pointed to the town of Kratie, saying "Just north of Kratie in Sambor is where the rivers come together. So it is good for you to work in Kratie." He'd pointed at a small city at the center of a region with the worst health outcomes in Cambodia.

From there, things moved quickly: Chenla Children's Healthcare officially started seeing patients in April 2017. Now, with Chenla in operation for nearly two years, the Chenla team is reflecting on the progress they've made and the challenges that lay ahead.

Context

Demographics

Cambodia is a southeast Asian country of about 15.6M people.[i] The population is predominantly rural (80%),[ii] Buddhist (97%),[iii] and Khmer (97%). The non-Khmer population (3%) consists of are ethnic minorities including Cham and Chinese. Though primary school enrollment rates are very high (nearly 97%), completion rates of lower secondary school are comparatively low (57%) versus other lower-middle income countries.[iv] The adult male literacy rate is 87%; females lag behind this at 76%.

The country's economy has grown explosively in recent years, with an average annual real GDP growth rate of 7.1% between 1994 and 2017, making it the world's sixth-fastest growing economy. The percentage of Cambodians living below the poverty line ($0.93 USD per day) declined from 47.8% in 2007 to 19.8% in 2011. It was estimated to have declined further to 13.1% in 2014.[v] Although this growth was driven primarily by garment exports and tourism, most rural people are still engaged in farming (subsistence and plantation work) – primarily rice, cashew, rubber, and pepper production.[vi] As a result, economic gains have not been equally distributed between urban and rural areas. Still,

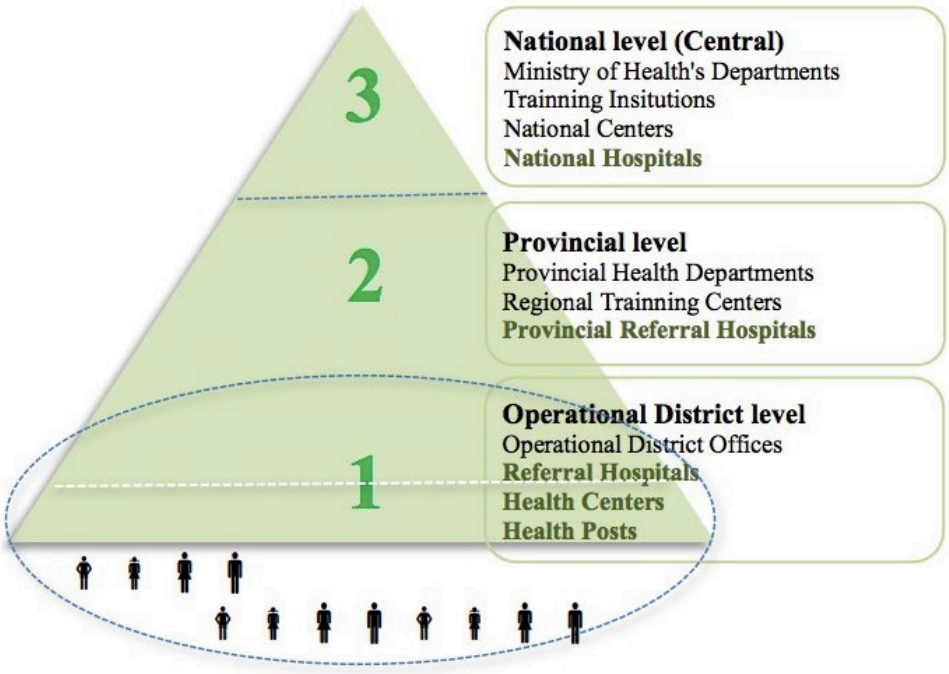
Exhibit: Map of Cambodia

Healthcare Services: Current Situation

With investment from government and international organizations, health status has dramatically improved in the last twenty years: life expectancy at birth was 69 years in 2016, up from 56 years in 1996.[vii] However, 25.6% of deaths in Cambodia are due to non-communicable diseases and poor maternal, prenatal, and nutrition, which exceeds neighboring countries (Thailand at 15.8% and Vietnam at 11.5%). Along with economic growth, the government has dramatically increased spending on healthcare, but it still lags neighboring countries. In 2015, Cambodia's per capita expenditure on health (in current international dollars) was ~$44. In Vietnam it was ~$140, and in Thailand, over $470.[viii] However, with a third of Cambodia's population of 16.5M below age 15, the demand for healthcare services for children and young adults is rapidly increasing. [ix]

Both public and private healthcare services are available in Cambodia. The public sector largely provides inpatient and preventative care, while the private sector typically dominates outpatient care, and is the first place that people typically access care. There are 102 public and 11 private hospitals in Cambodia. A tiered public health system spans from national tertiary care centers in dense urban areas to small health posts in remote villages.

Exhibit: Cambodia Public Health Infrastructure



[x]

The quality of health centers and posts has improved in recent years. In the past, they were often lacking essential supplies and medicine, and were un- or under-staffed. Now, they are typically effective at immunizing children, providing education, and referring patients to referral hospitals or private clinics for more advanced care. Still, they are often un-staffed in the afternoons, when providers may be at private clinics.

Referral hospitals typically serve one province, with between 80,000-200,000 people. According to the Ministry of Health, these hospitals provide health services that cannot be delivered by health centers, including specialized services, and diagnosis, follow-up and treatment for management of complex health problems. They also support and monitor the health centers in their districts, and can refer patients to national hospitals as required.[xi]

Unfortunately, the quality of these hospitals is limited by poor salaries in comparison with the private market, management challenges, need for process improvements in hygiene and other areas, and sometimes insufficient supplies and infrastructure.[xii] Because salaries are low, many staff members work second jobs in private clinics, where they can earn supplemental income. This can mean that staff leave before their shift in the public hospital is complete, or limit their availability on call. Physicians sometimes refer patients who come to the hospital to see them in their private practice instead, thus depriving the public system of revenue. Hygiene can be poor, and many hospitals lack higher level medicines and equipment. Where higher level medication and equipment is available, staff may not be trained to use or maintain it, and it may fall into disrepair. Hospitals may not be well equipped to serve high acuity patients, but transfers via ambulance are dangerous because little or no equipment or medication is available for the trip, and roads are poor.

Human Capital

Human capital shortages are a legacy of Cambodia's recent past - much of the country's medical infrastructure was decimated during the Khmer Rouge regime – it is estimated that only 45 doctors remained in the country in 1979. Though the situation is improving, today the number of physicians in Cambodia is still low, at fewer than two per 10,000 people – as a comparison, Thailand has 4.7 physicians per 10,000 people, and Vietnam has 8.2.[xiii] Worse, in 2010 more than half of the country's doctors were employed in Phnom Penh, but at the time less than 10% of the population actually lived there.[xiv]

Doctors in Cambodia must complete six years of medical school and two years of internship, if an internship slot is available; many doctors practice without completing their training due to a dearth of internship slots.

There are 11 medical schools in the country, of which two are public. However, international health experts consider the level of hands on clinical training they provide to be below international standards; many schools lack basic equipment and infrastructure.[xv] Doctors complete a six month pediatrics rotation during their internship, but no specialized pediatrics training was available, so doctors who wished to specialize in pediatrics complete their remaining training on the job. As a result, quality varies greatly: while some doctors are capable of handling critically ill patients, while others have never received this training.

There are five regional nurse training centers in the country, but none offer specialized pediatrics training, so newly graduated nurses benefit greatly from supplemental training.[xvi] The MOH acknowledges this in the Health Sector Strategic Plan, saying "competencies [and] skill-mix of [the] health workforce is limited. A shortage of competent health personnel in health facilities within the health system affects effective health service delivery."[xvii]

Doctors working in public hospitals in Cambodia typically receive between $250-300 USD per month in base pay, and may receive additional monthly funds due to HEF payments (these can range from nothing to $300 per month).

A typical doctor working at a private facility in Phnom Penh or Siem Reap can expect to earn $1300 USD per month. An especially skilled doctor in a higher quality NGO-run or private facility can expect to earn closer to $1800 USD per month. At Kantha Bopha Hospitals, a group of charity pediatrics hospitals in Phnom Penh, doctors are paid $2000 USD per month but are forbidden from seeing patients in private clinics.

Nurses working in public facilities are typically paid a similar or slightly lower base pay ($250-300 USD per month) in steady state, but may appear to receive higher salaries of up to $350-400 USD per month when recently hired; this accounts for temporary payments they must make to officials who helped them to secure jobs. Newly trained nurses in private facilities typically earn closer to $200 USD per month, while more veteran government nurses earn up to $500 per month from base pay and incentive schemes.

Public Healthcare financing

Until the introduction of the Health Equity Fund (HEF) in Cambodia, many poor people did not receive professional healthcare at all. With quality at the public hospitals needing further improvement, and services at private hospitals and clinics unaffordable for them, many chose instead to see a traditional healer or pharmacist, or to refrain from seeking care at all.[xviii] The HEF sought to solve this problem. Under the HEF system, the government pays public hospitals a set fee for each eligible patient they treat, regardless of the care they receive. The scheme is designed to attract and retain better staff at public facilities that are offering care to the poor.[xix]

Eligibility for HEF is determined via proxy means testing in a nationwide community-based exercise held every three years.[xx] Patients who are deemed eligible for the HEF program pay nothing at the point of care. Patients who arrive at the hospital and report that they are unable to pay can be evaluated on-location and still receive free care, if they qualify. HEF also covers transport and food allowance for patients' caretakers while they are in hospital. Unfortunately, payment for outpatient visits is limited. Most people seek care first in the private sector – because clinics in their villages are easily accessible – and these aren't covered. In addition, HEF will only cover an outpatient visit if the patient has a health center's referral and sees the doctor within a short four day window around the referral appointment. As a result, first visits to higher level facilities are rarely covered.

