CLINTON
HEALTH ACCESS
INITIATIVE

ANNUAL REPORT 2019

CONTENTS

STAFF REFLECTIONS

IMAGE, FRONT COVER: A WOMAN HOLDS A BED NET, DISTRIBUTED AS PART OF A MALARIA ELIMINATION CAMPAIGN, PUERTO OBALDÍA GUNA YALA COMARCA, PANAMA
IMAGE, OPPOSITE: A WOMAN REPAIRS A BED NET, PUERTO OBALDÍA GUNA YALA COMARCA, PANAMA

MESSAGE FROM LEADERSHIP

CHAI was founded in 2002 on the principle that every human life is sacred and that all people deserve the opportunity to fulfill their potential. Our mission is to ensure that everyone, no matter where they live or the circumstances of their birth, have access to quality, affordable health care. Equity is at the center of our work and is what motivates us each day.

All of us at CHAI follow a core set of values that guide every aspect of our work. We operate in over 35 countries and hire people who are part of the communities we serve. Over 70 percent of our staff are nationals of the countries where we work. Working hand-in-hand with, and at the request of, our government partners, we seek to not just impact problems, but solve them.

With each new program we take on, our strategy remains the same: we work on large, ambitious projects; we work to make healthcare delivery more efficient; and we work with governments so change can be sustained without our support. The results have been transformational. CHAI's programs have helped millions of adults and children access lifesaving medicine to treat diseases they otherwise would have died from 18 years ago.

In 2019, we were proud to transition several pieces of our work fully to our government partners, ranging from a transformative program that has saved the lives of thousands of mothers and newborns in Ethiopia, to the development of sustainable, locally-sourced food products to reduce malnutrition in Rwanda.

We also took on new areas of work. We expanded our efforts to tackle non-communicable diseases, including diabetes and cardiovascular disease, and launched a program to address cervical cancer, a preventable and treatable disease that still kills more than 300,000 women each year. We are also helping to reduce significant gaps in access to life-changing assistive technology such as wheelchairs, hearing aids, and eyeglasses in low- and middle-income countries.

As with all of our programs, we see an opportunity with these new initiatives to transform the way that disease and disability have previously been approached to close gaps in services, increase access to essential products, and create a more equitable system to improve and save the lives of people in the communities we serve.

As we move forward, our values and guiding principles continue to lead our work through new challenges, including the COVID-19 pandemic that has impacted health systems worldwide. We are helping our partner governments and donors respond to COVID-19, providing support on a number of fronts, including procurement of personal protective equipment and other diagnostic and treatment tools, as well as preparing health workers and systems for an eventual vaccine against the illness.

At the same time, we know that individuals still rely on the same health services that they did before the pandemic. We are working to ensure these individuals continue to receive the care they need to stay healthy, and that the gains countries have made against other diseases over the last two decades are not lost as limited resources are turned toward this new crisis.

—CHAI Management

IMAGE, OPPOSITE: A YOUNG GIRL HAS HER WEIGHT AND HEIGHT MEASURED DURING A NUTRITIONAL CHECKUP
MADHYA PRADESH, INDIA

TRANSFORMATIONAL CHANGE

We work with governments to reform their health systems, targeting areas where current approaches are failing, moving too slowly, or at a scale that leaves too many dying or suffering needlessly.

With each new program our strategy remains the same: we work on large, ambitious projects; we work to make healthcare delivery more efficient; and we work with governments so change can be sustained without our support.

Four key principles guide our programs:

A CHAI program must drive dramatic impact over current health outcomes.

It must change the way others approach a problem so that today's transformation becomes tomorrow's common wisdom.

It must transform the approach to solving a problem on a large scale: regionally, nationally, or globally.

Any change that we enact must be sustainable after we are gone.

The results have been transformational.

KEY MILESTONES

2002: CHAI founded. CHAI is founded to help save the lives of millions of people living with HIV/AIDS in low- and-middle income countries.

2002-2003: CHAI's first program: HIV/AIDS. First programs begin in Africa and the Caribbean, aimed at scaling up HIV/AIDS care and treatment in entire countries. As a result of this work, 800,000 people are treated in these countries in five years, up from a total of 2,000 when the work began.

2003: HIV first-line agreement. CHAI negotiates lower prices for first-line HIV drugs by over 60 percent, enabling over 60 countries to access the new prices.

2004: Reducing CD4 test prices. CHAI negotiates 50-90 percent price reductions for CD4 diagnostic tests for AIDS patients worldwide and enables nationwide scale-up of CD4 testing in over 40 countries.

2004-2005: Pediatric HIV treatment. CHAI and Unitaid lead global effort to scale up treatment for children with AIDS in 34 countries, from around 75,000 on treatment to over 900,000, lowering the price of medications from over US$600 to around US$60 per child, per year.

2005-2007: HIV second-line agreement. CHAI works with Unitaid to negotiate agreements to lower the price of second-line HIV/AIDS treatments by 75 percent and accelerate the roll out of these drugs to over 30 countries where patients were failing on first-line treatments.

2007: Expansion into malaria. CHAI launches a malaria program, which grows rapidly to help governments increase funding to combat malaria, improve access to quality diagnosis and treatment, and support evidence-based decision making to target resources and accelerate progress toward elimination.

2009: Scale-Up HIV care and treatment in South Africa. CHAI assists the government of South Africa with the largest scale-up of HIV care and treatment ever attempted, from 800,000 people in 2009 to approximately 3 million today. CHAI helps negotiate agreements to lower HIV and TB drug prices that save the South African government almost US$1 billion.

2010: Rapid diagnostic tests for malaria. CHAI begins to scale up access to rapid diagnostic tests for malaria in places where malaria cases are treated but diagnosis is not available. CHAI helps procure nearly 2 million low-cost tests across Kenya and Tanzania.

2011: Expansion into vaccines. CHAI begins work to lower costs and increase access to vaccines. Alongside the Bill & Melinda Gates Foundation, CHAI negotiates a landmark agreement to lower the price of the Rotavirus vaccine by 67 percent and the Pentavalent vaccine by 50 percent, saving the global community over US$800 million and US$150 million respectively.

2011: Expansion into human resources for health. CHAI helps the government of Rwanda establish a world-class health system through educating doctors, nurses, and health managers. CHAI eventually expands this work to other countries including Liberia, Malawi, and Zambia.

2012: Long-acting reversible contraception. CHAI negotiates an agreement to lower the price of long-acting reversible contraceptives from US$18 to US$8.50 per implant and accelerates rollout of the products to save the lives of women.

2013: Treating childhood diarrhea. CHAI helps reduce mortality from diarrhea for children under five, scaling up access to lifesaving zinc/ORS treatment in India, Kenya, Nigeria, and Uganda. CHAI supports governments to lower the cost of zinc/ORS products, resulting in wholesale prices dropping by approximately 60 percent.

2014: Viral load diagnostics deal. CHAI negotiates a global access price for viral load diagnostics of US$9.40 per test, which will save over US$150 million over five years and dramatically improve the quality of care for HIV patients.

2014: Point-of-care CD4 price reduction. CHAI negotiates a 67 percent price reduction for service and maintenance of the first point-of-care CD4 diagnostic tool, called Pima, for HIV. CHAI accelerates the market entry of a second supplier, called BD FACS Presto, which will facilitate further price reductions for point-of-care CD4 tests.

2014: Scale up of early infant diagnostic tests. With the support of Unitaid, more than one million HIV diagnostic tests for infants are performed globally, up from 80,000 tests in 2007.

2014: Ebola response in Liberia. CHAI helps lead case management and health worker training in response to the Ebola crisis in Liberia, serving as a critical link between the international emergency response and the Liberian government.

2015: Expansion into New Programs. CHAI introduces new programs in hepatitis, pneumonia, and cancer.

2015-2016: Reducing Mother and Infant Deaths in Nigeria. CHAI introduces a comprehensive community-based approach to save mothers and newborns in Northern Nigeria through improved outreach, treatment, and training of health workers, resulting in a sustained 37 percent reduction in maternal deaths, a 43 percent reduction in newborn deaths, and a 15 percent reduction in stillbirths within 12 months.

2016: Lowering the cost of hepatitis C treatment. CHAI helps reduce the cost of hepatitis C treatment in seven countries by 71 to 95 percent, from US$2,618 per patient to between US$133 and US$789 per patient treated.

2017: Increasing access to cancer medications. CHAI announces an agreement with the American Cancer Society, Pfizer Inc., and Cipla Inc. to expand access to 16 essential cancer treatment medications, including chemotherapies, in Kenya, Tanzania, Ethiopia, Uganda, Nigeria, and Rwanda, where 44 percent of cancer cases in sub-Saharan Africa occur.

2017: Affordable single-pill HIV regimen with DTG. CHAI and partners announce a groundbreaking agreement to accelerate the availability of the first affordable, generic, single-pill HIV treatment containing DTG, a best-in-class HIV medication, to public sector purchasers in low- and middle-income countries at around $US75 per person, per year.

2018: Lowering costs for lifesaving oxygen diagnostics. CHAI helped negotiate a 58 percent reduction, on average, for the price of handheld pulse oximeters—simple, life-saving tools that can help quickly diagnose severe pneumonia.

2019: Improving access to quality cancer treatment. CHAI forms Allied Against Cancer with the American Cancer Society, the National Comprehensive Cancer Network (NCCN) and IBM. NCCN adapts cancer-treatment guidelines for use in African hospitals and IBM develops an online tool to help African oncologists use the guidelines more efficiently.

IMAGE, OPPOSITE: COMMUNITY HEALTH ASSISTANTS VISIT A COMMUNITY HEALTH CENTER, ZAMBIA

OUR VALUES

We work with urgency. People are dying unnecessarily from AIDS, malaria, tuberculosis and other preventable and treatable conditions. We recognize that every day we delay, people die. Therefore, we work with utmost speed to build a strong foundation for sustainable impact. The faster we act the more lives we can save.

We work in cooperation with and at the service of partner governments. We believe that to make programs sustainable and scalable we need to help strengthen the mainstream government health systems. This means that we align our program strategies with our partner governments to work in service of their priorities and goals. Partnering with governments enables transformational impact, as they are the strongest institutions in developing countries with long-term and expansive health policies and programs.

We are a mission-driven organization. We want people to work with us who believe in the mission and whose fulfillment comes from the fact that collectively we succeed in advancing the mission. This ensures our unity of purpose, with all leaders and managers and their staff at all levels working to a common cause.

We are frugal. Our offices are modest. We do not use donor money to travel lavishly. We maintain low overheads. We feel that the donor funds we raise should go as much as possible to saving lives directly rather than to compensating ourselves excessively or incurring elaborate expenses.

We operate with humility. We do not seek credit for our work and will only take it if it is necessary to fulfill our mission. We do not seek to publicize our work independent of publicity that our government partners or donors want.

We have an entrepreneurial and action oriented culture. We hire good people and give them wide latitude to conceive of and execute programs. We have a culture of seeking out opportunities and then seizing them. Some of our greatest accomplishments, large and small, were not planned centrally. We are willing to take calculated risks to attempt to achieve goals that are substantial, challenging and uncertain.

We operate based on trust and transparency. We expect employees and partners to make ethical decisions and to work hard and manage their own work. As an organization, at all levels, we uphold good governance with transparency and accountability.

We recognize that our staff is our greatest asset. Our successes are driven by the talent, creativity and hard work of the people who work for us. We strive to support and protect our staff to grow and thrive within the organization and to enable them to have a major impact in fulfilling the mission.

We foster diversity and inclusion. We are an inclusive workplace and promote and integrate fairness, respect, equality, and dignity into CHAI's culture. We take a firm stance against discrimination and harassment and foster an environment where people with a multiplicity of personal characteristics, including race, color, religion, sex or gender (including gender identity and gender expression), sexual orientation, ethnicity, national origin, age, disability, HIV status, political or interest group affiliation, genetic information, veteran status, marital status, parental or pregnancy status or any other characteristic, are embraced and valued.

IMAGE: CHILDREN SIT LOOKING OUT AT A FIELD, MADHYA PRADESH

WHERE WE WORK

Countries where CHAI currently operates program activities:

39

Countries participating in CHAI access agreement activities:

130

Countries with a CHAI country office:

29

MAP KEY:

- Access Agreement Countries
- Program and Access Agreement Countries
- Countries with offices, programs, and Access Agreement

2019 PROGRAM COUNTRIES

Countries where CHAI had programmatic engagement with the government in 2019.

- Bangladesh
- Belize
- Benin
- Botswana
- Burkina Faso
- Cambodia
- Cameroon
- Congo, Dem. Rep.
- Dominican Republic
- El Salvador
- Eswatini
- Ethiopia
- Ghana
- Guatemala
- Haiti
- Honduras
- India
- Indonesia
- Kenya
- Lao PDR
- Lesotho
- Liberia
- Malawi
- Mali
- Mozambique
- Myanmar
- Namibia
- Nigeria
- Panama
- Papua New Guinea
- Rwanda
- Senegal
- Sierra Leone
- South Africa
- Tanzania
- Uganda
- Vietnam
- Zambia
- Zimbabwe

2019 COUNTRY OFFICES

Countries where CHAI operated out of an office location in 2019.

- Cambodia
- Cameroon
- Congo, Dem. Rep.
- Eswatini
- Ethiopia
- Ghana
- Haiti
- India
- Indonesia
- Kenya
- Lao PDR
- Lesotho
- Liberia
- Malawi
- Mozambique
- Myanmar
- Nigeria
- Panama
- Papua New Guinea
- Rwanda
- Senegal
- Sierra Leone
- South Africa
- Tanzania
- Uganda
- United States
- Vietnam
- Zambia
- Zimbabwe

2019 ACCESS AGREEMENT COUNTRIES

Countries that have access to CHAI-negotiated price reductions for high-quality medicines, diagnostics, vaccines, devices or other live-saving health products and services.

- Afghanistan
- Albania
- Algeria
- American Samoa
- Angola
- Armenia
- Azerbaijan
- Bangladesh
- Belarus
- Belize
- Benin
- Bhutan
- Bolivia
- Bosnia and Herzegovina
- Botswana
- Brazil
- Bulgaria
- Burkina Faso
- Burundi
- Cabo Verde
- Cambodia
- Cameroon
- Central African Republic
- Chad
- Colombia
- Comoros
- Congo, Dem. Rep.
- Congo, Rep.
- Costa Rica
- Cote D'ivoire
- Djibouti
- Dominica
- Dominican Republic
- Ecuador
- Egypt, Arab Rep.
- El Salvador
- Equatorial Guinea
- Eritrea
- Eswatini
- Ethiopia
- Fiji
- Gabon
- Gambia, The
- Georgia
- Ghana
- Grenada
- Guatemala
- Guinea
- Guinea-Bissau
- Guyana
- Haiti
- Honduras
- India
- Indonesia
- Iraq
- Jamaica
- Jordan
- Kazakhstan
- Kenya
- Kiribati
- Kosovo
- Kyrgyz Republic
- Lao PDR
- Lebanon
- Lesotho
- Liberia
- Libya
- Madagascar
- Malawi
- Malaysia
- Maldives
- Mali
- Marshall Islands
- Mauritania
- Mauritius
- Micronesia, Fed. Sts.
- Moldova
- Mongolia
- Montenegro
- Morocco
- Mozambique
- Myanmar
- Namibia
- Nauru
- Nepal
- Nicaragua
- Niger
- Nigeria
- North Macedonia
- Pakistan
- Papua New Guinea
- Paraguay
- Peru
- Philippines
- Romania
- Rwanda
- Samoa
- Sao Tome and Principe
- Senegal
- Serbia
- Sierra Leone
- Solomon Islands
- Somalia
- South Africa
- South Sudan
- Sri Lanka
- St. Lucia
- St. Vincent and The Grenadines
- Sudan
- Suriname
- Tajikistan
- Tanzania
- Thailand
- Timor-Leste
- Togo
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey
- Turkmenistan
- Tuvalu
- Uganda
- Uzbekistan
- Vanuatu
- Venezuela, Rb
- Vietnam
- West Bank and Gaza
- Yemen, Rep.
- Zambia
- Zimbabwe

INFECTIOUS DISEASES

A VILLAGE MALARIA WORKER TESTS CHILDREN AT THEIR HOME
KAMPONG CHHNANG, CAMBODIA

Four infectious diseases cause over half of all deaths in low- and middle-income countries: HIV, hepatitis, malaria, and tuberculosis (TB). CHAI has built on our work in HIV to address each of these diseases, in partnership with governments, donors, and other key stakeholders.

HIV/AIDS

Globally, we have made great headway in combating HIV in low- and middle-income countries. AIDS-related deaths have dropped by nearly 60 percent since the epidemic peaked in 2004 and over 25 million people living with HIV now receive treatments that make the disease a chronic illness rather than a death sentence.

However, not everyone can access HIV testing, treatment, and prevention, especially in Africa, where over two- thirds of all people living with HIV are located. CHAI works with donors and governments in over 20 countries to test smart, treat right, and ensure those who are not infected with HIV stay negative.

Increasing access to testing and treatment services

There are still large gaps in testing among target populations, such as children and men, in low- and middle-income countries. It is getting harder to find the remaining people living with HIV and strategies to date have not been effective enough at reaching the populations we need to. Antiretroviral therapy (ART) is the most effective treatment for HIV, but ensuring access to the best regimens can be challenging, especially for children who need specially formulated versions of adult drugs.

CHAI is working across **Ethiopia**, **India**, **Kenya**, **Malawi**, **Nigeria**, **South Africa**, **Tanzania**, **Uganda**, **Zambia**, and **Zimbabwe** to strengthen national HIV testing services and increase the number of people living with HIV who are diagnosed and linked to the care they need. In 2019, we helped Kenya, Malawi, Uganda, and Zimbabwe set national targets for testing services and kick started the process in Zambia.

> “Working alongside Tanzanian Ministry of Health colleagues, we were able to dramatically transform the situation by demonstrating that if the health system is supported (optimal ARVs made available, HIV laboratory systems put in place, provider’s capacity enhanced), it is indeed possible to offer hope for people infected with the virus, especially those in rural and hard to reach areas.
>
> **— Esther Mtumbuka**

READ MORE P. 17

At the same time, we are working to generate global consensus on the value of HIV self-testing. CHAI is exploring the impact and operational feasibility of using more HIV self-tests within health facilities to reach the people who remain undiagnosed. For example, in Malawi we found that men and young people were attending facilities but were being missed for testing. Self-testing can save money and time, allowing health workers to focus on improving the quality of their care.

CHAI is also working with ministries of health and other partners across Kenya, Malawi, South Africa, Uganda, Zambia, and Zimbabwe to drive and scale implementation of self-testing policies and positioning HIV self-testing as a key component of national testing strategies. We are supporting South Africa’s HIV self-testing program to deliver 2.2 million testing kits and generating evidence to inform the scaleup of domestic

IMPACT OF TLD VOLUME IN COST REDUCTION

120 **countries included or planned for TLD in their guidelines by the end of 2019**

120M+ **monthly courses of TLD were ordered**

12% ↓ **price reduction from US$75 to US$66**

TLD expected to drive global savings through 2023 of

US$1.7B

investment. The goal is to expand the service to those groups who are reluctant to be screened, ensuring as many people as possible know their status.

In 2017, a landmark ceiling price agreement brought the preferred first-line HIV treatment, a fixed-dose combination of Tenofovir, Lamivudine, and Dolutegravir (TLD), to market for US$75 per patient per year. By the end of 2019, over 120 countries had included or planned to include TLD in their guidelines, 70 had initiated procurement, and over 120 million monthly courses of TLD had been ordered. This tremendous scale up drove the price down further, with the annual cost of treating a patient with TLD falling to US$66. In South Africa, which has the largest HIV burden in the world, TLD is set to save the government over US$326 million over the next three years, allowing two million additional patients to receive treatment.

Funded by Unitaid, the Bill & Melinda Gates Foundation, and the United Kingdom's Department of International

A PREGNANT WOMAN IS TESTED FOR HIV AS PART OF A ROUTINE ANTENATAL CARE VISIT
KASAMBYA HEALTH CENTER III, UGANDA

Development (DFID), HIV programs in all CHAI-supported countries have moved to rapidly scale up access to TLD. Kenya, Malawi, Tanzania, and Uganda have all transitioned over 400,000 people to TLD in their respective treatment programs. In Nigeria, the number of people on TLD increased nearly twenty-fold, from around 40,000 patients on the regimen in 2018 to over 800,000 in 2019. Smaller volume countries have also made significant progress, including Laos, where over 50 percent of eligible patients have rapidly transitioned to TLD, with the goal of 100 percent uptake by the end of 2020.

CHAI has supported governments to develop policies in collaboration with communities of women living with HIV that promote a women-centered approach to care, and ensure they are not denied access to optimal treatment regimens. We conducted activities with communities of women living with HIV across eight countries to promote treatment literacy and empower them to have an informed choice in their care. All countries in which CHAI works now have policies which enable women's access to dolutegravir (DTG).

In parallel, CHAI is working to extend access to DTG for children. In 2019, we supported the introduction of DTG for children weighing over 20kg in countries including Nigeria, Uganda, Zimbabwe, Zambia and Malawi, in line with current formulation availability and dosing guidance. To deliver optimal treatment for all, including the youngest children, CHAI and Unitaid are working in an innovative partnership with ViiV Healthcare and two generic manufacturers to drive the accelerated development and availability of pediatric formulations of DTG to extend access to children from 3kg, with approval expected in 2020.

Closing the gap on pediatric care

We are helping governments pursue a comprehensive approach to pediatric HIV across the cascade of care from targeted testing and identification, to linkage to lifesaving care and treatment, to sustained viral suppression and retention in care.

