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2021





*Pictured: A nurse works with a disabled child at the Bizweni Centre For Children With Disabilities in Cape Town, South Africa. Photo by Yeahyeah Photography.*

*Front cover: A healthcare provider counsels a patient on cervical cancer screening at Makola Health Center in Mpulungu, Zambia. Photo by Dominic Mukumbila.*

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# MESSAGE FROM THE CEO

At CHAI, our staff is our greatest asset.

Our mission is to ensure everyone, no matter where they live or the circumstances of their birth, have access to quality, affordable healthcare. Our successes in delivering on that mission are driven by the talent, creativity, and efforts of the people who work for us.

CHAI has always been deeply grounded in the countries where we work: 85 percent of employees are based in program countries and 68 percent are nationals in the countries they are based. This model of operation is central to CHAI's strategy: governments lead the solutions and programs are designed to scale nationally with tactics that can be replicated in other countries. Our staff, therefore, work closely with ministries of health to develop and implement lifesaving programs and provide on-the-ground support all the way from the national level to the last mile.

In 2021, as we entered the second year of the COVID-19 pandemic, our staff drove our work forward even as they dealt with challenges, illness, and loss in their personal lives. This included supporting our partner governments to prevent, test, and treat COVID-19, from rolling out vaccines to securing affordable prices for antigen tests, to building the capacity of health systems to deliver medical oxygen to patients who need it.

At the same time, our staff continued to work with partners, not only to protect existing health programs, but also to ensure they thrived. The entire leadership team is grateful for the tireless efforts of our colleagues.

COVID-19 has exposed and exacerbated inequities that already existed between countries, people, and access to basic health services. Together with ministries of health, donors, and other partners, we continue to be committed to creating more equitable health systems that improve and save the lives of people in the communities we serve.



**Dr. Neil Buddy Shah**  
CHAI CEO





*HIV access program providers gather for a supervisory visit of Mainland Hospital Yaba in Lagos, Nigeria. Photo by AJ Best Global Services.*

# OUR HISTORY

## 2002

### CHAI is founded

#### 2002: CHAI is 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 select countries. 800,000 people are treated in these regions in five years as a result of this work, 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 to 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

#### 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 today, 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: Scaling-up HIV and TB 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 three million today. CHAI helps negotiate agreements to lower HIV and TB drug prices that save the South African government almost US\$1 billion.

#### 2010: Increasing access to effective drugs for malaria treatment

CHAI increases access to artemisinin-based combination therapies (ACTs). Over two years, we help get almost 300 million ACTs to patients in eight countries.

#### 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 GSK rotavirus vaccine by 67 percent and the Biological E. Limited pentavalent vaccine by 50 percent, saving the global community over US\$800 million and US\$150 million respectively. The pentavalent vaccine averts an estimated 2.6 million deaths between 2011 and 2015.

## 2012

### Long-acting reversible contraception

#### 2012: Long-acting reversible contraception

CHAI and partners, including the Bill & Melinda Gates Foundation, the Foreign Commonwealth and Development Office (FCDO), United States Agency

for International Development, NORAD, Children's Investment Fund Foundation, and the Swedish International Development Cooperation Agency, negotiate an agreement to lower the price of Bayer and Merck's long-acting reversible contraceptives from US\$18 to US\$8.50 per implant and accelerate roll out of the products to save the lives of women.

### 2013: Treating childhood diarrhea

CHAI begins work to 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 Roche's 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, Becton Dickinson (BD) in partnership with Unitaid, called FACSPresto, 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

### 2014: Ebola response in Liberia

CHAI, with the support of the Norwegian Government, 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 (HCV) 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

### 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 Ethiopia, Kenya, Nigeria, Rwanda, Tanzania, and Uganda, where 44 percent of cancer cases in sub-Saharan Africa occur.

### 2017: Affordable single-pill HIV regimen with DTG

CHAI and partners, including UNAIDS, the Bill & Melinda Gates Foundation, Unitaid, the FCDO, the United States President's Emergency Plan for AIDS Relief (PEPFAR), United States Agency for International Development (USAID), and the Global Fund to Fight AIDS, Tuberculosis and Malaria, announce a groundbreaking agreement with Aurobindo and Viatris to accelerate the availability of the first affordable, generic, single-pill HIV treatment containing dolutegravir, a best-in-class HIV medication, to public sector purchasers in low- and middle-income countries at around US\$75 per person, per year.

### 2018: Lowering costs for lifesaving oxygen diagnostics

CHAI helped negotiate a 58 percent reduction, on average, for the price of Hologic's 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.

### **2019: Expansion into cervical cancer**

CHAI begins work to scale up safe, effective, and affordable cervical cancer screening and treatment of pre-cancerous lesions across partner countries.

## **2020 Responding to the COVID-19 pandemic**

### **2020: Responding to the COVID-19 pandemic**

CHAI helps countries secure affordable supplies to safely and effectively treat patients with COVID-19, including personal protective equipment, biomedical devices for oxygen therapy, and diagnostics. This includes a global partnership with Unitaid, Viatris, and Macleods to make available 120 million affordable, rapid diagnostic tests for low- and middle-income countries.

### **2020: Price agreement drastically lowers cost for yearly pediatric HIV treatment**

CHAI and Unitaid announce a groundbreaking agreement with two pharmaceutical companies, Viatris and Macleods, to reduce by 75 percent the cost of HIV treatment for children in low- and middle-income countries. The partnership results in the fastest ever U.S. regulatory approval for a generic pediatric HIV drug.

### **2021: Partnership makes dual rapid test for syphilis and HIV available for under US\$1 in over 100 countries**

CHAI, MedAccess, and SD Biosensor introduce new price for point-of-care rapid diagnostic test that enables simultaneous diagnosis of syphilis and HIV in under 20 minutes from a single finger-prick sample.

### **2021: Climate initiative launched to reduce greenhouse gas emissions**

CHAI joins global non-profits, including BRAC USA, GiveDirectly, Integrate Health, Malaria No More, Partners In Health, and PIVOT in creating a new initiative to comprehensively reduce climate emissions. The Climate Accountability in Development aims to measure and reduce climate impact and chart a new path forward for climate accountability in the development sector.

## **2021 Agreement to increase access to oxygen**

### **2021: Agreement to increase access to oxygen**

ACT Accelerator partners, Unitaid, and CHAI broker an agreement under the COVID-19 Oxygen Emergency Taskforce with two of the world's largest medical oxygen suppliers, Air Liquide and Linde to increase access to oxygen in over 25 countries.





Facility staff install oxygen supplies at Kibuye Referral Hospital in Gitesi, Rwanda. Photo by Jean Bosco.

# WHERE WE WORK

CHAI was founded on the principle that it was morally unacceptable for millions of people to die each year of AIDS in Africa, Asia, and the Caribbean while those in wealthier countries were treated. Today, along with HIV, we work with governments and partners to prevent and treat other deadly infectious diseases, including COVID-19; address the rapid rise of non-communicable diseases in low- and middle-income countries; reduce maternal and child mortality by accelerating the rollout of lifesaving vaccines, combatting chronic malnutrition, and increasing access to sexual and reproductive health services; and make assistive technology available to those who need it.

With each new program, our mission remains the same: to save lives and reduce the burden of disease in the regions in which CHAI works to create high-quality healthcare systems. Our strategy is rooted in sustainability, which means governments lead the solutions and programs are designed to scale nationally with tactics that can be replicated in other countries. CHAI is deeply grounded in the countries we work, with 85 percent of employees based in program countries.

## 32

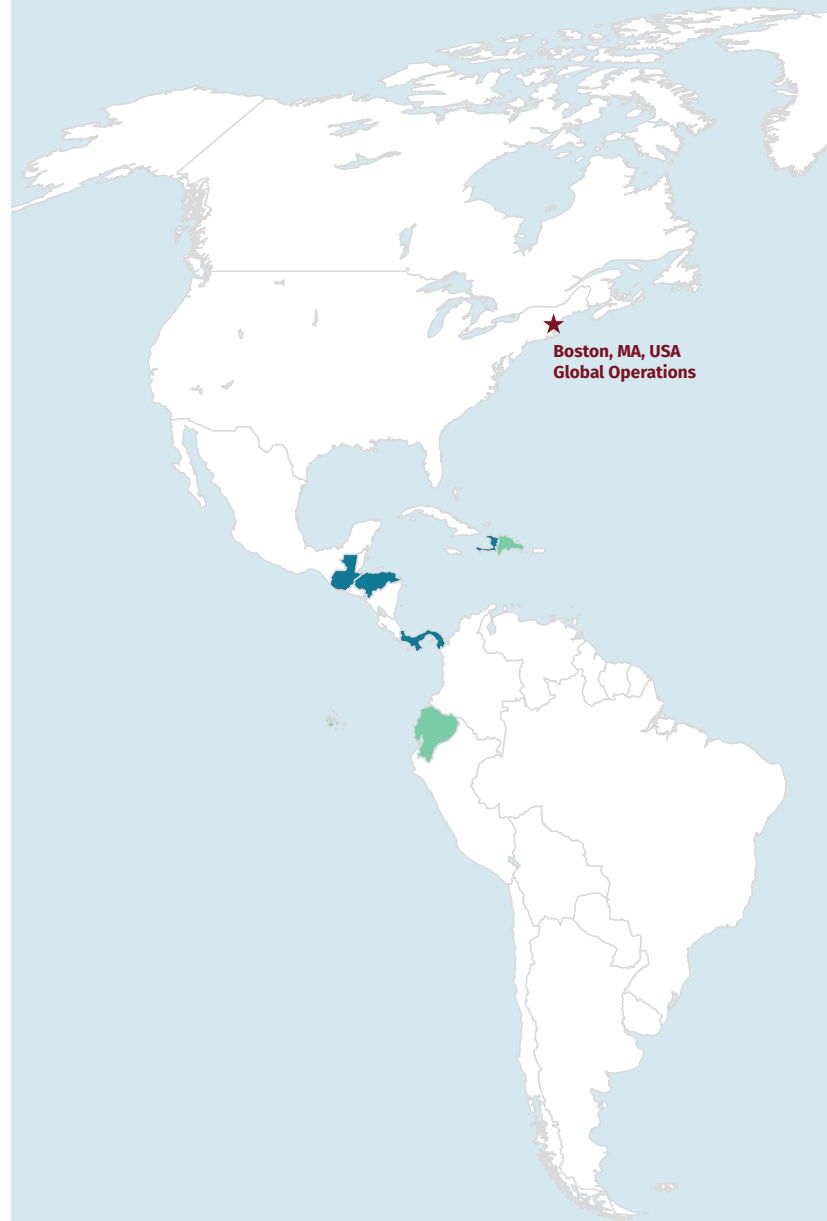
**Countries where CHAI operated out of an office location.**

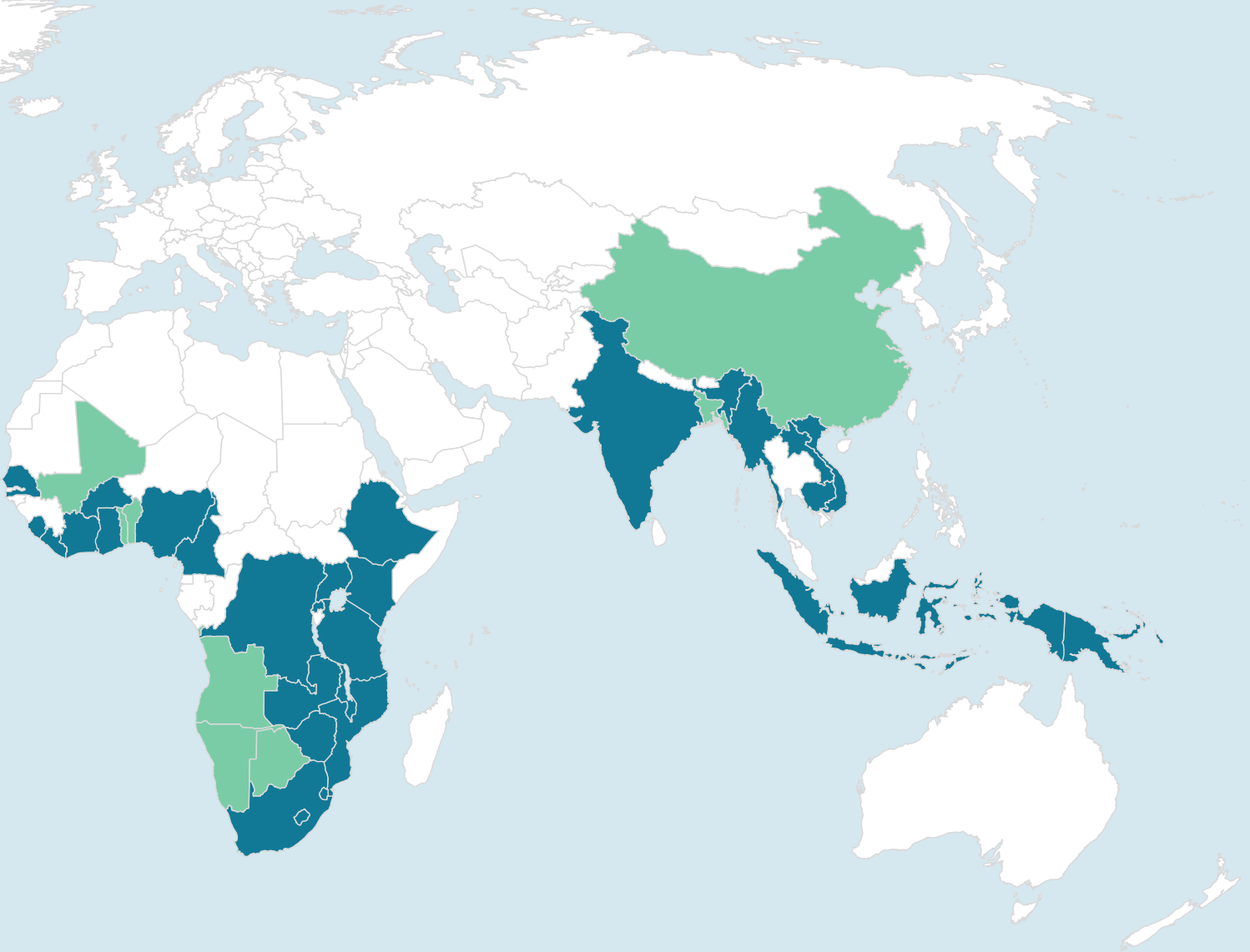
## 42

**Countries where CHAI had programmatic engagement with the government.**

## 125+

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





- |                      |             |                    |                |
|----------------------|-------------|--------------------|----------------|
| ■ Angola             | ■ Ecuador   | ■ Lesotho          | ■ Senegal      |
| ■ Bangladesh         | ■ Eswatini  | ■ Liberia          | ■ Sierra Leone |
| ■ Benin              | ■ Ethiopia  | ■ Malawi           | ■ South Africa |
| ■ Botswana           | ■ Ghana     | ■ Mali             | ■ Tanzania     |
| ■ Burkina Faso       | ■ Guatemala | ■ Mozambique       | ■ Togo         |
| ■ Cambodia           | ■ Haiti     | ■ Myanmar          | ■ Uganda       |
| ■ Cameroon           | ■ Honduras  | ■ Namibia          | ■ Vietnam      |
| ■ China              | ■ India     | ■ Nigeria          | ■ Zambia       |
| ■ Congo, Dem. Rep.   | ■ Indonesia | ■ Panama           | ■ Zimbabwe     |
| ■ Côte d'Ivoire      | ■ Kenya     | ■ Papua New Guinea |                |
| ■ Dominican Republic | ■ Lao PDR   | ■ Rwanda           |                |

■ Countries with offices and programs  
 ■ Countries with programs only

# 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.



Colleagues work at the BCZ in front of a map of the Banga Lubaka Health Zone with locations for new community healthcare sites in DRC. Photo by Lisa Murray.

**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.



Group photo of the CHAI Cambodia team.

# INFECTIOUS DISEASES

**For years, four infectious diseases drove the majority of illness and death worldwide—HIV, hepatitis, tuberculosis, and malaria.** COVID-19 has overtaken these diseases as the largest cause of global mortality by an infectious disease. CHAI has built on the expertise of staff and the on-the-ground experience developed with our HIV work to ensure that as we support governments and the global health community to respond quickly to COVID-19, we continue to address the risks posed by other deadly diseases. ●

**Programs:**

COVID-19 • Hepatitis • HIV/AIDS •  
Malaria and Neglected Tropical Diseases •  
Oxygen • Tuberculosis

**Countries:**

Angola • Benin • Botswana • Burkina Faso •  
Cambodia • Cameroon • Democratic Republic of  
Congo • Dominican Republic • Ecuador • Ethiopia •  
Ghana • Guatemala • India • Indonesia • Kenya •  
Lao PDR • Lesotho • Liberia • Malawi • Mozambique •  
Myanmar • Namibia • Nigeria • Panama •  
Papua New Guinea • Rwanda • Sierra Leone •  
South Africa • Tanzania • Uganda •  
Vietnam • Zambia • Zimbabwe



Administering the COVID-19 vaccine in Madhya Pradesh, India. Photo by Dr. Kaushik Ghosh.

# COVID-19

At the end of 2020, over 84 million cases of COVID-19 and 1.9 million deaths were reported to the World Health Organization (WHO). Just over a year later, the numbers had jumped to 458 million cases and over six million deaths. While every region experienced different waves, almost every health system and health worker were strained to their limits. The spread of new variants combined with inequitable access and use of tools to combat COVID-19, including vaccines and oxygen therapy, contributed significantly to the growth in both cases and deaths. CHAI has supported our partner countries to prevent, test, and treat COVID-19 since the beginning of the pandemic. In 2021, we continued that work.

## Supporting the rollout of vaccinations

The Africa Centres for Disease Control and Prevention (CDC) estimates countries on the continent have received close to a billion doses of COVID-19 vaccines, with slightly over 20 percent of the population fully vaccinated. In 2021, CHAI continued to help governments prepare for, acquire, and roll out available vaccines to their people.

**Rwanda** was among the first countries in sub-Saharan Africa to introduce COVID-19 vaccines. CHAI worked with the government and other stakeholders to build a national immunization plan to guide COVID-19 vaccine rollout in the country. We helped identify high-risk populations to receive the vaccine first, including health workers, people with co-morbidities, the immunocompromised, the elderly, and pregnant women. We supported the development of detailed implementation plans including community mobilization, procurement, distribution, and campaign monitoring activities. We also helped upgrade the skills of trainers at the national level who then trained other health workers at lower levels of care. As more vaccines were approved globally, CHAI also supported the rapid scale-up of new products in **Rwanda**. Today, all health centers in the country (over 500) are equipped to vaccinate patients against COVID-19. **Rwanda** was among the first countries globally to meet WHO COVID-19 vaccination targets with 41 percent of the eligible population receiving two doses by the end of December 2021. As of August 2022, over 95 percent of the population have received two doses and around 54 percent have received a booster dose.

Similarly, in **Cameroon**, CHAI leveraged past experiences in new vaccine introduction to provide critical technical assistance to the Expanded Program



**41%** of the eligible population in Rwanda received two doses of COVID-19 vaccine by the end of 2021, placing it among the first countries globally to meet WHO targets

on Immunization (EPI) as the COVID-19 vaccine was rolled out. CHAI supported the National Immunization Technical Advisory Group (NITAG) to make evidence-based recommendations on technical aspects of vaccine introduction, such as vaccine choice, priority groups to receive the vaccine, including health workers, and delivery model. We also supported the EPI to enhance the technical capacity of health professionals to offer COVID-19 vaccinations, including private sector pharmacies. As a result, health providers' vaccination rates rose from five to 59 percent within five months.

In **Burkina Faso**, CHAI conducted a nationwide cross-sectional serological and behavioral survey of close to 6,600 people of different ages, sex, and backgrounds. The study aimed to identify groups at high-risk of infection and gaps in knowledge, attitude, and practices towards the virus, to assess the acceptability of COVID-19 vaccines in the general population.

The Ministry of Health used the results to inform vaccination and communication strategies for the prevention and surveillance of COVID-19. For example, they used preliminary findings to prioritize four regions with the highest prevalence of the virus. The ministry also used the findings to prioritize populations willing to be vaccinated but living far from immunization sites.

In **Uganda**, CHAI supported the government to mobilize over US\$15 million to procure and deploy millions of vaccines through a series of funding applications to GAVI, the Vaccine Alliance. We also helped the government apply for and secure an additional US\$743,000 for technical assistance to support the country's accelerated mass vaccination campaigns. We helped the EPI update the national COVID-19 vaccination and implementation plan and related documentation ahead of the rollout of the campaign. Because of these efforts, by the end of 2021, over 12 million COVID-19 vaccines were administered, representing over 8 million—or 18 percent—of the population.

In **Lesotho**, there are only three public health testing sites for COVID-19 where polymerase chain reaction (PCR) testing is provided. To help increase testing, CHAI



**508% increase in COVID-19 testing sites and 134% increase in testing volumes across six CHAI-supported countries**

seconded 10 laboratory personnel to conduct COVID-19 testing at five busy land border posts in the country, ensuring people who arrive and leave the country are tested. This support provided an entry point for integrating community-level strategies into the overall national strategy for scaling-up COVID-19 testing. By December 2021, 359,031 tests had been conducted across the country.

Through nearly US\$1.45 million in funding from the Global Fund to support sustained access to testing, CHAI also supported the procurement of testing reagents and consumables, quantification and forecasting of COVID-19 testing, and treatment commodities and supplies including rapid tests.

In **India**, CHAI has been supporting the state governments of Bihar, Madhya Pradesh, and Uttar Pradesh in evidence-based decision-making and planning, leading to accelerated coverage of COVID-19 vaccinations. We supported the states in financial planning, managing cold chains and wastage, providing technical guidance for all stakeholders, and tracking the performance of the vaccination campaign.

Additionally, CHAI documented the COVID-19 vaccine campaign in Madhya Pradesh and Bihar to create a repository of knowledge for policymakers, public health practitioners, researchers, students, and general citizens for pandemic preparedness. These efforts have contributed to Bihar, Madhya Pradesh, and Uttar Pradesh achieving 100 percent coverage of the first dose and more than 90 percent coverage for both doses.

### Scaling up testing options

In 2021, CHAI continued to support global and in-country efforts to increase quick, affordable COVID-19 testing. Globally, we worked with suppliers to secure rapid antigen tests for low- and middle-income countries at affordable prices of under US\$4. We quickly secured and deployed donations of antigen test kits to over 15 high-burden countries. We also supported the development of testing guidance and tools and shared intelligence from our implementation experience to inform investments from donors, including the ACT-Accelerator for diagnostics, the Africa CDC-led Partnership to Accelerate COVID-19 Testing (PACT) Initiative and the Global Fund.