Pediatric Health Status

Cambodia has historically been among the countries with the highest childhood mortality rates.[xxi] However, great strides have been made in improving healthcare outcomes: between 2000 and 2014, infant mortality - the probability of dying between birth and age one - has declined from 95 to 28 per 1000 births. During the same period, under-5 mortality decreased from 124 to 35 deaths per 1000 live births.[1] Still, rural areas –

[1] National Institute of Statistics, Directorate General for Health, and ICF International, 2015. Cambodia Demographic and Health Survey 2014. Phnom Penh, Cambodia, and Rockville, Maryland, USA: National Institute of Statistics, Directorate General for Health, and ICF International. p. 129

where most of Cambodia's population lives - significantly lag urban areas, and Cambodia's eastern provinces are some of the most challenged, especially for children. Kratie, Stung Treng, Mondul Kiri and Ratanak Kiri continue to have very high rates of childhood mortality: under 5 mortality in Phnom Penh is only 23 per 1000 live births, it rises to 80 in Kratie, Mondul Kiri and Ratanak Kiri.[xxii]

This disparity is largely driven by differential access to care. The eastern provinces are remote, and many people live far from a functioning health center or hospital. In addition, poor travel infrastructure makes travel to national hospitals in Phnom Penh or Siem Reap difficult. The eastern provinces are dominated by ethnic minorities, including Cham, Phnong, Krung, Kuy, and Mnong, whose health-seeking behavior is different from the dominant Khmer. Whereas 98-99% of ill or injured people in Kampong Chhnang and Prey Veng seek treatment, only 86% do in Mondul Kiri and Ratana Kiri, the lowest of any provinces.[xxiii] These groups have historically had less of a political voice, and as a result, service provision has lagged.

Many people in these regions are still living in desperate poverty: 70% of people in Kratie province live on less than $3 USD per day, and in Stung Treng and Kratie, 46% and 34% of people respectively are in the lower quintile of wealth. This population infrequently seeks formal medical care as first-line when ill (23.5%). Many are living away from traditional village structures, around which the formal health system is based. In addition, an estimated 750,000 stateless Vietnamese people are living in Cambodia, with no access to the formal health system.[xxiv]

As a result, Cambodia's Health Sector Strategic Plan for 2016-2010 has a stated goal of "sustaining and improving access and coverage with a renewed focus on quality of health services across geographical areas." Indeed, the ministry argues that "achieving equitable health outcomes across geographical areas (rural vs. urban) and across the population (poor vs. rich) remains a pressing issue to the health system." They acknowledge that "investments in stronger competency-based education … will further promote quality of health care service at both public and private sector [sic]."

Pediatric healthcare typically focuses on two broad categories: preventative care to ensure proper growth and development into adulthood, and treatment for acute and chronic illnesses. Immunizations are a critical part of pediatric preventative care. They are crucial for both the individual and the population, and decreased vaccination rates result in increased risk of preventable and serious diseases. Although vaccination rates in Cambodia have been rising quickly, many children still have not received all of the recommended vaccinations. In fact, the 2014 DHS report indicates that only 73% of the entire pediatric population are up-to-date on all required vaccinations; 2.6% had received none of the vaccinations at the time of the survey.[xxv] These vaccination rates remain low compared to surrounding countries: a WHO/UNICEF report shows Thailand has near 99% vaccination coverage and Vietnam has coverage of around 95-99% for most of the required vaccinations.[xxvi]

In Kratie, these numbers are worse: only 65% of all children are up-to-date, while nearly 8% have not received any vaccinations. The majority (around 65%) of those who have not received full or any vaccinations are in families that reside in rural areas and considered in the lowest wealth quartile.[xxvii] In the last year alone, Chenla has seen several children with pertussis and two children with malaria – both diseases that are highly preventable with proper immunizations.

The other reason for pediatric physician visits is care for acute and chronic diseases. Acute care, particularly in Cambodia, is commonly related to infectious diseases, such as Dengue Fever, malaria, parasitic infections, and dysentery, as well as the common cold and pneumonia.[xxviii] It is crucial to treat acute illnesses quickly to avoid mortality or any long-term morbidity.

Dengue fever is a well-recognized viral illness that is hyperendemic throughout Southeast Asia and is a common reason for acute hospitalization. It has the potential to be life-threatening, and with no current disease-specific therapies or vaccinations, the World Health Organization (WHO) and policy makers throughout Southeast Asia consider it a major global public health concern. Cambodia currently only mandates the reporting of hospitalized children younger than 16 years-old, so it is difficult to determine exact prevalence. [xxix] The WHO reports around 14,000 cases annually, with epidemics occurring roughly every 5-7 years (last in 2007, with nearly 40,000 cases), but some studies report that the national disease burden is more than 3 times higher.[xxx]

Dengue's impact on the pediatric population is great and variable. It is a complex infection to treat, especially with the limited resources available in most of rural Cambodia, and it carries a risk of severe manifestations that is increased with each subsequent infection.[xxxi] To make matters worse, infection with the virus during pregnancy causes significant risk to the fetus, including high rates of preterm birth, fetal or maternal hemorrhage, miscarriage and even fetal death.[xxxii] There are also reports of the virus being transmitted via breast milk, which further exposes infants to grave risks.[xxxiii] This is especially concerning, as the vast majority of Cambodian mothers breastfeed their infants.[xxxiv]

Chronic diseases may include heart disease, kidney disease, liver failure, and neurological deficits. Chronic disease may be congenital or acquired from infections or nutritional deficiencies. It is important to monitor chronic illnesses periodically to evaluate for complications or progression of disease.

Adequate nutrition is crucial to the growth and development of a child, providing necessary elements that the cells of the body need to function and grow. Inadequate nutrition can manifest as chronic disease or insufficient development. Vitamin A deficiency is considered just below the threshold for a major public health problem in Cambodia. Vitamin B1 (thiamine) deficiency is common with severe malnutrition and can result in heart failure. This potentially fatal condition is known as beriberi, and is not uncommon in Cambodian infants. Iodine deficiency can cause severe thyroid disease, and in developed countries, food supplements ensure that all children receive enough. In Cambodia 66% of children have insufficient iodine levels.

Anemia, or reduced amounts of functioning oxygen-carrying red blood cells, is extremely prevalent in Cambodia. Deficiencies in iron, folate, and Vitamin B12 are the most common etiologies, but diseases such as sickle cell disease, malaria, and intestinal parasites (seen in 10% of children) are also prevalent. Additionally, anemia in pregnancy can result in maternal mortality, spontaneous abortion, prematurity, and low birth weight.[xxxv]

Origin of Chenla Children's Healthcare

After speaking with the Minister, Bill was interested in building a team to tackle the challenge, but only if he could to do things differently than he had at Angkor Hospital for Children (AHC) where he was currently the Executive Director. AHC is an entirely NGO-run and funded hospital, where all services were offered for free, regardless of whether families had the means to pay or could be covered by the Health Equity Fund. The team had worried constantly about sustainability. What would happen if the NGO funding situation changed? Was there a way to offer high-quality pediatric care to the people who needed it most in Cambodia, without relying 100% on foreign funds? Bill believed there was – if he partnered from the beginning with the Ministry of Health.

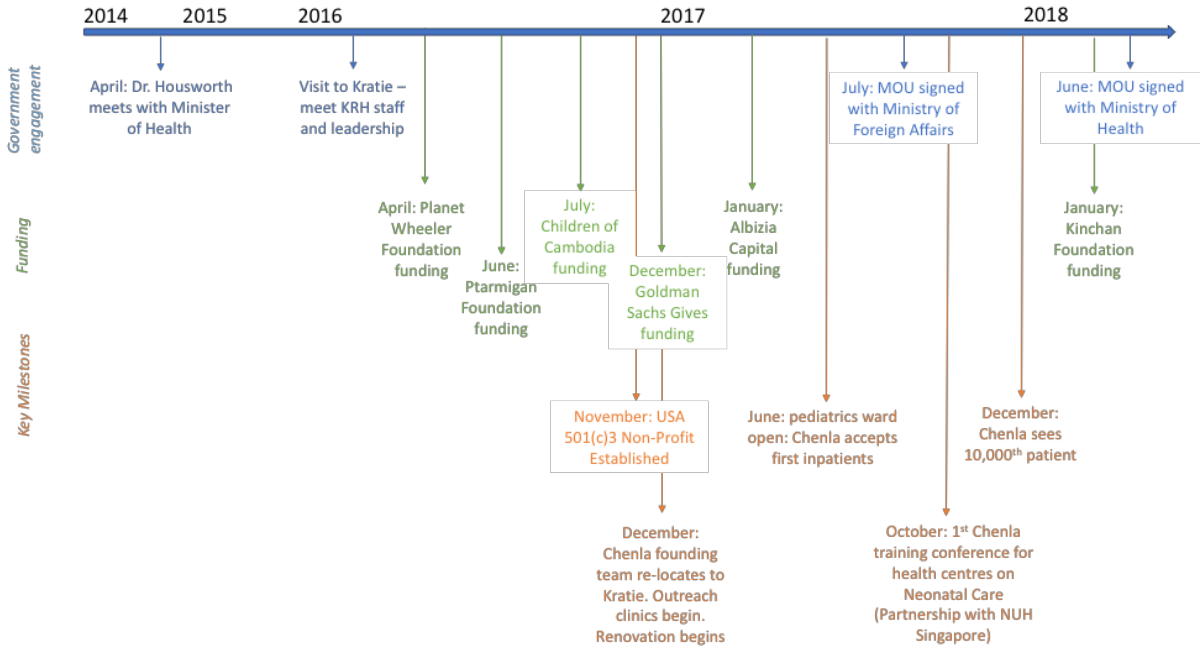
Bill proposed a new model to the Deputy Minister of Health – one much more focused on long-term capacity building, where a private NGO would work hand-in-hand with public hospitals. The model would demand more of the government staff and hold them accountable for a higher standard of care. But it would also to pay them more, invest in their training, and give them the medicines and supplies they needed. The idea was in line with one of the Ministry's strategic goals, to "strengthen and implement innovative approaches for effective, efficient and sustained health service delivery, with increased accountability for results," and consistent with the Ministry's plan to provide better care through with public private partnerships.[xxxvi] The Deputy Minister liked the approach. The Director of the Kratie Provincial Hospital (KPH) – the provincial hospital located in Kratie Province's largest town - was also keen to consider it. Bill tested the idea with some of his Cambodian colleagues from AHC, who also thought it had potential.