Diagnosing HIV in infants requires the use of complex technologies that can delay treatment by months. In order to eliminate these delays, CHAI works with countries to scale up point-of-care testing for early infant diagnosis (EID). In 2019, with funding from Unitaid, we helped governments in **Senegal** and **Tanzania** initiate point-of-care EID testing, and continued to roll out testing in **Cameroon**, **the Democratic Republic of Congo**, **Ethiopia, Kenya, Malawi, Mozambique, Uganda**, and **Zimbabwe**. In total, approximately 134,000 HIV-exposed infants received POC EID testing in these 10 countries in 2019. (See *Transforming HIV testing turnaround times with point-of-care diagnostics* page 14)

The testing has also dramatically improved access to rapid treatment of HIV-infected infants. In Cameroon, the proportion of HIV-infected infants initiated on treatment within a week of testing increased from eight percent to 74 percent with point-of-care EID testing, while in Zimbabwe it increased from three percent to 55 percent.

In Malawi, South Africa, Uganda and Zambia, identifying children and youth living with HIV is becoming increasingly difficult as the number of children and youth not on treatment decreases. This underscores the importance of deploying targeted testing strategies to make sure all children receive the care they need and of pursuing a patient-centered approach to service delivery to sustain gains made and improve viral suppression.

CHAI supported Zambia to introduce pediatric HIV service quality assessments (SQAs) to identify service delivery gaps that drive poor retention and viral suppression for children at service delivery points. One notable district-led remedial action in response to evidence from the SQAs was the creation of viral load committees in Ndola district. These committees conducted regular viral load data reviews, coordinated sample management, and conducted targeted clinical mentorship. This contributed to a 51 percent increase in viral load suppression.

In South Africa, in order to make an informed decision on which interventions were most feasible to roll out nationally, CHAI developed a matrix of interventions package, which is comprised of strategies endorsed by the Department of Health and key stakeholders. The strategies, which are currently being rolled out, were selected with the goal of providing scalable, sustainable

TRANSFORMING HIV TESTING TURNAROUND TIMES WITH POINT-OF-CARE DIAGNOSTICS

The World Health Organization (WHO) recommends that HIV positive infants are initiated onto ART within seven days of being diagnosed. However, in many low- and middle-income countries it can take weeks or even months to start treatment due to complex technologies required to diagnose the infection in infants. The turnaround time for viral load testing (which measures the amount of HIV in a blood sample) is similarly long, meaning patients already on treatment often do not know if they are responding to their medicine for several months and may stay on ineffective treatment for months without receiving counseling or treatment adjustment.

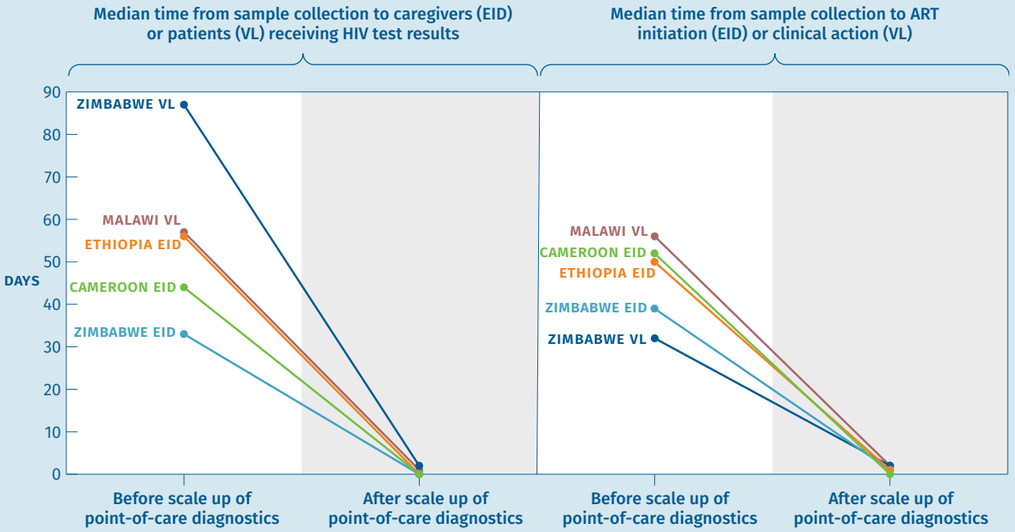
CHAI supports countries to improve test turnaround times by scaling up point-of-care diagnostics for both early infant diagnosis (EID) and viral load testing. Point-of-care testing is done at or near to where patient care is delivered. This enables more rapid clinical decision making, treatment, and monitoring, leading to better patient outcomes.

In 2019, CHAI helped **Cameroon, Democratic Republic of Congo, Ethiopia, Kenya, Malawi**, **Mozambique, Senegal, Tanzania, Uganda**, and **Zimbabwe** increase point-of-care EID, resulting in 22 percent of all EID tests being performed at points of care.

Based on evidence that CHAI generated, in 2019 **Senegal** and **Tanzania** decided to integrate EID and viral load testing on the same platform currently used for tuberculosis testing. This has paved the way for more optimized national diagnostic networks, which meet the needs of multiple disease programs through the optimal use of existing laboratory capacity in-country.

As a result, HIV exposed infants and their mothers now know their status in a single visit and HIV positive infants can start treatment on the same day they are diagnosed. Point-of-care testing also means they can find out whether their treatment is working within days of a clinic visit. This is particularly critical for those at a higher risk of treatment failure or onward transmission, including children, adolescents, and pregnant and breastfeeding women and other key populations.

OPTIMIZATIONS IN TESTING TURNAROUND TIMES



interventions that would provide the highest impact for children and adolescents.

With funding from the ELMA Foundation, we helped dramatically move the needle on pediatric ART coverage in Malawi and Zambia in 2019. We supported Zambia to reach 76 percent coverage, up from 58 percent in 2014, and Malawi to reach 74 percent coverage from 34 percent in 2014. In total, 107,223 children were initiated on ART in the two countries from 2015 through 2019.

In 2019, CHAI began implementing a new project called the Faith-based Action for Scaling up Testing and Treatment for the Epidemic Response (FASTER) in four countries: Nigeria, Tanzania, Uganda, and Zambia. The FASTER initiative is focusing on six priority actions, agreed upon by a core set of stakeholders as a follow up to the 2017 Rome Action Plan. FASTER will champion country-specific opportunities across the pediatric and adolescent testing and treatment cascade to reduce structural barriers (to testing and treatment), expand innovation, and scale up what works. Specifically, we are working to accelerate registration of critical pediatric products; increase point-of-care EID uptake and expand coverage at alternative entry points; and improve training and mentorship materials to address gaps in treatment and service delivery quality.

Preventing HIV

In 2019, 1.7 million people were newly infected with HIV and 690,000 died from HIV-related causes. Prevention measures remain critical to control the epidemic.

Available interventions, like voluntary medical male circumcision (VMMC) and oral pre-exposure prophylaxis (PrEP), have had an impact and CHAI continues to support these interventions. In South Africa, CHAI has supported the National Department of Health (NDoH) strategically and operationally since oral PrEP introduction work began in late 2015. In 2019, CHAI supported NDoH to analyze program outcomes and develop scenarios for scale up. Based on this analysis, NDoH decided to introduce oral PrEP in all 3,456 primary health care facilities nationwide throughout 2020 to ensure broad, equitable access and maximize impact. Nevertheless, both oral PrEP and VMMC have limitations and experts agree that a variety of prevention services will be required to adequately reduce new infections. That is why CHAI is working to bring additional HIV prevention options to market.

In collaboration with AVAC, the Bill & Melinda Gates Foundation, and ViiV Healthcare, we established the Biomedical Prevention Implementation Collaborative (BioPIC) in 2018. BioPIC plans for the introduction of new products in parallel to clinical trials with the goal of shortening time to impact across low- and middle-income countries once products are approved by regulatory bodies. BioPIC has developed a comprehensive introduction agenda and access strategy for the cabotegravir long-acting injectable (CAB-LA), the first long-acting injectable for HIV prevention. Informed by BioPIC's work, CHAI is partnering with the Children's Investment Fund Foundation, AVAC, and others to begin planning for a dual prevention pill which protects against pregnancy and HIV and could pave the way for more multipurpose prevention technologies and better integration of HIV and sexual and reproductive health services.

Leveraging innovative technologies

In sub-Saharan Africa, more than a third of all people living with HIV initiating ART have advanced HIV Disease (AHD) or AIDS, and approximately 10 percent of those die within the first three months. For those with AHD, more intensive follow-up and a package of interventions has been shown to reduce morbidity and mortality in this vulnerable group. Yet, the diagnostic tools, treatment, and preventative services required are virtually non-existent in most low- and middle-income countries.

To address this gap, and with sustainability in mind, CHAI, funded by Unitaid, made use of already established procurement mechanisms to bring optimal products, constituting an AHD package of care into 7 countries including **Botswana, Lesotho, Malawi, Nigeria, South Africa**, **Tanzania** and **Uganda**.

CHAI is supporting ministries of health to place orders through wambo.org, the Global Fund's online supply chain platform. The platform allows partners to procure commodities via existing, sustainable supply chain channels by aggregating order volumes to access the terms and pricing negotiated by Global Fund's Pooled

Procurement Mechanism. In 2019, Nigeria and Uganda placed orders for AHD commodities on the platform—marking the first time some of these lifesaving products will be publicly available to people living with AHD in these countries.

In **India**, the government has set the ambitious goal of adding approximately 350,000 people living with HIV to ART regimens in the next year. In light of the decline in new patients being identified and added to ART, there is an urgent need for new strategies to reduce high lost-to-follow-up rates. CHAI has developed a machine learning model to predict the likelihood of a patient dropping out of treatment, based on over 400 factors, including age, gender, education, past adherence to medicines, and CD4 count. This technology has the potential to help health workers take proactive and customized actions to prevent patients from dropping out of treatment, and significantly reduce costly measures needed to trace and bring back patients.

The model has been tested on program datasets and was able to identify a cohort of 20 percent of patients that make up the largest proportion of patients lost to follow-up. We are now assisting the Ministry of Health to design pilot sites to implement the model and measure the impact of subsequent interventions. The successful field validation of the model will be a key step in demonstrating data- and evidence-driven approaches for solving challenges in large public health programs.

LOOKING AHEAD

The global HIV community is at last on the cusp of making optimal products for children living with HIV available to all who need it. We will support the rapid introduction of these products and accelerate the development of additional optimal formulations for children. We will also continue to increase access to point-of-care EID and viral load testing, while simultaneously generating demand for these tests.

While tremendous progress has been made in the HIV response overall, decreases in new infections have stagnated in recent years, despite the existence of highly effective interventions. While supporting accelerated development and introduction of high potential pipeline products like CAB-LA, we will continue to work with governments and other stakeholders to ensure the best existing services and interventions are available to drive decreases in new infections in the meantime.

Esther Mtumbuka

Country Director, Tanzania

During the late 1990s, as a medical student, and later practitioner, I witnessed that being diagnosed with HIV was equivalent to a death sentence in most of African countries. Within my home country (Tanzania) and abroad where I worked; patients and people I knew succumbed to death due to the virus. Lack of antiretroviral (ARV) drugs, weak infrastructure to monitor clients, limited knowledge and fear amongst health providers, and stigma from the disease all made it next to impossible for the patients to survive. It was indeed devastating.

I then had an opportunity to join CHAI on what was initially going to be a short-term assignment. It was CHAI's dedication and passion to transform what was defined as impossible by many, room to innovate, and the conducive working environment that made me stay longer. Working alongside Tanzanian Ministry of Health colleagues, we dramatically transformed the situation by demonstrating that if the health system is supported (optimal ARVs made available, HIV laboratory systems put in place, provider's capacity enhanced), it is indeed possible to offer hope for people infected with the virus, especially those in rural and hard to reach areas.

I am humbled to observe positive results in Tanzania from innovations deployed through CHAI beyond the HIV program. Through collaboration with colleagues within vaccine teams we were able to jointly ensure real-time visibility and potency of vaccines stored and transported close to the vaccinating facilities; field tested and rolled out alternative refrigerators for storage of these antigens, and expanded national storage capacity.

The opportunity to work with other partners in addressing unique gaps in the health system has been one of the many fulfillments of working with CHAI. A few examples include the deployment of a vaccine management information system (VIMS) and transforming the utilization of data to improve access to reproductive and under-five health services at primary health facilities.

Being cognizant of the critical role played by private health providers, we introduced affordable and quality malaria rapid diagnosis and treatment within the formal private health sector (health facilities and accredited drugs and dispensing outlets-ADDOs). These tests and treatments are now accessible within the public and formal private sectors across the nation, and ADDOs can electronically report their performance to respective health management teams.

I have come across many committed, talented, and diverse people within CHAI, who individually have inspired and positively challenged me. I am grateful for the opportunity to learn from them.

As I look to the future, I am excited to tackle new challenges confronting health systems, including known and emerging infectious diseases and an increasing prevalence of non-communicable diseases—hypertension, diabetes, mental health, etc. With similar emphasis, I look forward to enhancing strategic planning and performance accountability of primary health care which is the programmatic engine toward achieving universal health coverage.

MALARIA

Nearly half of the world's population is at risk of malaria. The disease kills over 400,000 people each year, with children under five representing the majority of those deaths.

Increasing protection for at-risk populations by distributing bed nets and indoor residual spraying (IRS), along with improved diagnostic testing and effective treatment, have resulted in a 30 percent decline in malaria deaths since 2010. However, progress is threatened by drug and insecticide resistance, higher prices for newer, more effective tools, and continued dependency on donor funding.

CHAI supports over 20 countries across Africa, Mesoamerica and Hispaniola, and Southeast Asia to identify and close the gaps in malaria coverage and accelerate progress toward elimination.

We work with governments to systematically collect and analyze data to better control and prevent the disease by identifying where transmission happens and targeting the right interventions—from vector control to timely diagnosis and treatment—to have the greatest impact.

Improving the use of vector control

Vector control refers to the methods used to prevent malaria-carrying mosquitoes from biting humans. The two most common vector control interventions used are long-lasting insecticide-treated bed nets (LLINs), which protect people from being bitten while they sleep, and indoor residual spraying (IRS)—spraying walls inside dwellings with an insecticide that kills mosquitoes.

Many of our partner countries have been using IRS for decades but continue to face gaps in coverage and have begun to see mosquito resistance to the insecticides that are used. CHAI is assisting these countries achieve greater impact by helping them evaluate which insecticides will be most effective, plan targeted campaigns, and track implementation to ensure high coverage rates.

WORKERS COLLECT SAMPLES OF MALARIA-CARRYING ANOPHELES MOSQUITOES
GUNA YALA COMARCA, PANAMA

In **Panama**, with funding from the Bill & Melinda Gates Foundation, CHAI helped introduce a new insecticide in the Guna Comarcas, which include three regions, Guna Yala, Wargandi, and Madugandi. We also supported robust operational planning, including analysis to estimate the best time to deploy the spray before the malaria season, forecasting supply requirements for items such as spray pumps and personal protective equipment, training for IRS brigades, and engagement with the Guna traditional leaders and community health workers to increase acceptance of IRS spraying. As a result, in these regions, IRS coverage at the household level went from less than 50 percent to 93 percent, 97 percent, and 84 percent respectively.

In **Botswana**, the Ministry of Health's National Malaria Program faced challenges reaching its goal of 85 percent IRS coverage across six endemic districts because homeowners were rarely home during campaigns. In 2019, CHAI conducted a Bill & Melinda Gates Foundation-supported study in two districts, Ngamiland and Chobe, to determine why. Results indicated that limited or late community mobilization, scheduling conflicts, complaints about the spray smell, and staining were important issues.

We worked with the the district health management teams (DHMTs) of the two districts to address the concerns communities shared. Together with the with the DHMTs and local leaders, we developed a spray schedule two months in advance so households could better prepare for spray teams. Information packages were delivered to villages ahead of time to address other concerns, such as suggesting ways to minimize unpleasant smells. As a result, IRS coverage increased on average from 72 percent in 2018 to 80 percent in 2019 in Chobe.

In 2016, **Lao PDR** undertook a mass LLIN distribution using an outdated stratification from 2009. Stratification is the process by which we determine which geographical regions are most at risk of malaria transmission. The result was too many nets delivered to some places, while other at-risk communities received none.

> "We work with national malaria programs to identify gaps, strengthen operational plans, improve analytics on malaria transmission and implement new and more targeted interventions to achieve and maintain elimination. The results of this work suggest that elimination by 2023 is possible.
>
> **— Sebastian Salvador**
> **READ MORE P. 23**

In 2019, CHAI supported Lao PDR's Center for Malariology, Parasitology, and Entomology (CMPE) to better target bed net distribution, with financial support from the Bill & Melinda Gates Foundation. We used a map of malaria risk that we created in partnership with experts at the Malaria Atlas Project to guide resource distribution to the places with the most impact. We also ensured bed net quantification and procurement were based on accurate population data and planned the distribution campaign down to the village level.

An updated monitoring tool was applied to make sure Lao PDR could quickly and accurately calculate and visualize coverage rates shortly after distribution to see if any places were missed. At the end of 2019, more than 900,000 LLINs were distributed out of a targeted 1,002 million—a 90 percent coverage rate.

The Digital Solutions for Malaria Elimination (DSME) project—currently being rolled out in 10 countries—supports governments to eliminate malaria by building a comprehensive and sustainable malaria surveillance system to make complete, timely, and accurate data reporting easier and to improve decision making. In 2019, the project produced and piloted the Common Geo-Registry (CGR), an open-source platform designed to host, manage, update, and share geographic information over time and serve as a single source of veracity across multiple information systems and data sources. CHAI is supporting the platform's rollout in **Laos PDR**.

Strengthening community health worker networks

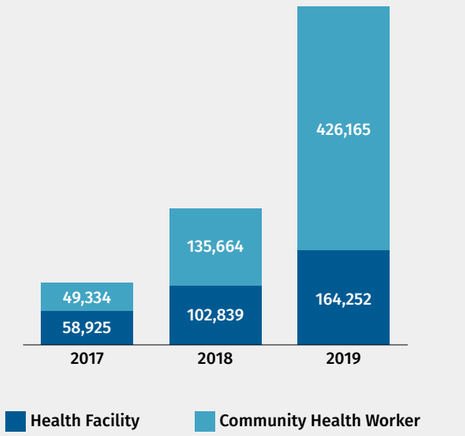
Malaria is typically a rural disease, with transmission often most intense in remote regions with poor access to health facilities. Community health workers can play a very important role in improving the accessibility of health services, including malaria diagnosis and treatment, in these remote places. Because these workers are members of the communities in which they work, they can improve trust and participation in anti-malarial efforts.

In **Guatemala,** CHAI supported the Ministry of Health in the department of Escuintla to strengthen community health workers' role in malaria elimination efforts. In 2019, we evaluated how their responsibilities could be expanded to improve case detection and adherence to malaria medication. Twenty-seven health workers across three districts in the department were trained on patient follow-up and treatment completion tracking, as well as reactive and proactive case detection. The workers received a non-monetary monthly incentive (a monthly basket with basic household items) for taking on this expanded role. During the pilot, 98 percent of patients completed their full 14-day treatment. Participating community health workers also tested 38 percent more patients. After analyzing its impact, we supported the scaleup of the intervention to 96 community health workers across seven districts. In 2020, CHAI will work with the Ministry of Health to assess how these experiences can inform expansion of similar activities across the country.

Cambodia's village malaria workers operate in malaria hotspots across the country. Workers receive a small but essential stipend to provide testing, treatment, and advice to their communities. However, in 2016 the network almost disappeared due to changes in grant disbursement policies that prevented workers from receiving their stipends. Most workers stopped testing and treating cases.

In order to restart the network, the National Center for Parasitology, Entomology, and Malaria (CNM), with support from CHAI, first identified the highest risk communities and hired 2,000 volunteer and community health workers in the locations they were needed most. CHAI then worked with CNM and the United Nations Office for Project Services (UNOPS) to get the volunteers paid by mapping electronic payment providers, negotiating contracts, and piloting the new system.

MALARIA TESTS CONDUCTED ACROSS CAMBODIA



The program is now re-established nationwide and village malaria workers have been steadily improving service coverage. In 2019, village malaria workers contributed 70 percent of all tests nationally and treated over 50 percent of confirmed malaria cases.

In addition to these routine malaria services, the CNM, with support from CHAI and partners, initiated an Intensification Plan (IP) to reduce transmission in malaria hotspots. We deployed interventions including strengthening existing case management services, targeting long-lasting insecticide-treated nets, and expanded mobile malaria worker programs to better prevent the disease among mobile and migrant populations.

In the **Democratic Republic of Congo**, **Nigeria**, and **Uganda**, CHAI led a consortium of partners, including UNICEF and the Swiss Tropical and Public Health Institute, to introduce the lifesaving drug rectal artesunate into established community health worker networks. The Unitaid-funded project aims to evaluate how this proven tool for treating children who are severely ill with malaria can best be scaled up through country-owned systems to reduce mortality. In 2019, CHAI and its partners helped the three governments distribute 37,630 units of the drug to community health workers and health facilities and train over 8,000 health workers on its use.

TRANSFORMING DATA INTO ACTION TO BUILD A BETTER MALARIA PROGRAM IN HONDURAS

In 2017, the Islas de la Bahia region of Honduras saw a 37 percent increase in malaria, the third highest number of malaria cases reported in the country. CHAI recognized this challenge as an opportunity to demonstrate how evidence-based systems can accelerate elimination efforts and began supporting the regional government in 2018.

We assessed the current program and identified significant challenges for patients. There was, on average, a four-and-a-half-day delay between symptom onset and diagnosis in 2018. Only 25 percent of cases were diagnosed within the national goal of 48 hours. This was largely due to limited availability of RDTs at health facilities and poor knowledge of malaria among health providers.

To improve the quality and availability of malaria services, CHAI worked with the Islas Ministry of Health to improve their case detection system across all public health facilities in the region. We equipped health facilities with RDTs and trained workers to test all patients with fever, a common malaria symptom. Each facility developed its own strategy for identifying and testing fever patients. The Ministry set quarterly goals for facilities. To track their progress against these goals, health centers conducted weekly data review meetings. These meetings improved monitoring of key interventions and helped build a culture of evidence-based decision making.

CHAI also supported the Ministry to install a new fever clinic at the Roatan public hospital's outpatient clinic, where 88 percent of the region's malaria cases were diagnosed in 2017.