CHAI also conducted operational research and provided support to look at testing experience and implementation of antigen testing across six countries—**Cameroon, Democratic Republic of Congo (DRC), Ethiopia, Rwanda, Zambia, and Zimbabwe**—through the first half of 2021. This facilitated a dramatic expansion of testing volumes and increased access by decentralizing testing across lower-tier facilities and in the community. From November 2020 to July 2021, overall testing sites increased by 508 percent associated with a 38 percent increase for PCR (58 new sites) and a 978 percent increase for antigen (2,458 new sites). This increase in sites was also associated with a 134 percent increase in testing volumes, with PCR increasing by 8,690 tests (seven percent) and antigen increasing by nearly 567,400 tests (978 percent). This scale-up was attributed to a shift in testing from an 87 percent PCR-to-antigen testing ratio in November 2020, to a 39 percent PCR-to-antigen ratio by July 2021.

In addition, this allowed for more equitable coverage geographically, improved the identification of positive cases, and reduced processing times, which helped reduce transmissions. Countries were able to activate testing in all or most regions through the increase in testing volumes. Before CHAI support, in **Rwanda**, for example, large volumes of antigen tests (over 10,000) had only been administered in four districts. After the increase in antigen testing volumes, testing was made available in nearly all 30 districts in the country. While antigen tests made up two-thirds of total tests conducted, the tests identified 90 percent of total cases over the study period. In those surveyed, 92 percent of patients received antigen results in less than one hour and 98 percent within one to two hours. This is compared to PCR testing, which in most parts of the country took over a day to return results, and in several districts could take up to 12 days.

In our partner countries, we supported governments to catalyze the introduction and scale-up of COVID-19 testing services by securing ministry of health buy-in, updating policies, establishing supply chains and training systems, and improving referral to care. Taken together, CHAI's global and country efforts catalyzed the procurement of more than 31.9 million COVID-19 antigen tests, playing a critical role in global efforts to combat the pandemic.

In the **DRC** testing was not only limited to PCR tests, but also to the capital city of Kinshasa. Combined with the weak transportation system in the country, this meant millions of people living outside the capital did not have access to any COVID-19 tests. These circumstances hampered the rollout of the government's strategy of testing, tracking, and treating the disease. In response, the COVID-19 Technical Secretariat requested CHAI help review the country's



COVID-19 testing strategy. CHAI recommended the decentralization of COVID-19 testing and the introduction and scaling-up of new and existing rapid tests. We also demonstrated that antigen tests were more cost-effective, fast, and easy to use.

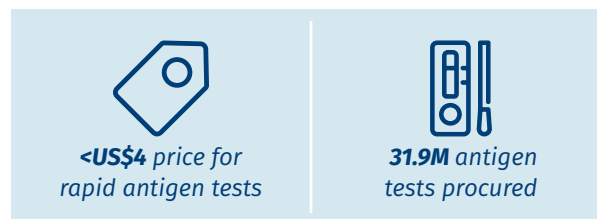
In 2021, we introduced and scaled up the first rapid tests in the country, prior to any long-term procurement funding. Through Unitaid support, CHAI supported the Ministry of Health to validate and quantify their need for the first antigen tests, implementing a donation of over 130,000 tests across 18 testing sites. With funding from the Bill & Melinda Gates Foundation, CHAI helped deploy 104 LumiraDX POC diagnostic devices and 40,000 rapid tests. CHAI also trained 204 laboratory technicians and 94 health zone members in the provinces of Kinshasa and Kongo Central and strengthened public-private partnerships to support underserved populations and increase access to testing services.

The Global Fund requested CHAI provide technical assistance to the Ministry of Health to expand antigen testing to an additional five provinces. This far exceeded the initial scope of the work, eventually training 288 health providers and scaling up rapid testing to 190 health facilities in seven provinces. Based on the success of the project, the Global Fund requested CHAI roll out antigen testing to 1,126 additional sites within Kinshasa province. With separate funding from FIND/IRD, CHAI also helped deploy more than 100,000 tests to 120 private clinics and points of care to increase testing coverage.

Overall, decentralizing and scaling up testing transformed the market in just under a year, increasing access to rapid testing from 5,000 tests in January 2021 to over 100,000 by December 2021, helping limit the spread of COVID-19 in the country.

During the pandemic, **Ethiopia's** Ministry of Health realized it lacked the capacity to easily detect COVID-19 and manage testing data. CHAI worked with the ministry to quickly scale up several antigen rapid diagnostic tests to supplement its PCR testing. These included tests from Abbott PanBio, SD Biosensor, and LumiraDx. The first two tests were rolled out to 118 sites, while training on the device-based LumiraDx test was provided to over 120 additional sites. Trainers of trainers further cascaded learnings to reach over 550 sites, effectively decentralizing testing and increasing access to those arriving via ports of entry and people who live in remote regions, including internally displaced people.

CHAI partnered with DHIS2 programmers at the Ministry of Health and supplier EdgeDx to introduce a new device, the Node, which supports the electronic collection of COVID-19 testing data even with unreliable



power supply. When the power supply is interrupted, the device holds any data collected, and transmits it for processing when power returns. This has been an essential tool as testing decentralizes, to quickly and reliably transmit testing data from remote sites to the central server.

In **India**, CHAI has provided support to various national and state government agencies to expand COVID-19 diagnostics since the onset of the pandemic.

CHAI supported the optimization of the supply chain for test kits and ancillaries, improvement of sample transportation, institutionalization of data-based decision-making, expansion of market access for commodities, decentralization of testing capacity, and galvanization of private labs to scale up testing to reach more people. CHAI also supported the national control room on data system harmonization and coordination. We helped deploy a fully functional, IT-enabled supply chain and inventory management system in less than 20 days to manage procurement and supply chain of kits across all COVID-19 testing labs through commodity forecasting, timely distribution, and stock management. These contributions augmented the country's daily testing capacity from 5,000 to two million tests per day.

At the state level, CHAI supported the government of Madhya Pradesh to reduce the cost of tests by more than 50 percent by reviewing and updating contracts with test suppliers.

In **Zimbabwe**, CHAI supported the development of tools to quantify and forecast rapid test kits needed, as well as monitoring and evaluation tools to measure the success of vaccinations in the country. With funding from the Gates Foundation and Unitaid, CHAI facilitated the procurement of 22,500 SD Biosensor and 48,000 LumiraDx rapid test kits and 124 LumiraDx point-of-care (POC) devices, which were distributed to 66 health facilities.

We also helped craft testing guidelines and supported scale-up of COVID-19 testing. Together with the National COVID-19 Laboratory Testing Pillar (comprising the Ministry of Health and Child Care (MoHCC) laboratory experts, WHO, USAID/PEPFAR, Centers for Disease Control (CDC), African Society for Laboratory Medicine, **Zimbabwe** National Quality Assurance Programme Trust, and local research institutes and

universities) we trained a team of 12 master trainers, who then trained 36 trainer of trainers from the 10 provinces of **Zimbabwe** on COVID-19 testing. In total, 700 health workers were trained to deliver COVID-19 rapid tests in their communities.

Access to testing was a challenge for rural communities due to long distances from health facilities. Through funding from FIND/ Interactive Research and Development (IRD), CHAI, in collaboration with **Zimbabwe's** MoHCC, piloted the use of community health workers in three districts (Gokwe, Gwanda, and Binga) to test in hard-to-reach areas. Approximately 60 community health workers were trained on COVID-19 testing and safe handling of samples, providing rapid testing to over 1,760 communities. Communities in hard-to-reach areas were able to receive their results in 20–30 minutes (at minimum), a time reduction from up to two weeks compared to PCR testing, which had to travel long distances to be completed at laboratories.

Demand for antigen tests in **South Africa** remained low heading into 2021. Health workers were unfamiliar with the antigen rapid test when it became widely available in the country—until then, antigen testing had only been used at ports of entry. Health workers continued

to request the more expensive and time-consuming PCR test. To help drive demand, CHAI organized a virtual COVID-19 antigen-training workshop. Almost 2,000 professionals from the public and private sector attended. Similarly, we engaged with provinces to introduce the rapid test to schools, universities, and other congregate settings. These measures have contributed to **South Africa's** high testing rate. The country accounts for 24 percent of all COVID-19 tests that have been taken in Africa—the highest number on the continent—at 21 million tests.

### Looking ahead

Moving forward, CHAI will continue to support partner governments to respond to the virus, including increasing equitable access to vaccines, improving access to testing, and making lifesaving treatments more available, including oral antiviral therapy for high-risk groups and medical oxygen. We will also continue work with governments, manufacturers, and other partners to build sustainable medical oxygen ecosystems in low- and middle-income countries both during the pandemic and beyond.

## Oxygen

Oxygen is one of the most important treatments for COVID-19, which requires two to six times the amount of oxygen than non-COVID patients in critical care. The pandemic has more than doubled the volume of oxygen needed to meet clinical demand. When the pandemic began, CHAI's prior work in oxygen for childhood pneumonia enabled us to leverage lessons learned for pandemic response.

COVID-19 brought many health systems to their knees; in 2021, CHAI prioritized supporting our partner governments as they increased access to oxygen to respond to the pandemic now and build more resilient health systems for the future.

### Global coordination to close the oxygen access gap

While the pandemic has highlighted the critical need for medical oxygen around the globe, lack of access to this lifesaving treatment has been a longstanding issue for many low- and middle-income countries. Over 90 percent of health facilities in these countries do not have pulse oximeters—simple, handheld devices used to measure blood oxygen levels—and fewer than half

have a reliable supply of oxygen. As a result, only 20 percent of patients in need of oxygen are diagnosed, and less than half receive it.

In addition to pneumonia and COVID-19, oxygen is used to treat low blood oxygen, or hypoxemia, when it occurs in a variety of medical conditions and emergencies including sepsis, preterm birth, trauma, or diseases such as malaria and HIV. Up to one in six children admitted to hospitals and up to 23 percent of sick newborns have hypoxemia. No matter the diagnosis, this condition can increase the odds of death sevenfold.

Since March 2020, CHAI has supported the World Health Organization (WHO) to provide guidance and technical support on oxygen therapy. Due to the unprecedented urgency created by the pandemic, governments and donors have committed billions of dollars to support the COVID-19 response, including procurement of pulse oximeters, oxygen therapy equipment, and consumables. The WHO convened a Clinical Care Consortium to secure and deliver equipment to low- and middle-income countries. CHAI initially leveraged existing relationships with manufacturers to quickly identify oxygen supplies and has since continued

supporting the consortium to develop tools for global coordination and national response planning such as equipment forecasts and rapid country capacity assessments.

On Feb. 25, 2021, the ACT-A Oxygen Emergency Taskforce was launched. Unitaid and the Wellcome Trust were announced as co-chairs, and several partners, including CHAI, were part of the founding members. Over the course of 2021, funding from the ACT-A partners was used to increase oxygen support to governments—for procurement, as well as maintenance and training. On Oct. 28, 2021, the ACT-A released a new strategic plan and budget seeking additional funding to enable the taskforce to continue to finance and provide oxygen supplies to low- and middle-income countries in need during 2022. As a result, many countries entered 2022 with a far greater capacity to meet the oxygen needs of COVID-19 patients.

### Increasing access to diagnosis and treatment for COVID-19 and beyond

Many patients experiencing hypoxemia are overlooked because facilities do not have the correct diagnostic tools or health workers have not been trained to see signs or understand symptoms.

Even when hypoxemia is diagnosed, oxygen may not be available to treat patients. Oxygen shortages are driven by constraints in supply, human resources, and funding, in addition to challenges in deploying resources rapidly and efficiently. Strengthening oxygen systems, including ensuring every sick patient is screened for hypoxemia using pulse oximeters and

all hypoxemic patients receive oxygen, can reduce mortality rates by as much as 50 percent.

As part of a consortium that includes PATH and the Every Breath Counts Coalition (EBC), funded by the Bill & Melinda Gates Foundation, CHAI supports country leaders to develop comprehensive respiratory care plans to meet the demands of COVID-19 and improve long-term access to oxygen and other essential respiratory care equipment within broader health systems. Then, in 2021, CHAI and PATH, with funding from Unitaid, announced a new program to provide catalytic procurement for the oxygen equipment countries needed to execute their respiratory care plans.

This work has enabled rapid assessments of respiratory care and capacity in 19 countries, with four more in progress. These assessments, along with comprehensive technical assistance, including demand quantification, technical specification review, and Pressure Swing Absorption (PSA) plant placement analysis, have helped countries articulate unfunded procurement needs.

To help donors and public health agencies rapidly address these procurements needs, CHAI and PATH completed a respiratory care supplier landscape which provided visibility into global and local supply options and lead times for delivery of lifesaving oxygen equipment to countries. This also included identifying local companies to provide after-sales services like installation and maintenance.

In **Ethiopia**, CHAI helped the Federal Ministry of Health prepare its COVID-19 response by developing an oxygen



CHAI Uganda Country Director Andrew Musoke (right) presents equipment, procured through Unitaid, to the Ministry of Health for distribution to health facilities across the country. Photo by Tanzi Media Ltd.



**7.5x increase** in oxygen access for hypoxemic patients after pulse oximeters were made available at every health center in Madhya Pradesh, India

generation gap analysis. The work was instrumental in harnessing extra production capacities from the private sector and supporting equipment quantification at the country's primary COVID-19 treatment center.

In **Cambodia**, CHAI used the quantification findings to guide a US\$1 million UNOPS/JICA investment into new PSA plants. The quantification enabled the Ministry of Health and partners to identify sites for the plants and outline technical and sizing specifications. CHAI supported the Department of Hospital Services to develop a national one-year oxygen preparedness plan and organize longer-term oxygen delivery post-COVID-19. In 2022, CHAI will help the government to implement this plan.

In **Rwanda**, CHAI supported the Ministry of Health to develop an oxygen scale-up plan that envisions a partnership with the private sector to install, operate, and maintain 11 new PSA plants and a hub-and-spoke model for cylinder distribution to lower-level hospitals.

In **Liberia**, CHAI immediately followed up assessment findings to quantify spare parts required to restore non-functional concentrators. The team then successfully advocated to partners to assist with filling this gap and invest in a unit to maintain the medical equipment.

In **Cameroon**, the Ministry of Health adopted a national oxygen strategy which has helped it advocate for greater investments in oxygen. Based on assessment findings, the ministry ordered PSA plants to be placed at 11 priority hospitals. In 2022, CHAI will help the government acquire and install oxygen tanks, reduce oxygen prices, and enhance the distribution network for oxygen cylinders.

In **Zimbabwe**, with support from Unitaid, CHAI supported the government to assess oxygen availability and existing bottlenecks to oxygen access. Like elsewhere, the large increases in oxygen need due to the pandemic exacerbated challenges that already existed with oxygen supply and delivery. Public health facilities rely on a single company for oxygen supply and storage such as cylinders and bulk tanks. CHAI is working to negotiate a decrease in the cost of oxygen both to address the pandemic and to help develop a comprehensive strategy to address access challenges in the long term. We are providing technical support including development of a strong, actionable

emergency oxygen plan targeted at national budget and international and local donors, assessing facility and equipment needs, and conducting a gap analysis. We are also assisting with demand quantification and cost-effective interventions while identifying potential donors or sources of funding for procurement and supply management.

Even before COVID-19, access to oxygen had been a challenge in **DRC**. With Unitaid funding, CHAI supported the Ministry of Health to conduct an oxygen therapy situational analysis in nine out of 26 provinces. CHAI collected data on oxygen requirements at treatment centers to determine the potential national need. The findings facilitated the development of a map of existing PSAs, both functional and non-functional. The government used this map to lobby donors such as the Global Fund to fix, replace, or move oxygen plants to locations that would increase access to the greatest number of patients.

Similarly, in **Sierra Leone**, the pandemic exposed existing shortages of oxygen availability. CHAI conducted an assessment to estimate the country's oxygen needs and identify capacity gaps that would need to be closed to meet daily usage as well as surges, such as during the pandemic. We supported the Ministry of Health in developing a long-term plan to guide the country's efforts to have a sustainable oxygen supply. With funding from the Global Fund, we also helped the country procure three PSAs. In addition, we helped the ministry determine where the oxygen plants would be located; prioritizing hospitals with the highest number of COVID-19 cases requiring oxygen therapy as well as hospitals that could support multiple nearby health facilities.

The demand for oxygen surged in **India** during the second wave of the pandemic in 2021. The sudden and significant number of COVID-19 patients severely strained the health system, which already had limited access to oxygen supplies or capacity to generate oxygen in health facilities. In response, CHAI supported the Ministry of Health and Family Welfare (MoHFW) to develop protocols, training modules, and data-reporting platforms for end-to-end installation and monitoring of 1,225 PSA plants via the Prime Minister's Citizen Assistance and Relief in Emergency Situations (PM CARES) Fund. These plants were installed and commissioned within a record span of six months.

CHAI also helped the states of Madhya Pradesh, Punjab, and Bihar coordinate with the national government for daily allocation of liquid medical oxygen tankers to the states. We helped drive adoption of online tools to more accurately and efficiently monitor oxygen availability, as well as forecast oxygen demand, and ensure that oxygen was delivered to the facilities most in need.

In collaboration with the All **India** Institute of Medical Sciences (AIIMS) Bhopal, CHAI helped draft and roll out the first-ever guidelines for rational use of oxygen and fire safety for health facilities. We also developed state-level action plans for a third wave of the pandemic and for long-term resiliency.

In 2021, as a result of these interventions, in Madhya Pradesh, hypoxemic patients' access to oxygen significantly improved from six to 51 percent, with pulse oximeters now available at every health center, and being used to measure patients' oxygen saturation far more often—up from seven to 97 percent over the year. In Punjab, CHAI's support to governments helped reduce wastage of oxygen by 50 percent by helping facilities track their oxygen usage. This was particularly important during the second COVID-19 wave.

Together with the Bill & Melinda Gates Foundation and ELMA Philanthropies, CHAI also provided support to **Cameroon, Ecuador, Guatemala, Lesotho, and Uganda.**

In **Uganda**, we worked to increase access to pulse oximeters, increasing supply and building capacity of health workers to use them through training and mentorship. As a result, hypoxemia screening of pediatric patients increased from 16 percent to 91 percent in target regions, resulting in nearly 3,000 cases of hypoxemia in children being diagnosed. The availability of pulse oximeters also helped improve identification and isolation of COVID-19 cases when tests were unavailable.

CHAI is also helping the government prepare to receive equipment, assisting the Ministry of Health and Child Care with coordination and distribution and training health workers and technicians on maintenance and installation. A monitoring system for equipment performance is being developed to streamline inventory management, maintenance schedules, and reporting. CHAI is also helping establish a redeployment plan for newly acquired equipment to ensure it remains functional once the pandemic subsides.

In **Ecuador** and **Guatemala**, assessments were conducted at priority hospitals, selected based on the number of patients treated with COVID-19, occupancy rates of ICUs, population size served by the hospital, and incidence rates of COVID-19. These assessments highlighted gaps in infrastructure and available equipment which we used to develop procurement plans.

In **Lesotho**, CHAI supported the Ministry of Health to establish the first-ever National Medical Oxygen Taskforce, of which CHAI is the Secretariat. The Taskforce includes a multidisciplinary group of stakeholders in global health and is responsible for developing a sustainable national oxygen supply,



**4.7x increase** in hypoxemia screenings in target regions of Uganda, resulting in ~3,000 cases in children being diagnosed

delivery, and management system. In 2021, CHAI helped the government map partners and resource commitments to scale up oxygen access in the country. We helped coordinate and conduct a nationwide medical oxygen landscape analysis that included all hospitals in the country. Findings from the assessment will inform a plan to scale up access to medical oxygen.

### Building an affordable liquid oxygen market

To alleviate supply and demand pressures on PSA plants in low- and middle-income countries, CHAI is working to increase oxygen supply through the liquid oxygen market. We began negotiations with private liquid oxygen suppliers on behalf of a consortium of countries to establish affordable liquid oxygen prices in the medium- and long-term and address infrastructure impediments, such as lack of bulk tanks, which drive up the cost of liquid oxygen delivery. To ensure sustainability, we are helping improve access to spare parts and maintenance services; upgrading facility infrastructure, such as piping networks; and strengthening logistics systems to transport oxygen cylinders.

In 2021, Unitaid and CHAI signed Memorandums of Understanding (MOUs) with liquid oxygen suppliers Linde and Air Liquide that are paving the way for increased oxygen supply.

In **Zambia**, more than 70 percent of COVID-19 admissions required oxygen therapy, creating a much higher demand than could be met by public production capacity in the country. Using the signed MOUs, CHAI worked quickly alongside the government, partners, and oxygen producer AFROX, to set up a functional system to optimize use of available medical oxygen. Lusaka and Copperbelt provinces represented well over half of all COVID-19 cases nationwide. As such, we focused on increasing the oxygen supply to the seven biggest health facilities in the two provinces.

We also worked with the government to review hospital preparedness for oxygen management of COVID-19 and shared lessons learned during the third wave of the pandemic. This resulted in practical changes to hospital staffing and oxygen cylinder distribution and storage, as well as better support from high-volume producing oxygen sites to smaller sites. This work stabilized oxygen supply in the seven initial hospitals and efforts are now underway to ensure additional

hospitals also can provide this life-saving care to patients.

Similarly, in **Ghana** and **Mozambique**, CHAI-led assessments identified hospitals that required immediate support. In **Ghana**, we worked with the Ministry of Health and Air Liquide, a liquid oxygen supplier, to establish a supply of liquid oxygen to Ho Teaching Hospital, which includes a COVID-19 treatment center. In **Mozambique**, where six hospitals were flagged for piping installation, The Global Fund to Fight AIDS, Tuberculosis, and Malaria and the United States Agency for International Development (USAID), funded the project. Additionally, we assessed PSA plants and plan to re-operationalize several plants that have been shut down.

### Looking ahead

Moving forward, CHAI aims to dramatically increase hypoxemia diagnosis and treatment for all patients in **Cambodia, Ethiopia, India, Kenya, Lao PDR, Liberia, Nigeria, Rwanda, Uganda**, and through lighter-touch support amongst a group of 20 additional countries. We also aim to reduce mortality with an emphasis on vulnerable and marginalized groups such as women, newborns, and children. The COVID-19 pandemic has highlighted the limited availability of oxygen services and the pandemic response, through mechanisms such as Global Fund's COVID-19 Response Mechanism (C19RM), has brought an unprecedented amount of respiratory care equipment to countries in need.