Bill spoke next to his biggest and most devoted donor from AHC – Mark Cubit from the Planet Wheeler Foundation. Mark was supportive – if Bill could bring some of his best staff from AHC to help, and could – over time – get more government investment, to make the model increasingly sustainable. Cubit figured it was worth a try in a province where the outcomes were so poor. He merely made Bill promise that if it didn't work, he'd invest any unspent donor funds back into the children's hospital in Siem Reap.

The last stop was the town of Kratie itself, where Bill had to do two critical things: understand the local community's openness to such an idea, and – if that worked - convince a few key staff members from AHC, his wife, and his four young children to make the move from Siem Reap to a remote town.

In a meeting with the government staff at KPH, they shared valuable feedback: they were tired of working with NGO's who paid their own, usually foreign, staff high salaries while demanding things from government workers, but leaving the government salaries just as they found them. Bill made it clear that he would expect more – but also that he would properly incentivize them, and create an environment that rewarded great care. He hoped that, over time, his venture would attract people who really wanted to provide great care, and help them to thrive. Chinda Long, Bill's Khmer right-hand administrative leader at AHC, also agreed to move, and after an enjoyable weekend in Kratie with a swim in the Mekong for the kids, the Housworth family was on board too. Chenla Children's Healthcare was born.

Exhibit: Key Milestones in Chenla's Development



Hospital Profile

Chenla Children's Healthcare was officially founded in mid-2016, began outreach in December 2016, and began seeing patients in April 2017. Chenla's objective is to strengthen the public healthcare system's capacity to deliver high quality sustainable pediatric care in Kratie Province.

Chenla is housed inside of KPH, an adult hospital with 130 beds, where it replaced the existing pediatrics ward. When the Chenla team arrived, the pediatric ward consisted of a small inpatient ward with ten wooden beds and no mattresses – only the second floor of the three-story stand-alone pediatrics building was used. The ward was old and dusty, and paint was visibly peeling from the walls. There was no outpatient department, and though an ER was available, it was understaffed and under-equipped. It lacked a CPAP machine and ventilator, equipment required for critical emergent care, as well as the ability to do blood cultures. It was staffed by a nurse only; a doctor could be called from another part of the hospital, or outside, during an emergency.

Prior to Chenla's establishment, patients with an HEF card would receive services at no cost, but because an HEF evaluator was often unavailable, patients who needed to be evaluated for HEF eligibility were often denied services unless they could pay upfront. In most cases, very sick patients could not be treated in Kratie

anyway, so parents would be faced with an expensive ambulance trip. Many of the doctors and nurses who staffed the unit also had private clinics in town, and would ask some who could pay to see them in those clinics. As a result, the pediatric ward of the hospital was seen as a place of last resort.

Chenla's renovation was basic, focused on providing a serviceable, hygienic ward with reasonably modern equipment. Renovation works totaling $76,000 USD focused on replacing flooring and windows, painting and plastering walls, and improving indoor plumbing. The renovation yielded a third-floor inpatient ward with 17 regular beds (and the capacity to expand to 24), 6 neonatal beds, a 2 bed ICU and a 1 bed ER. When additional capacity is required, the ward can expand to more than 40 beds. Chenla also has two outpatient exam rooms with room for two children each on the second floor, as well as administrative offices. The first floor remains largely un-used because of the risk of flooding during the rainy season.

Exhibit: Before/After Photos of the Pediatrics Ward at Kratie Provincial Hospital / Chenla
Before Renovation:

After renovation

Upon beginning to see patients in April 2017, Chenla's patient volumes quickly grew as word spread - in Kratie Town, the province in which it sits, and even nearby provinces Stung Treng, Mondul Kiri, and Ratana Kiri - that a quality pediatric facility had opened.

Chenla cared for more than 3,600 inpatient children, saw nearly 13,000 outpatients, and saw nearly 10,000 children in outreach clinics in its first 18 months of operation alone. During that time, the hospital generated more than $150,000 USD in revenue from patient care, paid through Health Equity Fund Coverage and directly by families. In 2017, the hospital raised $408,803 USD in donor funds.

EXHIBIT: Patient Volumes OPD/IPD

Month	# Inpatients	# Outpatients	# Patients Total
May-17	43	0	43
Jun-17	141	62	203
Jul-17	181	108	289
Aug-17	281	132	413
Sep-17	358	178	536
Oct-17	279	433	712
Nov-17	223	476	699
Dec-17	203	654	857
Jan-18	190	868	1058
Feb-18	172	833	1005
Mar-18	190	922	1112
Apr-18	207	900	1107
May-18	191	904	1095
Jun-18	178	1031	1209
Jul-18	201	1094	1295

Aug-18	184	1069	1253
Sep-18	141	999	1140
Oct-18	169	1137	1306
Nov-18	144	1194	1338
Dec-18	159	1453	1612
Total:	**3,835**	**14,447**	**18,282**

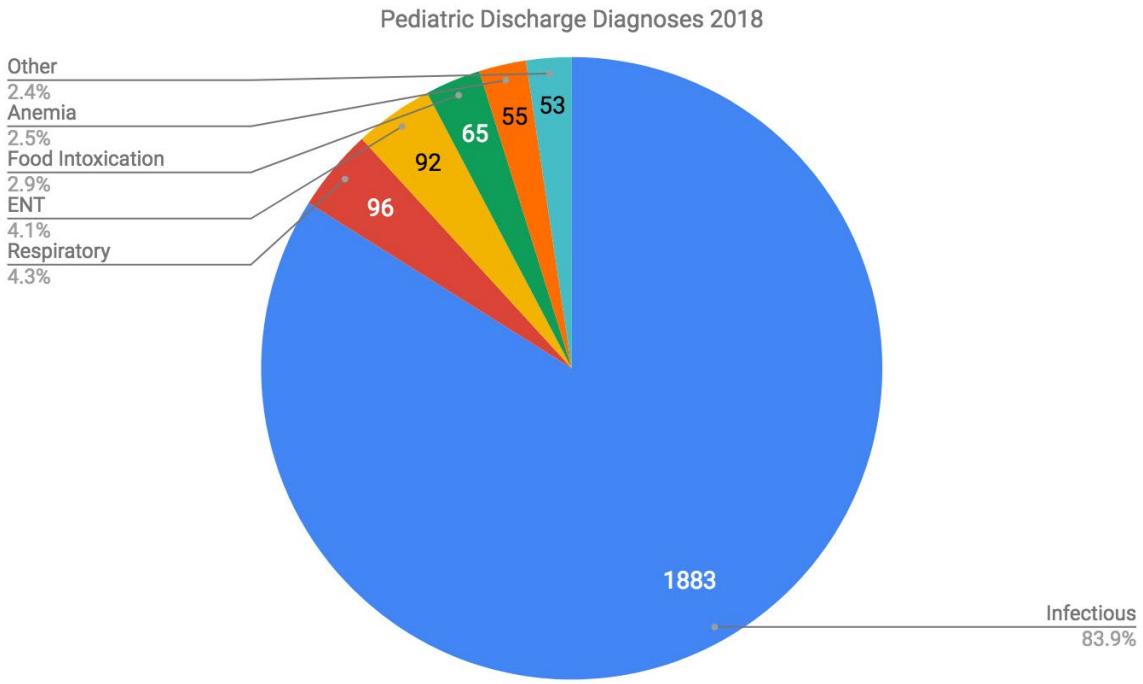
Chenla provides the following services:

- Treatment for febrile illnesses, respiratory illnesses, and other infections
- Neonatal care
- Stabilization of critical illness for transport to Siem Reap or Phnom Penh. Common problems requiring transport include birth at less than 32 weeks gestational age and sepsis.

The hospital's average length of stay is 4.56 days; their bed occupancy rate is 114%.

The most common reasons for seeking outpatient care include fever, diarrhea, dehydration, upper respiratory infections, and asthma.

EXHIBIT: Inpatient Pediatric Discharge Diagnoses, 2018



Notes:
Total admissions for 2018 was 2,244 children.
Respiratory includes: Asthma, with acute exacerbation; Dyspnea; Pleural effusion, not elsewhere classified
ENT includes: "Other" ENT diseases; Diseases of hard tissues of teeth
Anemia includes: Anemia, unspecified; Folate-deficiency anemia
"Other" includes: Nutritional Deficiency, Epilepsy, Renal Disease, Mental disorder, Dermatological Conditions, Neonatal Aspiration, Heart Failure, Motor Vehicle Accident, Other

EXHIBIT: Inpatient Pediatric Infectious Disease Discharges, 2018, Detail

2018 Infectious Disease Discharges, Detail

Respiratory	808	Includes: Acute upper respiratory infection, unspecified; acute bronchiolitis, unspecified; pneumonia, unspecified organism
Neonatal Sepsis	455	
GI Infection	221	Includes: infectious gastroenteritis/colitis, unspecified; Unspecified acute appendicitis
ENT	172	Includes: Acute pharyngitis, unspecified; acute tonsillitis, unspecified; Acute Sinusitis, unspecified; Tonsillitis Aspergillosis
Dengue Hemorrhagic Fever	85	
TB	34	
Malaria	28	
Sepsis	27	
CNS (Meningitis)	14	
Parasitic (Schistosomiasis)	9	
Other	8	Includes: Hepatitis (2), HIV (2), Typhoid (2), Pertussis (1), Descending Paralysis (1)
UTI	5	
Acute Amebic Dysentery	4	
Uncomplicated Viral	4	
Tetanus	3	
Measles	3	
Scabies	3	
Total	1883	

Dr. Bill Housworth is the Director of the Hospital. The parent organization is a U.S. registered 501(c)3. Chenla is also registered as an independent NGO in Cambodia, and works with Partners for Equity in Australia for tax deductible fundraising purposes with no overhead removed. The board of directors for the U.S. 501(c)3 includes Bill, Tessa Boudrie, and Dr. Nicolas Grundmann. As Chenla is jointly funded by the Ministry of Health and donors, its budget is incorporated into the Annual Operational Plan of the Kratie Provincial Health Department. However, Chenla is able to make all spending decisions regarding donor funds without consulting the Ministry.

The Chenla Model

The team's initial vision evolved into a unique partnership with the Ministry of Health. Chenla is effectively a children's hospital within a larger hospital, with the two hopitals are in an inextricable financial and clinical partnership. Chenla entered into two agreements with the Cambodian government to facilitate this: one with the Ministry of Foreign Affairs and a second with the Ministry of Health. The latter authorizes Chenla's operation for Jan 1 2018 – July 27, 2020 (extendable) and details the requirements for the hospital's operations.