By the end of 2019, these strategies had led to a 155 percent increase in overall testing across the region's health facilities and a dramatic decline in malaria cases.

Moving forward, we will build on these successes with targeted malaria testing to identify any remaining parasite reservoirs in the region. We will also work with the government to design new interventions to ensure disease transmission is not re-established in the area and we can sustain elimination over the long-term.

TRANSFORMATIONAL CHANGE

The program established:

155% ↑ **Testing increase across health facilities**

86% ↓ **Case decline from 2018 to 2019**

6

consecutive months without a malaria case in 2019, suggesting transmission has been interrupted.

Increasing access to rapid diagnostic tests

Malaria rapid diagnostic tests (RDTs) are simple, portable blood tests that can be used by health workers who do not have access to laboratory services. Despite their ease of use, RDTs are not typically available in the private sector drug shops of East Africa where tens of millions of people seek treatment for fevers every year. As a result, many may receive antimalarial drugs unnecessarily, and it is impossible to accurately know how much malaria is truly occurring and thus to respond appropriately.

In 2019, with funding from the United Kingdom's Department for International Development (DFID), CHAI made high-quality RDTs more accessible by signing low-cost agreements with 12 importers in **Nigeria** and

Uganda. These importers can now procure RDTs for US$0.23 per test through CHAI-negotiated pricing. In return, they agree to low, fixed markups, ensuring tests are sold at affordable prices at drug shops.

In **Nigeria**, CHAI supported the introduction of two new World Health Organization (WHO)-prequalified RDTs to the private sector. Our goal is to increase competition in the market, encouraging lower prices. At the same time, we catalyzed RDT demand by facilitating training for drug shops, including how to use the tests and steps to take if the results are positive. To date, we have reached over 4,000 drug shops, community pharmacists, and medical officers.

As RDTs become more available in the private sector, it is important to integrate providers into public surveillance systems so governments can monitor and evaluate private sector case management, incorporating that data into overall malaria elimination strategies. In **Uganda,** CHAI, with support from DFID, helped pilot an electronic surveillance system for reporting disease and stock information from the private sector in three districts, resulting in 80 to 90 percent reporting rates. CHAI is now working with the Ministry of Health to expand the system to eight more districts.

In **Cambodia**, where most malaria is now caused by *Plasmodium vivax (P. vivax)*, CHAI, with support from PATH and the Medicines for Malaria Venture, worked with CNM and WHO to introduce a new RDT and *P. vivax* treatment for the first time in four provinces. While standard malaria treatment is effective for curing the blood-stage malaria parasite from the body, an additional drug called primaquine targets other stages of the parasite—including dormant parasites that may be hiding in the liver—and is thus necessary to prevent relapses of *P. vivax* malaria. Although effective for curing parasites, the drug can be toxic to certain individuals, necessitating introduction of a new RDT called glucose-6-phosphate dehydrogenase (G6PD) (which identifies whether individuals have a genetic condition that means they should not receive primaquine) to inform health workers if patients are eligible for the 14-day radical cure.

In 2019, CNM procured 5,465 G6PD RDTs with CHAI's support. We also worked with CNM and provinces to roll out the new treatment. Since then, 78 percent of *P. vivax* cases detected at target health centers have received G6PD RDTs, and 100 percent of patients who are G6PD normal and eligible for radical cure have received the 14-day treatment. This test and treat model will expand nationwide in 2021.

LOOKING AHEAD

CHAI aims to continue accelerating progress in reducing the 400,000 deaths from malaria that still occur every year by identifying opportunities to further expand access to high-quality malaria commodities for prevention, diagnosis, and treatment across high-endemic African countries. In particular, CHAI is increasing its footprint in high-endemic parts of West and Central Africa, seeking to ensure that all who need appropriate diagnosis and effective treatment are able to access them.

At the same time, we will continue to support lower endemic countries to eliminate malaria transmission from regions where doing so is feasible and sustainable, increasing the number of malaria-free areas around the world and making sure progress is maintained even if donor funding is withdrawn. We aim to achieve elimination of malaria from Central America, Hispaniola, and the Greater Mekong Subregion in the next few years.

Sebastian Salvador

Regional Senior Manager, Malaria, Mesoamerica

I joined CHAI in 2014; but to explain this story, I need to go back to 2008, when I worked at The Global Fund to Fight HIV/AIDS, Tuberculosis, and Malaria.

At the Global Fund, I supported the Technical Review Panel with Latin American applicants, and later grant management for the disease portfolios of Palestine, Djibouti, and Iraq. I learned a lot about the challenges countries face when working to put infectious disease programs into practice.

This was particularly evident when I went to these countries and worked with their ministries of health, analyzing data to understand the issues they faced and coming up with tailored solutions. Those visits were not just insightful for my work, they introduced me to the sort of work I wanted to do more.

After leaving the Global Fund in 2013, I did a consultancy with the United Nations (UN)-Human Rights Special Rapporteur on Right to Health, supporting him and other experts to advocate policy reform for health financing and access to essential medicines. It was an enriching experience, especially the fact-finding missions in sub-Saharan Africa, where I felt the real challenges for governments were not so much developing these legal frameworks as implementing them and tracking progress.

After that consultancy, I moved to Boston to do a summer course on American Literature. During a conversation with a local friend around ministries of health and their challenges she said, "that´s precisely what CHAI does, have you checked their website?"

I joined CHAI´s malaria elimination project in Central America in September 2014, at a time when CHAI had no presence in the region and was new to the malaria space. I was hired to open our malaria portfolios in Guatemala and Panama. That first year I travelled a lot, spending as much time as possible in the endemic regions of Escuintla in Guatemala and the Guna territories in Panama, to learn from the government programs what their priorities and approaches were. Along the way we built very good relationships with our government partners.

Soon CHAI started providing technical assistance and management support to accelerate malaria elimination efforts in these two countries, as well as Honduras, the Dominican Republic, and El Salvador. Some key milestones (and nice memories) that come to mind when looking back at 2014 and 2015 include involving Guatemala´s main sugar cane association, ASAZGUA, in the national malaria elimination efforts. This public-private partnership has allowed the national malaria program to open numerous points of care inside plantations and get insights on malaria among seasonal workers in Escuintla.

In Panama, we engaged with the indigenous Guna Congress on malaria elimination efforts within their territories. We signed an agreement which allowed the Ministry of Health to develop the first network of community health workers in the Guna communities. Parallel to this, we worked with the Ministry to introduce rapid diagnostic tests (RDTs), which significantly reduced the time between diagnosis and treatment. In 2019, the Ministry endorsed the use of RDTs by all health workers in Panama.

Since those initial years, our team has grown from five to almost 40. We work with national malaria programs to identify gaps, strengthen operational plans, improve malaria transmission analytics, and implement new and more targeted interventions to achieve and maintain elimination. The results of this work suggest elimination by 2023 is possible in Guatemala, Honduras, Panama, and the Dominican Republic, and in five years for Haiti.

If I had to summarize what CHAI means to me I would say cutting-edge analytics and action. But those words don´t mean much without the people pushing them forward. In my time at CHAI, I´ve had the privilege of being part of a team of incredibly smart and action-oriented people with unique skills who are always willing to roll up their sleeves and pull through together.

TUBERCULOSIS

Every year, 10 million people fall ill with tuberculosis (TB) and 1.5 million people die from the disease. This makes TB the world's leading cause of death from a single infectious agent. Nearly all deaths occur in low- and middle-income countries where poor treatment management and inappropriate use of medication, compounded by long and burdensome drug regimens, have promoted the development of the far deadlier and costlier to treat drug resistant TB.

More than one-fifth of the world's population lives with the latent (or non-infectious) form of TB. Those that are infected have a five to 10 percent risk of becoming ill from TB over their lifetimes. Children and people living with HIV are particularly vulnerable.

Yet, TB is preventable and curable. The disease is treated by a standard six- to nine-month course of antibiotics. Treatment for drug-resistant TB is longer and more complex. High-risk populations with latent TB can receive preventive treatment to stop the onset of disease. The treatment uses the same drugs for a shorter time.

CHAI is working with our partners to eliminate TB by helping governments better identify, diagnose, treat, and prevent the disease. This includes negotiating lower prices to optimal drug regimens that offer higher cure rates, shorter treatment courses, and fewer side effects; improving access to preventative treatments for the most vulnerable; and tracking the disease through innovative technology to make data-driven decisions.

Preventing TB in vulnerable populations

Key to ending the epidemic is reducing the incidence of TB. CHAI is working to prevent latent TB from becoming active, with a focus on protecting those most at risk, including children under five and people living with HIV. To this end, we are helping partners in Africa and Asia Pacific introduce new preventive therapies, like 3HP, a short-course treatment to prevent active TB.

A NURSE POINTS TO CHARTS MONITORING MONTHLY SPUTUM COLLECTION FOR TB TREATMENT
CAPE TOWN, SOUTH AFRICA

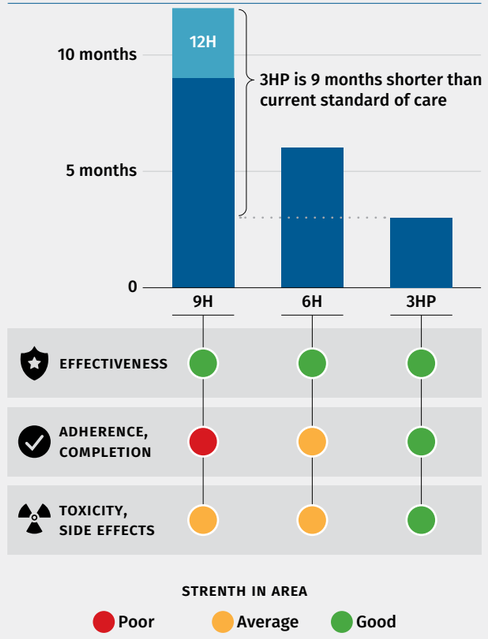
The 3HP regimen is a once weekly dose of isoniazid and rifapentine taken for three months. 3HP treats latent TB much more quickly and safely than standard therapies, which include daily treatments for up to 12 months.

While the lifesaving potential of 3HP is clear, its pricing has represented a significant barrier to patient access. To close this gap, CHAI completed an economic analysis to understand at which price point 3HP could be justified instead of traditional regimens. We then worked with branded and generic suppliers as well as countries, Unitaid, and other partners to negotiate a 66 percent price reduction for the 3HP regimen for both branded and generic products. The price reductions have also helped donors such as PEPFAR to push for increased adoption of preventive therapies, while encouraging the migration to shorter, rifapentine-based regimens.

In 2018, CHAI helped the National Department of Health in **South Africa** deliver the investment case for introducing 3HP nationally. We were able to show that not only was the new regimen as effective with fewer side effects than standard therapies, but that it was more affordable.

In 2019, we began working with partners in other countries to roll out the model tested in South Africa. In **Cambodia**, **Kenya**, **India**, and **Zimbabwe**, under the IMPAACT4TB Project (Increasing Market and Public health outcomes through scaling up Affordable Access models of short Course preventive therapy for TB), we helped governments introduce 3HP through updating national guidelines, supporting product registration, and designating sentinel sites, alongside development and forecasting tools, training health providers, and ensuring supply chains were ready.

3HP COURSE COMPARED TO STANDARD OF CARE IN SOUTH AFRICA



Tackling the largest burden of TB in the world

India has the largest burden of TB globally, with an estimated annual incidence of 2.7 million TB and 135,000 multi-drug resistant TB patients. Almost half a million people die from the disease each year.

While standardized care is available through a national program, the private sector is the first point of contact for up to 80 percent of patients. Gaps between the public and private sector lead to under reporting, diagnostic delays, inappropriate treatment, and sometimes catastrophic out-of-pocket expenses for patients.

CHAI works closely with the Global Fund-supported Joint Effort for Elimination of TB (JEET) to bridge these gaps and provide end-to-end care for patients—no matter where they seek services. JEET aims to connect private hospitals, clinics, and labs with public health programs to facilitate better reporting of cases (known as notifications), access to affordable diagnostics, and helping patients stay on treatment until it is completed. In 2019, JEET made progress against several objectives, including notifying 200,000 patients (against

a three-year goal of 1.6 million), and exceeding the target treatment success rate of 70 percent. Based on these achievements, the government has budgeted US$15 million to scale up and drive sustainability of the project.

In Chennai, India, 48 percent of TB cases are undetected, misdiagnosed, or unreported. To expand case finding, CHAI—with funding from the Surgo Foundation—has supported the Greater Chennai Corporation (GCC)-led TB-Free Chennai Initiative for the past three years. To improve access to diagnostic tools, CHAI facilitated the procurement of seven vans fitted with digital x-ray machines, which have been screening individuals in high-risk areas of Chennai since January 2019. Once collected, the x-rays are interpreted through artificial intelligence (AI)-enabled tele-radiology, allowing patients to quickly be referred to appropriate services. Using this AI technology has allowed more than 100,000 patients to be screened, with 300 to 400 x-rays processed per day, reducing the turnaround time for results from three months to just 24 hours.

Enhancing case finding

Low TB case detection remains a significant challenge. Globally, only 70 percent of TB cases (and less than 40 percent of drug-resistant cases) are found and notified to the government. With funding from the United Kingdom's Department for International Development (DFID), CHAI has been piloting innovative active case finding approaches in countries such as **Lao PDR**.

Lao PDR has a TB case detection rate of 57 percent. In partnership with the National TB Center (NTC) and local health staff, CHAI launched a case finding improvement project in Champasak province. The project strengthened routine TB screening in villages, health centers, and hospital service points and enhanced sample transport, data utilization, high-risk group mapping, and chest x-ray screening coverage.

The result was a 331 percent increase in TB presumptive identification, a 300 percent increase in multi-drug resistant TB case notifications and an overall 55 percent increase in TB case notification in the region.

JEET'S IMPACT IN INDIA

TB

INCREASE IN TUBERCULOSIS NOTIFICATIONS

2x **private sector**

2–14x **public sector**

PROGRAM SCALE UP

US$15M **of domestic funding budget for program scale up**

193 **districts**

19 **states**

LOOKING AHEAD

As we look ahead to 2020 and beyond, CHAI will help countries to find more TB cases leveraging digital x-ray and AI interpretation support. X-ray technology has been used to screen TB in communities since the 1920's. The introduction of low-cost, portable digital x-ray equipment and AI interpretation software now makes this technology affordable and practical for high throughput screening in most high-burden TB settings. CHAI will help countries identify where and how to use this technology to most efficiently support TB efforts.

Michael Campbell

Director, TB

On my journey to CHAI, I worked in consumer marketing, management consulting, and founded a venture capital-funded biotech company. I joined CHAI in pursuit of career fulfilment and transformative social impact. It has delivered beyond my expectations on both.

I started with CHAI in 2015 as the New Market Opportunities Team (NMOT) Director. NMOT works across the organization to build momentum for public health interventions that have been underserved or overlooked. The team works across disease areas and countries, to understand common implementation challenges and programmatic and therapeutic innovations with transformative potential. CHAI's work in hepatitis, assistive devices, cancer, and non-communicable diseases had origins in NMOT work. The team is an example of CHAI's willingness to "roll up its sleeves" and work urgently and collaboratively to save lives.

In 2018, I assumed leadership of CHAI's global tuberculosis (TB) work. Curbing the TB epidemic is both my job and a passion, as few diseases exact such a terrible health and financial toll on vulnerable individuals, families, and communities. In addition to global market shaping work, our TB work focuses on addressing country-specific barriers to controlling the disease, as well as increasing access to preventative medications and safer and more effective treatments.

Although effective treatment is available for TB, programs fail to detect 30 percent of the 10 million new TB cases annually. CHAI is working to support countries to explore a variety of innovations to better find TB cases—from working with traditional healers in Malawi, increasing private sector notifications in India, to active TB case finding using x-ray screening in India, Lao PDR, and Vietnam. In collaboration with our country colleagues, CHAI is helping to build stronger national TB programs which are more responsive and sensitive to the care-seeking preferences and constraints of vulnerable populations.

In addition to helping our partners find more cases, we are working to enable access to shorter, safer regimens for TB preventive therapy that are affordable for high-risk groups, such as people living with HIV and child contacts (particularly those under five) of TB patients. We are also working to expedite the transition from longer drug resistant regimens based on toxic, injectable drugs (linked to permanent hearing loss) to shorter, safer, and more effective regimens by making them more affordable. While we are slowing the TB epidemic, the gains are fragile and there is urgent need to accelerate progress.

My colleagues at CHAI continue to work long hours in support of governments around the world and global public. In times of crisis, CHAI staff are the type of people who run toward the problem. I am extremely proud to work in the company of such extraordinary people in the service of hard working, committed ministry of health staff across the globe.

I am also exceptionally grateful for the contribution that our collaborators within ministries of health make every day and continue to stand ready to support them.

HEPATITIS

Viral hepatitis—hepatitis C (HCV) and hepatitis B (HBV)—causes more than a million deaths every year and is projected to exceed the combined mortality of HIV, TB, and malaria by 2040.

Over 71 million people are chronically infected with HCV. The epidemic continues to grow, with 1.75 million new infections annually, driven mainly by unsafe injections in the health sector and injecting drug use with contaminated equipment. Left untreated, HCV can lead to liver damage, liver cancer, and liver failure. Fortunately, the disease can now be accurately diagnosed through low-cost screening and confirmatory tests and cured in more than 95 percent of patients with direct-acting antivirals (DAAs). While DAAs prices were previously an insurmountable barrier to care in low- and middle-income countries, dramatic price reductions have increased access for these countries.

In tandem, a number of diagnostic products and DAAs have recently received pre-qualification by the World Health Organization (WHO) for global use. With these advancements, over five million people have received treatment for HCV infection as of 2017.

Building off this progress, CHAI has worked with the governments of **Cambodia, India, Indonesia, Myanmar, Nigeria, Rwanda,** and **Vietnam** since 2016 to launch and expand access to HCV testing and treatment by simplifying national hepatitis programs and using market-shaping interventions to reduce commodity prices so that more patients can be treated using existing budgets. Progress across our partner countries shows that with political will, modest financial investment, and targeted technical assistance, strong public HCV programs can be established in low- and middle-income countries—and help them eliminate of the disease by 2030, the global goal set by the WHO and endorsed by all its member states.

BLOOD SAMPLES ARE COLLECTED FOR TESTING DURING A HEPATITIS C SCREENING CAMPAIGN
KIGALI, RWANDA

Simple, targeted hepatitis programs

To promote a simplified approach to testing and treatment, CHAI supported the development and launch of a global call to action to eliminate HCV. The call to action is sponsored by four regional liver societies: the American Association for the Study of Liver Diseases (AASLD), Latin American Association for the Study of the Liver (ALEH), Asian Pacific Association for the Study of the Liver (APASL), and European Association for the Study of the Liver (EASL). Launched in November 2019, at the AASLD Liver Meeting in Boston, the call to action highlights four criteria for a public health approach to eliminate the disease: simplification, integration, decentralization, and task-shifting, outlining the role liver associations and their constituents should play in eliminating HCV. Alongside our partner governments, we take this same approach to expand access to HCV testing and treatment in countries with limited resources.

CHAI'S IMPACT ON GLOBAL HEPATITIS BURDEN

We have helped ministries of health initiate over

275,000

patients on HCV treatment between 2018 and 2019.

We have generated approximately

US$81.9 M

in savings on HCV drugs and diagnostics for governments in low- and middle-income countries.

We helped bring to market

7

quality-assured generic drugs to make HCV treatment more affordable and accessible.

In **Cambodia**, initial work focused on the burden of HCV among people living with HIV, as this group is 10 times more likely to die from advanced liver disease. Beginning in 2017, CHAI has helped the Ministry of Health reprogram Global Fund resources for an HIV/HCV co-infection elimination program. CHAI has helped develop national co-infection guidelines, trained health workers, improved HIV data management systems, assisted in drug redistribution, and planned for the next grant cycle. By the end of 2019, 68 percent of adults living with HIV were screened and over 600 patients began HCV treatment.

The national co-infection program has put Cambodia on track to eliminate HCV among people living with HIV. Lessons learned from the program have also helped the government as it develops a national HCV response for the country. CHAI is contributing to these efforts, supporting the development of the National Strategic Plan for Viral Hepatitis B and C, clinical guidelines, and a costing and investment case for an elimination program that will be leveraged to advocate for financing for a national program.

Indonesia has an estimated 1.3 million people living with HCV. Prisoners are disproportionately affected, due almost exclusively to unsafe drug injections. While HCV diagnosis and care are available for free throughout most of the country, prisoners did not have access to the same services. In 2019, the national hepatitis program collaborated with the directorate of corrections, a local community organization called Yayasan Koalisi Satu Hati, and CHAI to provide HCV care in seven prisons in Jakarta. By the end of the year, over 16,000 prisoners were screened and more than 500 started treatment. The program is demonstrating that with cross-sector collaboration, planning, and communication, a public health-oriented HCV program can be successfully implemented in corrections' settings and comprises a key pillar of comprehensive HCV elimination planning.

Lowering the cost of drugs and diagnostics

In 2019, CHAI supported the incorporation of HCV and HBV viral load testing into Roche's Global Access Program (GAP) for HIV viral load testing. The agreement

has led to pricing parity with HIV at US$8.90 per test. That is a 40 percent decline from CHAI's previous HCV pricing arrangement with Roche. Other diagnostics companies have now begun to move toward equalizing pricing for similar tests. Providing multi-disease testing on the same platforms promotes collaboration and integration across programs, which can deliver significant system efficiencies and cost savings, increase patient access, and ultimately improve quality of care.

In the absence of a coordinated public program for HCV in **Vietnam**, patients must pay out-of-pocket. However, the cost of DAAs—almost US$1,000 for a 12-week course—is unaffordable for many patients. In 2019, CHAI focused on helping the government reduce the cost of DAAs. CHAI commissioned and supported the Health Strategy and Policy Institute within the Ministry of Health to undertake and publish a study which highlighted high DAA pricing and its limited availability at health facilities. In response, the government announced a new policy to include five DAAs in its national health coverage, with 50 percent of patient's drug costs being reimbursed, significantly increasing access to essential care.