Translating the pandemic response into long-term, quality services will require building the underlying sustainable systems necessary to provide reliable, quality care, including systems to keep oxygen equipment up and running for its full lifetime and systems that consistently provide health workers with the right tools, processes, and practices to save lives. At health facilities, this means improving hypoxemia diagnosis by driving routine pulse oximetry screening to all patients in need and strengthening platforms that continuously reinforce good clinical practices. Across the health system, this means driving equitable oxygen access down into lower-level health facilities and creating healthy business ecosystems that are built on coordinated supply partnerships, supported by sustainable financing channels, and guided by strong data systems to serve health facilities at scale.

CHAI aims to dramatically reduce mortality due to hypoxemia by addressing four key barriers: (1) strategic planning, policy, and capacity building, (2) developing coordinated supply partnerships to increase oxygen availability, affordability, and reliability, (3) securing sustainable financing, and (4) strengthening data systems and management. Interventions in these areas mutually reinforce one another, and CHAI's ability to effectively plan and work with governments to create national strategies to manage oxygen systems will ensure the sustainability of these solutions.

## Leveraging our diarrhea and pneumonia program to respond to COVID-19

Diarrhea and pneumonia are the largest causes of death for children under five globally. Each year, 500,000 children die from fluid loss caused by diarrhea and 700,000 die from pneumonia. Almost all deaths occur in low- and middle-income countries where access to lifesaving treatments is limited.

Prior to the pandemic, CHAI supported scale-up of zinc and ORS for diarrhea treatment across **Ethiopia, India, Kenya, Nigeria**, and **Uganda**. Usage of zinc and ORS increased from under 1 percent to 24 percent over four years in program countries.

For pneumonia, CHAI identified pulse oximetry and oxygen as overlooked interventions. In severe pneumonia, antibiotics are needed. Children's lungs can fill with fluid quickly and they will often die from lack of oxygen before the antibiotics take effect. Oxygen therapy can buy the body the time it needs to allow the medicine to work and strengthening oxygen systems have been found to reduce pneumonia mortality rates by 50 percent.

Pediatric pneumonia pilots in these five countries uncovered a clear gap in access to oxygen therapy. CHAI developed targeted interventions to close this gap by shoring up weak supply systems, improving clinical practices around the use of oxygen therapy, strengthening data systems, and securing sustainable financing. This increased oxygen for hypoxemic pneumonia from 19 percent to 64 percent. Oxygen is also a critical treatment for COVID-19. CHAI's work on oxygen for childhood pneumonia helped us leverage those lessons to accelerate country response during the pandemic.



## STAFF REFLECTION

# Kimhong Gove

Program Manager, Oxygen, Cambodia

I used to work in consulting and finance. While I was outwardly successful, I constantly questioned myself inwardly. My regular check-in conversations with my boss centered on how many deals we'd closed and the income they generated. I questioned if profitability should be the only workplace value for which I should strive in my life. I wanted my life to be more than a balance sheet.

I grew up in a Cambodia-Thailand border province, Koh Kong, in the aftermath of the Khmer Rouge regime, under which one quarter of the Cambodian population died between 1975 and 1979. Armed factions would wreak much havoc in parts of Cambodia even until the 1990s. I wanted to be able to contribute more directly to the development of my country.

I joined CHAI in 2016, shortly after my graduation in public policy from the National University of Singapore. CHAI is my first employer in development. CHAI's mission and the way our core values are translated into daily practice continuously inspire me. One of these values—staff as our greatest asset—may sound cliché, but it is honored in CHAI's practices.

A flexible workplace is supportive of my new life chapter as a first-time mother while leaving me with a sense of professional accomplishment. Although flexible work schedules are on the rise globally and in Cambodia following the pandemic, they have been in CHAI's practice since I first joined the organization. This goes beyond mere flexibility of being present at the office; it carries symbolic meanings of understanding

and trust among human resources, managers, and teams. It is in our common understanding that staff choose to be with CHAI for the public good, and that staff are working hard in the best interest of the people we serve. As a new mother this allows me the privilege of taking calls from home, while staying close to my newborn.

Breaking a glass ceiling for women like myself to gain the confidence to take on more challenging tasks. It can be difficult for young women aspiring to be in leadership positions in Cambodia, where many gender expectations—such as women taking on the lion share of work in the household—remain. In the labor market, climbing the career ladder to a leadership position typically requires not only proof of capabilities to do the job, but other factors like age, ethnicity, language proficiency, and appearance. But at CHAI, for the past six years, I have been given many opportunities and resources to take on challenging tasks both within and outside of my official role to realize my full potential.

For instance, as a Malaria Senior Associate, I started CHAI's supports to the Ministry of Health on procurement and supply management of malaria drugs and started the plasmodium vivax radical cure pilot—an innovative treatment regimen which prevents malaria resurgence (which was then scaled across the country). I then started the oxygen program, which has been supporting the Ministry of Health in responding to COVID-19, but also in leveraging the large wave of oxygen-related investments for other diseases. For instance, we are helping coordinate the installation of over 40 Pressure Swing Absorption (PSA) plants—up from two in public hospitals before the pandemic. We are also ensuring these investments are paired with regular maintenance through strengthening a new cadre of biomedical engineers.

I could have never done these things without first being a given opportunity, second a good mentorship, and last a close collaboration with global teams which are a part of the structural and cultural fabric of CHAI. It gives me countless chances to overcome self-doubts by immersing myself in new and unfamiliar projects to show what I can deliver, even if I have never done it before. My promotion in 2020 made me the youngest manager at the CHAI Cambodia office at that time, allowing me to lead a multidisciplinary team of different backgrounds and age groups. I hope my journey can pave the way for other young women at CHAI and in Cambodia more generally. ●

# Hepatitis

Hepatitis B (HBV) and C (HCV) are highly transmissible viruses that can lead to significant liver damage, cancer, and death when left untreated. Over 354 million people are living with HCV and HBV and more than a million people die each year. Globally, there are three million new HCV and HBV infections every year.

A World Health Organization (WHO) report published in 2021 highlighted the notable progress made to reduce HCV and HBV infections since 2015, driven by significant reductions in treatment costs. HCV treatment coverage increased nearly 10-fold from one million people at the end of 2015, to 9.4 million less than a decade later. Direct-acting antiviral medications (DAAs) can cure more than 95 percent of HCV patients and HBV can be prevented through vaccination at birth.

Nevertheless, treatment scale up remains uneven across low and middle-income countries for both HCV and HBV. This is particularly true in sub-Saharan Africa where only 10 percent of people with chronic HBV infection are diagnosed and only 22 percent go on to receive treatment. Across the region, testing also remains staggeringly low. At least 95 percent of people in Africa are still unaware of their HCV or HBV status.

Global hepatitis cases are growing, driven largely by unsafe injections and drug use, as well as transmission from mothers to their babies. While HBV prevalence in children has significantly fallen to under one percent, timely access to the vaccine at birth, when it is most effective, remains limited. By 2040, deaths from HCV and HBV are expected to exceed those from HIV, tuberculosis, and malaria combined.

To address these gaps and reach 2030 elimination goals it is critical to increase case-finding and domestic and donor funding to equitably scale-up HCV and HBV prevention, testing, and treatment.

## Scaling up diagnosis, treatment, and prevention

Since 2016, CHAI has worked alongside governments in seven countries—[Cambodia](#), [India](#), [Indonesia](#), [Myanmar](#), [Nigeria](#), [Rwanda](#), and [Vietnam](#)—to introduce and expand access to testing, treatment, and prevention of HCV and HBV.

We are supporting government partners to simplify hepatitis programs and working with the private sector to lower costs and increase access to testing and treatment to reach more patients within existing budgets. We are helping governments target populations most vulnerable to hepatitis infection,

such as people living with HIV, people who inject drugs, and prisoners. At the same time, we are increasing access to comprehensive harm reduction services to reduce transmission and promote treatment with the goal of elimination. We are also helping countries integrate programs and develop strategies for triple elimination of HIV, hepatitis B, and syphilis to reduce death and disease in mothers and their babies.

In 2021, over 53,000 patients were treated with DAAs in CHAI-supported countries due to elimination commitments from [Rwanda](#) and [India](#) (along with targeted efforts in [Cambodia](#), [Indonesia](#), [Myanmar](#), [Nigeria](#), and [Vietnam](#)).

[Rwanda](#) is making significant progress on its five-year plan to eliminate HCV, driven by significant cost reductions for DAA treatment. Working with the Ministry of Health, CHAI helped reduce costs for the medications which have accelerated service scale up and saved the government over US\$30.5 million. CHAI also worked with the Ministry of Health to introduce a second line treatment for HCV, with an implementation study ongoing to generate evidence on affordable alternatives for low- and middle-income countries. [Rwanda](#) continues to strengthen its patient information system, scaled in 2020 with support from the Bill & Melinda Gates Foundation, to inform program decisions and monitor progress towards HCV elimination. As a result, the country has already screened over 5.5 million people and treated over 50,000—and is on track to eliminate HCV in 2024.

In [Nigeria](#), Nasarawa state also committed to a five-year elimination plan for HCV in 2020, prioritizing screening and treatment for people living with HIV on antiretroviral therapy (ART). Since 2020, CHAI helped the government screen more than 10,112 people living with HIV across 13 ART sites. Of the 14 percent found positive for HCV, 280 received confirmatory testing, and 57 were linked to treatment.

CHAI also supported Nasarawa and Kano states to design and pilot interventions to improve HBV birth dose vaccine coverage and prevent mother-to-child transmission. We helped governments increase health worker capacity, improve task sharing and decentralize care across secondary care facilities. At the national level, CHAI helped strengthen the monitoring and evaluation (M&E) framework to improve viral hepatitis reporting. Furthermore, we assisted the national technical working group to get global access pricing, reducing the cost of viral load tests by 53 percent. This pricing has been rolled out in focal laboratories



nationally. We are providing technical assistance to the working group to update a five-year national strategic plan and clinical guidelines to reflect WHO guidance.

In **Indonesia**, the cost of HCV treatment sofosbuvir was five to six times higher than the global price. CHAI and the community-based organization Yayasan Koalisi Satu Hati used CHAI's market intelligence report to provide global, regional, and country pricing information, which helped lower the price of the medication by 85 percent, bringing the cost of a 12-week treatment down from US\$700 in early 2020 to US\$105. This price reduction presents an opportunity to include DAAs in the national insurance scheme.

To strengthen testing, diagnosis, and oversight of service delivery, CHAI supported the Ministry of Health to mentor provincial and district health officers, directly training 550 health workers and program managers across 18 provinces. To better target key populations for HCV elimination, the national HIV and HCV programs, supported by the Directorate General of the Communicable Disease Center in the Ministry of Health, officially announced their collaboration in 2021. The programs instructed health facilities in 34 provinces to launch and accelerate HIV and HCV screening among overlapping populations. CHAI helped develop an HCV dashboard for use by the public and program managers at all levels of the health system. This dashboard is in use in selected health facilities in 18 provinces and by local non-governmental organizations. This work will help the government reach its goal of scaling up the HCV program nationally in 2022.

In **India**, the Ministry of Health and Family Welfare released a national factsheet on seroprevalence of HCV and HBV for the first time, providing insight into the hepatitis disease burden and its distribution across the country. In 2021, CHAI provided technical assistance to the government at state and district levels, built capacity of health workers on optimizing diagnostic and treatment supply chains, and helped states develop their viral load strategy. The state of Madhya Pradesh implemented a public-private partnership model with support from CHAI to meet the demands of viral load testing across all districts. The state also made significant efforts to reach its large population living with undiagnosed viral hepatitis. Diagnostic and treatment services expanded to 55 health facilities in 2021, up from 20 in 2019. By the end of the year, the state had also conducted over a million tests for HCV and HBV combined, as compared to 600,000 in 2020.

CHAI led a study to help the state of Punjab identify the reasons patients stopped treatment early, despite free diagnostic and treatment services. The study showed a lack of awareness among patients, compounded by long travel times, and poor staff quality. To address



**53,000+** patients treated with direct-acting antiviral medications in CHAI-supported countries due to elimination commitments

this, we worked with the government to decentralize hepatitis services to the lowest level of the health system, integrate with other government-led programs, and create linkages to care for high-risk groups. CHAI also helped the state build the capacity of health workers to use a management information system and ensure compliance along with strategic planning to achieve set targets.

In **Cambodia** around 900 people die from HBV and another 1,200 from HCV each year, yet funding remains limited. In 2021, CHAI continued to support the Ministry of Health's Communicable Disease Control Department (CDC), alongside partners, to advocate for the inclusion of the hepatitis program in the ministry's annual budgeting process. CHAI provided the CDC with operational support to roll out HCV services free of charge at district hospitals and primary care centers in 12 districts, using a small commodity donation from Médecins Sans Frontières (MSF). Following the Global Fund's approval to use the HIV program's grant funding to re-start HIV/HCV coinfection services, CHAI continued our support to the National Center for HIV/AIDS, Dermatology, and STDs. This included quantifying and forecasting sufficient HCV commodities to treat partners of people living with HIV, candidates for PrEP prevention, and the remaining people living with HIV who were not yet tested for HCV. We supported the CDC and WHO to draft the 2021 and 2022 annual operation plans, including different budgeting scenarios for program start-up. CHAI also contributed to the development of the prevention of mother-to-child transmission guidelines for triple elimination.

In **Myanmar**, CHAI supported the national hepatitis program to complete a comprehensive review of the country's progress against its first National Strategic Plan for Viral Hepatitis. The findings and recommendations from this review will guide the country's development of the next strategic plan. Due to political instability and the disruption of health services, CHAI widened engagement in 2021 to include non-governmental implementing partners to boost viral hepatitis service delivery beyond government sites. In 2022, we will work to strengthen M&E processes by establishing standard operating procedures and, in line with the strategic plan recommendations, a data-entry mobile application for use in low-resource settings and a multi-layered national-level dashboard for viral hepatitis. The



*85% price reduction for 12-week treatment course of sofosbuvir in Indonesia, bringing the cost down to US\$105*

dashboard will integrate reporting across existing public and implementing partner sites and will help the national program monitor the progress of HCV service delivery across the country.

**Vietnam** used reprogrammed savings from its last Global Fund grant in 2021 to initiate 4,800 people living with HIV on HCV treatment as part of its goal to treat 16,000 patients by mid-2022. As COVID-19 continued to prevent patients from accessing essential services at health facilities and limit outreach to the most vulnerable communities, the program expanded HCV services from ART sites to methadone maintenance therapy clinics. CHAI began providing technical assistance to build health worker capacity including the development of standardized training materials and enabling virtual monitoring and evaluation meetings between the national program and health facilities.

Beyond the co-infection program, CHAI and partners successfully advocated for the use of daclatasvir as a pan-genotypic regimen in the country's 2021 treatment guidelines. We helped build health workers and community-based organizations' capacity to provide HCV treatment through the development of job aides and a national training curriculum. In the next two years, CHAI will continue advocating for additional financing from Global Fund to provide HCV diagnostic and treatment for another 13,000 patients.

### Sharing results

In August 2021, CHAI published its second Hepatitis C Market Report. In addition to evaluating the HCV commodity market more generally, preliminary insights into the HBV commodity market were included. This report found discrepancies in the cost of treatment (tenofovir) for HBV compared to HIV accessed by governments in low- and middle-income countries. In 2022, CHAI is undertaking a scoping exercise to identify the drivers of this price variation to inform market-shaping efforts and catalyze price reductions for the medication.

In 2021, CHAI also collaborated with Coalition for Global Hepatitis Elimination (CGHE) on a study that showed that approximately 5 percent of patients fail initial HCV therapy, a small but important population that will grow as HCV treatment coverage expands. Currently there is only one second line regimen recommended

by the WHO, a branded product that is costly and unavailable in low-resource settings. CHAI supported an analysis to identify readily available, generic treatments that have been used as a second line therapy for patients in Egypt, Georgia, and **Myanmar** and evaluate treatment outcomes in those patients. The standard for evaluating the effectiveness of HCV treatment is the SVR12, when blood tests show a sustained virologic response (SVR), or no detectable amount of the virus 12 weeks post-treatment. The results of the analysis were encouraging: SVR12 cure rates were at least 90 percent across all the most common regimens being used. While more robust evidence is needed from clinical trials, these findings suggest that many patients have been able to achieve cure after being retreated with these affordable, generic treatment options.

### Looking ahead

In November 2021, the Global Fund board approved a strategy to support countries to integrate viral hepatitis prevention, diagnosis, and treatment within existing HIV services in which Global Fund already invests—including ART clinics, sexual and reproductive health, antenatal, and harm reduction settings. CHAI advocated for this more inclusive policy and will work with governments to explore how we can use Global Fund resources to further strengthen hepatitis programs.

Following CHAI's advocacy, Unitaid announced a call for proposals in December 2021, investing US\$20 million in demonstration projects to strengthen existing harm reduction efforts and evaluate new tools to prevent HCV among people who inject drugs in harm reduction and prison settings. Injecting drug use accounts for approximately 23 to 29 percent of new HCV infections and 10 percent of HIV infections globally. Alongside Global Fund commitments, Unitaid's investment will be essential to achieving both HCV elimination and HIV targets, and CHAI will work to support these efforts.

In highly endemic settings, HBV is commonly transmitted from mother to child at birth. Furthermore, HBV infection in infancy and early childhood leads to chronic hepatitis in about 95 percent of cases. Global guidance highlights the overlapping synergies across the cascade of care, including the testing and treatment of pregnant women and exposed infants, further driving momentum to integrate care across the diseases. We will also work to assist countries in achieving triple elimination of HIV, HBV, and syphilis among mothers and infants through adoption of an integrated, person-centered approach.



## STAFF REFLECTION

# Dr. Rahel Belet Balkew

Country Director, Ethiopia

I joined CHAI in January 2012 as Deputy Country Director for Ethiopia, overseeing programs and operations. In my role, I help create mutual understanding of our mission to save lives to drive collaborative leadership both at the country and global levels. My role is very interesting, but at the same time very challenging and demanding. Leadership is not only about inspiring others and adhering to our vision; it requires creating a growth mindset across the organization.

Prior to joining CHAI, I worked in the development sector in Ethiopia and Tanzania. What I have enjoyed most at CHAI is the conscious decision and commitment to avoid parallel systems, while at the same time striving to help strengthen systems already in place. The path that we follow at CHAI doesn't mean all we have started will continue as anticipated nor reach its maturity. However, acknowledging the local context and investing in the existing health system enables momentum to continue.

Urgency is one of our values at CHAI. The metaphor of rescuing people who are trapped in the mining field resonates with me almost every day. Life is priceless, and the thought of assisting an individual to live his/her full potential gives me energy to strive more and to push harder.

When the COVID-19 pandemic hit in late 2020, the projected impact on lives lost was very hard to comprehend. Prevention tools that are so effective in many parts of the world—such as frequent handwashing, physical distancing, and wearing masks—

are to some degree a luxury in Ethiopia. The health system is not strong enough to hold such magnitudes of sick people due to limited availability of oxygen services. In a country with a population of over 100 million, CHAI estimates show the oxygen production capacity meets only around 20 percent of the national demand (around three million m<sup>3</sup> a month; about half of which is non-COVID). Production capacity in the country is only 330,000 m<sup>3</sup> per month, coming from public and private PSA plants.

*“Life is priceless, and the thought of assisting an individual to live his/her full potential gives me energy to strive more and to push harder.”*

As a trusted partner to the Federal Ministry of Health, the government asked CHAI for assistance with the COVID-19 response in multiple areas, including procurement of oxygen plants. This was a huge task given the global supply shortage, limited experience both in-country and globally, logistics problems, and lockdowns. Despite all this, we managed to get two oxygen plants up and running in less than three months. This was possible due to strong partnership and collaboration by both the CHAI country and global teams. We worked together and supported each other—all while facing our own personal challenges including team members and families getting sick.

These experiences have made me persistent in pursuit of our mission and vision. The beauty of making our internal staffing matrix work comes out of these dark times. I treasure this most and the contribution towards life saved is mind blowing.

Kudos to all who made this possible! ●

# HIV/AIDS

Global efforts over the last two decades have demonstrated great progress in the HIV response: nearly 29 million people living with HIV globally are receiving antiretroviral therapy (ART) and AIDS-related deaths have fallen by 68 percent since their peak in 2005. Work to reduce new pediatric HIV infections has achieved significant gains, with 50 percent fewer infections among children worldwide since 2010 and 81 percent of pregnant women living with HIV now accessing ART.

Despite remarkable progress and commitments, the global community risks failing to reach epidemic control. Achieving the UNAIDS 95-95-95 targets will require all partners in the HIV response double down on efforts to prevent new infections, find the remaining children and adults living with HIV, and link and retain them on lifesaving treatment to prevent AIDS-related deaths and further HIV transmission.

We have the tools, strategies, and commodities to address many of these challenges. We now have a highly effective injectable HIV prevention option, HIV self-tests are nearly at price parity with professional use tests, lifesaving treatments for cryptococcal meningitis are becoming easier to administer, and we finally have optimal treatments for children and adults. What the global HIV response needs is ambitious political will, vision, and funding.

CHAI is working alongside ministries of health, communities of people living with HIV, and partner organizations to increase access to lifesaving care, treatment, and prevention services to bring us closer to eliminating HIV/AIDS as a public health threat.

## Increasing access to optimal treatment

Children often wait years, if not decades, to access the same optimal treatments available to adults. Pediatric treatment can be unpalatable, bitter tasting, and complex to administer. These factors contribute to poor treatment adherence and viral load suppression, often leading to premature death.

Building on the historically rapid tentative approval of generic pediatric dolutegravir 10mg dispersible and scored tablets (pDTG) by the U.S. Food and Drug Administration at the end of 2020, CHAI worked with ministries of health and other partners to achieve rapid adoption and transition children away from sub-optimal pediatric treatments.

We supported ministries to develop national implementation plans, quantify current and future treatment needs, monitor uptake and health outcomes, and develop and disseminate key messaging and job aids for clinicians, patients, caregivers, and other healthcare staff. We worked closely with communities of people living with HIV, including adults, caregivers and adolescents living with HIV, through the Optimal, Faith-based Action for Scaling up Testing and Treatment for the Epidemic Response (FASTER), and AIDS Free Community Advisory Boards (CABs) to prepare and advocate for rapid product introduction. We helped develop information, education, and communication materials, hosted community sensitizations, and diagnostic and treatment literacy trainings, which reached thousands of children and adolescents living with HIV and caregivers with information on the importance of testing and treatment.