The MOU required Chenla to do the initial building renovation and subsequent project implementation in consultation with the Ministry of Health and Provincial Health Department respectively. Chenla must submit reports to both ministries every six months, with information on activities, progress towards achieving objectives, project implementation challenges, financial expenditures, and the number of expatriate and national staff. A representative from Chenla is also required to attend the monthly meeting with the Provincial Technical Working Group for Health, which coordinates all health-related NGO activities in the province and ensures they are in line with the Ministry of Health Goals and Priorities. Recently, Chenla was asked to lead this group.

The MOH agreement details that Chenla will "work closely at all times with their Cambodian counterparts in order to maximize transfer of skills and to strengthen Cambodian technical expertise and capacity with related

skills."[xxxvii] Therefore, Chenla's culture emphasizes deep partnership not only with MOH leadership, but also with local provincial health leadership, the Cambodian staff, and the broader community.

Chenla's Five Key Aims were developed in consultation with the Ministry of Health. They are to:

1. Provide high quality holistic healthcare in Kratie
2. Link healthcare with educational outreach to remote towns and villages
3. Establish a stabilization, referral, and transport center for children needing high-level care such as heart surgeries, cancer treatment or extensive intensive care unit services
4. Improve medical standards in the region by training local personnel in high quality care
5. Obtain a portion of funding from local and regional sources from the beginning, including the Health Equity Fund system, so that the project is equitably shared by local and international stakeholders and partners from the start.

The partnership benefits both the government and Chenla. The government aspires to continuously improve health outcomes in Cambodia, and lagging provinces like Kratie must be improved if they are to achieve this. Given the Chenla team's track record at AHC, and the relative lack of quality healthcare facilities in the region, Chenla offered the government the opportunity to make a major improvement for its constituents. Chenla was able to avoid building redundant facilities, make better use of existing government resources and build relationships with the community.

STAFFING

The KPH-Chenla staffing agreement is a critical part of the Chenla operating model, and a pillar of Chenla's financial and clinical success. As part of the agreement, KPH agreed to continue funding a significant portion of the staff from its former pediatrics ward, but ceded control of the ward and its staff to Chenla. As a result, the majority of Chenla's staff is from the Kratie community. This has helped the hospital to build a good relationship with the government and community, as well as to attract more patients, who often learn about the hospital's work organically.

Exhibit: Staffing Responsibilities - KPH and Chenla

KPH	Chenla	Shared
Registration Billing/Payment Pharmacy	Treatment in the Pediatric Ward Pediatric Ward Admin Security HEF Administration	Housekeeping Equipment Maintenance Physiotherapy Imaging Labs

Clinical Staff: Doctors and Nurses

Control is particularly important because Chenla has higher expectations for its clinical team: longer working hours, an excellent bedside manner, more accountability, and top-notch, pediatric-specific skills, often beyond what would typically be expected for a given role.

In order to understand the context for Chenla's staffing system, it is important to understand how clinical staffing works in a typical government facility. There, nurses and doctors work 8 hour shifts, 5 days per week. They are also technically required to provide "duty time coverage," which means that they return to the hospital when staff from other shifts are on break to provide coverage for the wards. In practice, however, this coverage varies.

This helps to explain the numbers in the exhibit "KPH and Chenla Profiles, December 2018" below. Especially in comparison to Chenla, it appears that KPH has few doctors and many nurses for the beds they must cover. The hospital does not have enough physicians to adequately cover the wards, especially given that seven of the 17 are specialists – an eye doctor, a dentist, 3 surgeons, and two anesthesiologists. There are two main reasons for this: first, the operating model for government hospitals is to use nurses to cover for doctors, to keep costs down. So, KPH makes up for having so few doctors per bed by having many nurses. Nurses take care of most of patients' needs, and doctors are summoned from home or elsewhere in the hospital when needed. Unfortunately, in practice this often results in lapses in patient care, because doctors simply do not see patients in person – if the nurse reaches the doctor by phone, he may provide advice over the phone, or

simply say that he is not needed. Where similar practices were used in other countries, they have since been discontinued because of the impact on patients. The second reason is that shifts are shorter, so the hospital needs more nurses to cover the same number of hours.

Exhibit: KPH and Chenla Profiles, December 2018

	Beds (IPD, ICU, OPD Consult)	**Doctors**	**Nurses**	**Support Staff**
Kratie Provincial Hospital (Adult)	130, of which 28 obstetrics, 27 surgery, 12 ER & 28 TB	17	90	13
Chenla Children's Hospital	IPD: 26, of which 2 are ICU, and 6 are neonatal OPD: 2	11	20	5

Note: Support staff includes clinical functions only. For KPH, doctors include 1 dentist; nurses include 20 midwives, 3 nurse anesthetists, and several nurses working in registration and other non-ward functions; support staff includes lab, physio, pharmacy, and medical assistants. For Chenla: doctors include 3 who are part time (counted here as 1), support staff includes lab, physio, pharmacy, and imaging (some of whom are only part time allocated to the pediatric wards.)

The model at Chenla is very different. There, the team covers the wards 24 hours a day, 7 days a week, so nurses and doctors work sixteen 12-hour shifts per month. Clinical staff may be asked to accompany children who need to be transferred to higher-level facilities, which requires unplanned, long, and stressful hours in the back of an ambulance with a sick child. In addition, Chenla team members must often do more than what they had previously – for example, nurses are expected to take on tasks that doctors would do in other private hospitals, if they are capable of doing so safely. Lastly, while Chenla staff are not forbidden from seeing patients in private practice outside of the hospital, hospital leadership is very clear that time at Chenla must be 100% devoted to Chenla patients.

Clearly, only people willing to make investments of time and energy to meet these expectations are attracted to and ultimately thrive at Chenla. At the same time, staff who were willing to take on longer shifts and meet higher expectations receive higher salaries – Chenla tops up government salaries, and provides some overtime pay. In addition, the Chenla leadership bet that by offering better services, they would increase patient volumes and thereby increase earnings from both private pay and through the health equity fund. This revenue is split among the hospital's staff, who are majority government paid, supplementing their income.

Though most of the staff at KPH did not have experience working in such an environment, some were attracted by the opportunity to provide better care, learn valuable skills and obtain the financial incentive. Others – who chose not to join - were concerned with the stress of meeting high expectations, and the hard hours The Chenla founding team believed that attitude was the most important thing – if staff wanted to provide care, Chenla could equip them to do so. This seems to have been successful: in 2018, nearly half of Chenla's clinical staff were originally from KPH.

However, because most of these staff lack pediatric-specific training, including in critical care, Chenla has had to both supplement the team and invest heavily in training. To do this, Chenla recruited additional doctors and nurses with specialty pediatrics experience from elsewhere in Cambodia - especially AHC. In fact, 20% of Chenla's initial staff came from AHC. In addition to their regular clinical activities, these staff members – along with Bill and his wife Lori Housworth, who is a pediatrician - take on a heavy teaching and training load. In addition, Chenla has established partnerships with National University Hospital Singapore and the University of Minnesota, which have facilitated volunteer visits from senior faculty and residents to provide additional training. To supplement on-the-job training, Chenla sends staff to conferences and events focused on neonatal, intensive, and emergency care.

The nursing team is a good example of the success that Chenla has been able to achieve with this model – most of the hospital's nurses were hired locally or from KPH, but the head nurse, who has extensive pediatric specialty experience from AHC, has trained them to deliver more complex, specialized care.

Over time, the team has found that most staff formerly from the Kratie Provincial Hospital learn very quickly, provided they get the training and resources they need. People enjoy working at Chenla, not only because of

the training opportunities, but because they enjoy being in an environment where they are expected to make clinical judgement calls, to push themselves to learn more, and to teach their colleagues.

Already Chenla has begun to play a role in the broader healthcare community by training nurses and residents from other hospitals and training centers both in and outside of Kratie. Nurses from Kampong Cham and Stung Treng Regional Training Centers are rotating at Chenla on an ad hoc basis, and one NGO and one government hospital are sending physicians to Chenla for pediatrics training. In the future, Chenla plans to become an approved government training site for residents who need to fulfil their six-month pediatric training requirement. To become an official site (and collect fees to cover the costs of training), Chenla will need to ensure that it has 1-2 senior physicians who can serve as professors.

Administrative & Support Staff
Many KPH services are available to support Chenla's operations. KPH staff provide patient registration and billing services to the entire hospital, including Chenla. As Chenla has gotten busier, KPH has actually improved these services with a better-staffed, new registration area with a larger waiting area. In addition, Chenla benefits from the use of the KPH pharmacy, imaging, lab, housekeeping, and maintenance staff at the adult facility. Chenla also invests in administration and security staff devoted specifically to the pediatrics ward.

The majority of the salary for each of these administrative and clinical support staff is covered by the government, but Chenla does in some cases provide additional incentives. In the early days of working with these teams, Chenla found that the staff were not always available during working hours to perform laboratory or imaging tests in a timely manner. In addition, laboratory materials ran low, in part because they would often "leak" out to the private market. Paying an additional incentive, along with management oversight, has ensured that Chenla receives a higher level of service from these government employees.

One of Chenla's most critical staff members is the Facility and Country Director, Chinda Long, a Khmer Cambodian national who came with Bill from AHC. In addition to serving as the chief administrator and problem solver for Chenla, Chinda is responsible for building and maintaining relationships with the government. This means frequent communication and collaboration with the provincial health director and the director of KPH, as well as serving on multiple government committees, including the Provincial Working Group for Health, which Chinda has been asked to chair. Since Chenla gets so much of its resources from the government – payment for staff salaries, shared services, basic medication and supplies, and space – it is imperative that Chinda maintain a strong working relationship with the government.