In **Rwanda,** CHAI supported the government to reduce the cost of diagnostic tests and quality assured DAAs from US$700 to US60 per patient. Based on these price negotiations and other program successes, Rwanda plans to eliminate HCV by 2021. (See *Transforming the HCV commodities market in Rwanda* on page 32.)

Increasing access to treatment

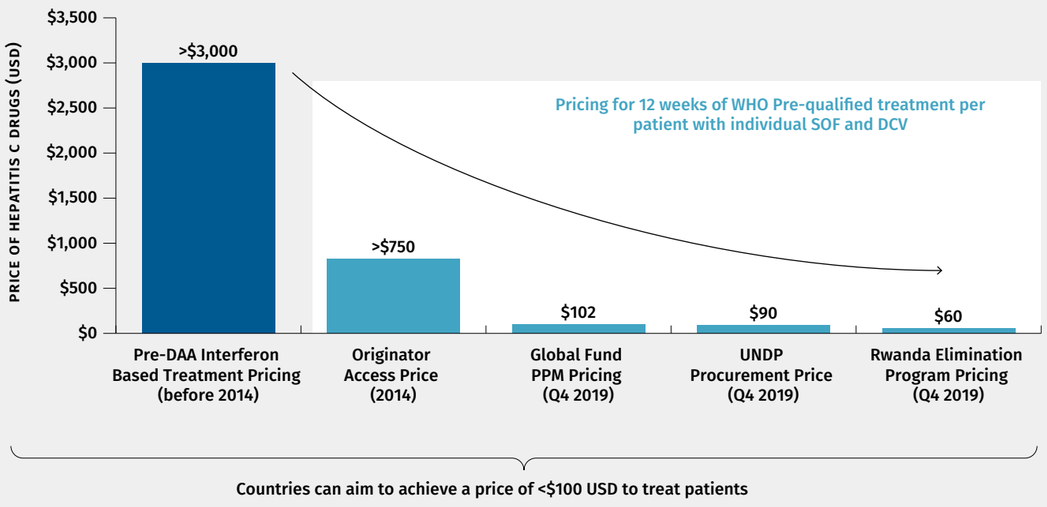
Since our program started, we have helped ministries of health initiate over 130,000 patients on treatment through a combination of drug and diagnostic price reductions and program simplification.

India has allocated US$130 million for its national viral hepatitis program over the next three years to ensure citizens can be tested and treated for both hepatitis B and C for free. During that time, the national program will screen five million people and treat 300,000. To support this service scale-up, CHAI helped develop and launch an electronic monitoring and evaluation platform in 2019 and trained over 1,000 health workers on its use. Data from the platform tracks program performance, identifies gaps, and targets interventions to mitigate challenges as the program continues to grow.

In **Nigeria**, Nasarawa state carries the highest burden of people living with hepatitis C in the country and patients must pay out-of-pocket for treatment. In 2017, CHAI worked with Nasarawa to pilot a treatment program in the state. Since then, we have helped reduce the price of HCV treatment by 67 percent, from US$627 to US$207, enabling over 2,800 patients to access treatment. Building off these efforts, Nasarawa committed to developing an HCV elimination strategy for the region. CHAI supported the state to create a five-year elimination costing plan that helped introduce a line for hepatitis elimination in the 2020 state budget. This sets the stage for the launch and scale-up of services for the estimated 200,000 people living with HCV in Nasarawa and builds momentum for a broader national response, which CHAI also continues to support.

In **Myanmar**, only the sickest and most vulnerable could access HCV treatment for free due to a small public budget and insufficient government-procured and donated drugs and diagnostics. In 2018, CHAI supported a public-private partnership across three hospitals in Yangon and Mandalay. Through the partnership, patients diagnosed in both the public and private sectors who are not eligible for free care can buy high-quality DAAs and access lab services at reduced prices. As a result, about 3,000 patients received treatment through the model in 2018. In 2019, CHAI helped the government create a roadmap for a coordinated scaleup of the public-private partnership model. We have also developed a screening strategy that targets existing resources to minimize the cost-per-case found. We supported the further rollout of HCV services, making treatment available in 18 clinics and 12 hospitals across eight states. The combination of CHAI and partner efforts has helped 6,000 patients get treated in 2019.

EVOLUTION OF PRICING FROM THE PRE-DAA ERA TO 2019 (PRICE PER PATIENT COURSE)



LOOKING AHEAD

While a significant gap in treatment access remains, a simplified public health approach will help low- and middle-income countries significantly reduce costs over time through elimination of HCV. As a healthier market for commodities develops and volumes increase, pricing will continue to fall.

CHAI will keep working with ministries of health to simplify, integrate, and decentralize HCV programs in order to scale up testing and treatment; mobilize resources to support government efforts toward sustainable domestic financing; and continue to work to eliminate HCV among people living with HIV and those who inject drugs—both of whom are at higher risk of contracting the disease. At the same time, we will continue to develop a healthy market for generic DAAs and diagnostic tests, helping all countries target an HCV commodity cure package price of US$100 or less.

Using our experience in setting up HCV programs, we will support countries to introduce and scale up appropriate interventions to eliminate HBV and expand treatment by reducing the prices of key commodities.

Expected financing from Gavi to introduce HBV birth dose vaccines within the next five years, and emerging WHO guidelines on the use of tenofovir among pregnant women to prevent HBV infection, will help us center efforts on eliminating mother-to-child transmission, the primary driver of the majority of new HBV infections.

TRANSFORMING THE HCV COMMODITIES MARKET IN RWANDA

Over 120,000 Rwandans live with HCV, an estimated four percent of the population. Since launching its national hepatitis program in 2015, Rwanda has taken an aggressive approach to combating the disease. By the end of 2018, 700,000 people were screened for HCV and 10,000 treated and cured.

Based on this success, the government announced plans to eliminate hepatitis C in five years. Achieving this goal would not only make Rwanda the first country to eliminate the disease in sub-Saharan Africa but would place it six years ahead of the 2030 global target for elimination set by the World Health Organization (WHO).

However, the price at which the Ministry of Health had been procuring diagnostic tests and DAAs was extremely high, making the elimination plan unaffordable. To address this, between 2018 and 2019, CHAI and the government negotiated significant price reductions for diagnostic tests and quality assured DAAs, leveraging Rwanda's public commitment to eliminate HCV in five years.

As a result, the price of DAAs dropped from US$700 to US$60 per patient for a 12-week course. This will save the government at least US$16 million over five years. The first procurement of DAAs at the new price arrived in the country in June 2019.

Both viral load and rapid diagnostic tests are important tools used to assess HCV; depending on patients' proximity to health centers with access to laboratories for viral load testing, or more remote locations for rapid diagnostic tests. In 2019, Rwanda secured viral load and diagnostic tests for up to 59 percent less than they had paid previously.

With affordable testing and treatment options in place, CHAI supported the government to quickly scale screening for viral hepatitis through a number of campaigns across the country. The government has screened over 420,000 patients for HCV through the campaigns. All eligible Rwandans are on track to be screened by the end of 2020, and Rwanda is planning to cure over 110,000 patients within the next two years. CHAI also helped train over 500 nurses, lab technicians, and data managers to perform the screenings and treat patients who test positive.

Based on these reduced costs of care, as well as increased screening and health provider capacity, Rwanda has accelerated its timeline for HCV elimination from 2023 to 2021. The price negotiations will also act as benchmarks for future global drug and diagnostic price agreements.

TRANSFORMATIONAL CHANGE

COST REDUCTIONS

91% ↓ **drop in cost of treatment from US$700 to US$60 per patient**

59% ↓ **reduction in viral load testing costs from US$23 to US$9.30 per test**

40% ↓ **decrease in cost of rapid diagnostic tests from US$1 to US$0.60**

INCREASED SCREENING AND TESTING AS A RESULT OF NEGOTIATED PRICES

422,164
patients screened for HCV and close to

10,000
patients initiated on HCV treatment since the beginning of 2019, as a result of the negotiated prices

Garrett Young

Country Director, Lao PDR

I joined CHAI more than 10 years ago hoping to apply what I had learned as a management consultant in the United States to problems with an impact beyond corporate bottom lines. I was attracted to CHAI's mission to urgently save the lives of people suffering and dying from preventable causes, and its vision to do so by changing the way public health systems are structured to deliver care. As a history student turned business consultant, I had limited prior exposure to public health, but had studied how system-level changes by governments could lead to dramatic improvements. I joined CHAI to help ministries of health do the same things. I've remained at CHAI because the people hold true to our mission and values, and because I've found that we consistently find ways to tackle and solve some of the hardest problems in public health.

I have spent my CHAI career working in country teams, beginning as an HIV analyst in Eswatini, then as health financing program manager in Ethiopia, and now as country director in Lao PDR. Through these roles, I have seen how CHAI's approach to building partnerships—truly believing in governments' capacity to deliver on big ambitions—combined with working hand-in-hand with officials each day can achieve transformational change in a short time. I am proud to have been a part of teams that have built long-term, high-trust partnerships with our government colleagues; the kind that are required to change the status quo. I have also seen one of CHAI's great strengths up close over time—the way each team and each country office uses the autonomy and flexibility of CHAI's approach to design programs tailored specifically to the country context.

In Laos, we've used that flexibility to help design programs that tackle the country's urgent health problems and also some of the systemic issues consistently limit quality care. Our malaria elimination work, part of CHAI's global malaria program, has helped the Ministry of Health identify a major gap in the approach to diagnosis, increase point-of-care testing by more than 80 percent from 2015 levels, and reduced malaria cases nearly 90 percent in less than five years. Our supply chain program, which was unique as a standalone program at CHAI when it began, started as a small pilot project in one district in 2014. Less than five years later, the Ministry of Health had implemented a fundamental reform of the supply chain that has reached 100 percent of the country's 186 districts, hospitals, and warehouses. Our small CHAI supply chain team, which was never more than three or four dedicated people each year, empowered a much larger Ministry of Health team of central, provincial, and district level staff to eliminate large-scale stockouts of HIV, tuberculosis (TB), malaria and maternal and child health products, and done it in an integrated way that is now being applied to the entire health system.

Reflecting on my decade at CHAI, I am struck by how my colleagues consistently demonstrate flexibility and entrepreneurial thinking to overcome individual challenges, show the tenacity and persistence to keep going when the odds seem long, and more than anything, embody a consistent belief in the ability of our ministry of health colleagues to make decisions that fit their context specifically and work for them. We still have a long way to go in Laos to achieve parity with the rest of the world and prevent people from suffering and dying from causes that can be prevented with tools that exist today. As I head into my second CHAI decade, I remain motivated to do everything we can to support governments to continue taking leaps forward.

WOMEN AND CHILDREN'S HEALTH

A MOTHER AND CHILD WAIT AT AN ANC CLINIC
KADUNA, NIGERIA

Women and children suffer the greatest burden from disease globally. Each year, more than 300,000 women die of complications related to pregnancy and childbirth, 2.6 million babies are stillborn or die within the first weeks of life, and millions suffer from chronic malnutrition and preventable deaths from diarrhea and pneumonia or vaccine-preventable diseases. Most of these deaths occur in low-and middle-income countries.

Working with our partners, CHAI is supporting governments to significantly increase access to recommended treatments for diarrhea and pneumonia, the largest killers of children under five; make critical vaccines that protect against childhood illnesses more affordable and accessible; combat chronic malnutrition; dramatically and sustainably reduce maternal and newborn deaths and ensure that women have access to the tools they need to safely plan their families to improve health outcomes and economic well-being.

MATERNAL, NEWBORN, AND REPRODUCTIVE HEALTH

Each year over 300,000 women die from complications related to pregnancy and childbirth. Nearly all these deaths occur in low- and middle-income countries. The first few weeks of life are the most critical, with nearly half of all children who die under five doing so in the first 28 days of life. Almost a million newborns do not live past their first day, while another million do not survive the first week. An estimated 2.6 million infants are stillborn.

Simple and effective interventions can prevent unintended pregnancies, treat complications of pregnancy and delivery, and save the lives of newborns, but many countries face critical gaps which prevent them from being implemented.

CHAI has developed and partnered with national governments to implement an integrated approach that reaches women throughout their reproductive years with the education and resources to safely plan births, supports healthy pregnancy and delivery, and allows newborns to thrive. Using this comprehensive approach, we are focusing on the major drivers of maternal and newborn deaths through targeted interventions at each level of care, from the community to the hospital.

Sustainably improving maternal and newborn care

CHAI's integrated approach to maternal and newborn health was first tested in **Ethiopia** in 2011, and then scaled up to three districts in northern **Nigeria** in 2014, covering a population of approximately 10 million people. In 2016, an external evaluation found the approach had contributed to a significant and sustained reduction in maternal and newborn deaths in the targeted regions of Nigeria: a 43 percent reduction in newborn deaths; a 37 percent reduction in maternal deaths; and 15 percent reduction in stillbirths over a 12-month period. Building on that success, with the support of the ELMA Foundation, we are working with governments to replicate this work in other countries.

In Ethiopia, CHAI scaled up its initial pilot to 100 Wordeas (districts) across the country with the highest rates of maternal and newborn deaths. This ambitious program targeted 203 of the lowest performing and most challenging health facilities (183 health centers and 20 hospitals) in four regions to sustainably improve the health of mothers and newborns.

Working alongside the government, we helped improve health worker mentoring and education from the community through each level of care, increasing childbirth at health facilities, strengthening emergency referrals, and improving access to lifesaving health products and post-partum family planning services. The program has helped transform maternal and newborn health care in the country, resulting in a significant increase in the number of women delivering in health facilities (69 percent in target areas), and a dramatic

TRANSFORMING MATERNAL AND NEWBORN CARE IN ETHIOPIA

Since 2017, with the support of the ELMA Foundation, CHAI has worked with the Ministry of Health in four regions of Ethiopia—Amhara, Oromia, Southern Nations, Nationalities, and People's Region, and Tigray—to help make sustained progress in reducing maternal and newborn deaths. Every year, about 15,000 women in Ethiopia die due to pregnancy-related complications. The four targeted regions have the highest rates of maternal and newborn mortality in the country.

When the program began, only about 61 percent of women attended prenatal care services, 36 percent attended postnatal care, 26 percent had a skilled birth attendant at birth, and only 36 percent used any form of contraception.

Working alongside the government, we developed an ambitious program targeting 203 of the lowest performing health facilities (183 health centers and 20 hospitals), chosen by the Ministry of Health. This approach integrated maternal and newborn health reforms with postpartum family planning services.

In 2019, this work was expanded to improve the country's health worker mentoring system. The program trained health workers to educate women and communities about the importance of facility-based prenatal care and childbirth and improve community referrals to facilities to reduce the risk of complications and ensure prompt emergency response. The three-year program accelerated transformational change in maternal and newborn health care in the country. Across the targeted health centers, the institutional delivery rate increased from 26 percent to 60 percent at the end of 2019.

Managing complications at health facilities significantly improved as health worker capacity and ability increased, and more than 50 percent of complications were treated within the primary health center. Unnecessary referrals to other levels of the health system were also significantly reduced.

Partographs (a critical monitoring tool during labor and delivery), safe surgery, and safe childbirth checklists were used at every birth. Stockouts for vital health products also fell while postpartum family planning increased. Over one-third of women delivering at a mentoring facility received long-acting reversible contraception to help safely plan pregnancies. CHAI also supported the revision and implementation of the country's health management information system to incorporate postpartum family planning indicators, helping enable digital transition.

At the same time, CHAI worked with the government to improve the supply chain, mentoring health facility pharmacy units to improve access to lifesaving equipment like the Non-Pneumatic Anti-Shock Garment (NASG). The NASG has since been adopted nationally and is included in the country's National Basic Emergency Obstetric and Newborn Care (BEmONC) training materials as well as the national obstetric protocols for health centers and hospitals. Building on CHAI's approach, the Ministry of Health has launched an ambitious procurement and rollout plan to introduce the NASG in every health center in Ethiopia.

The program resulted in a sustained and significant reduction in maternal and newborn mortality across target facilities over the three-year period. It is estimated to have averted nearly 8,000 deaths. A significant number of the lives saved occurred in facilities where expanded mentoring was provided. In these facilities, maternal mortality fell by 37 percent, newborn deaths by 44 percent, and stillbirths by 27 percent.

The program has now transitioned to the government and is being adopted as part of national policy and scaled up across the country. The Ministry of Health is broadening aspects of the program to other health services. It is also working to replicate the referral systems, which have strengthened the pathways from communities to health centers, nationwide.

TRANSFORMATIONAL CHANGE

69% ↑ **increase in the number of women delivering in health facilities in target areas**

29% ↓ **decrease in maternal mortality**

33% ↓ **decrease in neonatal mortality**

18% ↓ **decrease in stillbirths**

decrease in maternal mortality (29 percent), neonatal mortality (33 percent) and stillbirths (18 percent). In 2019, CHAI fully transitioned the program to the Ethiopian government. (See *Transforming maternal and newborn care in Ethiopia on page 36*).

In **Zambia,** CHAI has been implementing this integrated approach since 2018 to help the government identify gaps in the health system, strengthen the supply chain for lifesaving health products, increase the skills of health workers, and improve emergency referral networks. In 2019, we continued efforts to strengthen Zambia's community health systems.

In the Northern Province, we helped train 1,400 Safe Motherhood Action Groups (SMAGs) in 12 districts to generate demand for maternal, newborn, and reproductive health services at the community level. SMAGs are community-based volunteer groups that aim to reduce delays in receiving lifesaving maternal care at health facilities. The groups have helped identify and assist over 51,000 women during pregnancy and following delivery to ensure they are accessing pre-and post-natal health services.

To strengthen community referral systems and improve availability of transportation during emergencies, CHAI also helped procure and deploy Motorbike Ambulances (MBA) in 20 communities. Since deployment, 2,380 women have been transported for deliveries or during emergencies to health facilities. All 20 communities raise their own funds to procure fuel and service the MBAs.

In **South Africa**, we worked with the government to improve the quality of maternal, newborn, and reproductive health services at 21 facilities across three provinces, helping design and develop a comprehensive and collaborative Quality Improvement Plan that was implemented across national, provincial, district, and facility levels of the health system.

In a geographic area representing over 150,000 births, we helped to train over 100 frontline health workers and managers to implement and coach other health workers on the plan. We established Quality Improvement teams across facilities, using data to identify gaps, undertake analyses, and develop and enact ideas for change. Workers were trained in 45 regional hospitals on basic antenatal care, management of obstetric emergencies and small or sick newborns, respectful care for mothers, and a Neonatal Care Toolkit. CHAI also provided technical support to the National Department of Health to develop an Inpatient Sick Neonatal Admissions Register (iSNAR) and a Perinatal Problem Identification Programme (PPIP) to enable measurement of key maternal and newborn health interventions and monitor the quality of care for mothers and newborns across all levels of care.

In **Uganda**, we worked with the Ministry of Health to develop and cost the first ever national Emergency Medical System (EMS) strategic plan. The plan is now pending cabinet approval before beginning rollout and implementation. Within six focus districts, analysis done by CHAI led to an increased reallocation of funds for emergency medical transport for fiscal year 2019/2020. We also supported the government to conduct the first-ever national quantification and analysis of blood products and related supplies, critical to saving the lives of women experiencing maternal hemorrhage. As a result of these efforts, the Ministry has recognized blood as a lifesaving commodity ensuring that central and facility-level blood stock status will now be reported monthly to the government.

A PREGNANT WOMAN RECEIVES A MALNOURISHMENT TEST DURING A ROUTINE ANTENATAL CARE VISIT KASAMBYA HEALTH CENTER III, UGANDA

Increasing access to lifesaving products

CHAI is also working with governments to increase access to lifesaving equipment in maternal health emergencies.

The Non-Pneumatic Anti-Shock Garment (NASG) is an easy-to-use device that prevents deaths from obstetric hemorrhage—often the largest cause of maternal death—as women are transported to higher levels of care.

In 2019, CHAI helped the Zambian government introduce the NASG in facilities in the Northern Province. We procured and distributed a total of 918 NASGs to facilities in the province and conducted trainings for health workers on usage and protocols to address obstetric hemorrhage. We helped train these workers to integrate the use of the NASG into the obstetric emergency referral system, providing ongoing mentorship at all health facilities in the region. We are also supporting the Safe Motherhood Technical Working Group (TWG) and the Ministry of Health to plan for the use of NASG by first responders in communities. The Ministry has prioritized and included the roll out of the NASG in all facilities across the country and included it in its national strategy for 2019-2021.

In South Africa, CHAI supported the government to pilot the NASG in the country and is assisting with its procurement and distribution. In **Zimbabwe**, with support from the Embassy of Ireland, we worked with the Ministry of Health and Child Care (MOHCC) to introduce and evaluate usage of the NASG in the public sector health facility network in rural Hurungwe District, in the Mashonaland West Province. Results of the evaluation showed that the NASG was used in 90 percent of potential applications and that there was a 50 percent reduction in all maternal deaths versus the same time-period a year earlier, with no deaths from postpartum hemorrhage.

The results of the study helped enable roll out of the NASG to the rest of the 176 facilities in the province, as well as five central hospitals. CHAI also supported the Ministry and partners to integrate NASG use into national protocols, guidance, and mentorship. This work has contributed significantly to generating local, regional, and international evidence on how to successfully utilize the NASG in public health settings.

IMPACT OF NASG USE IN ZIMBABWE

With NASG in use in

90%

of potential applications:

50% ↓

reduction in all maternal deaths versus the same time-period a year earlier, with

0

deaths resulting from postpartum hemorrhage.

Supporting women to safely plan pregnancies

Ninety-five percent of postpartum women want to space or delay their next birth, yet 65 percent are not using any form of contraception. Family Planning alone can reduce maternal mortality by one third. Unlike many other contraceptives, long-acting reversible contraceptives (implants and IUDs) can be provided to women immediately following birth, while they are still at a health facility. CHAI is supporting governments to train and mentor health workers and improve guidelines, protocols, and the supply chain, to ensure that family planning services are available to women when they need it most.