With support from Unitaid, CHAI catalytically procured 100,000 packs of pDTG for [Benin](#), [Kenya](#), [Malawi](#), [Nigeria](#), [Uganda](#), and [Zimbabwe](#), which helped generate demand and evidence on early product experience to facilitate widespread rollout in these countries and beyond. Over 60 countries have now procured pDTG using the CHAI- and Unitaid-negotiated price with generic suppliers. CHAI is also supporting [Benin](#), [Nigeria](#), and [Uganda](#) with implementation research on pDTG rollout, including patient, caregiver, and provider experiences, as well as clinical outcomes. Early results from this research, as well as supportive supervision visits with caregivers and patients in other countries, have shown that children welcome pDTG's strawberry flavor and tolerate it much better than the previous standard of care.

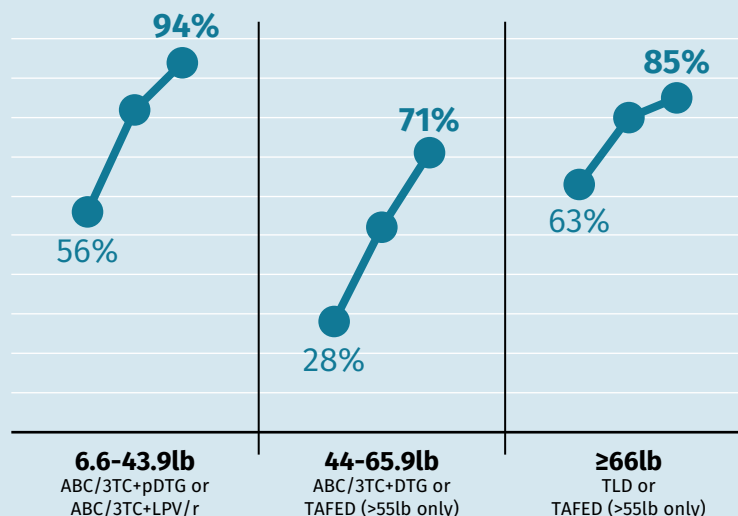
In addition to early adopter countries, CHAI is now helping other countries in sub-Saharan Africa and Southeast Asia introduce pDTG. In [South Africa](#), we have supported the National Department of Health by conducting modeling demonstrating cost efficiencies from adopting the treatment. We have also helped generic manufacturers with product registration applications with the South African Health Products Regulatory Authority (SAPHRA). In 15 countries, including [Cambodia](#) and [Lao PDR](#), we are supporting governments with pDTG introduction efforts, including training healthcare workers and stock status monitoring to ensure a stable supply of lifesaving medicines.

Percent of children living with HIV by weight band on optimal ART regimens in 245 pediatric priority sites in Nigeria, Tanzania, Uganda, and Zambia

Baseline: NG - Mar'20, TZ - Dec'19, UG - Sep'20, ZM - Dec'20

Endline: NG - Dec'21, TZ - Dec'21, UG - Sep'21, ZM - Dec'21

Sources: RADET files (Nigeria), CTC3 Macro Database (Tanzania), Uganda EMR, facility SQAs (Zambia)



In 2021, CHAI wrapped up the FASTER project, which ran under the leadership of Catholic Relief Services and was funded by PEPFAR through CDC. In **Nigeria**, **Uganda**, **Tanzania**, and **Zambia**, we continued efforts to institutionalize weight-based treatment monitoring and implement targeted quality improvement projects through health worker trainings, mentorship, and development of briefs and job aids to accelerate optimal ART uptake for children and adolescents. Optimal ART uptake increased dramatically across FASTER-supported sites in all countries and all weight bands: from 56 to 94 percent for children weighing 6.6 to 43.9 lbs; from 28 to 71 percent for children weighing 44 to 65.9 lbs; and from 63 percent to 85 percent for children and adolescents weighing over 66 lbs.

We continue to support our partner governments to scale up the optimal, single-pill combination of tenofovir, lamivudine, and dolutegravir (TLD). By the end of 2021, just over four years after first hitting the market, over 18 million adults in low- and middle-income countries were accessing TLD. Many countries, including the **Democratic Republic of Congo (DRC)**, **Kenya**, **Lao PDR**, **Malawi**, **Nigeria**, and **Tanzania** have transitioned over 90 percent of their first-line clients to TLD.

Although the work is not yet done, many countries have completed or are nearing the end of their first-line TLD transitions. As these first-line transitions end, many national treatment programs are now setting their sights on second-line treatment optimization.

Although DTG is very effective, additional options are still needed for people living with HIV who cannot tolerate DTG or experience treatment failure. Current options for treatment after failure on DTG are sub-optimal so CHAI and Unitaid have been working to accelerate access to darunavir/ritonavir (DRV/r),

which is a best-in-class option commonly used in high-income markets. In 2021 CHAI and Unitaid announced a groundbreaking pricing agreement with generic manufacturer Hetero Labs to supply a single-pill combination of DRV/r at a lower cost than the prevailing standard of care, bringing this treatment into reach of national treatment programs in low- and middle-income countries for the first time.

CHAI, with Unitaid funding, has catalytically procured DRV/r and is working with the ministries of health in **Nigeria** and **Zambia** to introduce this product to increase demand and encourage uptake in sub-Saharan Africa. Lessons learned from these initial rollouts will be disseminated to inform broader scale up globally.

Ongoing monitoring and pharmacovigilance are critical aspects of the treatment optimization process, and CHAI is supporting partner governments to better catalog and understand adverse events to ensure patient safety. Under the FASTER project, CHAI supported the Nigerian government to streamline reporting and review of adverse drug reactions (ADRs) for HIV treatment. Project-supported sites noted an increase in pediatric and adolescent ADR screening from 86 to 898 clients screened from January 2021 to November 2021. ADR reporting also increased from eight total reports nationwide between 2018 and 2020 to 66 reports in 2021 across eight FASTER-supported states transmitted to the National Agency for Food and Drug Administration and Control (NAFDAC).

In **Zimbabwe**, CHAI worked with the Medicines Control Authority of **Zimbabwe** (MCAZ) to train health workers to identify adverse events and report them immediately. To improve identification of adverse events and reporting, CHAI and MCAZ conducted pharmacovigilance training for 459 health workers in

24 sites in 2021, with the remaining 27 facilities to be trained in 2022.

### Preventing new infections

Treatment alone cannot end the HIV epidemic. Effective prevention interventions are also essential. While HIV infections have fallen over the past two decades, decline in annual new infections have plateaued. In some regions and populations infections are even increasing despite the rising number of people on treatment and the availability of highly effective prevention interventions, such as oral pre-exposure prophylaxis (oral PrEP) and voluntary medical male circumcision (VMMC). Further, key populations and their partners are disproportionately impacted, accounting for 70 percent of new infections globally in 2021. In Sub-Saharan Africa, girls and women between the ages of 15 and 24 accounted for nearly a quarter of infections in 2021 despite making up only 10 percent of the total population. Resources to support HIV programs have likewise plateaued and country health systems are increasingly being asked to do more

with less. Program integration and sustainability, particularly in the context of the COVID-19 pandemic, are an increasingly critical component of the HIV response. However, donor funding, national coordination, and program implementation models do not yet support a shared vision for sustainable and integrated HIV prevention programs.

Through the Sustainable Transitions to Resilient, Integrated Combination Prevention and Dissemination of Evidence (STRIDE) grant funded by the Bill & Melinda Gates Foundation, CHAI partners with governments and other key stakeholders in [Zambia](#), [Zimbabwe](#), and globally to advance sustainability and integration of HIV prevention programs.

In [Zimbabwe](#), this included developing an integrated HIV prevention district planning tool and launching the first comprehensive HIV prevention-focused resource mapping exercise. In [Zambia](#), CHAI helped strengthen program management and coordination, leading to the establishment of a quarterly HIV prevention technical partners meeting to share lessons, challenges,



*A mother and child receive pediatric DTG 10mg at a health facility in Malawi. Photo by Lighthouse Trust.*

and opportunities by national and subnational stakeholders.

In 2021, we continued work to introduce and scale up voluntary medical male circumcision—a highly cost-effective and proven intervention in many countries. Together with [Zambia](#) and [Zimbabwe](#), CHAI completed data collection and analysis for the second phase of the VMMC Transition Assessment Dashboards to measure progress toward country-defined sustainability targets. Representing the leading edge of such assessments in the HIV space, these dashboards' results informed annual program implementation and capacity planning for VMMC and other HIV prevention interventions.

Oral PrEP remains another essential tool for HIV prevention. From 2016 to 2021, as part of the Bill & Melinda Gates Foundation funded Prevention Market Manager grant, CHAI supported governments in [Kenya](#), [Malawi](#), [South Africa](#), and [Zimbabwe](#) to introduce oral PrEP and catalyze the expansion of these and other PrEP programs in the region. At the end of the grant, CHAI-supported countries accounted for over a quarter of cumulative oral PrEP initiations globally and over 36 percent in low- and middle-income countries.

In [South Africa](#), access to HIV prevention services and products, particularly oral PrEP became even more important during the COVID-19 pandemic. CHAI supported the government to engage health workers and direct resources efficiently through virtual trainings on oral PrEP implementation, including monitoring and reporting training uptake to provincial leadership. Over 250,000 people began oral PrEP between January and October of 2021 and by November, over 11,000 health workers had been trained on the virtual platform. In addition, CHAI presented tailored provincial reports on the latest available data on sexually transmitted infections (STI) highlighting the pivotal role of STI monitoring and management as a public health concern.

While further scaling and sustaining oral PrEP and VMMC remains critical, growing evidence highlights the importance of choice among highly effective prevention products as key to enable broad, impactful access. Many people at risk of HIV infection have expressed preference for longer-acting injectable HIV prevention products and multipurpose prevention technologies (MPTs). Several such products are in development and could soon be available, requiring advanced planning to ensure that health systems are prepared to deliver them.

Highly effective long-acting injectable cabotegravir (CAB-LA) received US FDA approval for HIV prevention in December 2021 and offers an opportunity to transform HIV prevention. With the support of the

Children's Investment Fund Foundation (CIFF), CHAI is advancing strategic supply-side analysis and planning for a set of promising near-term products in development, including CAB-LA. Analyses cover a range of inputs that will inform essential market interventions to ensure rapid and efficient introduction in low- and middle-income countries. We also worked in partnership with [Malawi](#) and [Zimbabwe](#) to execute preliminary country landscaping to identify priorities for health system adaption and strengthening to support delivery of these new products.

Also, with the support of CIFF, we are working as part of a consortium led by AVAC to plan for introduction of a dual prevention pill that combines oral contraception with oral PrEP. Should the product receive regulatory approval, this drug is positioned to be the first MPT to reach the market since male and female condoms, providing a much-needed additional option for individuals with contraception and HIV prevention needs.

Introducing new HIV prevention products, including CAB-LA and the dual prevention pill, could transform the HIV prevention space. Concerted global effort and collaboration is needed to realize potential impact. Ensuring advanced planning—and a focus on resilient, sustainable health systems—will enable rapid, impactful, and sustained delivery of available and coming prevention interventions to reduce new infections.

## Diagnosing and treating advanced HIV disease

People living with HIV that develop advanced HIV disease (AHD) are more likely to contract and die from opportunistic infections such as tuberculosis (TB) or cryptococcal meningitis (CM). A lack of screening and treatment for these opportunistic infections is a leading cause of death for people with AHD. In 2020, there were 650,000 AIDS-related deaths and of those 210,000 were from TB and 85,000 from CM.

CD4 testing is the gateway to the WHO's AHD package of care and is an essential test that indicates HIV disease progression and whether further diagnosis and treatment are necessary for a patient. Despite its clinical importance, data from 2020 suggested that an estimated 30 percent of people living with HIV on ART in low- and middle-income countries did not have access to timely CD4 testing.

Since announcing the Early Market Access Vehicle (EMAV) to expand access to device-free, same-day CD4 testing in 2020, Unitaid and CHAI have provided the VISITECT® CD4 Advanced Disease test at no cost to ten implementing partners and three ministries of health across 11 countries to catalyze demand and enable early user experience and evidence. By the end of 2021,

102,725 VISITECT® tests had been delivered globally. In **Tanzania**, CHAI partnered with the Elizabeth Glaser Pediatric AIDS Foundation to pilot the VISITECT® at 40 sites. Appetite for the test has been strong and in the first quarter of rollout 95 percent of clients that tested received same-day results and of those found to have AHD, 85 percent were linked to care. **Nigeria** has already adopted, procured, and included VISITECT® in multiyear supply plans for CD4 testing owing to improved turn-around time, as well as ability for use in hard-to reach locations. All participants share a common goal, to use this implementation to catalyze wider access to CD4 testing, resulting in faster, more equitable access to AHD-related opportunistic infection screening, prevention, and treatment within their respective regions.

In addition to CD4 testing, newly diagnosed people with AHD should be screened for TB and cryptococcal antigen (CrAg), which tests for cryptococcal antigenemia which leads to CM, using readily available rapid tests. We have supported governments in seven countries to catalyze access to TB LAM and CrAg testing, enabling access at low-volume facilities and opening the door to all countries seeking to decentralize AHD screening efficiently across lower-level and lower-volume sites.

In **Lesotho**, we have worked with the Ministry of Health to provide supportive supervision and clinical mentorship visits to health workers at selected AHD facilities. As a result, CD4 testing and screening for new and reinitiating patients increased by 57 percent, TB LAM use by 150 percent, and CrAg screening by 109 percent. By Q3 2021, 87 percent of AHD patients at these sites received a TB LAM test and 93 percent were screened for CM.

In **Zimbabwe**, we have supported the Ministry of Health and Child Care since 2020 to decentralize its AHD package of care in 24 sites, training 235 health workers to administer the VISITECT® test, screen for CM and TB in AHD patients, and administer CM treatment. By the end of 2021, over 9,700 VISITECT kits, other CD4, TB LAM, and CrAg tests had been procured. To address high staff turnover in **Zimbabwe**, partners are task shifting VISITECT® away from nurses to other health worker cadres, including microscopists, counselors, and lab technicians, with the aim of reducing the work burden on facility clinicians. This was possible following a CHAI-supported training of trainers' approach, where selected health workers partook in centralized training in order to take learnings back and share them with colleagues in their respective regions and facilities.

We also supported introduction and early roll out of flucytosine (5FC) and liposomal amphotericin B (L-AmB), both vital drugs recommended by the WHO for the treatment of CM. In **South Africa**, CHAI worked

with the National Department of Health and other partners to train medical officers, specialist physicians, and pharmacists on the management of CM and administration of 5FC. As a result, in 2021, CHAI helped distribute over 1,800 packs and train over 2,000 health workers across nine provinces. To date, **Botswana, Lesotho, Malawi, Nigeria, South Africa, Tanzania, Uganda, and Zimbabwe** have all received deliveries of optimal CM treatment commodities (5FC and L-AmB), and CHAI continues to work with procurement partners to ensure sustained access to these lifesaving commodities moving forward.

In 2021, we supported countries to conduct virtual and in-person technical working group meetings to ensure AHD, and specifically CM treatment, continued to be prioritized in national strategies. In addition, CHAI in collaboration with the CDC Foundation, Project ECHO, and Unitaid, hosted a series of AHD-focused webinars to provide continuing medical education for health workers and other stakeholders during the pandemic. These webinars had over 1,200 unique program participants across 96 countries.

### Supporting innovative testing strategies

In 2021, CHAI remained responsive in its support to ministries to mitigate the evolving impacts of the COVID-19 pandemic on HIV testing services, while continuing to work with programs to drive innovative, evidence-based strategies.

Specifically, CHAI supported routine analysis of testing and COVID-19 data to help monitor and mitigate disruptions. Response strategies included transitioning critical activities to virtual platforms and adopting new delivery models, such as HIV self-testing (HIVST). With funding from the Bill & Melinda Gates Foundation, we helped **Zimbabwe** drive expanded use of HIVST both in response to the pandemic and also in line with longer-term strategic scale-up of HIVST as an integral part of the national testing program. This included developing guidance and virtual trainings of trainers. Similarly, in **Uganda**, CHAI supported a national level training of trainers on HIVST distribution. We also helped revise guidance as the pandemic evolved, restoring in-person services that were suspended at the onset and integrating HIVST into additional delivery channels. In **Zambia**, we helped expand access to self-testing by revising guidance on HIVST use during COVID-19 and evaluating additional products to increase choices available to clients.

CHAI also generated evidence on the use of HIVST among high priority populations, including adolescents, caregiver-assisted use among children between the ages of two and 11, and pregnant and breastfeeding women and their partners to inform



government HIV testing policy and self-testing scale up. In **Uganda**, under a PEPFAR-funded project, trained peer distributors handed out HIVST kits to adolescents for their own use (primary distribution) and for them to share with their social networks (secondary distribution). Results informed revisions to national guidance to include adolescents 15 to 19 years old as a target population for HIVST. Under the same project, the use of HIVST for maternal HIV retesting during pregnancy and postpartum was demonstrated in **Nigeria**. Pregnant and breastfeeding women and their partners were provided self-tests to improve coverage of maternal retesting timepoints according to national guidance. The demonstration found a majority of seroconversions for women occurred before 72 hours postpartum and helped bolster national commitment for strategies to improve maternal retesting coverage, including through use of HIVST.

Finally, with ELMA Foundation support in **Nigeria**, we helped roll out self-testing for (caregiver-assisted) children via index testing services, adolescents and young people via peers, and pregnant and breastfeeding women via traditional birth attendants in the community. While uptake was low, there are promising results with 85 percent of those reached being first-time testers and a positivity rate of 3.4 percent among adolescents.

HIV testing drives demand not only for treatment, but also for prevention interventions such as PrEP, which can significantly reduce the risk of infection. With large gaps in treatment and prevention access, supporting countries to strengthen national HIV testing programs is more important than ever. CHAI worked with both national and global stakeholders to drive consensus for data-driven HIV testing strategies that will enable countries to reach their treatment and prevention goals across all populations. This included the dissemination of findings from an adult screening tool evaluation in **Uganda** that demonstrated the challenges and limitations to using paper-based risk screening tools to screen people out of HIV testing at health facilities. As an alternative, CHAI modeled the impact of distributing HIVSTs to clients visiting facilities to increase access to testing and decrease the burden on health workers. Findings from this modeling led to a partnership with **Uganda** and **Zimbabwe** to explore the operational feasibility of this service delivery model to increase testing uptake among clients while reducing the burden on health workers.

During the COVID-19 pandemic, increasing point-of-care early infant diagnosis (POC EID) was even more crucial to ensure the timely return of results and linkage to care during a time of increased service disruptions. CHAI supported ministries to strengthen and expand uptake of POC EID in **Nigeria**, **Tanzania**, **Uganda**, and

**Zambia**, under a PEPFAR-funded project. Overall, we supported the strategic placement and activation of 158 POC devices across these countries. To support utilization, CHAI provided comprehensive health worker training and routine mentorship, strengthened supply chain management to facilitate stock availability, and improved data connectivity at facilities to enable national monitoring. To increase demand for EID and complement this work, we helped develop tools to identify HIV-exposed infants at alternative entry points and developed mother-infant pair tracking tools to improve retention of mothers and infants through the end of the EID testing period. Across program countries, the national proportion of infants tested for HIV on POC platforms doubled, in part due to contributions from this work.

CHAI also helps partner countries identify and implement targeted testing strategies at facilities and in communities to identify older and harder-to-reach children most at risk who should be prioritized for HIV testing. In **Zambia**, we helped develop, validate, and determine operational feasibility of a pediatric HIV symptomatic risk screening tool through three study phases, with support from the ELMA Foundation. The study was conducted in high-volume wards in 30 randomly selected public health facilities, with 11,266 children 18 months to 14 years old enrolled. Six questions were determined to be best for inclusion in the tool, with high sensitivity of 84.6 percent and specificity of 64.6 percent. Through this screening tool, only children identified by the tool as at risk are tested, reducing the number of children who need to be tested to find a single child with HIV by 60 percent, from 76 to 32. This tool will increase testing efficiencies in high volume wards and improve overall pediatric HIV case finding, when used in conjunction with other proven pediatric testing strategies.

## Looking ahead

To achieve sustained epidemic control and improve and save the lives of people living with or at risk of HIV, CHAI will deliver transformational impact by: catalyzing the rapid development and introduction of optimal HIV products and services; working in partnership with governments and communities to build resilient, sustainable, equitable health systems; and through the principle of ensuring that people—no matter who they are or where they live—are at the center of the HIV response.

## CROSS-CUTTING EXPERTS:

# Diagnostics

*Our programs aim to save lives and reduce disease, while helping governments create sustainable health systems. Our teams of science, business, and technical experts work with program and country teams across the organization to support that goal. Throughout this year's Annual Report, we will highlight the collaboration between our cross-cutting groups and our program and country teams.*

Accurate diagnosis requires the right mix of affordable, quality technology and health system efficiency. The Global Diagnostics team supports countries to improve laboratories and testing infrastructure and introduce and scale up new technologies so that patients can be diagnosed accurately and quickly in order to begin treatment sooner.

In 2021, the Diagnostics team worked closely with other CHAI program and country teams to deliver products used to diagnose and monitor COVID-19, HIV, tuberculosis (TB), cervical cancer, malaria, diabetes, and hepatitis.

### Determining the right tools for the job

We close critical gaps in testing services by establishing quality diagnostic systems, especially for primary healthcare. We achieve this through evidence generation and catalytic adoption, followed by government-led national scale up for technologies and systems that are proven to work.

In 2021, we wrapped up a 10-year partnership with Unitaid to develop and scale up point-of-care (POC) HIV diagnostics in low- and middle-income countries. Working with 12 countries including **Cameroon, Democratic Republic of Congo (DRC), Ethiopia, Kenya, Malawi, Mozambique, Senegal, Tanzania, Uganda, and Zimbabwe**, the partnership resulted in several major successes. Working on the supply and demand sides of the market, we catalyzed the creation of the HIV point-of-care testing market in sub-Saharan Africa. This included bringing CD4 testing, early infant diagnosis (EID), and viral load testing closer to home for hundreds of thousands of clients and significantly reducing test result turnaround times so that those who need it can get on treatment faster.

The project is estimated to have saved 11,183 children's lives between 2016 and 2021 because of POC EID scale up. By 2025, we expect the project to save close to 54,000 children's lives. Additionally, the project helped our 12 partner countries save over US\$18 million between 2016 and 2021, with those savings expected to nearly quadruple to more than US\$68 million by 2025. These savings are largely due to the introduction of all-

inclusive pricing with the Hologic testing platform and the reduced price of POC tests.