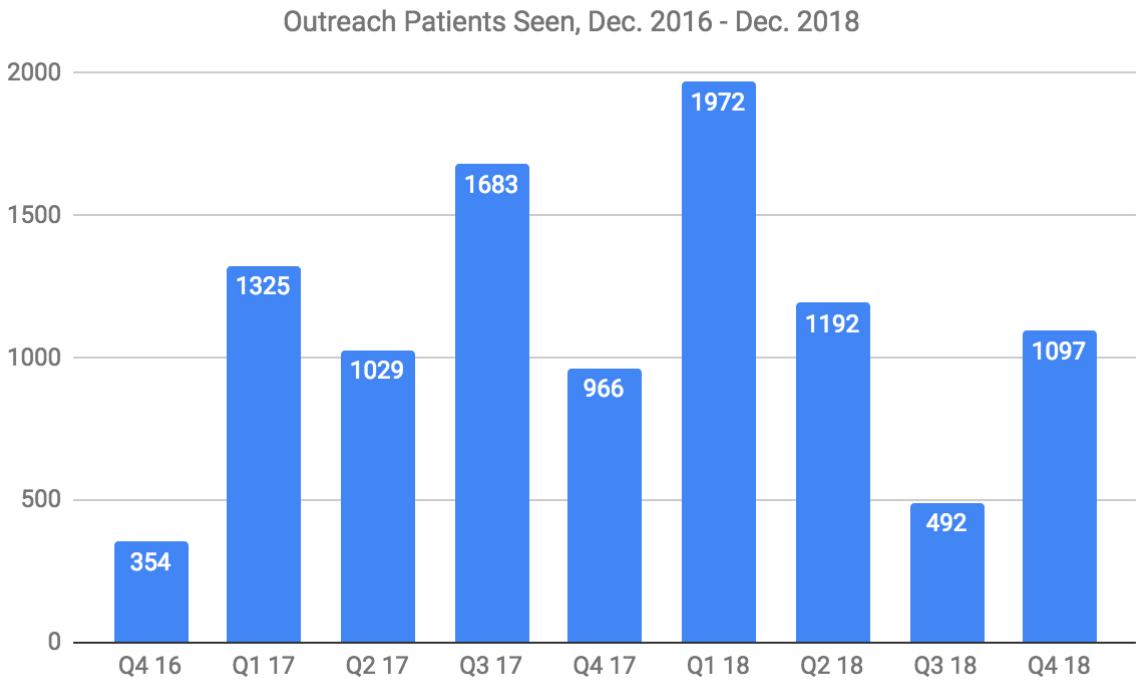
In addition, Chinda plays a critical role in bridging outside (UK, USA, Australia, Singapore, and Canada) cultural norms and standards with Cambodian norms and standards, while maintaining patient safety and quality. His role has helped to foster positive system level change in the government hospital, while still maintaining and protecting Khmer cultural norms.

OUTREACH
Each month, the Chenla team coordinates with the provincial health ministry to set a schedule for a team of Chenla doctors and nurses to visit one of the villages. Visits are always made in partnership with the local health center, and focus on health education, treating minor health concerns, and educating families about how they can access care if their child becomes more seriously ill. By partnering with health centers, Chenla is relying as much as is possible on existing community resources, reducing the demand for Chenla- or government-paid salaries and overhead.

Education provided at each outreach clinic includes teaching of early warning signs of severe infections in newborns, malaria and dengue fever symptoms, preventative measures for malaria and dengue, and traffic accident precautions. The team ensures that families understand that the Health Equity Fund will cover their healthcare needs, even including transportation to Chenla, if required.

Outreach clinics are not funded by the government and must be covered through the generous donations of one of Chenla's donors. Where possible, Chenla looks to partner with NGO's providing other services in the community; for example, Chenla has worked with All Ears, an NGO offering hearing exams and audiology services. In addition to providing much needed education and well-child visits to villagers, the outreach clinics have become Chenla's main form of advertising.

EXHIBIT: Outreach Patients Seen, 2016-2018, Quarterly



Note: Total outreach patients seen was 10,110. Chenla began seeing patients in outreach clinics prior to the formal opening of the hospital, during the renovation period.

CULTURE

Four principles permeate the Chenla culture, and are well known to all members of the team.

The first is *high expectations*. After more than 10 years working in Cambodia alongside medical colleagues and staff, Bill strongly believes that people will make the right decisions when given the tools and resources they need. Though most Cambodian hospitals operate in a fairly hierarchical way, Bill intentionally works to demonstrate trust in his Cambodian colleagues, and to defer to them as much as possible. He has trained his senior-most Cambodian leaders – both clinical and administrative - to behave similarly. In exchange for this high level of trust, Bill expects his staff to take ownership of the hospital: he often exhorts them to "treat this place like your home!" He also expects them to work extremely hard, and to have an un-ending commitment to patients. This is true regardless of whether a given staff member is on the government payroll, Chenla payroll, or a combination of the two.

Second is *compassion and respect for the patient*. In many Cambodian medical facilities, the hierarchy extends beyond the team to the patients themselves. Families may not be given the information to be able to make informed decisions, but are nevertheless expected to do a great deal to take care of their young charges. At Chenla, one will constantly hear staff reminding one another that "the patient is the boss." Even if patients are being offered free or reduced cost care in a government facility, they still deserve high-quality care, and to be consulted about the care they are receiving.

Third is a *belief in the value of every child's life*. Many NGOs focus on maximizing the number of patients to whom they offer care. Often, that means these facilities cannot afford to offer more complex care to very sick children – because doing so would mean spending money that could be spent caring for more patients. At Chenla, the focus is on providing high quality care to anyone who needs it, regardless of ability to pay, and – within reason - regardless of the cost of that care. The team has decided that being in a low-resource environment is not a reason to deny children an international standard of care. Sometimes this means

prescribing a more potent antibiotic; other times it means spending money on transferring a very ill child to Phnom Penh.

Finally, the Chenla team believes in *only working to improve what needs improvement*. That is, if the existing system – whether it is government or NGO – is doing something well, they don't re-do it. Instead, the team tries to work as a partner. For example: families sometimes ask to receive immunizations during outpatient visits. While Chenla could provide these, the health centers already provide this service quite effectively, so Chenla declines to do so.

A great example is Nurse Sary, a government nurse who had worked at Kratie Provincial Hospital for 10 years prior to Chenla being established. Although she underwent two weeks of hands-on pediatric training at AHC, she found that the pediatric ward at KPH was under-resourced, lacking adequate medical supplies such as oxygen, oxygen tubing, IV tubing, etc. In addition, the pediatric ward was lacking in hygiene supplies and many medicines. She was constantly frustrated and tensions with patients' families ran high – she found herself raising her voice with families, and giving orders, practices that were common in under-resourced, high-demand wards. She appeared to lack the empathy one expects from a nurse.

Sary decided to take a chance on Chenla, and signed up to join the team. At the beginning, many of these behaviors continued. One day, about a year after Chenla started, Sary was seen speaking loudly to a patient's family again. This time, Chenla senior staff quietly took her aside and explained to her that this is not the practice at Chenla – we don't manage our teams or our patients with blame or shame. Instead we work together as a team and support each other - the team explained that they were not mad at her for her behavior, but wanted to understand why, and wanted better for her. Suddenly, Sary broke down crying and apologized. She said she had never worked in a place where the team was so kind, and where she was expected to bring this kindness to patients. She spoke at length about how thankful she was for Chenla, and said she would try to bring this kindness into her work. Since then, while her clinical skills have continued to improve, the real change is in her approach to patients and colleagues – she brings her empathy to work! She is a true testimony as to the importance and strength of Chenla's organizational culture.

How it works

By relying on revenue from user fees and donor income, and reductions in operating expenses from the government partnership, Chenla is able to provide a level of care that far exceeds what is typically offered in a government-run facility.

These arrangements are enshrined in Chenla's agreements with the government, and by having Chenla housed directly within KPH, but there is no fixed system for this transfer of resources. As such, the statement of revenues and expenses presented here do not show user fees and HEF fees generated by Chenla, which go directly to KPH. Similarly, Chenla avoids covering certain expenses because of shared services from KPH, KPH salary payments to Chenla staff, medication and supplies obtained from the central hospital storehouse, and energy costs covered by KPH. These avoided expenses do not appear in the financial statements; all expenses shown here are paid directly by Chenla. Unaudited revenues and expenses for 2018 are included in the appendix; they may be considered more representative of future years because 2018 was the first full year of operations for Chenla.

In the below section on mitigating expenses, we explore how costs for each of the key expense areas are borne jointly by the government and donors.

EXHIBIT: Statement of Revenues and Expenses – Cash Basis, Year Ended Dec 31, 2017 Audited

Revenues	
General Donations	*173,728*
Donor A	*73,980*
Donor B	*99,975*
Donor C	*11,980*

Donor D	*50,975*
Donor E	*45,300*
Donor F	*57,865*
Total	***$513,803***
Expenses	
Program Expenses	
Benefits & Salaries - Doctors	*47,364*
Benefits & Salaries - Nurses	*64,590*
Benefits & Salaries – Other Medical	*38,922*
Benefits & Salaries – Housekeeping	*133*
Benefits & Salaries – Non-Medical & Admin	*54,780*
Medicine	*12,197*
Medical Supply	*22,641*
Lab Supply	*1,624*
Office Supply	*3,191*
Other Supply	*2,554*
Utilities - EDC	*1,309*
Utilities - Water	*67*
Utilities - Internet Phone	*1,522*
Utilities - Fuel	*1,793*
Training - Local	*6,071*
Patient Services	*1,828*
Staff Transport	*22,769*
Equipment	*23,073*
Total Program Expenses	***$306,295***
G&A	
Prof. Fee	*2,995*
Rental	*7,325*
Meeting	*1,635*
Bank Charge	*3,530*
Delivery	*686*
Other expenses	*7,689*
Depreciation	*3,261*
Fundraising	*1,403*
Total G&A	***$28,524***
Total Expenses	***$334,819***
Net Revenue	***$178,984***

Note: General Donations includes $60,000 from the Ptarmigan Foundation and $45,000 from the Planet Wheeler Foundation in 2016. Excluding these donations, the revenue from donations for 2017 was $408,803. This reduces net revenue to $73,984. See appendix for 2018 Statements (unaudited).

Revenue: User Fees & Donor Support

Chenla charges fees to patients, which vary depending on their ability to pay.