From 2016 to 2019, CHAI partnered with the governments of **Nigeria** and **Ethiopia** to establish immediate post-partum family planning (PPFP) services in public facilities in some of the hardest to reach areas. Over the course of the program, 130,350 women (24 percent of all facility deliveries) received postpartum long-acting reversible contraceptives (LARCs). Of these women, 59 percent received implants while 41 percent received intrauterine devices (IUDs) in the 48 hours immediately following delivery at the health facility. In Nigeria, an additional 43,781 women received postpartum LARCs

EMPOWERING COMMUNITIES TO TRANSFORM WOMEN'S HEALTH IN NIGERIA

When CHAI began work to reduce maternal and newborn deaths in rural areas of northwestern Nigeria, overall use of family planning (particularly long-acting reversible contraceptives) was very low. Ninety-six percent of women in the region who were not using contraception had also not discussed family planning with a health worker in the past year.

Postpartum family planning (PPFP) represented an opportunity to reach women with contraceptive information and services to help them safely space their pregnancies during an interaction with the health system. Between 2016 and 2019, CHAI worked with Kano, Kaduna, and Katsina states to develop and implement an integrated approach to increase access to family planning services to pregnant and postpartum women.

We identified key barriers that were limiting access to family planning including trained health provider shortages, limited availability of commodities and equipment, lack of data tracking systems, limited client knowledge on PPFP, and restrictive sociocultural and gender norms.

In health facilities, CHAI trained and mentored health workers to provide quality PPFP services, while equipping them with appropriate instruments and equipment. The clinic workflow was reorganized to provide patients access to PPFP services at every stage of care and across all major contact points for pregnant and postpartum women in the facility. In addition, PPFP messaging was integrated into antenatal care counselling to ensure all pregnant women learned about their family planning options prior to delivery.

To ensure sustainability, we implemented a quality improvement plan adapted from World Health Organization (WHO) guidelines. We also helped to generate demand for childbirth in health facilties, which as very low in the three regions, by leveraging traditional birth attendants (TBAs), male influencers, and traditional leaders. We trained TBAs to counsel and refer pregnant women or immediate postpartum mothers to health facilities and equipped them with a counseling handbook in the local language. To address transportation barriers to facilities, the program used existing community motorbike ambulances.

In addition to training and mentoring over 2,800 health workers, 374 facilities that provide PPFP services were equipped with equipment and instruments. CHAI worked to increase demand for PPFP in the community and engaged respected leaders and volunteers to improve information sharing, leading to a significant increase in the number of women receiving antenatal care over the course of the program.

The program also reached thousands of traditional and religious leaders, Islamiyah students and out-of-school youth, and Muslim and Christian groups with messaging on healthy timing and spacing of pregnancies and PPFP.

As a result, over 147,000 women to chose to receive PPFP services immediately after delivery at the target facilities. By the end of the program, more than 25 percent of women who received an immediate PPFP method had delivered at home and were referred to a health facility within 48 hours.

The program empowered community influencers with appropriate information and education to help transform the lives of women. CHAI is continuing to facilitate these community discussions to improve reproductive health knowledge and enable informed decision making for women and their families.

TRANSFORMATIONAL CHANGE

2,800+

health workers trained and mentored

374

facilities with PPFP services provided with equipment and instruments

women attending their first antenatal care visit grew from

10,320 → 34,527

November 2016 **June 2019**

"

I am sincerely honored to work for CHAI, an organization that allows me to serve above self.

— Betty Wariari

READ MORE P. 44

in the 48 hours immediately following delivery at home, demonstrating that PPFP can be successfully implemented even in regions with high rates of home deliveries.

Building on efforts to reduce newborn and maternal mortality in the three high-burden Nigerian states of Kaduna, Kano, and Katsina, CHAI worked to increase access to high-quality and effective LARCs through better reproductive counselling and PPFP services to women of reproductive age by skilled health providers. Working with the government, we helped train and mentor health providers on quality postpartum family planning, increasing access points and quality of reproductive health services, and worked directly with communities to increase education about these services. (See *Empowering communities to transform women's health in Nigeria on page 39*)

As part of CHAI's program to save the lives of mothers and newborns in Ethiopia, we worked with the government to improve access to contraceptive services for women and girls in four targeted regions by increasing access PPFP. Over the course of the three-year program, 37 percent of all women that delivered at a target health facility received postpartum LARCs (from a baseline of under one percent); 65 percent of these women received implants; and 35 percent received IUDs in the 48 hours immediately following childbirth. In addition, 88 percent of women (over 41,000) were counseled on postpartum family planning during their first antenatal care visit in 2019. As a result, over 5,000 mothers chose and received a postpartum IUD and another 10,085 received contraceptive implants.

To ensure critical family planning methods were available when needed, CHAI also developed tools to track the use of PPFP at facilities and supported pharmacies to properly monitor the availability of essential lifesaving commodities. As a result, stock outs for IUDs fell to five percent (from 41 percent), stockouts for injectable contraception fell to five percent (from 13 percent) and stockouts for one rod implants fell to eight percent (from 26 percent).

PPFP is critical to meet FP2020 commitments made by Ethiopia. With over 49 percent of births taking place in health facilities, PPFP has the potential to significantly improve contraception availability, reduce unmet need, and save lives.

CHAI's work in Ethiopia and Nigeria has helped inform national scaleup, training curricula, and the development of health systems to capture PPFP data. In both countries, these management systems are embedded into the governments to ensure the sustainability of PPFP into the public health systems.

Making reproductive healthcare available and accessible

In **Liberia**, we are working with the government to sustainably address high rates of maternal mortality and lack of access to contraception. Liberia has one of the highest rates of maternal mortality in the world, and it has nearly doubled over the last two decades. A very low proportion of adolescent boys and girls use contraception, and poverty, misinformation, and a lack of access to contraception have contributed to high rates of adolescent pregnancy. CHAI is supporting the government to increase access to family planning services and contraception, with a focus on increasing usage of LARCS, PPFP, and information about reproductive health for adolescents.

Through training, mentoring, and updating protocols and guidelines, we are helping the government strengthen national and county-level supply chains to ensure reproductive health tools are available.

In 2019, we helped the government increase the number of providers trained in reproductive health. A total of 471 facility providers were trained in family planning, adolescent-friendly services, health information systems, and supply chain management. As a result, every public health facility in the program has at least one trained provider and mentoring is ongoing to ensure these providers have the latest health information. In the same period, the number of health facilities that have adolescent-friendly access points increased from 17 percent to 60 percent and stock availability for long-acting reversible contraceptives increased from 17 percent to 45 percent. CHAI also developed the first-ever national Health Commodities Quantification to guide all health programs to better understand product availability to further reduce stockouts.

Cambodia is also facing challenges with ensuring availability and usage of reproductive health services at health facilities. Only around 26 percent of women in the country use a modern method of contraception and 12 percent of married women have an unmet need for family planning. About 75 percent of modern contraceptive users rely on short-acting methods.

In 2019, CHAI supported the National Maternal and Child Health Center to develop a sustainable, scalable model for training and mentoring staff to provide quality reproductive health services at 95 facilities in targeted regions and increase supply security. CHAI assisted with training as well as a standardized mentorship program to increase provider confidence and identify and improve health facility preparedness. We also helped digitize mentoring checklists to ensure real-time reporting and trend analysis. The approach is being scaled up to other provinces.

In **Tanzania**, with the support of the Bill & Melinda Gates Foundation (BMGF) and the United Kingdom's Department for International Development (DFID),

MIDWIVES RECEIVE COACHING DURING ON-SITE TRAINING EXERCISES
SVAY CHRUM HEALTH CENTER, CAMBODIA

CHAI supported the government to improve its data management systems to have greater visibility into reproductive health services. We helped the Ministry of Health's Reproductive and Child Health Section better understand which workers were trained in reproductive health services, what type of services were being provided, and where. Working in the lower level facilities in Arushua, Dodoma, and Geita, we helped the state governments develop costed plans to address specific challenges with the reproductive health workforce. We then conducted quarterly review meetings to monitor progress. The new data management system is being used by both government and partners to plan for health worker trainings, identify gaps in family planning services, inform supportive supervision plans and facility planning and budgeting.

In 2019, 107 facilities in Geita committed resources to family planning services, compared to only 70 in 2018. The system has improved visibility into human resources data and has helped mobilize resources to cover gaps in skills. It has also significantly reduced the duplication of resources.

In **India**, CHAI is supporting the government in the state of Madhya Pradesh, which has a population of 80 million, to increase access to modern methods of family planning. A robust and efficient supply chain is critical to ensure reliable and timely access to contraception.

In 2019, using a human-centered design approach, CHAI developed training modules and job-aids to train key stakeholders within the supply chain which are now being adopted by the federal Ministry of Health for use in other states. Within a 12-month period, we supported implementation of a real-time digital inventory management system across district warehouses and hospitals, and community health centers. We also worked with the state to train around 36,800 frontline health workers to build supply-led demand. These interventions resulted in regular use of the inventory management system across 814 facilities and by around 22,500 of frontline health workers. To ensure accountability, we are working with the state to embed coordinated family planning review mechanisms, such as monthly bulletins summarizing staff and facility progress, adoption of effective management processes, and strengthening existing good practices.

A WOMAN SITS IN A DOORWAY FEEDING HER SON
MADHYA PRADESH, INDIA

INCREASING SCREENING IN INDIA

By digitizing reporting and increasing health worker awareness, testing rates for syphilis and HIV increased from

30% → 57%

in 2017-2018 **by end of 2019**

helping the country better identify and treat maternal and congenital syphilis and paving the way to significantly reduce fetal and newborn deaths.

Targeted interventions to diagnose and treat syphilis

In 2019, CHAI began working with the governments of India, Uganda, Kenya, South Africa, and Nigeria to leverage existing maternal health systems to better diagnose and treat pregnant women with syphilis. Syphilis is the second leading cause of stillbirth globally. Approximately one million pregnant women are infected with the disease and an estimated 350,000 stillbirths, miscarriage, newborn deaths, preterm births, and congenital anomalies occur as a result each year. Even though there is effective, affordable treatment for the disease, testing and treatment for pregnant women remains low across sub-Saharan Africa and parts of Asia.

Testing women during antenatal care visits presents a significant opportunity to diagnose and treat the disease. In many countries, up to 95 percent of women are tested for HIV during these visits, but less than 50 percent are tested for syphilis. Closing this gap could result in a significant reduction in stillbirths and other adverse events.

In 2015, the first dual HIV and syphilis rapid diagnostic test received WHO pre-qualification. Alongside integration of maternal syphilis screening and treatment into maternal and newborn health programs, scale up of these tests could result in a significant increase in the number of women tested.

In India, the government has targeted dual elimination of mother-to-child transmission of both HIV and syphilis by 2020. Although the country adopted universal screening in 2014, testing rates for syphilis and HIV have remained low. To help increase the number of women tested, CHAI worked with the government in 2019 to digitize reporting and increase health worker awareness. These efforts helped to improve the number of women screened from 30 percent in 2017-2018 to 57 percent by the end of 2019; helping the country to make substantial progress in identifying and treating maternal and congenital syphilis and paving the way to significantly reducing fetal and newborn deaths. The Ministry of Health, policymakers, and donors are now renewing focus on an effective strategy for sexually transmitted infection (STI) management as part of HIV control efforts.

CHAI is also helping to secure a reliable global supply of benzathine penicillin G (BPG), the only proven treatment to prevent congenital syphilis. BPG shortages have affected at least 39 countries around the world between 2014 and 2016. By working with buyers to identify new sources of supply and by helping suppliers to accelerate corrective actions to address issues that disrupted production, this fragile market is now stable. CHAI continues to support WHO and other partners to monitor the market and is developing support tools for BPG procurement and use.

LOOKING AHEAD

CHAI will continue to work with partner governments to expand our approach to reducing maternal and newborn deaths and increase knowledge about how to successfully connect each level of the health system to deliver comprehensive and quality care across all health care needs.

We will continue efforts to increase access to sustainable family planning financing in Nigeria, Kenya, and Tanzania and will work to make hormonal IUDs affordable and accessible. We will also continue our work to expand interventions to increase diagnosis and treatment for syphilis to save the lives of newborns.

Betty Wariari

Senior Program Manager,
Maternal, Newborn, and Child Health,
Kenya

Growing up in Kenya, I witnessed my father's dedication to his job, working to increase food security and save lives by initiating agricultural projects in rural communities. I often accompanied him when he visited these projects and had the opportunity to listen to first-hand accounts on the impact of his work on people's lives. My mother, an avid educator of children with hearing impairment, was a great source of inspiration to me. As a result, being mission-driven and serving humanity is something I learned early in life.

While studying human biology at the University of Wisconsin Green Bay, I served in the student senate where I advocated for key reforms on diversity, including securing scholarship programs for minority students. As a graduate student, I established the Global Health and Peace Club to increase participation and awareness in global health issues. This included organizing free HIV testing on campus. I also served as the vice president of the African Student Association and was a student representative to the President's Commission on Diversity. In 2008, I was inaugurated into the Phi Kappa Phi honor society and earned a master's degree in Community Health. The hallmark of my career shaping efforts happened when I published my thesis research on HIV/AIDS education in Kenya through the Ministry of Education, Science, and Technology.

Buoyed by experiences in my graduate studies, I worked for a non-profit organization in Minnesota. Part of my responsibility was providing technical support to the Minnesota Department of Health on targeted programs for immigrant health services. In 2009, I registered a non-profit organization and moved back to Kenya with a goal of serving indigent communities. As I was settling down, I met some friends over lunch who told me about CHAI. I was interested and decided to apply for a position. A few days later, I was on a plane to Lesotho to begin my new role as a prevention of mother-to-child transmission of HIV (PMTCT) coordinator. While I left my parents still trying to comprehend my sudden change of plans, I was looking forward to joining a resolute team, with intrinsic dedication to saving lives. Ten years later, I am still happy that I took the leap of faith to serve a greater mission.

When I joined CHAI in Lesotho, the country had the third highest prevalence of HIV in the world. A day after my arrival, I started learning the national antiretroviral therapy (ART) treatment protocols and developed reference cards for various treatment formulations that I knew little about. After a week, I set off to work in the mountainous district of Thaba Tseka, fully braced for winter. I worked with the government to scale up PMTCT services. I helped set up a coordinating mechanism and technical working groups to remedy supply chain challenges and reduce stockouts of HIV treatments and assisted the districts to adopt an integrated approach to clinical mentoring and scale up community outreach efforts in rural villages. I found innovative ways to get treatments to patients, including horse transportation to navigate the challenging mountainous terrain—something I personally enjoyed. I immediately saw the transformational impact resulting from the availability of life saving drugs and diagnostics.

In 2012, I moved back to Kenya and started a new role as an analyst in our essential medicines program focusing on diarrhea, then the top national killer of children under five. Despite oral rehydration salts (ORS) and zinc being the recommended treatments, only 39 percent of children suffering from diarrhea received ORS and only 0.2% received zinc. These low rates were driven by lack of availability and limited knowledge about their use by caregivers and providers. To address this, we leveraged market shaping strategies to get local manufacturers to produce co-packaged zinc/ORS products, leading to a 55 percent reduction in costs. The introduction of new products and increased competition has resulted in a dramatic rise in usage rates, especially in the public sector, which serves over 75 percent of patients.

Today, more than six years after introduction of the co-pack while scaling up Integrated Management of Newborn and Childhood Illness (IMNCI) strategy, I continue to be encouraged to find active Oral Rehydration Therapy (ORT) corners in health facilities. I see the impact this has on children receiving zinc/ORS treatment, who are back to playing and laughing only a few hours after onsite rehydration.

In my current role as the Senior Program Manager for Maternal, Newborn, and Child Health, I am excited to build on the successes of the diarrhea program as we scale up timely, accurate diagnosis and treatment for pneumonia, the top killer of children.

One of the major barriers to effective management of children with severe pneumonia is the limited availability of quality oxygen and equipped ambulances. This leads to referrals by most facilities with the hope that severely sick children will make it on time. Due to the delay in receiving quality oxygen, many of these children die immediately after arrival at the referral facilities, or shortly thereafter. This sad reality was confirmed when I visited a referral hospital and reviewed the pediatric mortality report. Five out of eight children had died from severe pneumonia within 24 hours of admission. Though a painful reality, I am confident that working hand-in-hand with government and partners, CHAI will transform oxygen availability in Kenya and end preventable deaths.

I am sincerely honored to work for CHAI, an organization that allows me to serve above self. I have been inspired by the people I work with and appreciate the tenacity we apply to living our values. This has enabled us to remain committed to our mission and achieve transformational results even when we are not entirely sure what to expect.

I am also so thankful to see this positive transformation reflected in my personal life as a volunteer in Rotary, where I have expanded my reach in serving communities by scaling up global grant projects worth $800,000.

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VACCINES

Every year, one and a half million children die from vaccine preventable diseases, the majority in low-and middle-income countries. Immunization is one of the most effective health interventions that exists to save lives. Vaccines are cost effective and help contribute to economic and social security, increase labor productivity, and improve cognitive and educational achievements for children. Even so, an estimated 20 million children each year do not receive even the most basic vaccines.

CHAI is working with partner governments to sustainably increase access to lifesaving vaccinations. In 2019, we worked with partners and manufacturers, including quality-insured manufacturers in emerging markets, to make vaccines and vaccine supply chains more affordable. We helped governments take steps to increase access and usage and focused on delivery, management, and support for countries transitioning from donor funding to help sustain gains.

Supporting sustainable access to vaccinations

In **Indonesia**, with the support of the Bill & Melinda Gates Foundation, CHAI worked with the government in 2019 to increase access to the pneumococcal conjugate vaccine (PCV), a lifesaving vaccine to prevent pneumonia. Although PCV is one of the most effective tools to reduce deaths from pneumonia—one of the largest killers of children under five—it is not currently provided as part of the country's routine immunization program. From 2017-2019, CHAI supported the government to implement a pilot project in two provinces assessing the vaccine's effectiveness in reducing costs and the burden of pneumonia to inform nationwide rollout. We helped the government to develop the investment case to support mobilization of domestic resources and addressed procurement challenges to enable an affordable, accelerated nationwide introduction. The government is planning to introduce the PCV nationwide from 2020-2024, free of charge, for around 4.8 million children born in the country each year. Once rolled out, the vaccine will avert several thousand child deaths annually.

A CHILD GRIMACES AS A NURSE ADMINISTERS A VACCINE
KANO, NIGERIA

In **Papua New Guinea**, with funding form Gavi, the Vaccine Alliance, CHAI is working with the government to strengthen financing and service delivery of vaccines to ensure sustainable access. We are helping assess the root causes of low vaccination rates in Central and Morobe provinces to support the development of an enhanced, cost-effective, and sustainable model for outreach services.

In 2019, CHAI helped the government better understand the partner landscape and developed an outreach diagnostic assessment protocol that will be deployed in 2020. This mapping exercise has identified gaps in delivery and will enable the country to prepare for its National Immunization Strategy 2021-2025. We also completed a six-month scoping exercise to identify risks to the performance and sustainability of the country's immunization program which helped enable donor funding. We are also helping the government to develop its comprehensive multi-year plan for 2021-2025 which will include a detailed plan for expanding immunization access and transition from Gavi support.

With support of the Bill & Melinda Gates Foundation, in **India,** CHAI is assisting the government of Madhya Pradesh to train immunization program managers and frontline healthcare workers to improve service delivery and equity through better data-based decision making, problem solving, and effective leadership. At the request of the government, we helped drive system-strengthening interventions in selected geographies through transformed sub-district review processes, optimized health worker deployment, enhanced managerial and governance capacity of program managers, and mentoring for health supervisors. This work helped build the capacity of 428 health workers and supervisors and 37 district and sub-district officials through 14 routine immunization workshops and trainings held across the two districts. The state is now encouraging other districts to deploy similar strategies to improve health worker training and immunization rates. CHAI has also co-developed, along with a consortium of partners, a pilot program for mentorship of frontline workers nationally.

We are also working in Madhya Pradesh to enable a digital approach to last-mile vaccine delivery. This cold chain Network Optimization and Extension approach helps identify existing and new locations for storage sites through the use of a sophisticated, yet easy to use GIS-based tool. This new tool was piloted in eight districts in the state and has reduced average time-to-supply by 58 percent in remote villages. The approach is now being scaled up in the remaining 43 districts in the state.

CHAI is also supporting the state to develop and implement a multi-year strategic cold chain plan. To ensure that vaccines are effective at the time of delivery, they must be stored in a temperature-

"CHAI has provided me with the opportunity to not only work with a very high caliber team and take our approach to strengthening immunization outcomes to new domains and geographies, but also support and learn from other programs.

— Harkabir Singh Jandu

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STRATEGIC COLD CHAIN PLAN IN INDIA

Increased the proportion of sites with sufficient capacity through 2027 from

71.5% → 97%

in 2017 **in 2018**

controlled supply chain, known as a cold chain. This new plan has significantly increased the proportion of sites with sufficient capacity through 2027 from 71.5 percent in 2017 to 97 percent in 2018. This work helps ensure cold chain readiness for stocks of newer vaccines in the state while building strategic reserves for future replacement and extension of the cold chain.

In **Lesotho**, CHAI supported the government to improve its recordkeeping for vaccines, working with the Expanded Programme in Immunization (EPI) to institute a monthly physical inventory count practice to enable active tracking of vaccine stock balances. The physical inventory count resulted in a reduction of discrepancies between running balances and book balances by more than 80 percent. This work will help the country to avert vaccine stock outs by ensuring accurate accounting. CHAI also has helped transition 100 percent ownership of the human papilloma virus (HPV) vaccination roll out to the government to ensure smooth introduction of the vaccine to the country by 2022.

Helping governments transition to sustainable funding

In Nigeria, CHAI has been supporting the government to transition fully to domestic funding for its vaccine programs. In 2018, the government developed a 10-year plan to transition from Gavi support which required that Nigeria increase its annual budget for vaccines. With the support of Gavi, CHAI has assisted the government across all levels to implement these financial commitments.