To support the scale up of the market, CHAI regularly monitored and assessed our activities, producing studies on the impact of point-of-care molecular testing on early infant diagnosis, viral load monitoring, and the feasibility of integrating TB and HIV testing on the same GeneXpert platform. The evidence generated through these studies contributed to updated HIV guidelines from the World Health Organization (WHO).

In 2021, we also provided support to cervical cancer and TB programs. For example, in **Zimbabwe**, cervical cancer screening programs that use traditional clinician-administered testing to identify women with pre-cancerous lesions have had limited success. This is due to shortages of health workers to perform the test and patients, many of whom prefer to self-collect samples. CHAI generated evidence to show that clinician- and self-collected sampling at public health facilities in **Zimbabwe** were both effective. The Ministry of Health now recommends self-collection as routine practice and this policy change is expected to increase access to screening, especially among women in underserved communities.

At the request of the Bill & Melinda Gates Foundation, CHAI worked with stakeholders in **India** and **South Africa** to evaluate the potential for future TB diagnostic tools—a tongue swab for sample collection, the lateral flow TB-LAM test, or the point-of-care nucleic acid (molecular) test. Our model showed that widespread adoption of both tongue swab and point-of-care nucleic acid testing could expand access to testing and lead to a 24 percent increase in case-finding in both countries. These findings have informed product development investments and could inform future programmatic scale-up.

### Increasing COVID-19 testing

CHAI continued to play a leading role globally and within our partner countries to guide COVID-19 response efforts. Globally, we built on a 2020 agreement to make rapid antigen tests available for US\$5 for low- and middle-income countries, further

reducing the price to US\$3.50. In 18 countries across sub-Saharan Africa and Asia, as well as regionally in Latin America, we supported governments to catalyze the introduction and scale-up of COVID-19 testing services. Our efforts helped catalyze the procurement of more than 31.9 million COVID-19 antigen tests, playing a critical role in global efforts to combat the pandemic. For example, in **Cambodia**, COVID-19 has significantly strained laboratory infrastructure, but has also demonstrated the country's capacity to expand diagnostic needs while maintaining routine services. CHAI is supporting the Ministry of Health to integrate COVID-19 testing into lab systems for the long term, while also building diagnostic capacity for HIV, TB, and malaria among other diseases. In 2021, we completed a needs assessment that provided an overview of the country's laboratory network and can inform the government's plans to further integrate services.

### Optimizing laboratory networks

Diagnostic network optimization (DNO) is an analytical approach meant to better align demand with testing capacity. DNO looks at optimal type, number, and location of diagnostic services and referral networks that work together to provide patients with the greatest access to services and the quickest test result delivery times, while maximizing efficiency to help limited government budgets go further. In 2021, CHAI worked with ministries of health in **DRC, Rwanda, Senegal, Uganda, and Zimbabwe** to complete DNO exercises with a focus on point-of-care integration for HIV testing services. The resulting recommendations include device movements and upgrades, additional optimal placement of testing capacity, and changes to referral assignments allowing optimizing device use and reducing sample transport distances. These network changes contribute to shorter result turnaround times as an outcome of reduced sample transport distances and less sample backlog at testing sites. Recommendations have been approved and implementation is ongoing in **DRC, Rwanda, and Zimbabwe**.



**11,183** children's lives saved as a result of our 10-year partnership with *Unitaid scaling up point-of-care HIV diagnostics*

The Africa Health Diagnostics Platform (AHDP) similarly aims to expand the capacity and effectiveness of government-run laboratory systems through partnerships with private companies. First funded by the Bill & Melinda Gates Foundation in **Ethiopia, Ghana, Rwanda, and Kenya**, the project expanded in 2021 to include support from the European Investment Bank to do similar work in **DRC, Côte d'Ivoire, Malawi, and Burkina Faso**. An example of the work includes **Ghana**, where we supported the government to conduct the first national Sickle Cell Disease baseline survey and roll out the first national newborn screening program for the disease.

With funding from the Bill & Melinda Gates Foundation, CHAI conducted the most comprehensive national survey on **Burkina Faso's** laboratory sector undertaken in the past decade. We evaluated operations, HR capacity, service and equipment quality, and biomedical waste management in over half of all labs across the country. The data generated will inform the Ministry of Health's strategy moving forward, including how to better integrate private sector partnerships.

### Looking ahead

Successes in 2021 laid the groundwork for expanded work in the next year, which will advance increasingly integrated and cost-effective diagnostic networks in the countries CHAI serves in order to ensure patients are diagnosed quickly, affordably, and accurately.

# Malaria and Neglected Tropical Diseases

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 most of those deaths. Pregnant women, people living with HIV, mobile populations, and travelers are also high-risk groups. Most malaria cases and deaths occur in sub-Saharan Africa, although Southeast Asia, the Western Pacific, and parts of the Americas are also vulnerable. Interventions such as bed net distribution and indoor spraying of insecticides to kill or block the mosquitoes that transmit malaria, 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 is supporting over 20 governments across Africa, Latin America, the Caribbean, and Southeast Asia to strengthen surveillance systems for the timely collection and analysis of high-quality data, and to increase the quality and coverage of case management services and vector control.

In 2021, CHAI's malaria portfolio continued to expand and evolve. We intensified our fight against malaria in West Africa, where the burden is the highest in the world, and initiated dedicated support to [Angola](#) and [Papua New Guinea](#) (PNG) for the first time. In July 2021, the CHAI-supported region of Escuintla, [Guatemala](#) had zero cases of malaria for the first time ever. This area formerly experienced the highest number of cases in Central America. As a result, the state was the 2021 winner of the Pan American Health Organization (PAHO)'s malaria champion of the Americas. Today [Cambodia](#) and [Vietnam](#) are both on pace for dramatic 70 percent drops in the number of cases in 2021, keeping them on track to eliminate drug-resistant plasmodium falciparum in the near term.

Based on these successes, CHAI is now applying the same approach to help neglected tropical disease (NTD) programs better use data to make impactful decisions. Our work in digital health across disease areas expanded and became more integrated.

## Strengthening surveillance and data analysis

Routine surveillance systems are the backbone of an evidence-based approach to reducing malaria transmission. Integrating high-quality information on

where malaria cases are occurring including data on malaria vectors, interventions, and commodities allows a malaria program to monitor trends and transmission. In addition, programs can easily assess gaps in intervention coverage and commodity availability, behaviors of mosquitoes that transmit malaria, and evaluate what is working and where improvement is needed. CHAI helps governments increase the timeliness, completeness, and quality of reporting of by formulating surveillance policies and guidelines and developing standard operating procedures and data collection tools. We also do this by helping map geospatial data or geographic coordinates of health facilities and sources of transmission, and populations at risk. We also support governments with the design, development, and roll out of improved health informatics tools for timely and complete reporting and data visualization.

2021 has been an exciting year for our health informatics work, CHAI made progress in expanding our work on digitizing monitoring and evaluation (M&E) for indoor residual spraying (IRS) and bed net campaigns, as well as integrating public health campaigns across malaria, immunization, NTDs, and other campaigns.

In [Mozambique](#), CHAI ramped up reporting into the newly released Integrated Malaria Information Storage System (iMISS) which helps to centralize, manage, and analyze all malaria data. We developed data review guides and helped simplify and upgrade iMISS dashboards to improve data ownership and routine review/feedback loops. Furthermore, an integrated surveillance grant allowed for the development and roll out of an electronic Integrated Disease Surveillance and Response (IDSR) system to over 1,700 facilities (161 districts) nationwide that integrates malaria, COVID-19, and other notifiable disease data. When the system is complete, it will resolve longstanding data fragmentation issues and enable timely data transmission from facilities to district and national levels.

In [South Africa](#), we spurred an agreement to permit CHWs to test for malaria for the first time. We also trained over 65 malaria surveillance program and management staff including environmental health practitioners, information officers, data capturers, and entomologists to better distinguish between indigenous and introduced cases—a mandatory

requirement for a malaria elimination program. The exercise led to an improvement in the quality of entomological surveillance data staff collects, which has resulted in improved program decisions.

In **Zimbabwe**, CHAI supported DHIS2 updates for case-based surveillance in districts close to malaria elimination, resulting in an increase in the case investigation rate from 62 percent in 2020 to 85 percent by the end of 2021 to limit disease transmission. This also enabled the availability of case-based surveillance data to develop a weekly elimination bulletin shared with district and provincial managers for feedback and prompt response to any surge in malaria cases. This catalytic support will ensure sustainability in evidence-based decision-making to respond to outbreaks in malaria-susceptible areas. We trained 30 district and 25 provincial managers in using the DHIS2 indoor residual spraying (IRS) dashboard to assess real-time data for decision-making during the spraying seasons.

### Increasing quality and coverage of case management services

CHAI aims to increase access to quality diagnosis and treatment by helping countries prioritize, plan and evaluate context-appropriate malaria management strengthening activities. Depending on the context, these efforts include helping governments streamline commodity distribution by integrating health information and logistics data systems, introducing tools and processes to improve case management practices in both the formal public sector and informal private facilities, as well as improving the design and management of community health worker programs.

In **Lao PDR**, CHAI developed a new national malaria commodity quantification dashboard on DHIS2, and methodology to calculate stock levels, which demonstrated an 11 percent improvement in predicting consumption. We trained the National Malaria Control Program (NMCP) staff, including health workers in over 1,200 facilities in using the dashboard for routine reviews. We observed a 14 percent improvement in supply within one year of use despite COVID-19 interruptions. In addition, we helped phase out the outdated, duplicate stock data system (ODK) the Lao NMCP was using, resulting in a 12 percent increase in reporting timeliness of stock levels (from 79 percent) in nine months from the transition.

Working with the Center for Malariology, Parasitology, and Entomology (CMPE) and World Health Organization (WHO), CHAI helped to refine data collection tools and guidelines for the national rollout of *Plasmodium vivax* (*P. vivax*) radical cure, which kills dormant mosquito parasites in the liver of infected individuals. Following the pilot at 385 health facilities, we facilitated the



*In July 2021, the CHAI-supported state of Escuintla, Guatemala had **zero cases of malaria** for the first time ever, winning the PAHO Malaria Champion of the Americas Award*

national rollout of quantitative G6PD testing, which checks if primaquine, the treatment for *P. vivax* radical cure, is toxic to certain individuals. CHAI also assisted the national program with the development of job aids and training materials and setting up a dashboard to track radical cure indicators for monthly reviews to monitor coverage, compliance with national treatment and testing guidelines, and identify operational challenges. The proportion of patients with *P. vivax* who received G6PD testing increased from 34 percent in January 2021 to 78 percent in September 2021.

In **Burkina Faso**, the malaria commodities forecasting tool presented several challenges for the National Malaria Control Program and technical partners. The data were analyzed in separate documents and entered manually into the tool; there were difficulties in updating the calculations and assumptions each year, and conflicting versions of the tool were used simultaneously, making it difficult to ensure standard outputs. To address these challenges, CHAI developed a new tool that follows the same general methodology, but is easier to update from year to year, contains validation formulas, minimizes manual data entry, and includes graphs and charts to help users visualize trends and gain insights for decision-making. CHAI and the NMCP tested the tool to ensure that the functionality and outputs aligned with the previous tool while providing an easier-to-manage and more automated format. Training of NMCP supply chain staff on the new tool will take place in Q1 2022, after which the NMCP will officially transition to it.

We also helped the NMCP to mobilize resources to train community health workers (CHWs) on the safe delivery of services during the COVID-19 outbreak. We procured personal protective equipment worth over US\$300,000, including surgical masks, cloth masks, face shields, surgical gloves, hand sanitizers, and handwashing buckets, and distributed them to over 5,300 CHWs that support about two million of the population.

In the **Dominican Republic**, the CHW network that we helped set up and manage contributed to reductions in the country's total malaria incidence from 92 percent in 2019 to 40 percent in 2021, largely driven by reductions in malaria cases in the CHAI-supported La Cienaga and Los Tres Brazons regions.

In 2021, CHAI also concluded a three-year Unitaaid-funded Community Access to Rectal Artesunate

(CARAMAL) project to introduce rectal artesunate, the recommended pre-referral drug for children with severe malaria, among 8,000 CHWs in **DRC**, **Uganda**, and **Nigeria**. The consortium of partners led by CHAI showed that by the end of the project, over 80 percent of children were receiving rectal artesunate at the community level.

### Increasing quality and coverage of vector control and chemoprevention

CHAI helps countries choose the right tools for the right activities in the right places. We help countries target next-generation vector control products based on rigorous studies on mosquito behavior, environment, and response to insecticides. CHAI also helps malaria programs strengthen processes for implementing quality, efficient vector control interventions, including creating detailed operational plans, documenting procurement processes, and timelines to navigate complicated tendering processes and avoid delays in product delivery.

At the global level, CHAI kicked off the first year of five of the global malaria commodities forecasting project, which aims to provide visibility for donors, manufacturers, and other stakeholders into the market landscape for malaria commodities such as insecticide-treated nets, insecticides, treatment, and diagnostics. We published the first annual short-term procurement forecast with projections of donor-funded procurements for the next one to three years across a range of case management and vector control commodities, broken down by commodity type, now hosted on the RBM global malaria dashboard. In addition, we compiled our first deep dive report on the market for piperonyl butoxide (PBO) nets to synthesize current research around PBO net use and to contribute to ongoing global discussions around the likely future directions for these net types.

CHAI helped **Mozambique's** and **Namibia's** malaria programs access funds from the Global Fund's COVID-19 response mechanism to adapt and maintain bed net distribution, IRS campaigns, and digitize data collection and reporting for the 2021 net campaign. In **Namibia**, we helped decentralize microplanning for IRS to facilitate safer training for spraying officers. We convinced the **Mozambique** malaria program to increase the distribution frequency of insecticide-treated nets (ITNs) from the standard every three years to two and a half years based on data showing that net durability was shorter than assumed and longer net usage increases the number of malaria cases. We also responded to the humanitarian emergency in Cabo Delgado and the resulting challenges with access to care and prevention among over 600,000 internally displaced people in one of the world's highest malaria-

endemic regions. We helped the NMCP to coordinate an emergency mass drug administration campaign, which delivered over 400,000 malaria treatments to displaced people to suppress malaria before upsurges could occur.

In **Panama**, CHAI helped the ministry of health strengthen IRS spray quality and planning at the central and regional levels by performing IRS spray quality and durability tests in one region of the country. We have assisted the malaria program to develop and implement IRS microplanning templates, an instructional manual to support planning, and a field guide for IRS implementation which includes WHO guidelines for IRS supervision, spray technique, spray pump calibration, household preparation, and community mobilization. We have also trained health workers to implement entomological surveillance and have supported malaria guideline updates and the national quantification of entomological surveillance supplies needs, including human resources and equipment.

### Looking ahead

Neglected Tropical Diseases (NTDs) are a diverse group of over 20 infectious diseases that affect more than a billion people worldwide. NTDs often overlap geographically with malaria incidence, and most are similarly transmitted by vectors including mosquitoes and flies, meaning that they can be prevented through similar measures as those used to fight malaria. Today, the largest efforts against NTDs involve the delivery of preventive chemotherapy through mass drug administration—population-wide distribution of drugs such as ivermectin and albendazole to cure and prevent five diseases: lymphatic filariasis, schistosomiasis, soil-transmitted helminthiasis, onchocerciasis, and trachoma.

Operating under significant resource constraints, national NTD programs need to make data-informed decisions to improve strategic planning, strengthen surveillance to understand where transmission continues, better target campaigns to where they will be most impactful, and manage campaign operations to ensure these costly programs achieve their goals. For years, CHAI has been helping governmental malaria programs with exactly these sorts of improvements, and so we see clear opportunities to expand our efforts to ensure NTD programs similarly benefit from enhanced surveillance, digital tools, modeling and mapping, and management improvements.

To leverage our malaria work to reduce the burden of preventable, treatable NTDs, we have begun to help NTD programs improve their collection and use of data to improve program performance.



## STAFF REFLECTION

# Dalavone Sengamphay PSM

TB/HIV program Manager, Lao PDR

Before I began working with CHAI five years ago, I worked as part of the Ministry of Health Global Fund Principal Recipient (PR) Office for Lao PDR for over 12 years. In the national PR office, I was part of the team that was responsible for overseeing the country's supply chain for HIV, TB, and malaria. We ensured that the country had a consistent supply of medicines and diagnostics for communicable diseases. Despite a huge amount of effort from a large team, the national supply chain results were consistently poor. We faced stock outs in some parts of the country, while the products needed would expire in another warehouse in another part of the country. In one five-year period, we had to destroy more than US\$4 million worth of medicine due to expiration—which was equivalent to more than two years of medicine for all people living with HIV.

Every six months we would spend several weeks collecting supply-chain reports on paper from the country's 18 provinces and 148 districts and analyze the data manually to assess the performance of the national supply chain. At the end of the exercise, we could see the challenges, but had limited time to find solutions before the data collection process would start again. During this time, my colleagues and I saw many ambitious projects planned to improve the supply chain for medications and diagnostics, but most failed. When the CHAI project started in 2014, I was skeptical that anything would be different, but quickly saw that CHAI was taking a different approach.

By working closely with the government and looking at the problem comprehensively, the CHAI team was

able to get continuous feedback and successfully address the major root causes of supply chain failures. A “superuser” project team made of stakeholders from across the Ministry of Health designed and guided project implementation from the start. As a member of the team, I helped outline the existing supply chain and gaps, identifying common issues across disease programs, and developing solutions for the Laos context. We experimented often, keeping the ideas that worked well and discarding the ones that did not. Collectively, we selected and modified an electronic Logistics Management Information System called mSupply to serve as the country's information backbone for the supply chain. Within one year, we implemented the mSupply system in multiple pilot sites, and began the process of continuous improvement to ensure the reforms could scale nationally quickly. Within four years, the pilot had expanded to all sites nationally, including the country's district and provincial warehouses. We were no longer using paper-based reporting systems to manage the country's supply chain. Expired products and stockouts decreased dramatically.

Halfway through the project, I formally joined the CHAI team as a program officer, and since then I have grown my personal responsibilities and skills overseeing the Laos supply chain system. I have had the opportunity to grow from a technical staff member focused on my role, to a manager with leadership responsibility for a team.

***“By working closely with the government and looking at the problem comprehensively, the CHAI team was able to get continuous feedback and successfully address the major root causes of supply chain failures.”***

Today, I can see that we can still make significant improvements to the national supply chain, particularly at hospital pharmacies. We can improve the use of supply chain data to address critical issues such as the management of antimicrobial resistance and ensuring availability of high-quality, cost-effective medicines for patients. I am excited to continue playing a critical role in a CHAI team that is helping the Laos government achieve transformational change now and in the future. ●

# Tuberculosis

Tuberculosis (TB) is the second leading cause of death from an infectious disease next to COVID-19 worldwide. People who become sick with TB live with the disease's active form. However, many people may be infected and not know it. Globally, an estimated 1.7 billion people live with latent TB, usually without symptoms. With no treatment, five to 10 percent of these people will develop active TB. However, those with compromised immune systems, including people living with HIV, malnutrition, or diabetes, and people who use tobacco, have a much higher risk of becoming sick. Treating latent TB is critical to prevent the development and spread of active infection.

CHAI is working on solutions. We aim to prevent the disease by accelerating the adoption of shorter treatment regimens for latent TB—particularly in people living with HIV and children; enhance TB screening using digital chest x-rays in combination with computer-aided detection/artificial intelligence software and improve treatment completion—particularly for individuals with drug-resistant TB.

## Preventing TB with a shorter, more effective new treatment regimen

New treatments for latent TB developed in recent years require shorter courses and have fewer side effects. The 3HP regimen is a once-weekly dose of isoniazid and rifapentine taken for three months. Studies have shown that compared to standard therapies, which typically take six to 12 months, 3HP has lower rates of adverse events, higher adherence, better completion rates, and overall better clinical outcomes. That is why the World Health Organization (WHO) recommends 3HP as an alternative to longer regimens for people living with HIV and children in contact with people with infectious TB.

Under the IMPAACT4TB Project (Increasing Market and Public health outcomes through scaling up Affordable Access models of short Course preventive therapy for TB), we work with governments to introduce 3HP. In preparation, we update national guidelines, support product registration, and designate disease

surveillance sites. We also develop forecasting tools, ensure supply chains are ready, and train health providers.

In **Zimbabwe**, despite COVID-19-related delays, we provided training at 15 IMPAACT4TB sites compared to five the previous year. Over the last two years, these sessions reached 820 providers at IMPAACT4TB sites.

To reach the remaining providers, CHAI introduced peer-to-peer mentoring at 22 non-IMPAACT4TB sites. Together with the Jointed Hands Welfare Organization (JHWO), we also developed a community health worker toolkit that trained local community health workers as TB champions to encourage latent TB treatment in their communities.

As a result, over 13,000 patients began the preventive 3HP regimen in 2021, resulting in a 98 percent completion rate among eligible individuals. To increase the number of patients on 3HP, especially among priority populations, CHAI facilitated the purchase of approximately 86,800 courses of fixed-dose combinations (FDC) of 3HP.

The COVID-19 pandemic provided opportunities to monitor 3HP coverage remotely. In **Zimbabwe**, CHAI facilitated regular data reviews of electronic 3HP coverage reports. The reviews ensure quality, accurate preventive therapy reporting and allow for real-time monitoring, which facilitate course corrections as needed. CHAI developed and disseminated standard operating procedures and monthly reporting forms for all IMPAACT4TB focus districts. Nearly 180 health workers were virtually trained in data collection, resulting in a 100 percent reporting rate for all IMPAACT4TB and implementing sites.

CHAI also supported **South Africa's** National Department of Health to roll out 3HP. We helped plan and manage the demand and supply of the new regimen, providing the national TB program with the information necessary to forecast and quantify appropriate 3HP procurement needs. Now, we are doing the same for 3HP FDC.

We partnered with the department and IMPAACT4TB consortium to manage a phased rollout of 3HP, starting with the highest-burden districts in the country to ensure target populations are prioritized. To date, the implementation of the 3HP rollout plan has gone smoothly in these highest burden districts and plans to commence the next phase of the rollout will start soon.