HEF-eligible families receive free care at the point of care. Chenla reports what has been provided to the government and then receives reimbursement directly to Kratie Provincial Hospital. KPH manages this process. Families who have not been evaluated for HEF but who claim to have no means to pay will be evaluated at the hospital by a Chenla-funded HEF interviewer. Though some worry about overutilization of services because they are provided at no charge, this has not been the experience at Chenla. In fact, sometimes people who can't pay anything try to do something (e.g. paint the walls) to contribute. Approximately 50% of Chenla's patients are covered by HEF,[xxxviii] but this can be managed up or down by working with village chiefs and leaders to ensure they send the patients.

HEF pays a flat rate of $30 for inpatient stays regardless of length. This fee covers any required laboratory tests and x-rays, and a portion may be used by the patient to cover transportation between the hospital and home, and food while the child is staying at Chenla. Outpatient visits are covered at $8 per visit, if the child has a referral and previous appointment. This $8 may also be used to cover transportation to and from the hospital, which can be costly for patients living in remote rural areas. Funds for transport and food are paid directly to the patient by the HEF office at the main hospital.

The user fees and HEF funding that Chenla receives are retained by KPH. KPH is mandated to remit 1% of these fees to the Provincial Health Department, to spend 60% on salaries, and to spend the remaining 39% on administration. Chenla has only informal input into how HEF funds invested in salaries and administration are allocated.

Exhibit: HEF Fees Paid to Hospital

HEF Feed Paid to Hospital ($ USD)	
ER or ICU Stay – Package rate	$75
Inpatient Visit – Package rate	$30
Outpatient Visit	$8
Surgery (Minor – Medium – Serious)	$100 - $150 - $250

Note: Imaging, bloodwork, food, and transport, as needed, are included in inpatient and outpatient package rates.

In some cases, Chenla families are not able to pay but do not have the correct documents to be deemed eligible for HEF funds. In these cases, Chinda and Lihok, the Director of Nursing, will actually contact the village chief for that patient directly (often via Facebook), and request the requisite letter stating that the family has limited income. Chinda prints the letter and helps the patient re-approach the HEF assessor in the main hospital. If these efforts are not fruitful and the family still cannot pay, Chenla will not turn them away; they typically spend approximately $10,000 USD per year on family support to ensure that these children are treated, are fed, and can return home. Many of the children who access free care at Chenla are poor but not HEF-eligible because they are from a large nearby floating village of undocumented Vietnamese.

Families who have means, who are deemed ineligible for HEF, or who seek outpatient care without a prior referral, are charged on a fee-for-service basis (see exhibit below). Fees, which are the same regardless of family income, are also set by the government. Fees are not charged on a sliding scale; families pay a set fee regardless of income.

Exhibit: Common Patient Paid Fees

Common Patient Paid (Non-HEF) Fees ($ USD)	
ER Visit or ICU (per day)	$10
Inpatient Visit (per day)	$5
Outpatient Visit	$2.50
Imaging (X-ray, ultrasound unlimited)	$5
Blood work (unlimited)	$5
Surgery (Minor – Medium – Serious)	$10 - $70 - $150

Note: Patients pay no additional charges after 7 days in IPD/ICU/ER

Fees for each hospital are recommended by a committee that includes representatives from hospital leadership (including Chenla) and the provincial ministry of health. After changes to fees are recommended,

the committee must seek approval from village commune chiefs, as well as from the Ministry of Health. After 18 months in operation, with improved patient volumes that demonstrate that parents are clearly willing to pay, Chenla began advocating raising fees to cover more of their costs. The hospital director was agreeable, and the committee has recently proposed the following changes, which are currently being reviewed by the villages:

- Increase OPD fee from $2.50 to $3.50
- Increase IPD per day rate from $5 to $7 (not including imaging and bloodwork)
- Retain current ER/ICU rate; however, after 7 days, charge normal IPD rate (instead of free of charge)

Donor Support

Chenla is fortunate to be supported by a small group of donors who have taken a particular interest in Chenla's public-private model and focus on the neediest parts of Cambodia. Many of Chenla's donors came to know Bill and Lori Housworth through AHC, and remained supportive of the experiment at Chenla. Some donors are more flexible about how their funds are spent, while others are more restrictive. Regardless, Chenla practice is to report on how every dollar is spent.

Planet Wheeler and the Ptarmigan Foundation are Chenla's two largest donors. Their interest is in seeing their funds used efficiently – and with as little overhead as is possible – to help kids who need it most. In addition, they value Chenla's small size because it facilitates running a very small, lean organization, with minimal administration.

It is most difficult for Chenla to secure donations to cover operating costs – donors often do not wish to cover things like medication, supplies, energy, and salaries, that will lock them into a longer-term relationship with the organization. As a result, the Chenla team has made finding donors who WILL pay for such costs a priority. In contrast, funds for one-off equipment purchases are typically requested on an as-needed basis, as donors to cover these costs are easier to find. Unfortunately, many NGO's and public hospitals have purchased equipment and failed to maintain it. The Chenla team has established a great track record for ongoing maintenance, which has helped to attract and retain donors for capital expenses. Since Chenla's founding, it has received nearly $120,000 in donated equipment. In 2018 alone, donations included CPAP machines, a ventilator, infusion pumps, and baby warmers. Chenla's largest donators of equipment are DAK Foundation (Australia), Albizia Capital Pte, Ltd (Singapore) and Zau Foundation (Hong Kong).

EXHIBIT: Medical Equipment Donations, 2017-18

Equipment	QTY	Estimated Total Value (USD)
2017		
Infant Warmer	4	$ 6,800
Phototherapy light	2	$ 2,400
	Total	**$ 9,200**
2018		
Dolphin CPAP Machine	6	$ 19,800
Phototherapy light	1	$ 1,200
iM8B Patient monitor	9	$ 12,600
M3A Patient monitor	5	$ 7,500
Infusion pump	16	$ 25,600
Portable Ultrasound	1	$ 2,000
Mobile Ultrasound	1	$ 6,900
Mobile X-ray machine	1	$ 9,150
Adult Low Vacuum Suction	1	$ 250
Neonatal Low Vacuum Suction	1	$ 250

Wallaby Warmer (baby warmer)	2	$ 3,400
I-STAT Machine + Printer	1	$ 9,980
Puritan Bennett 840 Ventilator (Refurbished)	1	$ 10,945
	Total	**$ 109,575**
	Grand Total	**$ 118,775**

Mitigating Costs

Chenla's unique partnership model allows it to run a very lean operation. Chinda Long, Chenla's facility director, endeavors cover as much of Chenla's operational needs as is possible, before using donor money to pay for them directly.

The largest expense is staff salaries, overtime, and annual leave. The team receives a large subsidy on staff costs from the government: including HEF fees that flow to individual staff, the provincial hospital paid for slightly more than 30% of the cost of salaries for staff that work at Chenla in 2018 ($135K), up from less than 27% in 2017.

Because there is no explicit transfer pricing scheme in place, it is important to share some detail on the numbers provided here: they include all staff that are full time at Chenla, whether they are majority Chenla or government paid, and the full salaries for 6 staff members who are employed at the adult hospital, but who spend a substantial portion of their time providing services to Chenla patients and staff. These staff members are included because they spend so much time on Chenla activities – and their contributions are so important to providing high quality patient care – that Chenla has chosen to further incentivize them. There are others working at the adult hospital who provide support to Chenla who are not explicitly accounted for in the numbers here.

Chenla is the only payer of 32 staff members who only work at Chenla – they perform no adult-related work. Of these 32 staff, 19 are full time and 13 are part time. Their collective salary is $195K.

The remainder of the staff are co-funded by Chenla and the government. 15 work only at Chenla; their salary totals $195K USD in 2018, of which 49% was covered by the government. 6 work at both Chenla and the adult facility. Their salary totaled $46K USD in 2018, of which 83% was covered by the government.

EXHIBIT: Funding for Chenla Clinical Staff

Clinical Staff (#)	**Work Duties**	**Payer**	**Total Salary ($ USD)**
32 (19 full time and 13 part time)	Chenla only	Chenla (100%)	$ 194,957
15	Chenla only	Chenla (51%) & KPH (49%)	$ 196,456
6	Chenla & KPH	Chenla (17%) & KPH (83%)	$ 46,330

Regardless of whether clinical staff salaries are paid entirely by Chenla or partially by the government, Chenla endeavors to make them competitive with what staff would get paid working in competitive facilities, which include other private and NGO-run hospitals. Chenla does not benchmark to public facilities because it requires significantly more hours and accountability from the staff, as described above.

Chenla subsidies for government workers salaries come in the form of a salary top-up which averages 79% and ranges from 15 to 175% (inc overtime) of the base pay (before user fees) they receive from the government.[xxxix] These top-ups are set based on the level of skill of the employee. For example, the head doctor, who is responsible for patient care but also team management, would get paid $1600 USD per month, while other senior doctors would get paid $1200 USD per month, and very junior doctors would get less. The three levels of nurses at Chenla get paid anywhere from $450 to $1100 USD per month, depending on their

level of experience and responsibility. Those at the lowest end would have just graduated from nursing school and have very limited customer experience.

In addition, government paid employees can receive overtime for hours worked at Chenla.

EXHIBIT: Representative salaries: Average Monthly

Administrative	
Admin Director/Country Representative	$1,444
Part time HR Admin	$500
Admin Assistant	$420
Part time -Housekeeper	$220
Part time accountant	$210
Part-time Security	$170
Part-time Admin (PP)	$165
Register	$250
Medical	
Medical Director	$1,633
Senior Medical Doctor	$1,450
Medical Doctor	$1,062
Part time Medical Doctor	$591
Expat Doctor	$2,000
Nursing	
Director of Nursing	$1,075
Nurse Team Leader	$1,171
General Nurse	$832
Internship	$485
Support	
LAB Manager	$788
Register	$250
Nurse X-ray	$668
General Nurse - Physiotherapy	$618
Pharmacist	$618
Social Worker	$888

The partnership with the provincial hospital also helps Chenla reduce operating costs. The hospital is located in a space that is owned by the government, reducing capital costs for renting or purchasing space. In addition, most essential supplies and medicines are obtained from the hospital storehouse, at no direct cost to Chenla, saving Chenla an estimated $1500/month or $18,000/year. The hospital also pays for energy costs, and the supply and maintenance of key energy machinery, such as generators.