In 2019, we helped the government to ensure appropriate and accurate vaccine forecasting, costing, and budgeting, and build the capacity to carry out these efforts. CHAI helped promote awareness, ownership, and buy-in from non-health stakeholders within the ministries of finance and budget for vaccine financing and ensured that identified funding needs were reflected in the government budget and released in a timely manner.

HEALTH WORKERS PREPARE FOR A VILLAGE VACCINE CAMPAIGN
MASERU, LESOTHO

These efforts helped to significantly improve resource allocation for vaccine procurement, which, if sustained, will place the country on track for self-financing beyond the 10-year transition period. Government allocation to vaccines increased from three percent in 2018 to 28 percent in 2019 and the government released 100 percent of funding budgeted for vaccines. Nigeria has also established its first Vaccines Financing Committee, chaired by the government.

In **Tanzania**, with support of the Bill & Melinda Gates Foundation, CHAI helped the government improve accountability for the performance of health facilities in planning, budgeting, and implementation of immunization activities. We helped the government introduce quarterly programmatic and financial performance review meetings for Council Health management teams across three regions with the goal of increasing commitment and accountability for implementation of immunization activities. This review includes a set of key performance indicators that monitor implementation and inform progress. As a result, there are 74 more health facilities providing immunization services.

In **Kenya,** we are supporting the government to optimize vaccine procurement. Kenya will enter the accelerated transition phase out of Gavi support in 2022, which will require steep increases in domestic vaccine financing. New or lower-cost vaccines can reduce the financial impact of transition without affecting vaccine protection, such as the release of a five-dose presentation measles-rubella vaccine in 2019.

Kenya currently uses the 10-dose presentation of the vaccine. While effective, this excess dosage has contributed to significant wastage (around 60 percent). This wastage may contribute to health workers declining to open immunization vials when there are not sufficient numbers of children seeking immunization, compromising vaccine coverage. To address this, CHAI supported the Ministry of Health to evaluate the potential programmatic benefits of switching to a smaller, five-dose presentation—with initial results indicating that Kenya could save up to US$1.2 million per year, or around 10 percent of its current immunization budget. This work has helped bring attention the broader importance of market intelligence and regular vaccine portfolio review.

To improve Kenya's vaccine cold chain, CHAI worked with the Kenyan Ministry of Health in 2019 to deploy and install 2,278 refrigerators. While Gavi's Cold Chain Equipment Operationalization Platform (CCEOP) would usually require countries to procure, deploy, and install cold chain equipment through supplier-led service providers, the Kenyan government preferred to deploy and install the equipment independently, successfully doing so at a lower cost. This country-led deployment led to Gavi introducing a flexible CCEOP service provider model based on country capabilities rather than a one-size fits all supplier-led model.

LOOKING AHEAD

CHAI will continue to work with partner governments and suppliers to ensure supply security and affordability of lifesaving vaccines so that all children are able to receive vaccinations no matter where they live. We will continue to support governments to strengthen primary health care systems and identify "zero dose" children—those missing out on all vaccinations.

We will also help our partners as they transition to sustainable domestic-based funding to enable strong and responsive vaccination programs.

Harkabir Singh Jandu

Associate Director Immunization and Strategy, India

Looking to dip my toes in the development space, I joined CHAI as a curious, though tad-hesitant, volunteer in 2015 and was promptly tasked with helping scope the immunization program in India. Through this work I visited rural communities to gain a first-hand understanding of the program and its challenges.

During one of these visits to an isolated immunization session site atop a hillock, I came across a young girl who had carried her infant brother in her arms over a few kilometres to get him immunized. Rooted in her mother's explanation of how the measles vaccine had kept the girl safe during an outbreak, the simple yet clear motivation she voiced for making the arduous trek to get her brother the same protection struck home. My decision to commit to the sector was made on that day and my journey at CHAI subsequently has only strengthened it.

Soon after moving to a full-time role, I got a chance to collaborate with colleagues from vaccine delivery and markets teams to craft an assessment for India's Ministry of Health and Family Welfare on Grade A cold chain equipment and we were able to demonstrate that for less than US$1 per fully immunized child the government could safeguard lifesaving vaccines from the risk of temperature damage for millions of infants in India over a 10-year period. The assessment not only involved all of us working as a fast-paced start up but also helped inform policy for the government to adopt Grade A specifications for cold chain equipment. I was thrilled by the power of this collaborative effort with our peers and was also impressed by the way we devised a systems-oriented solution to make the recommendations truly pragmatic and likely to succeed.

Working alongside our government partners, it is projects such as designing data-driven and easy to use decision making tools and GIS-based optimization solutions for the immunization supply chain that stand out for me and have transformed my perspective. These projects have allowed me to see grassroot workers and government functionaries as the real agents of change, hungry for the right tools, and simply in need of support. Consequently, these experiences have ingrained in me faith in and respect for public health actors for having the mindset and volition to sustainably take solutions forward.

CHAI has provided me with the opportunity to not only work with a very high caliber team and take our approach to strengthening immunization outcomes to new domains and geographies, but also support and learn from other programs. After all this time, I remain in awe, nay, am even more in awe, of the values, people, and impact of CHAI.

The endless possibilities for learning by doing have made real for me the cliché about drinking from a firehose, but with the added advantages of being able to proactively chart one's course to reach goals. I have also enjoyed the benefit of learning from the experiences of (and constructive pushback from) my colleagues.

I am excited by the goals that CHAI has set for itself in India by deepening its resolve to bolster established areas such as HIV, tuberculosis (TB), hepatitis, and maternal and child health programs and expanding its support to the new areas of cancer, vector borne diseases, and health financing. This increase in our mandate speaks volumes about the trust and confidence we have painstakingly built with our partner governments and it is as good a recognition as any of our commitment to those we serve. I consider it a privilege to be able to contribute to CHAI's mission.

DIARRHEA AND PNEUMONIA

Diarrhea and pneumonia are the largest causes of death for children under five globally. Even though simple and effective tools for diagnosis and treatment exist, they are often unavailable in low- and middle-income countries.

CHAI is working with partner governments to sustainably increase access to these lifesaving treatments and diagnostics to ensure they are available when and where they are needed. We are working to lower prices, assist governments to update guidelines and protocols for usage and maintenance, and ensure that certain products, such as oxygen therapy, can be developed on-site. We are also supporting governments to mentor staff so that workers can confidently diagnose and manage life-threatening complications.

Supporting effective diagnosis and treatment

Fluid loss due to diarrhea can lead to death in children if untreated. Although the combination of two simple treatments—zinc and oral rehydration salts (ORS)—can avert nearly all deaths if used promptly and effectively, these lifesaving solutions are often unavailable in low-income countries.

Low blood oxygen, or hypoxemia, is a common, life-threatening condition that causes abnormal breathing. In children, it is most commonly caused by pneumonia, sepsis, and malaria. While hypoxemia is treatable with the right diagnosis and equipment, every year the condition contributes to over 800,000 preventable deaths in low-income countries. Simple tools, such as pulse oximeters and concentrated oxygen can significantly increase chances of survival, but in low-income countries these products can be expensive and difficult to effectively maintain. In these countries, 90 percent of health facilities lack access to a pulse oximeter and less than half of all facilities that need oxygen have a reliable, quality supply. As a result, only 20 percent of patients experiencing hypoxemia are diagnosed, and less than half of those diagnosed receive oxygen therapy.

With funding from Absolute Return for Kids, the Bill & Melinda Gates Foundation, ELMA Foundation, Global Affairs Canada, the IKEA Foundation, the International Zinc Association, and the Norwegian Agency for Development Cooperation (Norad), CHAI has worked since 2012 to improve access to and increase usage of zinc and ORS in **Ethiopia, India, Kenya, Nigeria,** and **Uganda**—where 42 percent of deaths from diarrhea occur. Since 2015, we have been working to increase treatment rates for non-severe and severe pneumonia cases in Ethiopia, India, Kenya, Nigeria, and Uganda, with a focus on increasing access to medical oxygen to reduce deaths from hypoxemia. There is a significant need for oxygen in these countries as six to 10 percent of all children admitted to the hospital and 23 percent of newborns are hypoxemic.

IMPROVING PNEUMONIA AND HYPOXEMIA MANAGEMENT IN NIGERIA

Oxygen administration for hypoxemic children across 30 hospitals since 2018 increased from

23% → 78%

In Ethiopia, in 2019, CHAI fully transitioned its program to reduce childhood deaths from diarrhea and pneumonia to the government. Over the course of four years, this work led to a significant and sustained increase in access to lifesaving tools and treatments for diarrhea and hypoxemia at health facilities throughout the country, averting thousands of deaths. (See *Transforming child health in Ethiopia on page 52*).

In **Nigeria**, with funding from the Bill & Melinda Gates Foundation, CHAI has been working since 2018 in the target states of Kano, Kaduna, and Niger to improve pneumonia and hypoxemia management across 30 hospitals through the introduction of routine pulse oximetry and oxygen therapy. This work has resulted in an increase in oxygen administration for hypoxemic children from 23 percent to 78 percent.

In 2019, we also worked closely with state Ministries of Health on public sector service delivery to establish and sustain referral systems between patient and proprietary medicine vendors (PPMVs) and public health facilities. From November to December 2019, over

TRANSFORMING CHILD HEALTH IN ETHIOPIA

In 2019, CHAI fully handed over to the Ethiopian government a program to increase access to lifesaving diagnosis and treatment for childhood diarrhea and pneumonia. We began working alongside the Federal Ministry of Health and the Ethiopian Pharmaceutical Supply Agency (EPSA) in 2015 across 400 districts where 80 percent of cases occur—Amhara, Oromia, South Nation, Nationalities, and Peoples Region (SNNPR), and Tigray—to save the lives of children under five. This support included integration of Zinc, ORS, and Amoxicillin Dispersible Tablets (Amox DT) into a national integrated forecasting, procurement, and distribution system. In addition, CHAI supported government and private suppliers to produce these commodities locally, which has significantly contributed to their regular availability.

With a focus on reducing deaths from hypoxemia, CHAI also worked with the federal and all regional governments to increase availability of pulse oximeters and oxygen therapy. We helped develop guidelines, trainings, and mentorships for clinicians and other health workers to ensure correct usage and maintenance and created a roadmap for the government to scale up usage at all health facilities across the country by 2020.

CHAI also provided technical support to the government to expand oxygen production through establishing oxygen manufacturing plants at referral facilities in the country. During the program period, five oxygen plants became functional, including two established through a public-private partnership. We helped introduce oxygen quality monitoring services in the country to quickly identify non-functional or underperforming oxygen concentrators in use at hospitals and make timely repairs. From 2015-2019, more than 3,000 oxygen concentrators and more than 5,000 pulse oximeters were procured through public financing and distributed to health facilities.

As a result of this work, functional availability of oxygen at Pediatric Inpatient Departments of general/referral hospitals on the day of visit improved from 62 percent in 2015 to 100 percent in 2019, while functional availability of pulse oximetry in these departments improved from 45 percent in 2015 to 100 percent in 2019. Ninety-one percent of admitted severe pneumonia cases were tracked with pulse oximeters compared to 20.5 percent in 2017 and 83 percent of hypoxemia cases were prescribed oxygen therapy compared to only 57 percent in 2017. In addition, availability of amoxicillin DT (for treatment of pneumonia), increased from zero to 99 percent from 2015 to 2019, and ORS and zinc (used to treat diarrhea) increased from 72 to 100 percent and 48 to 99 percent, respectively, on the day of visit.

Preliminary output from the Lives Saved Tool (LiST), developed by the Institute for International Programs (IIP) at Johns Hopkins Bloomberg School of Public Health shows, more than 17,000 lives saved during the project period due to the scale up of zinc, ORS, and amoxicillin DT. The program impact is even higher when considering the increase in oxygen therapy (currently not included in the LiST tool).

The successful efforts have allowed for sustainable transition to the Ethiopian government and the government is now broadening the efforts to other aspects of the country's health supply chain. The government has also scaled up oxygen support to all regions of the country.

TRANSFORMATIONAL CHANGE

Between 2015 and 2019, we helped

Establish
5 oxygen plants
at health facilities around the country

Procure and distribute
3,000 oxygen concentrators
and
5,000 pulse oximeters
at health facilities

AS A RESULT, PEDIATRIC INPATIENT DEPARTMENTS AT 32 HOSPITALS SAW DRAMATIC IMPROVEMENTS:

Increase in availability of oxygen
62% in 2015 to 100% in 2019

Increase in access to pulse oximetry
45% in 2015 to 100% in 2019

Severe pneumonia cases tracked with pulse oximeters
20.5% in 2017 to 91% in 2019

hypoxemia cases prescribed oxygen therapy
57% in 2017 to 83% in 2019

4,700 PPMVs were trained on diagnosis and treatment of three major childhood illnesses- diarrhea, malaria, and pneumonia—through sessions managed by local engagement consultants and supported by CHAI. Local distributors of child health diagnostics and treatments were also invited to connect with PPMVs so they knew where to find affordable, high-quality treatments.

In **Kenya,** in 2019, CHAI also worked with the government to continue to improve treatment rates for diarrhea and pneumonia. In 18 target counties, treatment for diarrhea with ORS and zinc increased from 51 percent in 2018 to 66 percent in 2019 and treatment for pneumonia with amoxicillin DT increased from one percent in 2018 to 11 percent. In addition, the availability of critical commodities, such as medical oxygen, increased from 15 percent to 28 percent in these counties due to the introduction of cost-effective oxygen solutions. At the national level, the switch from oral suspension formulation of antibiotics for children to amoxicillin DT has also been successful. Supply of amoxicillin DT to public health facilities increased by over 3,000 percent, from 62,000 in 2017, to 688,000 in 2018, to 2.03 million in 2019.

CHAI also developed a new, innovative public-private partnership model in Kenya that has greatly improved access to affordable oxygen. In 2019, we successfully engaged the lead oxygen supplier in the country to reduce costs by 80 percent through price restructuring. The model consolidated demand and pooled procurement centrally, including a switch to a hub-and-spoke model for cylinder distribution and a formalized engagement between the supplier and county through a gas supply agreement. In November 2019, Kajiado County became the first adopter of this model and oxygen coverage in the county increased from 15 to 100 percent.

In **Uganda**, the first national oxygen scaleup strategy led to the installation of oxygen plants at 13 regional hospitals. The project was launched in the Mubende and Jinja regions to demonstrate a model for other plants going forward. Results from the project are expected in 2022. In **India,** CHAI supported the government of Madhya Pradesh to improve pneumonia case management, primarily through better diagnosis, while helping the Ministry of Health introduce major policy and community engagement activities. Along with partners, including UNICEF, Save the Children, United States Agency for International Development (USAID), and the World Health Organization (WHO), we supported the government to revise national guidelines for the treatment of pneumonia in 2019 and also supported the Ministry in conceptualizing the SAANS initiative, a nationwide campaign to reduce deaths from pneumonia.

Supportive supervision and regular monitoring through Patient Chart Abstraction (PCA)—a method by which teams are deployed across public top-and middle-tier hospitals in Madhya Pradesh to survey medical information of children under five with a diagnosis of respiratory illnesses—helped increase the percentage of hypoxemic children receiving oxygen in district hospitals from five percent in 2017 to 52 percent by the end of 2019. Zinc use for diarrhea treatment continued to grow from 38 percent in 2017 to 47 percent in 2019, and ORS use remained strong. CHAI also worked to increase partner supplier efficiency through data and tech platforms such as barcoding and geotagging to transition fully to the government in 2020.

LOOKING AHEAD

CHAI will continue to work with partner governments to increase access to lifesaving tools from treatment of diarrhea, pneumonia, and hypoxemia. As the need for lifesaving oxygen and tools for diagnosis and treatment increases, we will continue to develop innovative methods to reduce prices, lower barriers to access, and ensure that lifesaving products are available where and when they are needed.

Salem Fisseha

M&E Manager, Ethiopia

I came to CHAI purely by chance. My cousin sent me a job listing that was posted at her graduate school for a one-year fellowship to work with CHAI on a public health project in Ethiopia. At the time, I was working in New York with an organization that provides health services to African immigrants. I was intrigued.

I was familiar with CHAI's work to shift HIV drug pricing, and the prospect of working in Ethiopia excited me. I left Ethiopia when I was two and always wanted to return to contribute to the country's betterment. My parents had left to escape the political turmoil at the time. Their nostalgia and desire to one day return home were transferred to my sister and me. I studied anthropology as an undergraduate at Harvard College and went on to get a Master of Science from the London School of Hygiene and Tropical Medicine in control of infectious diseases, all with one day returning to Ethiopia in mind.

I first arrived in Ethiopia in 2006 to work on the Ethiopian Hospital Management Initiative (EHMI)—a joint effort between the Ministry of Health, Yale University School of Public Health, and CHAI. I served as a mentor at three public hospitals working with staff to address their most pressing challenges related to operations and hospital management. Although many of the hospitals we worked with faced constraints, there was an unwavering desire for improvement.

My experience working with the hospital staff to introduce quality improvement techniques opened my eyes to the challenges of providing quality healthcare in resource-poor settings, but also allowed me to see the impact that quality improvement processes can have in bringing about change even in the most difficult settings. Through the technical support we provided and guidance from the Ministry of Health, we were able to bring focus to and change hospital operations. The lessons I learned from my colleagues at the hospitals and through the project are still with me today. I also coordinated stakeholders from hospitals, the Ministry and other government agencies, professional associations, and development partners to develop the Ethiopian Hospital Reform Implementation Guidelines. These hospital reform guidelines are the cornerstone of the Ministry's hospital reform effort. This work with government and partners is a perfect example of how CHAI's program innovations catalyze shifts in policy, fundamentally changing the way that things are done.

After completing my work on EHMI, I transitioned to a new role as manager of monitoring and evaluation (M&E) for the Ethiopia office, my current position. In this role, I helped set up the M&E system for the office by developing tools and guidance materials to support M&E practice, and building capacity for M&E of programs. The system our team designed is now supporting all Ethiopia programs. We have refined planning, M&E framework development, and performance tracking to use evidence generated by programs to track progress, take corrective measures, and make more evidenced-based decisions.

Working for CHAI over the last 14 years has allowed me to see what sets the organization apart. There is an extraordinary amount of leeway afforded to staff to innovate. CHAI does not promote prescriptive practices, but rather provides the space for all staff to propose and try new ideas. This flexibility and freedom foster a drive for innovation and creativity which is reflected in our achievements.

The opportunities I have been afforded at CHAI have given me a platform to exercise my curiosity and use my public health skills, all while reconnecting me to my country of birth, Ethiopia.

In one of his visits to Ethiopia, President William J. Clinton once said, "Every time I visit Ethiopia, I am amazed at the progress being made and reminded of how much we all can do". I echo his words; I am grateful for the experiences I have had so far with CHAI in Ethiopia and I look forward to what is to come.

NUTRITION

In countries across sub-Saharan Africa, Southeast Asia, and Southern Asia, over 40 percent of children under five suffer from chronic malnutrition. Malnutrition is the single greatest predictor of death in this group of children globally.

In addition to causing stunting, a condition in which a child's height for age is at least two standard deviations below average, chronic malnutrition can lead to cognitive impairment and a less effective immune system. This leaves children at risk of infections and other illnesses and limits their potential. Severely stunted children are five times more likely to die in early childhood than those who are well-nourished and is a contributing factor in almost half of all childhood deaths in low- and middle-income countries.

Improving nutrition sustainably and locally

Since 2014, with the support of the United Kingdom's Department for International Development (DFID), the New Zealand Ministry of Foreign Affairs and Trade (MFAT), and the Netherlands Development Finance Company (FMO), CHAI has worked with the government of **Rwanda** to improve access to locally-produced high-quality blended foods for women and children. These nutrient-dense supplementary and complementary foods are distributed to children aged six to 23 months, pregnant women, and nursing mothers in the poorest and most vulnerable households in the country to prevent the onset of stunting.

CHAI began working with the government and private investors in 2014 to establish a local joint venture to produce nutrient-dense fortified blended foods that

GIRLS HOLD NEWLY-FORMULATED NUTRITIONAL SUPPLEMENTS DURING ROLLOUT
MADHYA PRADESH, INDIA

meet international quality standards. This venture, known as Africa Improved Foods (AIF), constructed a state-of-the-art production facility outside of Kigali which began production at the end of 2016. CHAI helped develop a commercially viable business model for AIF, underpinned by sales of Super Cereal Plus which is used by the United Nations World Food Programme (WFP) for distribution in emergencies across the continent. AIF is the first facility in Africa capable of producing this product to meet the quality standards of the WFP.

AIF, to the greatest extent possible, purchases ingredients for the fortified blended food product (particularly maize and soybeans), locally from farmers in Rwanda. To ensure sustainability, CHAI worked with the government to boost local food production by helping farmers improve crop yields and quality. In 2019, this program transitioned fully to the government and local partners.

In 2019, after finding a decline in the number of people receiving the foods the year before, CHAI worked with the government to implement data-driven improvements to the program. We supported the government to increase the ration size for target beneficiaries in the poorest households and overhauled the beneficiary enrollment system. We also helped the government conduct refresher trainings for over 1,300 health center staff from all 492 health centers across the country on the improved beneficiary enrollment process and supported the government to re-invigorate key messages on fortified blended food use, preparation, and storage through a nationwide campaign hosted by local leaders in every village in the country. Subsequent evaluations showed consistent improvements to consumption of the foods among all target populations due to these interventions.

A GROUP OF WOMEN AND CHILDREN PREPARE FOOD
MADHYA PRADESH, INDIA

To increase local crop production and supply, CHAI supported an innovative sourcing model in 2019, known as the Cob Model, for post-harvest processing. This model is based on purchasing maize from farmers directly on the cob (immediately after harvest), then transporting it to a central processing facility for immediate threshing and drying and delivery to local agri-businesses. The process is quicker and more efficient than current processes and minimizes losses due to poor quality. The model has reduced post-harvest losses and allowed AIF to increase the amount of maize sourced locally, reaching nearly 19,200 Rwandan farmers with improved agricultural technologies. The program has resulted in an estimated additional $3.8 million value in agriculture production.