**13,000+** patients in Zimbabwe began the 3HP regimen, resulting in a 98% completion rate among eligible individuals



**Cambodia** continues to have a high TB burden with 274 cases and 20 deaths per 100,000 people. Active TB is also a major cause of death among people living with HIV. CHAI has been supporting the **Cambodia** National TB Program (NTP)/CENAT to adopt and scale up 3HP among close contacts and people living with HIV since 2020. In 2021 7,189 TB close contacts were identified and put on preventive treatment. Of these 19 percent were treated with 3HP. In addition, over 4,820 people living with HIV were also given isoniazid preventive therapy (IPCT). We also kicked off an operational study on 3HP alongside partners Institut Pasteur du Cambodge (IPC), CENAT, and National Centre for HIV/AIDS, Dermatology, and STD Control (NCHADS). Training, supportive supervision, and mentoring sessions have been conducted for site implementers and study sites have started enrolling people living with HIV on 3HP. CHAI and IPC helped **Cambodia** overcome global 3HP supply challenges and supported the Ministry of Health in its policy decision to scale 3HP use as a preferred regimen countrywide.

### Enhancing case finding

COVID-19 has disproportionately affected the fight against TB compared to other diseases. In 2021, the WHO reported the first year-on-year increase in TB mortality since 2005. This was due to the diversion of staff and diagnostic equipment to COVID-related work, closure of public facilities to non-COVID cases, and patients either not seeking care for fear of contracting the virus or not being allowed to seek services at public sites. However, many TB programs adapted to the restrictions posed by the virus and found innovative ways of continuing to screen, diagnose, treat, and counsel patients.

In **Zimbabwe**, CHAI supported mobile phone use to conduct routine TB screening, monitor patients on treatment, and provide counseling. This initiative resulted in 98 percent of patients who began preventative treatment completing their regimen.

In **Vietnam**, CHAI continued to help the National Tuberculosis Control Program (NTP) address gaps in case finding by supporting the upgrade of an Access to Care Information System (ACIS), which facilitates communication between facilities and patients via telehealth platforms and helps manage patient data. Following the upgrade, 28 provinces introduced ACIS with CHAI's support.

In the same provinces, CHAI assisted the NTP to increase TB case notifications and improve the quality of treatment services using ACIS and computer-assisted diagnosis for TB screening and triage. We streamlined the TB case reporting process for private and non-TB public sector health facilities, as well as HIV outpatient



**28 provinces** in Vietnam introduced upgraded Access to Care Information System (ACIS)

clinics. We achieved this by developing an HIV-specific module on ACIS that allows HIV outpatient clinics to register and screen their patients for TB.

TB case finding based on disease symptoms alone misses at least half of patients, who will unknowingly transmit the disease. Verbal screening with prolonged cough lasting longer than two weeks has been used as the initial screening step for patients in low- and middle-income countries. While it is simpler to use, it is difficult to identify patients who are not overtly sick, that is, it has lower sensitivity for detection. In contrast, chest x-ray (CXR) has been widely used for TB detection in North America and Europe. CXR screening when read by humans as the initial test, has high accuracy for detecting any abnormality.

Portable CXR can therefore increase the ability of national programs in low- and middle-income countries to triage, diagnose, and treat more patients. Digital radiology over the long term allows for low running costs, high image quality, lower radiation dose, and high throughput of large groups of people. Used in conjunction with computer-aided diagnosis (CAD) and artificial intelligence (AI), CXR eliminates variations in observation between doctors. Digital CXR (dCXR) can be used as a low-cost and rapid triage test that will give patients access to fast, accurate, and convenient TB screening. In turn, faster and more convenient screening can reduce travel costs and wait time, and speed up access to diagnosis and treatment. Despite these benefits, national TB programs need evidence of how to effectively roll out this technology in a manner that is clinically effective, safe, and reproducible.

In 2021, CHAI and the National TB Elimination Program for Delhi, **India** began a validation study, with a proof-of-concept study to follow, that tests dCXR with CAD/AI for TB screening in primary health centers and chest clinics. The study is one of the first of its kind in **India** to generate evidence on ultraportable dCXR use in primary health settings. For these two studies, CHAI has procured three ultraportable dCXR equipment packages and CAD/AI software that will be donated to the Delhi state program at the end of the year-long study.

### Tackling the largest TB burden in the world

**India** accounts for one-fourth of the global TB burden and more than two million people are diagnosed with

the disease every year. TB kills more adults in **India** than any other infectious disease and has the highest burden of TB and drug-resistant TB (DR-TB), and the second highest number of cases of TB-HIV. In **India**, the private sector is the preferred first point-of-care for TB patients. CHAI supports these patients through the Joint Effort of Elimination of Tuberculosis (JEET).

Despite COVID-19 restrictions, many patients accessing care via JEET continued to receive their medication. CHAI helped the JEET team adapt to lockdown restrictions by ensuring patients could access doctors' prescriptions digitally and have their medications delivered. Counseling and follow-up were provided over the instant messaging application, WhatsApp. As a result, over 50,000 patients were notified of their TB results through the first and second COVID-19 waves; at least 18,000 newly diagnosed TB patients received the requisite drugs, and existing patients continued to receive their medications on time. CHAI also helped integrate screening of TB and COVID-19 patients to expedite the detection of comorbidities and link eligible patients to treatment services.

Despite robust public health interventions and private sector initiatives like JEET, it is estimated that nearly one million patients go undiagnosed each year and are missed by inadequate screening efforts and/or inadequate reporting via the private sector. The private sector often does not notify the public sector about many of its TB cases even though the government mandates it. To help address this barrier, the National Strategic Plan (NSP) for 2017 to 2025 introduced guidance to develop public and private interventions which track, diagnose, treat, and care for patients with TB between both sectors.

In the last few years, the government has tried several public-private mix (PPM) models to achieve this. However, their success has been limited due to challenges such as the absence of specific policies for private-sector engagement, limited capacity and resources at the state and district level, inadequate funding, and difficult financial mechanisms of payment under PPM schemes. In 2014, one such PPM model proved to be more effective than others. The Private-Provider Interface Agency (PPIA) implemented in Mumbai, Patna, and Mehsana effectively engaged with the private sector. PPIA formed a network of existing doctors, chemists, laboratories, and hospitals and helped them align TB diagnosis and treatment practices to the national standard of care to ensure accurate diagnosis and better treatment adherence. In addition, patient subsidies for diagnostic tests and drugs were offered to reduce out-of-pocket expenses for patients and increase treatment coverage. The model was so successful that a national agency within

the NTEP was set up to scale up the program across the country.

Four out of the six states where CHAI was implementing JEET have transitioned to The Patient-Provider Support Agency (PPSA), contracted by the state government. In Bihar, the change has led to a 68 percent increase in reporting of TB case finding from the private sector.

While successful, the PPSA primarily engages formal providers. Another solution was needed to connect with all providers—from chemists, alternate medicine practitioners, and informal providers—with whom a TB patient might interact. The Project Accelerating Diagnosis in Initiation of TB through Your Action (ADITYA), supported by TB Reach, launched in February 2021. CHAI helped develop a management information system app that allowed all providers to provide TB diagnosis and notifications as well as offer free x-rays to any symptomatic patient.

Since its launch, ADITYA has contributed to a 32 percent increase in test results provided to patients; an 83 percent increase in providers reporting case-finding results to the NTEP; and a six-fold increase in diagnosis compared to a 2019 baseline year.

### Looking ahead

CHAI continues to examine, test, and scale innovative interventions in support of country TB elimination goals. Addressing the large burden of latent TB will be key to this endeavor. CHAI will continue to facilitate the uptake of shorter, latent TB treatment regimens such as 3HP. Additionally, to ensure person-centered care, we are working to demonstrate triage innovations such as digital chest x-ray and artificial intelligence to improve both TB case finding and the management of lung health generally, including for COVID-19.

To improve drug-resistant TB (DR-TB) treatment and management, CHAI continues to work with our country partners to identify critical evidence gaps. For countries that are in their donor transition phases, we are working to expedite a robust introduction of new, standard, prioritized DR-TB treatment regimens to improve quality of care and sustainability of programs.

CHAI has fostered a regional and international community of practice to optimize various tools to advance local guidelines, regional collaboration for direct country-to-country technical assistance and capacity building, and future research and programmatic planning for DR-TB treatment regimen transition.



CHAI staff member Maka Gombe visits with a patient volunteer to discuss their 3HP medication regimen in Harare, Zimbabwe. Photo by Eugene Ncube.

**CROSS-CUTTING EXPERTS:**

# Market Shaping

*Our programs aim to save lives and reduce disease, while helping governments create sustainable health systems. Our teams of science, business, and technical experts work with program and country teams across the organization to support that goal. Throughout this year's Annual Report, we will highlight the collaboration between our cross-cutting groups and our program and country teams.*

Access to effective and quality assured medicines and diagnostics is at the core of CHAI's mission to save lives. The Global Markets team helps governments maximize the impact of their limited funding by identifying innovative products that improve patient outcomes while reducing costs. The Global Markets team assists pharmaceutical, vaccine, and diagnostics companies with strategies to expand patient access in low- and middle-income countries via volume guarantees, product licenses, new product introduction strategies and incentives for accelerated product development.

As a result, since CHAI was founded in 2002, we have completed over 140 agreements to bring the most effective drugs and diagnostics to tens of millions of people. These agreements ensure that people in over 125 low- and middle-income countries can access the best products while realizing billions of dollars in savings.

The Global Markets team continues to innovate. In 2021, CHAI supported the development of new products for drug resistance testing, collecting blood samples in remote areas, use of digital health tools for early detection of infectious diseases and preventing the spread of tuberculosis (TB). We also set the standard for publishing objective and accurate market intelligence reports on a wide variety of health commodities used in low- and middle-income countries.

## Preventing tuberculosis with faster, more effective treatment

Key to ending the TB epidemic is reducing the incidence of TB. That is why CHAI is helping partners in Africa and Asia introduce new preventative therapies,

like 3HP, a short-course treatment to prevent active TB. The 3HP regimen is a once weekly dose of isoniazid and rifapentine taken for three months. 3HP treats latent TB more quickly and safely than standard therapies, which include daily treatments for up to 12 months. As a result, the regimen's completion rate of 90 percent is far higher than standard treatments.

While easier to complete, 3HP is also expensive, costing US\$45 per patient course. In 2020, the price for both existing and new generic treatments was reduced to US\$15 per patient course for select countries. In 2021, CHAI worked with MedAccess and Unitaid on volume guarantee agreements that extended access to 3HP at US\$15, with a pathway for a stepwise further reduction in pricing, to 138 low- and middle-income countries.

The agreements provided financial support and procurement commitments that allow suppliers to scale up production and reduce costs by planning for higher volumes. Suppliers were also able to offer a guaranteed ceiling price through 2024. This, in turn, unlocked further demand for 3HP from global health partners like PEPFAR, the Global Fund to Fight AIDS, Malaria, and Tuberculosis, and the Global Drug Facility, as well as governments.

In 2021, over 1.6 million courses of 3HP were ordered for 32 countries under the agreements. For reference, this surpassed the total number of people who received any form of TB prevention globally in 2017.

In 2021, CHAI country teams and IMPAACT4TB (Increasing Market and Public health outcomes through scaling up Affordable Access models of short Course preventive therapy for TB) also began rolling out 3HP in several countries, including [Cambodia](#), [Kenya](#), and [Zimbabwe](#).

## Lowering prices on optimal products to improve women's health

Syphilis is the second leading cause of stillbirths globally and contributes to 11 percent of all stillbirths across Africa, each year. While screening for HIV during antenatal care is routine in many countries, syphilis testing and treatment rates remain low for pregnant



**1.6M** courses of 3HP ordered for 32 countries under new volume guarantee agreements brokered by CHAI, MedAccess, and Unitaid

women across sub-Saharan Africa and parts of Asia. Simple-to-use dual HIV/syphilis rapid diagnostic tests are recommended by the World Health Organization (WHO), but their adoption remains suboptimal, in part due to the higher price for the dual test compared to the single HIV rapid diagnostic test.

In 2021, a WHO prequalified dual HIV and syphilis test for under US\$1 was made available for public sector purchasers in low- and middle-income countries, through a partnership between MedAccess, SD Biosensor, and CHAI. This is the lowest priced WHO-prequalified dual test available. The affordability of the test is helping catalyze introduction of dual HIV/syphilis testing into existing antenatal care platforms to close the gap between HIV and syphilis diagnosis and treatment.

### Looking ahead

CHAI's Global Markets Team will continue to work with international life science companies, governments, and other partners to create programs that reduce the time it takes for the most appropriate new drugs and diagnostics to be widely available at affordable prices to the 6.7 billion people living in low- and middle-income countries. Looking ahead, we expect to continue to work on innovative long acting HIV prevention products, self-tests for HIV and other diseases, anti-viral drugs for treating COVID-19, and expanding the supply chain for liquid oxygen.



*A doctor examines a patient for symptoms of tuberculosis in New Delhi, India. Photo by Satvir Malhotra.*

# WOMEN AND CHILDREN'S HEALTH

**Far too few women and children worldwide have access to the essential, quality health services and nutrition they need not only to survive but thrive.** As a result, hundreds of thousands of women die every year from avoidable or treatable conditions, 2.6 million infants die within their first weeks of life, and millions more children and adolescents suffer avoidable deaths from malnutrition, pneumonia, diarrhea, or vaccine-preventable diseases. CHAI, together with our partners, supports governments to reduce maternal and newborn deaths, ensure women can access the tools they need to safely plan their families, scale up cervical cancer screening and treatment, and protect against childhood illness, disease, and chronic malnutrition. ●

**Programs:**

Cervical Cancer • Maternal, Newborn, and Reproductive Health • Nutrition • Vaccines

**Countries:**

Cambodia • Cameroon • Ethiopia • Ghana • India • Indonesia • Kenya • Liberia • Malawi • Myanmar • Nigeria • Papua New Guinea • Rwanda • South Africa • Tanzania • Uganda • Vietnam • Zambia • Zimbabwe



*A healthcare worker checks a child's blood pressure in Plateau, Nigeria. Photo by AJ Best Global Services.*

# Cervical Cancer

Cervical cancer is the fourth most common cancer in women worldwide. It affects over half a million women each year and causes more than 300,000 deaths annually.

Virtually all cervical cancers are caused by human papillomavirus (HPV), a vaccine-preventable sexually transmitted infection. Women in low- and middle-income countries are six times more likely to develop cervical cancer than women in high-income countries, and 90 percent of deaths from cervical cancer occur in the former. Certain factors, such as co-infection with HIV, put women at particular risk of progression to cancer.

Early screening to detect and treat pre-cancerous lesions is essential to avert invasive cervical cancer. However, limited access to high-quality screening and treatment services has hindered the scale-up of preventive solutions in many low- and middle-income countries.

In 2020, the World Health Organization (WHO) launched a global strategy to achieve global cervical cancer elimination, setting targets for the coming decade. At scale, HPV vaccination and effective efforts to screen and treat women for pre-cancerous lesions offer the opportunity to eliminate cervical cancer.

Since 2019, with support from Unitaid, CHAI has partnered with governments to scale up secondary prevention programs to reach women with screening and treatment of pre-cancer. We are helping to generate evidence on effective tools and models of care to make the goal of elimination possible.

## Increasing access to better technologies

In many low- and middle-income countries, access to screening and treatment remains a significant challenge. Many countries still rely on visual inspection with acetic acid (VIA) to screen for pre-cancerous lesions and use of cryotherapy to treat screen-positive women. However, VIA is an inconsistent screening method, and cryotherapy can be difficult to administer in low-resource settings, particularly in rural communities.

Newer technologies such as HPV testing for screening, and portable thermal ablation and Loop Electro-surgical Excision Procedure (LEEP) devices for treatment are revolutionizing access for women and can help position countries to eventually eliminate cervical cancer altogether.

CHAI has been working with partners to significantly lower the costs of these products through market shaping efforts. This work has helped lower the cost of HPV testing by more than 40 percent, thermal ablation devices by 50 percent, and LEEP devices by 20 percent, facilitating greater access for women.

Since 2019, this Unitaid-supported program has screened more than 440,000 women—including more than 132,000 with HPV tests, and there has been a substantial increase in the proportion of women receiving appropriate treatment with thermal ablation or LEEP. The program has helped partner governments establish hundreds of screening and treatment sites that will enable national scale-up and provide a model for other countries. The demonstration of effective delivery models for screening, treatment, and linkage to a full continuum of care using existing tools is helping to lay the groundwork for more affordable and point-of-care technologies when they become available.

CHAI is also working with partners, including Global Health Labs, a group that specializes in developing innovative technologies to reduce health disparities globally, to develop a new, artificial intelligence-based screening tool to improve VIA. The new tool, known as Automated Visual Evaluation (AVE), runs on a standard cellphone and will provide guidance to health workers within a few seconds. AVE is being developed as an aid to health workers for primary screening or triage of HPV-positive women.

## Supporting elimination goals

**India** contributed an estimated 1.3 million new cases to the global cancer burden in 2020 alone. Cervical cancer is the second leading cause of cancer deaths in the country, with 124,000 new cases and over 77,000 deaths in 2020. While the government has made great strides in improving access to care for other types of cancer, challenges with prevention, screening, and treatment of cervical cancer continue. Community-level awareness about cervical cancer—particularly prevention efforts—remains negligible. In addition, there is an absence of basic commodities, infrastructure, and trained health workers to provide accessible pre-cancer screening and treatment services.

Since 2019, CHAI has supported the government to prioritize secondary prevention of cervical cancer, specifically, lesion screening and treatment. We



**73,000+** women in India screened for cervical cancer after 1,200 providers were trained on VIA screening

leveraged the 2016 Operational Framework on Screening and Management of Common Cancers to promote cervical cancer screening for all women aged 30 to 65. We helped the state create a technical committee to guide the implementation of the policy across the cascade of care. This included the creation of training collateral including state-specific guidelines, standard operating procedures, and frequently asked questions to promote linkage to treatment and care, and support skills development. We engaged implementing partners and developed assessment templates and checklists to support the state government to address gaps in availability of essential products and build service provider capacity to initiate cervical cancer screening using VIA. We also engaged with device manufacturers, in-country distributors, and government stakeholders to expedite the importation and deployment of 217 thermal ablation devices for treatment of precancerous lesions. At the height of the COVID-19 pandemic, we worked with the government to mitigate the impact of the virus and sustain capacity building, adopting a hybrid approach that uses online platforms and learning tools while leveraging group settings for hands-on training.

In total, we helped the state train over 1,200 service providers on VIA screening, leading to the initiation of VIA screenings at over 340 health facilities, including around 180 primary care centers, enabling over 73,000 women to be screened. The pool of master trainers in the state are now supporting additional trainings. We are working with the state government to launch a comprehensive campaign to raise awareness and encourage women to be screened.

CHAI is now also working to formalize partnerships with the state governments of Chhattisgarh, Punjab, and Sikkim to support interventions on secondary prevention of cervical cancer.

**Zimbabwe** similarly has a high rate of mortality from cervical cancer. In 2018, there were over 3,000 cases in the country with over 60 percent of those resulting in death. Only 13 percent of non-invasive precancerous lesions were screened, with only 65 percent of those treated. As such, the government has set a three-year target to reach 500,000 women and raise treatment rates to above 80 percent. VIA and cervicography (VIAC) are the primary methods of screening used by the National Cervical Cancer

program, reaching approximately 100,000 women yearly, while cryotherapy is used for treatment. Using these methods alone, **Zimbabwe** cannot achieve the desired screening and treatment coverage rates.

The Ministry of Health and Child Care (MoHCC), in collaboration with CHAI, and with support from Unitaid, is working to leverage existing platforms to offer available, but not widely used tools such as HPV testing for screening and portable thermal ablation devices to treat pre-cancerous lesions, along with advancing development of AVE to improve the accuracy of VIA.

In 2021, we supported the government to pilot HPV testing and expand access to HPV molecular nucleic acid technology (NAT) testing services which detect the presence of the viral DNA on existing multiplex platforms. We helped pilot thermal ablation as an alternative for treating precancerous lesions and provided technical support to the Ministry to update and implement national guidelines on cervical cancer.

The goal of the pilot was to establish HPV testing as a primary cervical cancer screening method, particularly for women living with HIV. The study included four health facilities in Mashonaland East with centralized testing on the Hologic platform at Marondera Provincial Hospital. Almost 4,000 participants were enrolled in the study, which found that 40 percent were HPV-positive. Of those, 82 percent were linked into care within 54 days.

The study demonstrated the feasibility of integrating HPV testing on existing HIV testing platforms with minimal investments made in training and development of HPV screening information, education, and communication (IEC) materials. In addition, the study findings were used as primary data sources for the development of new screening and treatment guidelines and national testing need quantification tools.

CHAI, in collaboration with **Zimbabwe's** MoHCC, also developed training materials for thermal ablation, trained nearly 230 health workers in 68 facilities, and rolled out 72 thermal ablation devices across seven provinces; this is in addition to seven health facilities and 12 health workers trained in collaboration with ZIMTECH at the close of 2020. In collaboration with MoHCC and other partners, CHAI revived the Cervical Cancer Technical Working Group to guide policy formulation, advocacy, and inform scale-up planning. In 2022, CHAI will support the government to facilitate completion and publication of updated policy guidelines on screening and treatment, help introduce low-cost screening alternatives such as AVE and thermal ablation and scale up HPV testing. We will also help ensure that more women return for treatment and care.





*A healthcare worker assembles a thermal ablation device for cervical cancer treatment at Chilonga Mission Hospital in Zambia. Photo by Dominic Mukumbila.*

In **South Africa**, CHAI worked with partners to achieve cervical pre-cancer screening and treatment targets. In 2021, we supported the National Health Laboratory Services (NHLS) and provincial districts of health in Gauteng, Kwa Zulu-Natal (KZN) and the Eastern Cape with a demonstration project to generate evidence for the implementation of HPV testing. The project provided the National Department of Health and NHLS an opportunity to pilot the introduction of high-risk human papillomavirus (hrHPV) screening using dual testing (liquid-based cytology [LBC] and hrHPV) as per WHO recommendations.

CHAI, with Unitaids' funding, also facilitated the donation of 72 portable LEEP devices in three focal provinces to strengthen linkages from screening to treatment and improve access to appropriate care. The device donation was accompanied by health worker training—conducted by our clinical partners, Aña Tai Care—to ensure program activeness. The training curriculum complemented the sexual and reproductive health and rights (SRHR) curriculum on Knowledge Hub, the department's official platform for professional development opportunities and resources. The Eastern Cape training involved a theoretical workshop attended by 140 healthcare workers. It was followed by a practical, in-facility session where 32 nurses were taught to conduct adequate screening. In addition, 34 doctors were trained on how to perform a LEEP procedure and treated a total of 76 patients during the practical training.