Even considering the user fees and HEF funding that it generates through patient care directly and remits to KPH, Chenla still sees benefit from the arrangement: in 2018, it received slightly more than double the value of services and salaries from the hospital than it generates for it in fees.

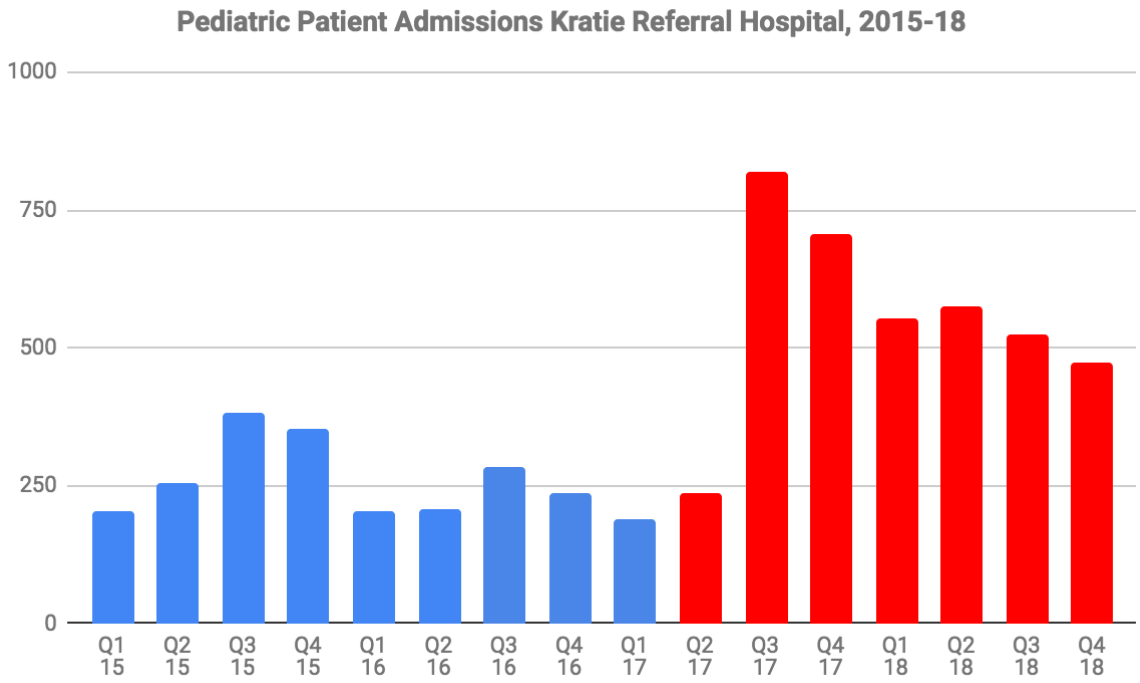
Exhibit: 2018 Intra-hospital Transfers

Payment (2018) Chenla -->KPH			Services KPH-->Chenla	
HEF	$ 27,539		Salary to Chenla Staff	$135,090
Patient Fees	$ 55,183		Energy Costs Paid (Est.)	$18,000
			Meds & Supplies (Est.)	$18,000
Total	**$ 82,721**			**$ 171,090**

Note: "Payment" from Chenla to KPH is money that KPH collects on behalf of Chenla patients.

However, it is important to note that Chenla's presence has had a number of benefits for the main hospital. Prior to Chenla taking over the pediatrics ward, KPH's pediatric patient numbers were significantly lower (see exhibits: Pediatric Ward Admissions 2015-2018). In fact, while pediatric patient admissions to Kratie Provincial Hospital declined from 2015 to 2016, they more than doubled in the year that Chenla opened, and maintained similar numbers in 2018.

Exhibit: Quarterly Pediatric Patient Admissions 2015-18, Kratie Provincial Hospital



Note: Red shading indicates months with the new Chenla ward in operation. Q3 17 numbers were higher than expected due to over-admission by the hospital registrar in August and September 2017. Controls were put in place immediately (see Challenges section)

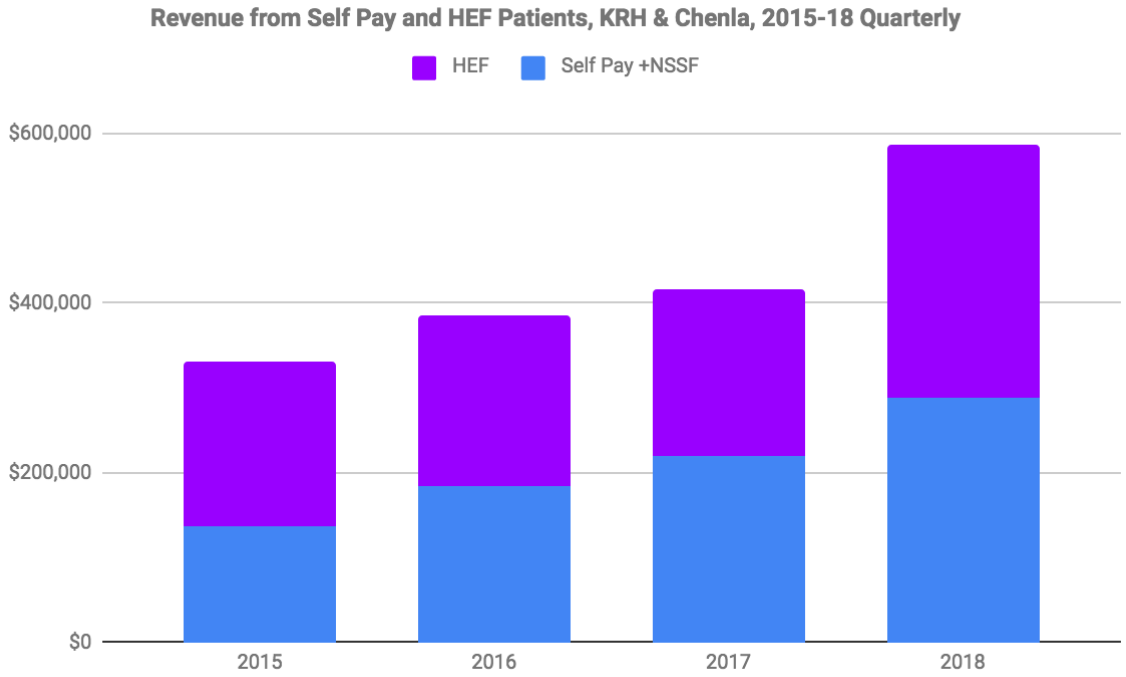
Exhibit: Total Pediatric Patient Admissions 2015-18, Kratie Provincial Hospital

	2015	**2016**	**2017**	**2018**
TOTAL	1,194	930	1,950	2,126
YOY Change	--	*78%*	*210%*	*109%*

In addition, in each month of the first year of Chenla's operation, KPH delivered a larger percentage of the provinces babies than it did in the same month the previous year. Overall, KPH has consistently delivered 300+ more babies in each of the post-Chenla years than it did in the year immediately preceding Chenla opening. In total, KPH delivered 23% of the province's babies in 2016, and 26% and 27% of the province's babies in 2017 and 18 respectively.

While Chenla has driven increases in fees from pediatric patient volumes, revenue has also increased in the hospital overall: in 2018, the first full year of Chenla's operations, HEF funds collected for adult patients alone were up by 66%. This increase was despite the fact that a lapse in funding for HEF assessment meant that no new patients could receive HEF reimbursement for the first half of the year.

EXHIBIT: HEF Fees Collected by KPH before and After Chenla



Note: Self-pay total includes NSSF payment of between approximately $3,000-5,000 total per year in 2015-17, and $33,000 in 2018. NSSF is a national insurance scheme for government staff and workers.

In the future, Chenla plans to tie reimbursement rates to meeting or exceeding quality measures and compliance with government clinical guidelines and policies. This isn't easy: KPH has not historically been able to do so. However, Chenla has achieved this, which should ultimately benefit KPH's financials. In fact, the governor recently commented: "Chenla has allowed Kratie to have a standard of care similar to Kantha Bopha Hospital and Angkor Hospital for Children for our children here. Our town is remote, but Chenla is very important to help save lives here."

Relative to other NGO's, the team also minimizes costs by employing only two expatriate staff members – Bill and Lori Housworth – and taking only a $2,000/month stipend in total for their time. In addition, Chenla is working to maintain a high bed to nurse ratio of 7 to 1 (4.5: 1 for neonates). This ratio is significantly lower than in typical government wards, where it can be 10 or 12 beds to 1 nurse, but Chenla is seeing sicker patients (see exhibit: Chief Diagnoses, 2018). For comparison, AHC, which sees similarly ill children, has a ratio of 6 to 1.

Although Chenla initially anticipated needing to market its services to achieve volume goals, and has done some radio advertising, it has since found this expenditure to be unnecessary. The advertising was effective, but the hospital has attracted incoming patients by doing outreach clinics alone.

Finally, as noted above, Chenla has minimized costs by seeking direct donations in-kind of equipment. Better equipment enables Chenla's ICU to treat sicker patients and care for more neonates, making expensive transfers unnecessary.

Key Challenges

Certainly, any facility like Chenla which trying to provide high quality care in a difficult setting will face obstacles. Many obstacles stem from Chenla's location in a remote eastern province of the country, and to limited access to human capital in the country in general and in Kratie specifically. Others, predictably, relate to funding and compensation for care provided.

Chenla's location in Kratie was chosen strategically: it is a town that is well connected by river and road to both the more developed center of Cambodia, and to the even more remote eastern part of Cambodia. However, as discussed above, Kratie, like many rural areas, suffers from significant flooding during the rainy season. Many structures are not built to withstand the amount of rainfall that occurs, which can be catastrophic for a healthcare facility. As a result Chenla had to make some costly choices in its renovation to account for flooding risk, and it is still impossible to use the majority of the first floor of the facility. In addition, the staff must plan for terrible road conditions in the rainy season, which can affect both outreach clinics and transporting patients to higher-level facilities in Phnom Penh and Siem Reap.