Supporting healthier women and children

In **India**, with the support of the Ikea Foundation, CHAI is working with the government in the state of Madhya Pradesh on targeted improvements to the Integrated Child Development Services Program (ICDS) to address the crippling burden of malnutrition among children, and anemia among adolescent girls and pregnant women. Madhya Pradesh has a high prevalence of anemia across all age groups—over 69 percent of children, over 54 percent of pregnant women, and over 53 percent of reproductive age women suffer from anemia. Twenty percent of all maternal deaths can be directly attributed to anemia and 50 percent of these deaths indirectly related.

CHAI is focusing on three key areas: improving nutrition and complimentary food distributed through ICDS and increasing availability at village health centers; improving formulation and availability of Iron Folic Acid supplements that are distributed under the government's anemia control program; and, engaging community health workers to improve the quality of counseling services to bolster the adoption of nutritious behaviors. We are also helping the government to develop sustainable, cost-effective models to improve access to safe drinking water.

CHAI has successfully advocated for improvements to the formulation of ICDS take-home rations, improving the micronutrient content, raising the level of skim milk powder, and decreasing the amount of sugar. With evidence collected by CHAI, the government of Madhya Pradesh has introduced formulations of Iron-Folic Acid (IFA) and plans to strengthen efforts to address anemia through a national program 'Anemia Mukht Bharat' (Anemia free India).

To improve access to the IFA, we supported an ambitious strategy which improved the supply chain to increase availability of the product at village health centers and schools. The government is now taking steps to replicate the strategy throughout the state and add other essential medicines to help further improve health. CHAI also supported the government to train community health workers and community nutrition workers to provide improved nutrition counseling.

To improve access to safe drinking water, CHAI partnered with Tata Trusts to identify a robust technology and piloted an operational model which leverages rural entrepreneurship to ensure sustainability. The community water treatment plant has been successfully functional for 18 months and the government has committed to take the intervention to scale in other affected areas of the state.

LOOKING AHEAD

CHAI will continue to work with government partners to develop innovative solutions and reduce barriers to accessing nutritious food.

UNIVERSAL HEALTH COVERAGE

EMERGENCY OBSTETRIC AND NEONATAL CARE TRAINING SEMINAR
ZAMBIA

Nearly half of the global population is unable to access basic health services. Every year, around 100 million people in low-and middle-income countries are pushed into poverty due to health care costs. As a result, many people who are sick avoid seeking care, leading to worse health outcomes, greater inequity, and spread of disease.

CHAI is working with partner governments to upgrade health systems, build a stronger health workforce, and ensure sustainable and equitable health financing with the goal of Universal Health Coverage (UHC) so that all people are able to access high-quality health care, regardless of their economic situation.

SUSTAINABLE HEALTH FINANCING

Countries across sub-Saharan Africa and Asia are pursuing ambitious reforms to progressively realize the goal of UHC, starting with defining, financing, and delivering high-priority primary care services to address the greatest need, including for the most vulnerable. With support from the Swedish International Development Agency (Sida), the Bill & Melinda Gates Foundation (BMGF), Irish Aid, the United Kingdom's Department for International Development (DFID), the Surgo Foundation, and the ELMA Foundation, CHAI is supporting partner governments to define these services, mobilize resources for health system upgrades, strengthen domestic financing systems, and improve efficiency in financing and service delivery. We are also helping governments to move away from a reliance on user fees and donor funding toward sustainable and equitable financing.

Upgrading primary health care

In 2019, CHAI expanded work in **Mali** and **Ethiopia** to mobilize domestic and external funding for primary health care reform. With the goal of ensuring essential services are accessible and high-quality (particularly for women and girls), we supported the government of Mali to develop an investment case and mobilize donor and domestic funding to repeal user fees on critical services for women and children's health. At the same time, we worked with the government to strengthen the community health workforce and upgrade primary health center infrastructure and systems for better service delivery. In Ethiopia, as part of its Woreda (district) transformation, we helped the government strengthen district-level management of community and primary care. With support from the ELMA Foundation, we are working with the government to design and test multisectoral approaches in eight demonstration districts to align on what is needed to transform primary health care and mobilize donor and domestic resources for reform.

In **Malawi,** the Ministry of Health is decentralizing planning and management to sub-national levels to deliver on its commitment to a free essential health care package that includes integrated primary health care services. The health sector is heavily reliant on disease-specific donor funding which can be inflexible and leave the underlying service delivery systems under-resourced. In 2019, at the request of the Ministry, and with support from Sida, CHAI began collaborating with District Health Management Teams to improve planning, budgeting, and coordination of donors and resources at the district level. This work will strengthen District Health Management Teams' ability to improve processes for planning, resource allocation, and respond to service availability gaps at the primary care level to address bottlenecks to service delivery.

Kano State in Northern **Nigeria** has committed to finance and deliver a Minimum Service Package which will upgrade the availability and delivery of its primary care services. Over the past few decades, as funding for primary care from government and donors has increased, health outcomes in Nigeria have largely remained stagnant with significant inequities.

With the support of Global Affairs Canada and the Bill & Melinda Gates Foundation, CHAI has supported Kano in its reform efforts, focusing on community and primary care. This work has significantly improved health outcomes including large reductions in maternal, child, and newborn mortality and increased the provision of postpartum family planning services (PPFP). With support from these donors and Sida, we are helping Kano to establish a monitoring unit to better understand what is needed to finance and deliver on a minimum health service package and then pilot this delivery at a primary care center in specific local government areas to ultimately coordinate and mobilize additional resources to expand coverage.

Fostering evidence-informed decision making

It is essential to routinely use robust evidence to inform policy, implementation, and management decisions. In 2019, CHAI worked with the International Decision Support Initiative (iDSI), a global network of experts in health policy and economics, to improve priority-setting for benefits package design. CHAI, together with iDSI members Center for Global Development, Imperial College London, KEMRI Wellcome Trust, HITAP Thailand, partnered with the governments of **Rwanda**, **Kenya, Zambia, South Africa,** and **India** in this effort.

A NURSE PERFORMS A COMMUNITY VISIT
ZAMBIA

Working with the Rwanda Social Security Board (RSSB), we helped to begin to address the long-term financial sustainability of the Mutuelles insurance scheme covering the informal sector. We helped the government define what services are included in the Mutuelles benefits package, beginning with a demonstration project to assess the comparative advantage of two interventions to manage acute kidney injury. Through this process, we helped the government to begin to engage directly with local and regional universities and researchers to generate the evidence needed to inform decisions in a more sustainable manner.

In India, CHAI expanded work with central and state governments in support of the PMJAY health insurance reform which aims to provide health coverage to 500 million of the poorest and most vulnerable people in the country and represents a significant investment by the government in the health system. We worked with the National Health Authority and State Health Agencies (Maharashtra and Gujarat) to improve the capacity of a 'Data Insights Hub' to use routine claims, enrollment, and provider contracting data to strengthen management and implementation of this new system to control costs and improve quality service coverage.

With support from Irish Aid, in 2019, CHAI also worked with the Ethiopian Health Insurance Agency to pilot a mobile and web-based insurance information system for enrollment of beneficiaries, submission and adjudication of claims, and reporting. The system is now being used consistently by health facilities and the Insurance Agency in pilot areas and is providing the first real-time, patient-level data from primary health care centers to managers of the insurance scheme to understand what is being paid for and what coverage is being provided. In **Eswatini,** CHAI supported the Ministry of Health Planning Unit to conduct a study to better understand the barriers to care posed by user fees in the country. This assessment is informing work by the Ministry of Health to investigate pre-collection of pooled user fees to eliminate payment at the point of service.

Reshaping health budgets

Across countries, we are working with governments to increase efficiency, transparency, and accountability by improving budgeting, planning, and management of expenditures. In 2019, CHAI assisted countries with resource mapping and, in Malawi and **Zimbabwe**, supported the harmonization of resource tracking exercises to increase visibility on donor and domestic funding flows, government ownership over the health sector, and to address resource gaps and inefficiencies.

In **Senegal**, we supported the Senegalese Agency of Universal Health Coverage (ACMU) to conduct resource mapping and expenditure tracking for the period of 2017-2021 to facilitate partners' funding coordination, improve efficiency of resource allocation, define funding gaps, and advocate for mobilization of additions funds. In Malawi, Zambia, and Kenya, we began or expanded work at district or sub-national level to improve funding flows to health facilities. In Malawi, we worked with the government to develop its HSSP II Operational Plan and Global Financing Facility investment case, leveraging a suite of sector-wide aid coordination tools for planning and budgeting at the national and district level to facilitate joint planning between government and partners for health sector investment decisions. The government now uses these tools to allocate 100 percent of its national and district health funding, empowering it to better define and deliver on its strategic priorities and use evidence to inform decision-making.

In Zambia, CHAI is supporting the Ministry of Health, as well as district health authorities, to develop activity-based budgets linked to the National Health Strategic Plan and utilize existing accounting software to track expenditures against these budgets. This work is strengthening the capacity of the government to report and monitor financing flows against plans and will be used across the directorates at the Ministry. It will also provide full visibility of financial performance across national and subnational stakeholders. In Kenya, CHAI is helping the Isiolo County government reform and strengthen its public financial management system to set tand allocate funds to priority programs. In 2019, CHAI helped draft and leverage support for county legislation that will offer greater financial autonomy to health facilities, allowing them flexibility to budget and manage their resources to deliver services in a responsive manner. Passage of this legislation will help the country scale up affordable coverage of essential services by making hospitals responsible for directly managing a larger share of service delivery funding.

CHAI also expanded our engagement with South Africa's National Treasury, provincial governments, and the National Department of Health. We are working with the National Treasury to strengthen provincial management systems for procurement and contracting of private service providers, as well as human resource planning and budgeting. We are also supporting the Treasury and the provinces to utilize human resource planning tools and financial management systems to improve equity and service quality nationally, through inter-provincial sharing of lessons learned and capacity building.

In countries facing increased resource constraints due to economic pressures such as Eswatini, Zimbabwe, and Zambia, we are focused on helping governments increase efficiency in resource allocation. In Zimbabwe, CHAI continued to help the government to improve allocation and utilization of limited resources, using resource mapping to identify underfunded priorities. We helped the government develop a comprehensive budget proposal which helped to increase budget allocation to health from eight to 10 percent of the total annual government budget. In Eswatini**,** where personnel costs account for 42 percent of the Ministry of Health operational budget and can be as high as 75 to 80 percent of costs at the facility level, CHAI helped the government to identify and streamline on-call hours for the health workforce. This work saved a total of US$2.4 million (29 percent) from the total on-call budget and could save US$4.5 million (52 percent) from the total on-call budget if the government redesigns on-call compensation. The cost savings from this redesign will be used to fill gaps in service delivery, allowing the Ministry of Health to procure more lifesaving health products and recruit additional staff.

TRANSFORMING RWANDA'S HEALTH WORKFORCE

Rwanda has experienced tremendous population growth over the past two decades. Recognizing the necessity of a robust health workforce to provide universal health coverage to this growing population, the Rwandan government began partnering with CHAI in 2011 to develop its Human Resources for Health (HRH) program. Launched in 2012, this government-led initiative set out to build the health education infrastructure needed to sustainably create a high-quality health workforce.

CHAI supported the government with the design, resource mobilization, and early implementation of the program, along with critical assessments at the mid-term and completion in 2019. The government's high-level advocacy, with CHAI's support, was revolutionary in its approach to development assistance: just under US$100 million in funds from the United States government and the Global Fund were invested through the government of Rwanda's national budget. The scale of funding, and the direct funding of the government to implement the program, was unprecedented and continues to serve as a model for bilateral government partnership.

In 2011, Rwanda's ratio of health professionals to the general population was significantly short of the World Health Organization's (WHO's) recommended target. The majority of practicing physicians, nurses, and midwives were lacking any kind of formal post-graduate degree while a shortage of faculty and limited infrastructure, equipment, and supplies in the country's health training institutions and teaching hospitals was preventing Rwanda from producing the number of skilled health workers required.

To address these challenges, the program built the capacity of the sole government-funded higher-education institution, the University of Rwanda. The government established 17 new academic training programs at the university, and an additional 11 training programs received resource investment and/or technical assistance. Eight of the new programs introduced were masters in specialty nursing. As a result, Rwanda now has more specialty nurse training programs than any other country in sub-Saharan Africa aside from South Africa.

Over the course of seven years, an estimated 4,357 graduates were trained in prioritized academic programs.

This initiative has helped Rwanda's health workforce grow significantly.

- The midwife per population ratio improved dramatically from one midwife per 66,749 people in 2010 to one midwife per 4,064 people in 2017.
- The doctor per population more than doubled.
- The numbers of Rwandan specialists in country increased from 94 in 2009 to 436 in 2018.

Over 90 academic publications have captured the success, challenges, and lessons learned of this wide-ranging transformation of the health education infrastructure.

Building on the significant progress that has been made, the government has also reaffirmed its commitment to strengthening the health workforce, and CHAI is supporting the government to plan the next 10 years of health workforce development with an emphasis on achieving sustainability in its training programs and expanding focus to workers who provide critical primary and secondary care.

TRANSFORMATIONAL CHANGE

17 New academic training programs at the university

11 Additional training programs received resource investment and/or technical assistance

8 of the new programs introduced were masters in specialty nursing

4,357
graduates trained in prioritized academic programs over 7 years

STRENGTHENING THE HEALTH WORKFORCE

A strong health workforce is the backbone of a functional health care system and is essential to supporting UHC. CHAI is working with partner governments to strengthen and support their health workforces through evidence-based planning, training, and support of national institutions to ensure sustainability long into the future.

In 2019, the **Rwandan** government completed its flagship health worker program, which CHAI helped launch in 2012. Since its introduction, the program has trained and deployed over 4,000 health workers throughout the country (See *Transforming Rwanda's health workforce* on page *62*). In **Ethiopia**, we worked with the government to improve the quality of training programs related to women's and reproductive health, surgery and anesthesiology, pediatrics, and other specialties. From 2018 to 2019, CHAI helped the government harmonize curricula and establish quality standards for 11 targeted post-graduate and 13 associated undergraduate mid-level provider training programs. To better understand the existing capacity of the training institutions, we undertook an assessment using the developed standards; the government utilized the results from these assessments to develop a comprehensive operational plan to inform large scale quality improvements to the targeted programs at 12 teaching institutions. The assessment reports have also been shared with each training department at each university to help their future planning.

In **Zambia**, CHAI is helping the government address an ongoing shortage of health workers. In 2017, the clinical health worker per population ratio was 1.2 per 1,000, compared to the World Health Organization (WHO)-recommended standard of 2.3 per 1,000. While certain health indicators have improved over time, others, such as the rates of maternal and newborn mortality, have not. To address these disparities and increase the number of high-quality health workers, CHAI has supported the Ministry of Health to create comprehensive plans to train and sustainably deploy Community Health Assistants (CHAs), Skilled Birth Attendants (SBAs), and specialist providers throughout the country.

In 2019, CHAI facilitated an agreement between the Government of Zambia and the United States Agency for International Development (USAID), to provide bridge funding for 600 CHAs to close the health workforce gap and improve access to basic health services in six provinces. In addition to strengthening these services, the program aimed to improve central oversight and management of the CHA program by the Ministry of Health, supervision of CHAs, and the quality of CHA training. The CHAs were supported by the project to provide lifesaving basic health care services for an 18-month period, after which they are expected to transition to government payroll. An additional 258 CHA supervisors were trained to improve oversight and service delivery to the most vulnerable populations.

In 2019, CHAI also completed a program, supported by Sida, aimed at reducing maternal and newborn deaths by increasing the number of Skilled Birth Attendants (SBA) in rural Zambia. The program began in 2013 and has helped the government construct hostels, classrooms, lecture theatres, skills labs, admin blocks and libraries in several training institutions, develop curricula and skills labs, and enabled the training of 3732 SBAs (nearly 30 percent from rural communities), along with 687 specialist doctors and nurses. Forty percent of these workers graduated by the end of the program and are on track to be deployed into the civil

A HEALTH WORKER MAKES NOTES DURING A CLINIC VISIT ETHIOPIA

> You cannot change a health system overnight. Policy changes should be complemented with changes in people's ways of thinking and approach to doing things.
>
> **— Tholoana Masupha**
> **READ MORE P. 73**

service. The program also improved the capacity of SBAs already deployed to deliver timely emergency obstetric and neonatal care (EmONC) services and procured critical equipment such as motor bikes and four-wheel drive vehicles to enable transportation of emergency cases to higher levels of care. This work supported the referral of over 4,000 mothers from 2016 to 2018. It also helped strengthen supportive supervision and clinical mentorships for SBAs and CHAs post-graduation, generating evidence to inform policy decisions around health care worker retention strategies. In 2019, CHAI also supported the Ministry to develop a Pediatric Workforce Plan that sets targets for the pediatric health workforce in Zambia and outlines targeted interventions to increase the scale and quality of training for clinical pediatric specialists, nurses, and neonatal care providers in the country.

With support from the Norwegian Ministry of Foreign Affairs, CHAI also continued to work with **Malawi's** Ministry of Health to scale up access to emergency obstetric care and critical family planning services. In 2019, the government completed construction and furnishing of two 100 bed capacity student hostels at Mzuzu University and Malawi College of Health Science Blantyre Campus, bringing the total number of structures built across the country to 15. CHAI also supported dissemination and implementation of the Human Resource for Health Strategic Plan 2018 – 2022. Districts and central hospitals are working on updating data to conduct detailed a staffing gap analyses and develop a costed three-year recruitment plan and review of the activities from the strategy for prioritization and inclusion in their district implementation plans. We are also working with the government to develop a plan for scaling up training of critically required pediatric care providers.

In **Zimbabwe**, CHAI recently began supporting the government to strengthen the health workforce in the formal and informal sectors. In 2019, we supported the Ministry of Health to operationalize its Human Resources for Health Strategy (developed in 2018). We helped identify priorities for reform, including enhanced review of job descriptions to reduce role conflict and duplication. We also supported the Ministry to define a Comprehensive Essential Package of health services that can be provided at the community level to reach rural and marginalized communities with health education and preventive services for non-communicable diseases, malaria, and adolescent, reproductive, and sexual health services.

This work will be delivered through integrated and well-trained community health worker cadres as outlined in the country's Community Health Strategy developed in 2019 with support from CHAI, UNICEF, and UNFPA.

LOOKING AHEAD

As countries begin to implement reforms toward UHC, it is essential that they can finance and deliver on promised services. CHAI will continue to support governments to use evidence to inform decisions, manage change, strengthen systems, and identify and remove bottlenecks that may arise as they move forward with plans. We will expand work at the sub-national levels to develop and implement practical approaches to demonstrate real progress for UHC goals, with a focus on essential primary health care, and we will continue to support governments to mobilize resources to implement their national health plans.

Understanding the importance of health workers in achieving UHC, including in times of crises, we will continue to develop a global evidence-supported business case for further investment by governments, bilateral, and multilateral organizations in a strong health workforce.

SUPPORTING ASSISTIVE TECHNOLOGY

Universal Health Coverage (UHC) can only be advanced inclusively if people are able to access quality assistive products and services, known as assistive technology, when and where they need them. Worldwide, over one billion people, largely disabled or older, need assistive technology to help them live healthy and independent lives including wheelchairs, hearing aids, prosthetics, and eyeglasses. Yet, these products are only available to around one tenth of people in need. This gap is even more prominent in low- and middle-income countries.

In many of these countries, assistive technology is primarily donated from charitable organizations, leading to small markets that are of limited interest to suppliers. Under the AT2030 program, funded by the United Kingdom's Department for International Development (DFID) and led by the Global Disability Innovation Hub, CHAI is helping governments to increase access to high-quality, affordable, and appropriate assistive technology by addressing market inefficiencies.

In 2019, we worked with governments across 10 countries—Ethiopia, Indonesia, Kenya, Liberia, Malawi, Nigeria, Rwanda, Sierra Leone, South Africa, and Uganda—to understand their capacity to provide assistive technology that meets their population needs. This assessment helped to expand global understanding of challenges that countries face. As a result, countries have now begun to establish national strategies to increase access to assistive technology, guidelines for service delivery, and data systems to better understand need.

In Ethiopia, CHAI worked with the Ministry of Health to establish a unit to oversee efforts around assistive technology as well as national rehabilitation services. We helped mobilize partners engaged in this work in the country and established a platform for national stakeholder engagement. We are also helping the government to develop a national assistive products list, product specifications, and service delivery guidelines.

In South Africa, we supported the government to revise its Integrated School Health Policy to include hearing and vision screening and helped pilot portable screening equipment to ensure that the policy could be carried out. The pilot program trained over 300 health workers and screened over 15,000 students. In Kenya, CHAI is supporting the Ministry of Health to scale up access to appropriate wheelchairs and other mobility devices nationally through the development of a costed national strategy. After undertaking a comprehensive nationwide capacity assessment in 238 hospitals, we quantified the gaps in policy, supply chain, and human resources that exist in wheelchair and mobility device provision. The national strategy will inform policy changes and health system improvements that are needed to ensure increased access to appropriate wheelchairs and other mobility devices.

In Indonesia, we helped the government establish a cross-ministerial technical working group to strengthen national coordination for assistive technology, consisting of eight key ministries and representatives from disability advocacy organizations, which produced a draft National Assistive Technology Strategic Plan for 2020-2024. In Rwanda, we helped complete a capacity assessment which is serving as a solid foundation to develop a joint framework on how best to allocate resources to accelerate access to assistive technology. This effort is informing planned development of national guidelines on assistive products procurement and supply chain management, standard operating procedures for assistive products registration, and a business case for inclusion of assistive technology into the Community-Based Health Insurance benefit package. This work is also supporting the development of a National Strategic Plan for People with Disabilities, as well as a national disability information system, which includes data collection protocols, and a roadmap to support timely decision-making.