One of the key challenges identified by stakeholders was limited routine data collection and the lack of a data management system to assist in tracking patients. As a short-term solution, CHAI developed and distributed 47 treatment logbooks for frontline staff to capture patient information including contact details, HIV status, highly active antiretroviral therapy (HAART) status, colposcopy and LEEP procedure, biopsy sample, results communicated to patients, and next steps to close the loop in patient tracking from screening to treatment.

For longer-term systems innovation, CHAI partnered with a software development company to create an interactive results-for-action cervical cancer management dashboard. The dashboard will allow users to monitor programs and implement changes to meet the needs of the national cervical cancer screening program from national to health facility level. The purpose of the dashboard is to provide relevant information in an accessible and actionable format to allow for near real-time monitoring and evaluation of results regarding individual patient care, laboratory management, and quality assurance.

In **Rwanda**, a lack of trained personnel and medical equipment to conduct the LEEP procedure was hindering access to treatment for women. Plans to train gynecologists on LEEP were further delayed due to COVID-19. To address this, CHAI worked with a well-regarded gynecologist familiar with LEEP

and experienced in training providers. The doctor trained other medical doctors and nurses to become national trainers for LEEP devices. Following this, CHAI facilitated the procurement and distribution of the devices to help with the rollout of the service. As a result, 10 out of 30 districts in the country are now offering LEEP with expansion to additional districts planned.

The initiation of cervical cancer screening and treatment and training on thermal ablation at CHAI project sites was delayed due to COVID-19 safety restrictions. However, we found innovative approaches to ensure trainings happened despite the disease. For example, CHAI staff used more training rooms to reduce the number of participants in one room, ensuring that all participants adhered to preventive measures while receiving instruction. CHAI managed to complete training in the five project districts. By the end of 2021, nine districts were offering cervical cancer screening and treatment with thermal ablation, including the five districts supported by CHAI and four districts supported by other partners.

CHAI also helped generate demand for cervical cancer screening among people living with HIV in five CHAI-supported districts. We integrated cervical cancer screening with HIV test and treatment services to ensure that the program reached more women living with HIV. The program has trained 268 existing HIV peer educators to disseminate cervical cancer screening and prevention messages and 95 nurses in cervical cancer screening and treatment, doubling the number of women screened. Due to this success, more partners have joined the government to support early cervical cancer detection, especially among women living with HIV. In addition to the CHAI project sites, four more districts supported by other partners have initiated screening and treatment of precancerous lesions.

In **Zambia**, CHAI helped review the National Cancer Control Strategic Plan (NCCSP), the development and review of national cervical cancer screening and HPV testing guidelines, LEEP manual and cervical cancer treatment guidelines, and provide mentorship and capacity building for health workers on thermal ablation and LEEP. We also supported national program coordination activities, civil society engagement, and demand creation. For example, community radio programs on cervical cancer prevention and treatment in Muchinga and Northern provinces, and producing a documentary on cervical cancer prevention, screening, treatment, and community-based mobilization. CHAI worked closely with partners in **Zambia** to complete training and validation of the AVE algorithm which demonstrated strong performance in accurately identifying women with precancer.

In addition, we worked with the government to increase access to VIA, HPV testing, and procurement of pre-cancer treatment devices. In 2021, 6,000 HPV tests were procured, nearly 11,000 women have been screened for cervical cancer with VIA, and nearly 3,500 women have been screened with HPV testing. Due to the pandemic, the operationalization of HPV testing was delayed due to a procurement lag. Even so, 140 thermal ablaters and 15 LEEP devices were procured, for a total cumulative procurement of 350 thermal ablaters and 75 LEEP devices since the beginning of the program. These products have been distributed across 10 provinces.

### Looking ahead

In 2022, CHAI will focus on demonstrating effective models for screening and treatment, including implementing HPV testing, same-day screening and treatment, and the use of thermal ablation for treatment to scale up the technologies more broadly. We will help develop and implement patient tracking and follow-up systems to reduce loss to follow-up, building on investments made in the HIV program. We will continue to work with our partner governments to develop costed scale-up plans and mobilize resources to fund the expansion of the successful models proven through our program.

We will continue to promote efforts to reduce the cost and efficiency of screening and are preparing a series of performance studies to evaluate the accuracy of AVE as an assist to VIA. We will help drive a change in government policy guidelines to include HPV testing and new service delivery models, develop training materials on these new models to enable rapid scale-up, develop and test models to generate demand for products, and develop a platform for partner engagement to encourage investment.



## STAFF REFLECTION

# Morrison Zulu

**Associate Director, Sexual, Reproductive, Maternal and Newborn Health**

After graduating from medical school and completing an internship at one of the three largest teaching hospitals in Zambia, I joined the Zambia Flying Doctor Service. It was there that I realized my passion for working with communities in some of the remotest areas of the country, providing much needed preventive and curative services to the mainly poor and underserved populations. Years later, I moved on to the non-profit sector and joined FHI360 as a Technical Advisor on the largest United States government (USG)-funded HIV/AIDS project in Zambia at the time. This was at the height of the AIDS pandemic in Zambia. My drive to serve grew even stronger when I lost some of my close family members to the pandemic. After several years working in HIV and seeing significant gains made by the country to control the pandemic, I wanted to apply my public health skills to a new challenge.

After spending over 10 years working for USG-funded programs in Zambia, I joined CHAI in May 2019 as Associate Director for the Sexual, Reproductive, Maternal, and Newborn Health (SRMNH) cluster where I currently oversee implementation of the four-year integrated SRMNH program in 12 districts of the country's Northern Province and four districts in the Western Province. I joined CHAI when the program was in its second year with several key interventions yet to be fully rolled out. My work required frequent travel—a journey of almost 900 km by road—to one of the largest provinces in Zambia. Northern Province is highly rural and economically underdeveloped, with limited infrastructure and a complex geographical terrain that includes rift valleys, rivers, and streams. This poses great challenges to easy movement of people, goods,

and services. At the time, the province had one of the highest levels of maternal mortality in the country. Each year, there were more than 650,000 births in Zambia, of which approximately 15,500 newborns and 2,500 mothers would die due to complications of pregnancy and childbirth. Our program's highly ambitious goal was to reduce maternal and newborn mortality by 40 percent and perinatal (the period before and after childbirth) mortality by 20 percent by 2021. At the time this seemed practically impossible to achieve given the complexity of the geography and the many challenges associated with program implementation in the province. To achieve these significant reductions and ensure they were sustained, we worked with the Zambian Ministry of Health to pursue six strategic objectives, integrated with CHAI's SRMNH strategy.

Our team has worked tirelessly over the last four years, collaborating with the Ministry of Health, to improve adolescent health, increase access to SRMNH services at community and health facility levels, strengthen referrals and linking patients to care, and building healthcare worker and community-based volunteer capacity to provide quality SRMNH services. By the end of 2021, based on a robust Maternal and Neonatal Health Surveillance System established across Northern Province, we observed significant reductions in maternal and newborn mortality. The program surpassed all the targets; maternal mortality declined by 41 percent, newborn mortality fell by 45 percent, and perinatal deaths by 43 percent when comparing the previously available data (April 2019 to March 2020) with the latest year available (October 2020 to September 2021).

These achievements were attained despite widespread disruptions caused by the COVID-19 pandemic and were possible largely because of the hard work and tenacity of a highly talented and self-driven team. Their zeal and enthusiasm to make a difference in the communities we serve was simply unmatched. I have found that CHAI affords staff an extraordinary amount of leeway to innovate. This not only makes the organization unique but creates such a great atmosphere of optimism and agility that it makes seemingly insurmountable challenges look like a walk in the park.

I feel privileged and honored to work for such a great organization whose transformational impact touches and changes lives every single day. I look forward to achieving greater success in the coming years. ●

# Maternal, Newborn, and Reproductive Health

Although there has been progress over the past two decades, a pregnant woman or newborn still dies somewhere in the world every 11 seconds. Most of these deaths occur in low- and middle-income countries, reflecting inequalities accessing quality health services. The odds of survival for women and infants living in poorer rural communities are far worse. If they experience complications during birth, they are less likely to make it to a health facility in time, if at all.

Nearly half of all under-five deaths occur during the first 28 days of life. In many rural areas across countries CHAI serves, babies are not named until they are six weeks old. Until then they are temporary visitors who arrive and may just as easily leave again.

Simple and effective interventions can prevent unintended pregnancies, treat pregnancy and labor complications, and save the lives of newborns. The challenge in many of CHAI's partner countries is to implement them in a reliable and timely way. Working with ministries of health around the world, CHAI has developed an integrated approach to address these challenges to serving women throughout their reproductive years, enabling them to safely avoid or plan pregnancies, have a healthy pregnancy and delivery, and ensure their newborns can thrive.

## Scaling up our approach to save the lives of women and newborns

In **Zambia**, we partnered with the government in the Northern Province, one of the most underperforming regions in the country with some of the greatest levels of maternal and newborn deaths nationwide. Covering 1.3 million people with an estimated 32,700 annual births, CHAI applied our experience from previous projects in **Ethiopia** and Northern **Nigeria** to avert preventable maternal and newborn deaths.

In rural areas, 1,450 community volunteers were trained to support pregnant women, including providing early referrals to the nearest health facility to receive further care. In health facilities more than 370 health workers were trained to identify complications early enough to prevent them becoming life-threatening, while additional support was provided in 85 higher level facilities to ensure health workers were able to provide high quality emergency obstetric and

newborn care. Referral systems were strengthened, with pathways designed to lead from the community to the health facility, supported by the development of emergency transport systems, including deployment of 20 motorbike ambulances. Underlying these efforts CHAI strengthened district and provincial managerial capacity to provide oversight, make data-based decisions, and improve accountability at all levels.

The number of lives saved surpassed all project targets. Between 2019 and 2021 the number of women who died during pregnancy and childbirth across Northern Province fell by 41 percent and newborn deaths fell by 45 percent, with access to essential services largely sustained throughout the COVID-19 pandemic. We are continuing to work with **Zambia** throughout 2022 to ensure a full transition to the government and support Ministry of Health efforts to duplicate impact in other parts of the country.

In **Uganda**, we partnered with the government on a similar program that aims to avert deaths of mothers and their babies in six of the worst performing districts nationwide. A series of high impact interventions were implemented across all 131 public health facilities within the districts. Efforts focused on bringing services closer to communities and supporting health workers to provide quality maternal and newborn care. The project directly influenced government priorities at national and sub-national levels, with plans to adopt and scale up key parts of the program to additional regions.

CHAI supported the upgrade of 80 health centers to provide quality pregnancy and delivery services and bring maternal health services closer to the people they serve. Linkages and referrals across different health levels were improved; health worker capacity to provide quality services was strengthened; availability of essential commodities, consumables, and equipment was enhanced; and information systems, timely review, and analysis was strengthened. More than a third of the mothers previously dying in health facilities during childbirth were saved and close to half of those newborns who previously would not have made it past the first week of life, survived.

In **South Africa**, we continued to support a maternal and newborn program that aims to reduce mother and neonatal mortality and institutional stillbirths across catchment areas. In 2021, the program developed the



*A mother and child utilize the m-mama transportation program to better access a health facility in rural Lesotho. Photo by Sechaba Monkoe.*

Electronic Birth Register (EBR) which enabled the recording of information on newborn babies and their mothers, facilitating collection and use of routine data. Reinforced by efforts to update and disseminate dashboards and District Health Information Software (DHIS) data, CHAI helped ensure use of real-time reporting of maternal and newborn deaths, as well as stillbirths, encourage review of health outcomes, and support development of solutions to prevent further mortality while strengthening accountability. In addition, CHAI helped increase availability of essential commodities, consumables, and equipment from 84 percent to over 90 percent of supplier delivery fulfillment of nine of the eleven commodities tracked nationally across [South Africa](#).

In [Nigeria](#), CHAI, as part of the Smiles for Mothers consortium, is at the forefront of providing technical assistance to the government to optimize postpartum hemorrhage prevention and management by improving access to high quality uterotonics, ensuring their appropriate use in line with updated World Health Organization (WHO) guidelines. Through CHAI's support, in 2021, the Federal Ministry of Health updated the national postpartum hemorrhage guidelines to include heat stable carbetocin (HSC) as a first line preventive uterotonic. This was done to address supply chain and quality gaps with Oxytocin, which is considered the gold standard medicine.

Our support had earlier led to a revision of the National Essential Medicines List to include HSC, and in 2021, to update the training curricula for frontline providers to improve the use of uterotonics and strengthen adverse case identification and reporting. At subnational level, CHAI's support will enable evidence-based introduction of HSC into the maternal health commodity supply chain in three states—Kano, Niger, and Lagos. With the introduction of HSC and support to ensure a well-planned roll out, [Nigeria](#) is leading the way, formulating lessons and tools for other countries to use as they update their care and treatment protocols.

Maternal mortality is high in [Lesotho](#) as most women live far from health facilities and cannot easily access care. With funding from Vodafone Foundation, CHAI and partners are working with the Ministry of Health to implement m-mama [Lesotho](#), an emergency transportation system for pregnant women and newborns, across the country. The program aims to reduce maternal mortality by providing sustainable, safe, and timely transportation to pregnant women and newborns through a network of local taxi drivers who act as “taxi ambulances” in areas where ambulances are rarely available. In 2021, using a train-the-trainers model, we helped train 551 drivers at 59 health facility attachments in Leribe, Berea, and Butha Buthe districts. By year-end, the program had supported 513 referrals from communities to health facilities and from health centers to hospitals. All taxi drivers were



*~500,000 women reached with DMPA-SC in Ghana, Liberia, Malawi, and Myanmar, despite global supply challenges*

compensated via M-PESA, a mobile payment system, which is one of the main components of the program.

### Expanding women's reproductive health choices

Women around the world deserve access to a variety of contraceptive options and the agency to choose the method that works best for their bodies and needs. Yet, some effective contraceptive options remain unavailable or underused in low- and middle-income countries due to unaffordable pricing or other market barriers. CHAI is committed to supporting ministries of health to scale up access to new and lesser-used reproductive health products to avail a broad range of contraceptives to women and increase contraceptive use.

In 2021, CHAI, in collaboration with donors, procurers, and other partners, implemented a global strategy to increase access to the hormonal intrauterine device (IUD), a highly effective, long-acting reversible contraceptive that has been available in high-income markets for over 30 years but is not widely available in the countries we serve. As a result of these joint efforts, in 2021, quality-assured hormonal IUDs were made available for less than US\$11 per unit for the first time, leading to their addition to the UNFPA and USAID product catalogs.

CHAI worked with ministries of health in **Nigeria**, **Rwanda**, and **Zambia** to develop phased and costed introduction plans to support coordinated rollouts of hormonal IUDs, while ensuring supply security.

For example, in **Rwanda**, CHAI supported the Ministry of Health through the **Rwanda** Biomedical Center (RBC) to integrate hormonal IUDs into routine healthcare by ensuring facilities are stocked and supply chains are efficient and responsive. CHAI trained 20 master trainers at the national level who then provided training to 100 health workers in districts, who in turn provided onsite trainings at primary care facilities. As a result, more than one thousand women were active users of hormonal IUD at the end of 2021, just a few months after introduction began. There are plans to expand rollout across the three countries and into additional countries.

Over the last several years, in **Ghana**, **Liberia**, **Malawi**, and **Myanmar**, CHAI has supported the rollout of subcutaneous injectable contraceptives (DMPA-SC),

which women can inject themselves, by increasing access through multiple service delivery channels in communities. In 2021, we helped reach almost half a million women in these countries with DMPA-SC, despite global supply challenges and a political crisis in **Myanmar**.

Using our experience in scaling new and underused contraceptives, CHAI worked with governments in **Kenya**, **Nigeria**, **Tanzania**, and **Zambia** to build systems and processes that would support routine, government-led introduction of new reproductive health products. Previous efforts have been partner led and product-specific, resulting in inefficiencies and limited government ownership. The function of these systems is to establish more efficient resource management, government ownership of product rollout, and improved coordination and cohesion of implementation amongst partners against a common government strategy. The intended result is to reduce past inefficiencies, fragmentation, and suboptimal approaches in rollout of new products. In **Nigeria** and **Zambia**, CHAI is working with the governments to test these new systems and processes with the introduction of hormonal IUD. In **Kenya** and **Tanzania**, CHAI is working with governments to use the new approach to determine which products to introduce to best meet local market needs.

Globally, CHAI administers a flexible pool of funds for the introduction of reproductive health products called the Catalytic Opportunity Fund (COF) on behalf of donors. In 2021, CHAI expanded the number of COF funding streams and provided over US\$6 million to 15 countries across 31 grants to support DMPA-SC and hormonal IUD introduction. This mechanism is demonstrating the impact of an innovative demand-side financing model that provides agile, flexible, and transparent funding, is responsive to country needs, and fosters coordinated use of donor resources.

### Building long-term sustainability

Between 2018 and 2020, CHAI worked across high burden subnational geographies in nine countries to increase access to reproductive healthcare. In 2021, we focused on embedding and securing successful approaches into government systems and budgets. For example, in **Zambia** and **Uganda**, CHAI helped integrate interventions such as training and mentorship, youth-friendly services, and community engagement activities, into district plans and health budgets to ensure the programs continue to run beyond our support. In **Uganda**, CHAI collaborated with the Ministry of Health to update the country's National Health Sector Quality Improvement Framework and Strategic Plan 2021-2025, integrating CHAI's systems-based mentoring model to support roll out of mentorship

for health workers across the country. In addition, in **Liberia**, CHAI developed a costed national framework for sexual, reproductive, maternal, and newborn health clinical mentoring. We partnered with the Ministry of Health to ensure the program was well integration into the health system.

In **Cambodia**, CHAI adapted to continued pressure from the COVID-19 pandemic to deliver health worker training on reproductive health services. We supported the National Maternal and Child Health Centre (NMCHC) to scale-up a hybrid (remote and in-person) training model to six provinces, covering 77 trainees from 72 health facilities. An e-learning website was also set up to enable continuous learning on select topics. This was complemented with an online training database. The database empowered regional health managers to own their own data on health worker capabilities and identify priority gaps for future trainings. The in-person trainings resulted in a 29 percent increase in eligible sexual and reproductive health providers nationwide, and 28 additional facilities providing related services. The online tools are expected to expand these numbers over the coming year as demand for services increases and subnational leaders leverage tools to increase health facility staff capacity.

### Eliminating congenital syphilis

Each year, more than 210,000 stillbirths or newborn deaths are caused by congenital syphilis, which could be prevented if the mother is tested and treated in time. In many countries, particularly across sub-Saharan Africa and parts of Asia, up to 95 percent of women are tested for HIV during antenatal care, but less than 50 percent are tested for syphilis. Despite the WHO's 2019 recommendation for rapid dual testing of HIV and syphilis for pregnant women during antenatal care, only 23 percent of countries have adopted the test in their antenatal care programs.

In November 2021, MedAccess, CHAI, and SD Biosensor announced a partnership to ensure for the first time that a WHO prequalified dual HIV/syphilis rapid diagnostic test (RDT) was available for under \$1 for public sector purchasers in low- and middle-income countries. We are now supporting countries to accelerate syphilis screening among pregnant women to match levels of HIV testing. Achieving this target in the 20 highest-burden countries could eliminate one-third of the adverse outcomes resulting from syphilis infection—saving at least 74,000 lives and averting 53,000 cases of severe infection each year.

In 2021, **India** adopted integrated HIV and syphilis testing with the goal of eliminating mother-to-child transmission of both diseases. In support CHAI helped the program set up operations, including



*<US\$1 price for dual HIV/syphilis rapid diagnostic tests in low- and middle-income countries*

identifying key gaps in syphilis testing in facilities, and identified registered dual rapid diagnostic test suppliers, working with them to meet in-country and global supply requirements. CHAI helped generate demand for dual RDTs by educating facility staff about the tests and helping identify funds for procurement. As a result of this program, syphilis screening among pregnant women nationwide rose from 30 percent in 2018 to 67 percent in 2021. Additionally, eight states (representing approximately 30 percent of all pregnant women in **India**) procured 4.7 million dual RDTs. The success of the project is catalyzing national change, with the National AIDS Control Organization (NACO) now planning national procurement of dual RDT kits for screening of all pregnant women and other at-risk groups across the country.

Between 2019 and 2021, CHAI partnered with the National AIDS and STDs Control Programme in **Nigeria** to introduce dual HIV/syphilis tests through a pilot in three states. More than 45,000 pregnant women were tested across 31 pilot sites. In parallel we supported the government to update policy and treatment guidelines to ensure the tests were incorporated. By the end of the year the government had committed to scaling up dual HIV/syphilis tests to reach all pregnant women in **Nigeria**, backed by reliable access to appropriate treatment, as a key program strategy.

In partnership with the federal, regional, and woreda health offices in **Ethiopia**, CHAI implemented a three-month pilot program on dual HIV/syphilis RDTs in select facilities across four regions. CHAI's pilot aimed to tackle barriers to syphilis testing and treatment and increase coverage in the country. Introducing affordable dual HIV/syphilis test kits into the country's existing maternal and newborn health program was a key component. In 2021, a total of 14,146 pregnant women were tested using dual tests. Following the success of the pilot program, the ministry is now planning for national roll-out of integrated HIV/syphilis testing.

### Looking ahead

The integrated strategy underpinning CHAI's SRMNH program has demonstrably averted the deaths of thousands of mothers and babies across a diverse array of geographies. By establishing "Networks of Care" to reliably and effectively link together every

level of the health system, CHAI is proving that women and newborns experiencing complications during birth can be stabilized, referred, and ultimately treated no matter where the birth occurs and no matter how rural, impoverished, and marginalized the community. CHAI will continue to work with governments and global partners to scale up this innovative approach and encourage widespread adoption.

The COVID-19 pandemic had a detrimental impact on access to sexual health and newborn services worldwide. CHAI's goal is to support our government partners as they seek to respond to and address these exacerbated challenges. As the biology of pregnancy creates specific vulnerability to climate change, impacts such as extreme weather threaten to further erode maternal and newborn health gains, compounding existing gaps and amplifying global and national failures.

CHAI will continue to be a global leader in reproductive health supplies, building on unique in-country and global partnerships to shape the product introduction landscape and provide strong technical support to strengthen commodity security. As donors transition funding for contraceptive commodities, countries need to find sustainable and consistent resources for

supplies. CHAI will continue to work with governments to improve domestic funding for procurement of contraceptives and strengthening country commodity procurement capabilities. In 2022, CHAI will also continue to support governments in select countries to strengthen their systems for financing and delivery of reproductive health services as part of their primary healthcare systems.