Chenla's relatively remote location also makes it more difficult to attract and retain talented healthcare workers, many of whom train and now live in the big cities. Volunteers and donors may be unwilling to make the trip to Chenla. As such, in comparison to other NGO's – such as Angkor Hospital for Children (Siem Reap), and Kantha Bopha Hospital for Children (Phnom Penh), it is more difficult for Chenla to organically attract attention from donors and potential employees alike.

This has made it more difficult to execute on the team's vision to save money by having each healthcare worker deliver care at the very top of their capabilities. It's a win-win approach for hospitals and their staff, because nurses, medical assistants and doctors all get to do the most complex work they are capable of, while the hospital benefits from lower costs from being able to employ fewer of the most expensive staff. At Chenla, the initial goal was to achieve 20% efficiency improvement (in terms of nurse and doctor to bed ratios) over other hospitals seeing comparably sick patients. While he still believes that this is possible, Bill now understands that it will take some time to get there, since attracting highly trained staff is difficult, and many staff available locally require significant additional on the job training.

Finally, Chenla's location – in a part of the country where healthcare infrastructure is thin, but where many families lack the means to travel to the better hospitals – means that Chenla sees a relatively high proportion of high-acuity patients, and that most of them are poor. The HEF pays for only some of their care, and the government does not pay for a social worker, which many of the poorer families require. The biggest challenge, however, is that fee structures do not appropriately compensate for high-acuity patients, and hospitals that see a larger proportion of them are most affected. For example:

- Per government rules, private pay patients only pay for the first 7 days of an inpatient stay. In addition, the hospital receives a flat fee of $30 for an HEF patient on an inpatient stay, regardless of length or level of care that must be provided. Many children born prematurely exceed a 7 day stay, as do many patients with severe infections; for these, Chenla must absorb the costs.
- The cost of medication is included in the day rate for private pay patients, and in the flat rate for HEF patients. Therefore, if a patient requires either a great deal of medication, or more costly medication, fees may not cover costs.
- Patients pay a flat fee for bloodwork, and a flat fee for x-rays and ultrasounds, regardless of usage. For HEF patients on inpatient stay, this is included in the flat package rate. Of course, sicker patients and those who must spend more time in the hospital use more of these services.
- Sicker patients often need to be transported to higher-level care facilities, but the charges (both HEF and private pay) do not cover the costs of doing a safe transfer. Transfers require staff overtime pay, gas, and the use of a vehicle that can travel on rough roads with a critically ill child, medication, and equipment. Chenla has worked to minimize this by treating more of the sicker children locally, which is possible now that the hospital has more staff trained in critical care, and C-Pap and ventilator machines for children. Since the hospitals founding, the team has reduced transfers to less than 1/4 of a percent from an initial peak of nearly 4%. Still, these transfers strain the hospital's budget

Chenla is working to serve more critically ill patients and increasingly attracting families who know that alternative care facilities will not be able to help. However, the more ill Chenla's patients are, the greater the impact on Chenla's finances, and on the finances of staff that Chenla is able to attract, since their compensation comes in part from the collection of HEF fees. Chenla has been filling this gap with donor funds.

Other challenges Chenla has faced in its first two years of operation include:

- Hospital-acquired infections, which though not unique to Chenla, are dangerous, costly and must be managed with extensive deep cleaning.
- A short-lived period during which the central hospital registration office approved too many admissions for the pediatric wards, admitting children who did not require inpatient care. The Chenla team suspects this may have been driven by a desire to increase revenues, and put more stringent admission rules and oversight in place.
- World Bank funding to pay the KPH-based staff-member who assessed eligibility for the Health Equity Fund was unexpectedly withdrawn. The position was therefore eliminated, and families arriving at the hospital who had never been evaluated either had to be treated for free, or turned away. Chenla depends heavily on the presence of a full-time HEF assessor, since half of all its patients are HEF-eligible, and many arrive at the hospital without having been assessed for the program. Chenla ultimately decided to pay for an assessor itself.
- Many grant-making organizations, including several that Chenla has approached, require that an NGO be in operation for two years before it can receive funds. Chenla plans to re-approach these donors just after the hospital reaches its 2 year anniversary.

Looking Ahead: Considerations Going Forward

As Chenla grows, the team is working to solve the problems that come along with success, and working on making the hospital's finances even more sustainable by depending less on external donor funds.

As the hospital has become more well-known, more patients are coming, from further away. More kids accessing quality care is good, and it means more revenue for the referral hospital and for Chenla's staff. However, as discussed above, more high-acuity patients also mean more demands on Chenla's budget for medicine, beds, and staff.

As a result, Chenla is looking at how they can increase community and government investment to match. Increasing community investment means increasing fees: if some families *can* pay pay a bit more, it will help to subsidize care for the many patients who are unable to do so. Increasing HEF reimbursement rates will also help – possibly removing the referral requirement so that OPD visits are covered for more patients, and paying separately for laboratory and imaging, as well as increasing overall payment for children, such as neonates, requiring longer inpatient stays. As described above, the Chenla team is already working with the Provincial Health Department on changes to the current framework. The team is also pushing for the government to increase their funding for Chenla staff salaries.

At the same time, Chenla is looking at potential avenues for cost savings. It is hoping to reduce the hospital's salary and office rental tax bill ($9,000 in 2018), since it is providing government services. In addition, Chenla is currently completing the necessary government registration to be able to receive donated medication from NGO's. Once approved, this could save the hospital up to $10,000 per year in medication costs.

Since the hospital's founding, patient numbers, demographics, diagnoses and outcomes have been tracked. As patient numbers grow, these rates will become a meaningful reflection of the quality provided at the facility. The team also does ongoing malaria surveillance and tracking of severe cases and the villages they come from.

At this point, the team believes it is crucial to invest in accurately measuring even more outcomes, so that the hospital can track and share data more widely. Pending funding, the hospital plans to hire a nurse leader in 2019 to focus on this, who will track, among other things:

- Neonatal outcomes by prematurity level
- Outcomes by infectious disease diagnosis
- Prevalence of high-acuity (e.g., children in ICU, on CPAP, intubated) cases and associated mortality

- All hospital acquired infections and their etiology
- Hand hygiene compliance
- Adherence to sepsis treatment protocols
- Adherence to national treatment guidelines for the top 5 most common diagnoses
- Location of villages of children with the highest acuity illnesses and poorest outcomes.

Meaningful comparisons using this data will be difficult, because many hospitals in Cambodia do not track and report on this information. There are two reasons for this: first, many pediatric wards inside of referral hospitals in Cambodia either do not attract very sick children, or these children typically leave the hospital before their disease progresses. Second, fear of blame often trumps transparency. Chenla aims to turn this culture on its head by sharing data not publicly reported before, which should help both Chenla and others to set meaningful baselines for comparison. The team is also hopeful that by taking this action, they will inspire other hospitals in Cambodia to begin to track and report on their outcomes, as well.

Looking ahead, the Chenla team and some of its funders are considering whether the model can be replicated. Initially, this would mean expansion to a neighboring province: Kratie Province sits next to three others – Stung Treng, Ratanak Kiri, and Mondul Kiri, with equally bad pediatric health outcomes. The provincial hospital in Stung Treng has many similarities to Kratie Provincial Hospital, and preliminary talks indicate that the provincial health director is open to Chenla taking over the pediatric ward there too. More broadly, this could mean a network of similar public-private partnership hospitals across Cambodia.

Of course, if the Chenla team and the government decide to try to more hospitals in the Chenla model, new challenges will emerge. Key architects of the model at Chenla may need to split their time between building more hospitals and maintaining and growing what they've built at Chenla. More talented leaders will need to be recruited, and relationships formed with a new group of government officials and health centers. The team will need to study and replicate the key aspects of Chenla's culture that have facilitated high expectations and accountability. Finally, the financial model will need to be refined to depend less heavily on donor support, with the government stepping into take on a larger percentage of salary costs – hopefully up to 60%.

Expenses Actuals 2018	From Petty Cash	From Bank Transfer	Total Expenses	2019 Budget
Doctor Salaries (10 Khmer and 2 Expat)	$250.00	$164,236.09	$164,486.09	$172,710.39
Nurse Salaries	$445.00	$130,456.48	$130,901.48	$176,717.00
Other Supporting Medical Staff Salaries		$7,926.00	$7,926.00	$8,322.30
Non-medical Staff Salaries	$897.68	$11,645.00	$12,542.68	$13,169.81
Housekeeping Salaries	$139.25	$7,877.60	$8,016.85	$8,417.69
Administrative Salaries	$109.50	$31,092.12	$31,201.62	$32,761.70
Medicines	$1,038.63	$18,865.87	$19,904.50	$21,894.95
Medical Supplies	$1,273.75	$21,284.95	$22,558.70	$24,814.57
Lab Supplies	$582.00	$14,637.20	$15,219.20	$16,741.12
Housekeeping Supplies	$1,866.19	$536.40	$2,402.59	$2,642.85
Office Supplies	$566.41	$1,138.70	$1,705.11	$2,100.00
Other/Misc (incl maintenance, food for staff, outreach)	$4,741.14	$2,332.80	$7,073.94	$8,000.00
Electricity			$0.00	$0.00
Water	$679.21		$679.21	$900.00
Internet, phone	$679.85	$599.05	$1,278.90	$1,800.00
Fuel	$479.97		$479.97	$600.00
Local Training	$429.00	$1,195.00	$1,624.00	$2,000.00
Patient Services	$7,271.85		$7,271.85	$10,000.00
Staff Transport	$946.50		$946.50	$1,000.00
Equipment (Capital Costs)	$115.00	$35,952.02	$36,067.02	$50,000.00
Professional Fees			$0.00	$0.00
Rentals	$1,041.25		$1,041.25	$1,200.00
Meeting (others)			$0.00	$0.00
Bank Charges	$3.88	$180.19	$184.07	$250.00
Shipping/Delivery (From PP and over seas)	$1,516.63	$5,124.62	$6,641.25	$7,000.00
Admin Expenses (Taxes, Accounting Fees)	$1,118.27	$10,070.52	$11,188.79	$12,000.00
Rennovations (Capital Costs)		$7,378.52	$7,378.52	$5,000.00
Fundraising, Marketing	$266.25	$450.00	$716.25	$1,000.00
	$26,457.21	**$472,979.13**	**$499,436.34**	**$581,042.39**

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