Countries increasingly recognize the necessity of assistive technology to realize their commitments to the Sustainable Development Goals, to UHC, and to the United Nations (UN) Convention on the Rights of Persons with Disabilities, which protects the rights and dignity of people with disabilities. Governments are critical to developing and strengthening the systems to deliver assistive products and services to those that need them.

CHAI will continue to support these governments and work with local and regional partners to build capacity for the provision of assistive technology. We will also work with suppliers of quality, appropriate products to address bottlenecks that may arise as they look to increase access to low-and middle-income markets.

Kristin Koskella

Associate Finance Director, Accounts Payable

Somewhere, sometime ago, someone determined that we change our careers three times during our lives. From my perspective there is truth in this theory.

My first career started after leaving graduate school with a newly minted degree in education. I taught children in public schools in the United States and also abroad in England. For my second career, I chose the business world where margins and profits reigned supreme. For 20 plus years, I traveled a path through the retail industry and all it had to offer. I approached this time with exuberance, absorbing the tricks of the trade, gaining an education in business finance, and learning how to navigate a maze of office politics.

I was happy and fully engaged working in this tough, fast-paced industry. Although, during the last few years of my second career, I began to realize that I had strayed from my initial aspiration of dedicating myself to others. The natural inclination of educators is to work selflessly in the interest of their students, and I was no longer doing as I had originally planned. So, at 59, I got up my courage and moved on to my third career; this time in the non-profit sector at CHAI.

My recollection of my first day at CHAI's finance office in Boston is as clear as if it happened yesterday, not eleven years ago. I was filled with nervous apprehension and excitement but ready to begin my job as Accounts Payable (AP) Manager and become part of an organization whose purpose was to help low-resource countries bring health to their citizens.

The office was humble in its physical structure. Workers sat shoulder-to-shoulder at long counters serving as desks. There was no corner office with walls of glass overlooking the Boston skyline. The room was filled with vitality, an energy so palpable, you could almost feel the air vibrate. I knew right then I was home, where I was meant to be. A place where egos were set aside, and mission was paramount. To this day, CHAI has never failed in living up to its values of frugality, humility, working with trust, and fostering diversity, amongst others.

CHAI's value of entrepreneurship has given me the opportunity to build an AP team whose purpose is to assist and service those working directly with governments in their mission to save lives. In my humble opinion, the members of the AP team are background heroes. Supporting CHAI's frontline workers is their priority. These dedicated associates swing into action when a supplier delays shipping an order of life saving drugs until payment is received, when a CHAI employee calls in a panic that it's 2:00 a.m. and they can't get a hotel room until payment is guaranteed, or when a hospital won't release a patient from their care until the bill is paid. There are so many examples of the AP team's heroic efforts.

This team has developed and implemented policies that help protect our generous donors' funds. They've implemented measures designed to ensure the safety of traveling staff by providing credit card programs and by partnering with worldwide travel agencies.

Although my team doesn't operate on the frontlines of CHAI's mission, their professional expertise enables them to serve selflessly as consultants, expeditors, and trainers for our program and country teams. The AP team is a true example of CHAI values in action.

Society says that as a septuagenarian I should relax and take time for myself; stop working full time. I ask why when I am living the best that life has to give. I'm doing that which I had aspired to do: supporting others who are giving of themselves. Perhaps finding your third career is finding the place you belong. Besides, how do you leave family? And CHAI is a family: one big worldwide family.

NON-COMMUNICABLE DISEASES

PATIENT RECEIVING TREATMENT AT THE UGANDA CANCER INSTITUTE
KAMPALA, UGANDA

Each year, 15 million people die from non-communicable diseases (NCDs) between the ages of 30 and 69. Over 85 percent of these deaths occur in low- and middle-income countries. Cardiovascular diseases (like heart attacks or strokes) account for the most deaths, followed by cancers, respiratory diseases, and diabetes.

CHAI began work in this area with the launch of our cancer program in 2015. In 2019, we began to investigate ways to address cardiovascular diseases as well as diabetes. In low- and middle-income countries, the response to these diseases as been characterized by a lack of services, especially at the primary care level. Access to essential medicines and basic health tools at primary health centers can ensure those in need receive testing and treatment.

HYPERTENSION AND DIABETES

Hypertension, or high blood pressure, is the leading risk factor for cardiovascular diseases. There are significant gaps in the detection, treatment, and control of hypertension—with over 900 million people not on treatment and another 300 million taking the wrong or ineffective medications.

PATIENTS SIT IN A CLINIC'S WAITING ROOM
NAGURU, UGANDA

There is a huge opportunity to simplify service delivery and improve treatment to better control hypertension and save the lives of millions of people.

Diabetes is a chronic condition that results in elevated blood sugar levels, which over time can cause blindness, kidney failure, heart disease, and amputation. In type 1 diabetes the pancreas produces little or no insulin by itself. Type 2 diabetes, dramatically on the rise over the last three decades according to the World Health Organization (WHO), occurs when the body becomes resistant to or doesn't make enough insulin.

Without access to insulin, both conditions are fatal.

In resource-limited countries, the life expectancy for type 1 diabetes is under a year (in the United States, it is nearly equal to the general population). Those living with type 2 diabetes face disability and progression of the disease due to late diagnosis and poor management.

Eswatini is one of the first countries that CHAI is working with to close the treatment gap for hypertension, type 2 diabetes, and other common NCDs.

One in three adults in the country has hypertension and one in four lives with diabetes or pre-diabetes. However, less than 20 percent are being treated for these conditions. Before CHAI partnered with the Ministry of Health, diagnostic and treatment services for NCDs were only available in a limited number of hospitals across the country, mostly in large cities.

In 2019 we began working with the Ministry to develop and roll out a package of cost-effective, point-of-care services which can be delivered within the government's current network of over 200 primary care facilities, using technology and expertise which largely already exists at those facilities.

The program will bring over 80 percent of the population within walking distance of simple, affordable services that can save their lives. With CHAI's support, the Ministry of Health has already delivered this service package to five percent of primary care facilities, with a costed, operational plan to scale up services to every community in the country by early 2021.

CANCER

Every year, nine and a half million people die of cancer globally. The majority of these deaths happen in low- and middle-income countries and are often from forms of the disease that are preventable or treatable, such as breast or cervical cancer.

Lack of information and inadequate care mean that many cancer patients do not seek treatment until it is too late. When they do, cancer treatment centers are often not equipped with the right tools, medications, or specialists. Drugs and diagnostics are often poor quality and unaffordable. As a result, cancer is more than twice as deadly in low-resource countries as it is in the United States.

CHAI is working with the American Cancer Society (ACS) and other partners to lower the cost of lifesaving cancer medications, increase access to diagnosis and treatment, and help governments develop plans to comprehensively manage the disease. We have also developed new partnerships to increase access to other elements of the cancer treatment cascade.

Making treatment affordable and sustainable

Affordable cancer treatment and strong systems for their delivery are crucial to improve patients' survival in sub-Saharan Africa, where there are over 800,000 new cancer cases each year, with incidence expected to double by 2040.

In 2017, CHAI and ACS formed access agreements with two pharmaceutical companies, Cipla, Inc. and Pfizer, Inc., to expand access to 16 essential chemotherapies in cancer treatment centers across six countries in sub-Saharan Africa: **Ethiopia, Nigeria, Kenya, Uganda, Rwanda,** and **Tanzania**. In 2019, we added three more countries: **Malawi, Zambia**, and **Zimbabwe**.

In **Nigeria**, frequent stock outs of chemotherapy at public hospitals drove patients to the private sector, where they faced high prices and uncertain drug quality. In 2019, the federal Ministry of Health, with support from ACS and CHAI, announced that a new public-private partnership would deliver high-quality chemotherapies to seven teaching hospitals at a substantial savings, enabling thousands of additional patients to access care.

Building on the strength of our work with ACS, we formed a new partnership. Allied Against Cancer supports a network of African oncologists and technical assistance partners to improve the quality of cancer care in the region. Members include IBM, ACS, and the National Comprehensive Cancer Network (NCCN).

In 2019, the alliance worked with a network of African oncologists to create the NCCN Harmonized Guidelines for sub-Saharan Africa, which adapt best practice cancer treatment guidelines for use in African hospitals. IBM then developed an online tool called Cancer Guidelines Navigator to provide oncologists with interactive access to the new guidelines. A clinician can input a patient's information and be directed to relevant treatment options under the guidelines.

Immunotherapies and biologic therapies have revolutionized cancer care in high-income countries. However, too often, new medicines become available to people in low- and middle-income countries decades later. Even when available, they are often priced well beyond what people who need them can afford. In 2019, CHAI partnered with the Parker Institute for Cancer Immunotherapy, three pharmaceutical companies, Bristol-Myers Squibb, AstraZeneca, and Roche, as well as nine countries to accelerate the introduction of innovative cancer medicines to **Ethiopia, India, Kenya, Nigeria, Rwanda, South Africa, Tanzania, Uganda** and **Vietnam.**

The project aims to show the feasibility of introducing these medicines safely and effectively in resource-limited settings and subsequently map out a path toward distributing them across the continent.

We have developed demonstration projects for innovative products in **Kenya, Nigeria**, and **Uganda.** Hospitals have already identified the products they want to use in the projects based on cancer incidence in their country, the product's clinical efficacy and side effects, and diagnostic requirements, amongst other criteria. CHAI has also worked with countries to mobilize resources to fund national cancer programs.

In 2019, we helped **Kenya** map out the cost of their national cancer control strategy. With the full resource need clearly outlined, the cancer program in Kenya

secured an additional US$1 million from the government to procure cancer-related commodities, including chemotherapy, personal protective equipment, and rehabilitative equipment.

CHAI also supported costing analyses in **Cameroon, Eswatini, Ethiopia,** and **Rwanda.** As a result, in Cameroon, the Ministry of Health had, for the first time, data to support its financial requests to the government. The Ministry has now secured funding for chemotherapy procurement.

Leveraging technology

In 2018, **Uganda** registered 32,000 new cancer cases and 21,000 deaths. Cancer is often diagnosed late due to limited screening, laboratories, and pathologists. A single central organization, the Uganda Cancer Institute, serves the entire country and there is no public health pathology system. Clinicians are unable to effectively screen for cancer, diagnose disease or develop care plans as pathology is crucial for management of any cancer.

A shortage of pathologists exacerbates the already constrained access to pathology services. Only 13 pathologists serve a population of 44 million. This has resulted in a backlog of cases. Patients must wait on average two weeks to receive a diagnosis. If a pathologist needs to get a second opinion, it can take two months to receive their results.

In 2019, the American Society of Clinical Pathology (ASCP) with support from CHAI established a cloud-based platform to deliver pathology services at the Institute. The platform uses a network of US-based pathologists to help reduce the backlog while also building the capacity of local pathologists.

Since the platform was introduced, over 2,000 cases have been digitized and archived. Pathologists can get second opinions on specific cases within 72 hours from ASCP pathologists, significantly reducing turnaround times for patient results. To improve pathologist capacity, a resource center is available for research and training purposes. Over 40 students and doctors made use of the center.

CERVICAL CANCER

Cervical cancer is one of the most preventable types of cancer but continues to generate a significant burden of disease and death. More than 300,000 women die of cervical cancer each year, with more than 90 percent of deaths occurring in low- and middle-income countries.

Virtually all cervical cancers are caused by infection with human papillomavirus (HPV), a common sexually transmitted disease. Co-infection with HPV and HIV puts women at particular risk of progression to cancer, making cervical cancer a significant threat to improving health outcomes for women living with HIV.

At scale, HPV vaccination and effective programs to screen and treat women for pre-cancerous lesions (primary and secondary prevention, respectively) offer the opportunity to eliminate cervical cancer as a public health problem. However, most low- and middle-income countries are only now beginning to introduce the HPV vaccine, which is typically administered to girls between the ages of nine and 14, leaving older generations of women unprotected.

Access to effective secondary prevention has been constrained by the package of tools currently used in low-resource settings: most programs rely on visual inspection with acetic acid (VIA), the accuracy of which is highly variable; cryotherapy to treat pre-cancerous lesions is cumbersome and expensive and logistically difficult to maintain; and HPV testing is expensive and available only at a limited number of sites.

New products and technologies that are now available finally offer the opportunity to make widespread scale up of screening and treatment for pre-cancerous lesions practical, affordable, and achievable. In 2019, with funding from Unitaid, CHAI launched a program in seven countries, **India, Kenya, Malawi, Nigeria, Rwanda, South Africa**, and **Zambia,** to address the burden of cervical cancer. The program is accelerating the deployment of these new technologies and products in order to effectively scale up screening and treatment for pre-cancerous lesions in the countries.

Within six months of launching the program, CHAI negotiated with suppliers to reduce the price of two critical tools: HPV test kits for screening and portable thermal ablation devices to treat lesions. We reached

TRANSFORMING A NATIONAL CANCER PROGRAM

In Ethiopia, breast cancer is the leading cause of cancer mortality, with over 8,000 deaths each year. In 2016, there were only two hospitals in the country that could treat breast cancer. Both of them were in the capital, Addis Ababa—hundreds of miles away from many patients.

Ethiopia also faced a severe shortage of health workers, with 16 oncologists for a population of 100 million people. Not only was it difficult for patients to access treatment, but the few who did faced long wait times. As they waited, potentially curable tumors progressed to advanced stages.

In 2018, CHAI supported the Federal Ministry of Health to begin expanding access to breast cancer treatment to six regional hospitals. By 2019, together with the Ministry, we successfully addressed the challenges patients faced: shortening diagnostic turnaround times, improving quality of care, and the affordability of medicines. We also developed a national forecast to ensure a reliable supply of medicines across the country.

As a result, the number of patients starting treatment at the designated regional hospitals grew by 76 percent from 2018 to 2019.

For patients receiving chemotherapy, the average waiting period to start treatment after diagnosis dropped from 4 months to 1 week at most—a 90 percent reduction in wait times.

Ethiopia was able to close the gap for skilled cancer health workers, training 22 doctors and 36 nurses. Six surgeons were trained to obtain quality biopsy samples and 12 pathology technicians were trained to reduce turnaround time. A total of 22 pharmacists from the central medical supply agency as well as regional hospitals were trained on stock management and safe handling of cancer medications.

The national forecast also helped the government double the cancer program's procurement budget between 2016 and 2018.

This holistic approach to the national cancer program included reimagining how diagnostics, clinical care, and supply chain management were delivered. This made treatment for the deadliest cancer in the country accessible and affordable to those who needed it most.

TRANSFORMATIONAL CHANGE

Ethiopia closed the gap for skilled cancer health workers, training:

- **22** Doctors
- **36** Nurses
- **6** Surgeons to obtain quality biopsy samples
- **12** Pathology technicians to reduce turnarounds
- **22** Pharmacists on stock management and safe handling of cancer medications

Expanding and improving access:

- **2X** Growth of cancer program procurement budget between 2016 and 2018 as a result of the national forecast
- **76%** Growth of patients starting treatment at designated regional hospitals from 2018 to 2019
- **90% ↓** Drop in chemotherapy patient's average waiting period to start treatment after diagnosis

agreements with two suppliers of thermal ablation devices to source the devices at lower prices, with production plans in place to support anticipated demand. This has enabled point-of-care treatment at less than US$0.50 per woman treated, assuming that a device can be used at least 2,000 times. This represents significant progress towards achieving the overall goal of delivering screening and treatment at a total commodity cost of less than US$1 per woman. Further, we have negotiated significant price reductions for HPV tests, allowing more tests to be purchased with precious in-country finances.

The program has laid the groundwork for the successful launch of screening and treatment in partner countries.

In **Rwanda,** CHAI is working with the government to provide cervical cancer screening and treatment as part of routine services at primary health centers in five districts. Key access points for patients will include HIV clinics, non-communicable disease clinics, family planning clinics and general consultation clinics.

Since the program launched in 2019, the government has published National Cervical Cancer Guidelines to direct patient care, 45 trainers have been trained to coach providers who will deliver the services, and we have partnered with the Imbuto Foundation to drive community awareness. The program aims to ramp up screening to reach 70 percent of women between the ages of 30 and 49 living in the five districts.

Together with Unitaid, CHAI is also working on bringing a promising new screening technology to market. Automated Visual Evaluation (AVE) uses artificial intelligence to overcome the inadequacies of human visual inspection of the cervix. AVE analyzes images to detect pre-cancer, potentially offering effective screening at very low cost via a software app on mobile phones. In **Zambia** and **India** CHAI partnered with the (US) National Cancer Institute to launch AVE development studies in 2019 to train and validate the algorithm across a geographically diverse dataset.

LOOKING AHEAD

We will continue our work to improve access to lifesaving diagnostics and treatments and are expanding our product portfolio to provide a holistic set of affordable oncology medicines and supportive therapies to countries. More countries, more hospitals, including those in the private sector, and more manufacturers are being added to the CHAI-ACS access partnership.

We are also turning our attention to children who suffer from cancer. In Africa, 70 percent of children with pediatric cancers will die. By contrast, long-term survival rates in the United States are close to 80 percent. With support from the UBS Optimus Foundation, CHAI is focusing on pediatric cancer in **Cameroon, Ghana** and **Nigeria**. We will negotiate with pediatric chemotherapies manufactures to ensure that children receive quality treatment at an affordable price. We will also begin to tackle some of the health system challenges that imped access to treatment at hospitals, including better patient education and stronger tracking systems to keep children in care.

We will also continue to support governments to reach women with effective secondary prevention services for cervical cancer. We will leverage existing platforms to deploy tools that are available but not widely used: HPV tests for screening and portable devices to treat pre-cancerous lesions.

By demonstrating effective delivery models for screening, treatment, and linkages to a full continuum of care using existing tools, we will seek near-term public health impact and lay the groundwork for the scaleup of more affordable point-of-care screening technologies when they become available.

Tholoana Masupha

Senior Program Manager, Vaccines, Lesotho

When I enrolled for an MBA in Finance and Global Business in the fall of 2012, I had my eyes set on joining the corporate world. Never did I imagine this fulfilling career I have, working at the service of my country in ensuring access to quality health care for all.

My work with CHAI allows me to merge my business school qualification with my passion and belief that everyone deserves a quality life. CHAI's goal is to ensure that everyone in need of health services has access to quality health care. This calls on all of us to work to help create effective, efficient, and sustainable health systems in the countries where we work. We have used this approach in Lesotho to strengthen the vaccine supply chain.

In 2017, a CHAI-supported assessment found that although vaccine supplies were available in district vaccine stores, stock outs were happening at the health facilities due to disruptions in delivery. To address this, we worked alongside the government to pilot a last mile vaccine distribution system utilizing motorbikes. Bikers collected monthly supplies of vaccines from the district vaccine stores, which are responsible for supplying and delivering vaccines to health facilities in their respective districts, which helped ensure that vaccines were delivered on a predictable schedule, and allowed for flexibility of emergency deliveries to the health facilities. This work helped to increase vaccine availability by an average of 15 percent at health facilities.

And we are now moving into new areas, including supporting the government to introduce the Human Papilloma Virus (HPV) vaccine in Lesotho in 2022. Cervical cancer, nearly always caused by HPV, is a major contributor of morbidity and mortality of women in my country. Screening for reproductive cancers is opportunistic and most women report late for screening or present themselves for treatment at very advanced stages of the disease, a situation that renders them ineligible for treatment.

You cannot change a health system overnight. Policy changes should be complemented with changes in people's ways of thinking and approach to doing things. With the goal of health system strengthening in mind, we are leveraging on the introduction of the HPV vaccine to strengthen district level service delivery and demand generation and promotion strategies. We must ensure that we will not only achieve a strong new vaccine introduction, but also create a sustainable and cost-effective approach to service delivery.

Various countries' experiences have indicated that the high costs associated with delivering the HPV vaccine can hamper effective service delivery. It is essential to adopt a well thought out service delivery strategy that aligns with the country's context. While this story is still unfolding, we are happy about the successes and networks built thus far.

These are uncertain times, but I am happy that CHAI remains a thought partner at the global and country level as we continue to build strong and long-lasting health systems.

FINANCIALS

Clinton Health Access Initiative, Inc. and Subsidiaries
End-year **2018** and **2019**
Amounts in Thousands of Dollars ($000's)

CONSOLIDATED STATEMENT OF ACTIVITIES

	2019	2018
Total revenue	**$ 194,236**	$ 162,981
EXPENSES		
East Africa	30,003	29,768
Caribbean	667	459
Southeast Asia	9,589	6,865
Southern African Development Community	37,403	33,614
West Africa	25,622	20,628
India	12,481	8,450
Direct Country Team Expenses	**115,765**	99,784
Direct Global Team Expenses	**56,768**	45,596
In-Country Indirect Cost	2,073	2,492
Executive & Program Management	3,488	3,054
General and Administrative	11,324	9,608
Overhead	**16,885**	15,154
Finance System	-	-
Total expenses	**189,418**	160,534
Increase (Decrease) in Development Fund	**4,820**	2,447

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

	2019	2018
ASSETS		
Cash and cash equivalents	$ 11,077	$ 7,233
Assets limited as to use	80,538	90,673
Accounts receivable	726	886
Contributions receivable	-	1,541
Grants receivable	7,173	1,890
Prepaid expenses	2,552	3,565
Property and equipment, net of accumulated depreciation	305	139
Total assets	**102,371**	105,927
LIABILITIES AND NET ASSETS		
Accounts payable	6,366	5,249
Accrued expenses	5,304	4,662
Deferred revenue	79,915	23,588
Obligations associated with assets held for commodities purchases	-	-
Total liabilities	**91,585**	33,499
Total net assets	**10,786**	72,428
Total liabilities and net assets	**$ 102,371**	$ 105,927

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AVAC

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World Health Organization (WHO)

World Hepatitis Alliance

Zachary Shapiro

IMAGE, LEFT PAGE:
GIRLS SING EDUCATIONAL SONGS ABOUT NUTRITION IN THEIR SCHOOL COURTYARD
MADHYA PRADESH, INDIA

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48

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67

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