CHAI's support to introduce and scale up dual HIV/syphilis tests shows that the historic silos that separate HIV, sexually transmitted disease, and maternal and newborn health programs at country, global and donor levels can be broken down. By working to link the testing and treatment of maternal syphilis with HIV testing in pregnant women, countries are finding a more cost effective and sustainable approach towards ensuring improved levels of antenatal care. These initial steps will serve as a foundation as countries move towards achieving the triple elimination of transmission from mother to child HIV, syphilis, and hepatitis B.



*A peer mentoring group of Patent and Proprietary Medicine Vendors (PPMVs) discuss child health services in Kaduna, Nigeria. Photo by MTE Photography.*



## CROSS-CUTTING EXPERTS:

# Global Health Sciences

*Our programs aim to save lives and reduce disease, while helping governments create sustainable health systems. Our teams of science, business, and technical experts work with program and country teams across the organization to support that goal. Throughout this year's Annual Report, we will highlight the collaboration between our cross-cutting groups and our program and country teams.*

The Global Health Sciences team aims to lower costs, improve quality, and accelerate and increase access to treatment for millions of people in resource-limited settings. The team develops less expensive and more effective versions of critical medications for adults and children; helps advance our understanding and management of diseases; and improves patient care.

There are five groups within Global Health Sciences: Analytics and Implementation Research; Clinical Sciences; Product Development and Regulatory Affairs; Process Chemistry; and Quality, Sourcing, and Costing. Scientists on these teams work closely with CHAI country and program staff as well as commercial entities, regulatory authorities, normative organizations, and academic partners.

### Increasing access to quality health products and devices

The COVID-19 pandemic has led to a global shortage of quality assured personal protective equipment (PPE). Although the World Health Organization (WHO) has a centralized PPE platform and supply portal to meet requests from ministries of health, countries often require PPE sooner than available through the portal. In response, the Quality, Sourcing, and Costing and Product Development and Regulatory Affairs teams worked with CHAI's country and program teams to assess locally available products and determine which types of PPE were most suitable for their needs, for example, a respirator or facemask. During the course of research, many counterfeit products were observed. For buyers unfamiliar with the product standards and required certifications, the probability of buying counterfeit products is much higher. CHAI helped several countries source and procure quality-assured PPE, for example shipping N95 masks to CHAI teams in [Vietnam](#) and [Papua New Guinea](#). Where CHAI teams needed to source PPE locally, we helped review documentation provided by manufacturers to assure quality standards were met.

In addition, we created an internal COVID-19 dashboard to help CHAI staff identify and manage quality, sourcing, local manufacturing, and regulatory

resources. The dashboard provides up-to-date resources from several sources—the U.S. Food and Drug Administration (FDA), U.S. Centers for Disease Control and Prevention (CDC), and WHO—to inform countries about the availability of quality-assured PPE. In addition, we provided easy reference documents to further distill the material in the dashboard into information directly applicable to CHAI country teams looking to procure quality-assured PPE. One such reference document, for example, is titled [How to Buy Quality Respirators](#) and another, [CHAI Country Considerations for PPE Decontamination](#).

CHAI's Quality and Product Development teams also support our Cervical Cancer team in [India](#), [Kenya](#), [Malawi](#), [Nigeria](#), [Rwanda](#), [South Africa](#), and [Zambia](#) to procure quality assured medical devices purchased by CHAI to diagnose and treat cervical cancer, which include thermal ablation devices and software to aid in the diagnosis of precancerous cervical lesions. As part of this work, we built a process to manage complaints regarding broken thermal ablation devices. We developed a mechanism to receive and document device complaints, notify the appropriate representatives, and track any emerging device failure trends. The process includes virtual meetings with healthcare providers in partner countries and manufacturers to assess and immediately fix issues in the field, as well as putting in place training manuals so devices can be maintained without our support.

The dashboard we created to report and track complaints has also helped the Cervical Cancer team review training protocols for healthcare providers. Since the program began in 2020, CHAI has quickly replaced 17 defective devices and accessories at no additional cost to CHAI, while ensuring that testing and treatment services in partner countries received minimal disruption. We are now using lessons learned from this work to build a roadmap for complaint activities that could be applied to other programs.

Antimicrobial resistance (AMR) occurs when bacteria, viruses, fungi, and parasites change over time and no longer respond to medicines, making infections harder to treat and increasing the risk of disease spread, severe illness, and death. The WHO has declared AMR



*CHAI announced a partnership with GARDP and Shionogi to bring its new antibiotic, **cefiderocol**, to market in low- and middle-income countries*

an urgent and growing global health and development threat: by 2050, an estimated 10 million lives per year will be lost due to AMR and a cumulative US\$100 trillion in economic output will be squandered. Even now, AMR is responsible for more deaths annually than HIV or malaria.

In 2021, CHAI announced a partnership with the Global Antibiotic Research and Development Partnership (GARDP) and innovator company Shionogi to bring its new antibiotic, cefiderocol to market in low- and middle-income countries. We are also working with the Global Antimicrobial Resistance Innovation Fund of the UK government to conduct market shaping activities to address the AMR priorities identified through a series of key informant interviews in five countries that CHAI supports.

### Finding new approaches to solve pressing health issues

Decisions are influenced by multiple and competing factors. Particularly for decisions that impact program strategy, it is important to use a transparent decision-making process that balances these competing factors. The Product Development and Regulatory Affairs team uses decision science methodologies to support program teams, leading several exercises in 2021 that have helped change the way the global health space makes decisions.

For example, new treatments for latent tuberculosis (TB) developed in recent years require shorter courses and have fewer side effects, leading to better treatment outcomes. Under IMPAACT4TB (Increasing Market and Public health outcomes through scaling up Affordable Access models of short Course preventive therapy for TB), CHAI works with governments to introduce these regimens. In 2021, CHAI's Product Development team facilitated a decision science methodology to help decide which product to include in a new regimen to prevent active TB. The result was the development of 1HP, an ultra-short course regimen of daily isoniazid and rifapentine for 28 days, which is shown to be as effective as traditional nine-month treatments.

A second decision science exercise led by the team informed decision-making at the WHO on which products to include when updating the WHO-led Pediatric Antiretroviral Drug Optimization (PADO)

group. PADO establishes medium- and long-term priorities for drug development to accelerate access to the best formulations for children living with HIV. CHAI led the exercise to develop criteria by which to rank pipeline drugs for pediatric HIV treatment. This was accomplished using a decision science tool and launching a survey to approximately 80 participants involved in the WHO PADO5 meetings to gather evidence for which drugs should be listed as priority and which should be added to the watchlist for future discussions.

The Clinical Sciences team develops strategies and technologies that advance our understanding of disease and improve the delivery of health services. Over the past three years, CHAI has developed materials and tools that improve access to key commodities for Advanced HIV Disease (AHD), which makes individuals more vulnerable to deadly opportunistic infections like tuberculosis and cryptococcal meningitis. In 2017 and 2018 the WHO released a series of guidelines for managing AHD, including for cryptococcal meningitis. Despite this new guidance, barriers remained on both the supply and demand side that made the commodities and services to diagnose and treat AHD largely unavailable in low- and middle-income countries.

In 2021, the Clinical Sciences and HIV/AIDS teams worked with community groups to improve treatment literacy around AHD. Together with Unitaid, we developed resources, including an online toolkit, on the management of AHD, for implementing partners to use in their work.

Unitaid and CHAI have also worked together for the past six years to accelerate access to a new antiretroviral medication, dolutegravir (DTG). In 2021, a child-friendly formulation of the drug became available based on a collaborative development and registration effort between CHAI, ViiV Healthcare, and Unitaid which led to a global re-structuring of pediatric HIV treatment. CHAI worked closely with ministries of health to quickly align plans to roll out this new pediatric HIV treatment. We conducted operational research on the barriers and facilitators of pediatric DTG uptake and to explore clinical outcomes in early adopter countries. As new pediatric community advisory boards formed in partner countries, we provided information on the product to drive demand for the new formulation. CHAI provided training to members of AfroCAB, an organization of HIV treatment advocates across Africa, so they could cascade the learnings to their networks. With support from this engagement, AfroCAB members supported national policy adoption and implementation planning for pediatric DTG, and developed a suite of information, education, and communication materials that

ministries of health are adapting in over 10 countries. AfroCAB members are training mentor mothers and patient support groups to raise awareness about pediatric DTG and provide feedback to national programs and implementing partners. Finally, AfroCAB is training community leaders, national networks of people living with HIV, and civil society to drive a faster transition to this best-in-class pediatric HIV treatment.

CHAI's Analytics and Implementation Research (AIR) team is made up of public health experts strategically positioned at the center of CHAI's geographic and disease priorities, getting to solutions using impact and evidence. AIR designs applied research studies to test innovations and evidence-based interventions; builds mathematical models to predict impact under varying scenarios and generates and uses geospatial data to target critical interventions and at-risk populations. AIR costs and plans what it takes to operationalize policy and catalyzes strategic initiatives. With an initial focus on HIV, AIR's reach has expanded over the years alongside that of CHAI, and currently includes maternal, neonatal and child health, sexual and reproductive health, vaccines, viral hepatitis, cervical cancer, COVID-19, diabetes, tuberculosis, and sickle cell disease.

In recent years, CHAI has supported **Malawi** and **Ghana**'s sexual, reproductive, maternal, and newborn health programs to introduce and scale up a new formulation of a popular three-month injectable contraceptive. Depot Medroxyprogesterone Acetate-subcutaneous (DMPA-SC) has lower dosage, is easier to administer, and can be administered by any trained person, including clients themselves. However, both countries have seen lower uptake of the self-injection option than might have been expected based on early acceptability studies. Government partners wanted to understand the supply and demand barriers that may be contributing to this picture.

In 2021, CHAI's Analytics and Implementation Research team co-designed comprehensive research studies with

the CHAI maternal, newborn, and reproductive health team and government partners in both countries to address this knowledge gap. In **Malawi**, where national rollout of health worker training on DMPA-SC had already been completed, the team conducted a qualitative study with injectable client groups and health workers to help identify the areas where these groups required renewed support in integration of DMPA-SC. In **Ghana**, where health worker training in DMPA-SC was still ongoing, a mixed-methods study with clinical trainers, both trained and untrained health workers, and injectable client groups was conducted to help identify bottlenecks and guide the next phase of the national rollout.

Both studies identified the key challenges affecting current provision (including challenges with stock outs, gaps in post-training health worker support, and building client confidence in self-injection) as well as promising examples of supportive attitudes towards self-injection and counseling best practice that could be built on moving forward. The studies have resulted in concrete policy and programmatic recommendations that are guiding efforts to further embed DMPA-SC (including for self-injection) into the contraceptive method mix in both contexts. For example, the study recommendations are helping to identify target areas of focus during health worker supportive supervision and sharing of best practice counseling examples to build health worker skills, as well as guiding counseling messaging and sensitization materials to build client confidence.

### Looking ahead

Looking ahead, we plan to broaden activities in nascent disease programs, such as AMR, and start looking at new disease areas, such as sickle cell disease, by building on the foundation and lessons learned from past experiences.

# Nutrition

Malnutrition is a contributing factor in almost half of all childhood deaths globally. Approximately 155 million children under the age of five suffer from chronic malnutrition—a condition that sets in during the first 1,000 days of a child’s life. Chronically malnourished children are more susceptible to disease and infection, resulting in high infant and child deaths. Moreover, children who are chronically malnourished may suffer from cognitive impairment.

Anemia—a lack of iron in the blood—is linked to malnutrition in both children and women, contributing to low birth weight and increasing the risk of serious complications during pregnancy. Malnutrition and anemia form an intergenerational cycle: a malnourished child is more likely to become anemic as a teen, who is more likely to have a risky pregnancy and deliver an underweight infant, who is more likely to grow into a malnourished child.

## Improving nutrition

CHAI is working with governments to break the cycle of malnutrition and anemia by improving access to high-quality, locally produced, nutrient dense supplementary and complementary foods in the critical first 1,000 days of a child’s life, as well as supporting government-run nutrition programs.

In **Rwanda**, CHAI supports a government-led initiative to introduce and distribute fortified blended foods to children between six and 23 months of age and pregnant and nursing mothers among the poorest and most vulnerable families throughout the country.

CHAI facilitated the launch of a local venture, Africa Improved Foods Ltd., and supported the development of distribution systems and targeted messaging campaigns to ensure that products are reaching those most in need. We also supported the government to develop routine monitoring and evaluation and have managed an ongoing evaluation to understand the impact of providing fortified blended foods on childhood growth.

The evaluation has shown a significant decline in chronic malnutrition from 2017 to 2021 among children living in the poorest households in **Rwanda**. Children had a 40 percent reduction in the odds of being stunted and a 41 percent reduction in the odds of being underweight from 2017 to 2021, demonstrating the benefits of this approach.

## Empowering communities to improve lifelong health

Since 2016, CHAI has been supporting the government of Madhya Pradesh, **India** in developing and executing ambitious new efforts to reduce chronic malnutrition and anemia in the state with a specific focus on strengthening service delivery and uptake of all key nutrition services extended by the government. One of the key pillars to CHAI’s multipronged strategy to break the intergenerational cycle of malnourishment included establishing and strengthening community level systems via community health workers to improve service delivery.

## Raising awareness about anemia among adolescents by leveraging the education system

According to the latest edition of National Family Health Survey, NFHS-5 (2019-21), at least 58 percent of girls and 31 percent of boys aged 15 to 19 are anemic in Madhya Pradesh. The state runs a program called Anemia Mukta Bharat (AMB) that provides prophylactic iron and folic acid (IFA) supplements to all children and pregnant and nursing women to reduce anemia in the community. School-aged children receive IFA supplements through the Weekly Iron Folic Acid Supplementation (WIFS) program through the AMB. However, only one in three in-school adolescents receive the recommended IFA dosage in Madhya Pradesh.

CHAI conducted an assessment in the state in 2018 to understand the low coverage and uptake of IFA among in-school adolescents. The assessment revealed that a large proportion of schoolteachers were not trained on counseling and administration of IFA.

To address this challenge, CHAI leveraged District Institute of Education and Training (DIET), which provides pre-service and in-service training to primary, middle, and secondary school teachers. We assessed the existing DIET resources and modules of the teacher training curriculum and advocated for the inclusion of health and nutrition content focused on anemia



*Distributing fortified blended foods in Rwanda reduced children’s odds of being stunted by **40%** and being underweight by **41%***

and school-based IFA supplementation. CHAI also worked with the health and education department in the state to develop training content and conducted virtual training sessions for the state at the district and block level and DIET faculties across Madhya Pradesh. We trained over 5,000 teachers and since the training sessions were broadcast via YouTube, the video is available for ready reference; since then, it has been viewed over 42,000 times. Since the intervention, the Madhya Pradesh National Health Mission has directed the state education department to include training on anemia in DIET's in-service teacher training curriculum.

**Institutionalizing capacity building of front-line workers through the Incremental Learning Approach**

Accredited Social Health Activists (ASHAs)—a cadre of frontline health workers—are envisaged under the National Health Mission to work as an interface between the community and public health system. Their main responsibility is to promote child, maternal, and reproductive health services in the community, including family planning, appropriate care-seeking, antenatal care (ANC), and skilled care during childbirth.

Before the edition of the National Family Health Survey, NFHS-4 (2015-16), the uptake of maternal health services was low in Madhya Pradesh, with only 36 percent of mothers reporting to have had four or more ANC visits, 53 percent reporting to have received an ANC check-up within their first trimester, and nearly 24 percent to have consumed 100 or more IFA tablets during their pregnancy.

ASHAs are responsible for mobilizing the community; therefore, they must have adequate knowledge and skills to promote the uptake of health services. CHAI conducted a rapid assessment in 2020 to understand their levels of knowledge on various topics and found there were areas for improvement on IFA supplementation, dietary diversity, diarrhea, and pneumonia.

A 2011 National Health Systems Resource Centre Report evaluating the ASHA program indicated the functional effectiveness of ASHAs depends on the quality of training received, frequency and quality of interactions between ASHAs and ASHA supervisors, and regular supply of medicines and other commodities. Another study recommended ASHAs have regular refresher courses to improve knowledge on maternal and child health and family planning.

Based on these studies and CHAI's experience, we decided to take an incremental learning approach. Using this approach, ASHA supervisors select a specific topic each month and ensure ASHAs can practice that aspect of service delivery throughout the month. CHAI conducted a pilot in two districts of Madhya Pradesh to train supervisors in conducting these sessions.



**2.7M+** liters of safe drinking water provided by the Community Water Treatment Plant in Madhya Pradesh, India

To ensure a high level of comprehension, CHAI, in collaboration with the state ASHA cell, developed and disseminated 11 capsular modules on a weekly basis to the supervisors. Upon approval of the concept, CHAI led the development of a detailed training plan and structured modules for the learning approach. We then conducted 11 virtual training sessions for ASHA supervisors with participation ranging from 100 to 160 per session, followed by one face-to-face session in each block (a total of 12 blocks in the two pilot districts).

A total of 150 ASHA supervisors were trained across 12 blocks in the pilot. The supervisors demonstrated a better understanding of the topics covered and developed annual training calendars for ASHAs. Recognizing the success of the pilot, the government has initiated the training of an additional 5,000 ASHA supervisors across the state, using the capsular modules developed by CHAI. CHAI continues to support the state in training master trainers and supervising some of the training sessions conducted by the master trainers. A total of 63,000 ASHAs across the state are expected to benefit from this initiative.

In addition, other states expressed interest in replicating our efforts in their geographies. Towards the end of 2021, CHAI began providing technical assistance to the Punjab government, sharing our learnings with government stakeholders, and guiding them on how they could produce the results CHAI was able to support the government of Madhya Pradesh in achieving.

### **Unlocking government support to provide safe drinking water**

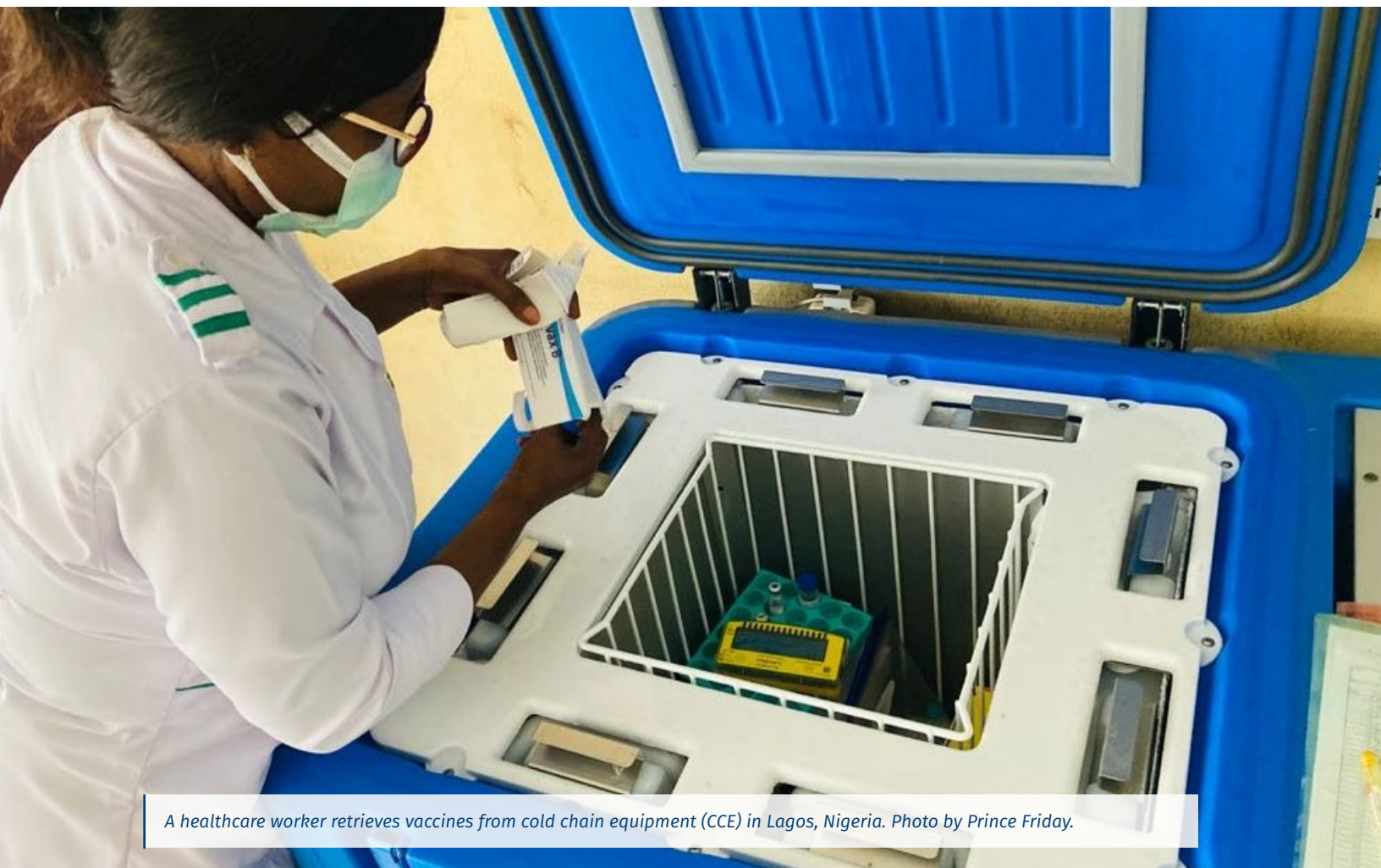
Access to safe drinking water is abysmally poor in rural Madhya Pradesh. According to a baseline study conducted by CHAI in 2016, less than four percent of the state's rural population uses an effective method of water purification. To improve access to safe drinking water, in 2018, CHAI partnered with Tata Trust to identify a robust water defluorination and purification technology and piloted an operational model—the Community Water Treatment Plant (CWTP)—which leverages rural entrepreneurship to ensure sustainability. The program has been running successfully since 2018 and has provided over 2.7 million liters of safe drinking water.

After the success of the program in the pilot district, the Public Health Engineering Department (PHED) and Government of Madhya Pradesh, with CHAI support, decided to expand it to other districts in the state that suffer from high fluoride contamination in groundwater. In 2021, CHAI signed a Memorandum of Understanding (MoU) with the PHED to bear the initial capital expenditure for the establishment of 30 to 50 CWTPs over the next two to three years. CHAI then supported the state in identifying 19 CWTP sites across two districts, developed detailed standard operating procedures and monitoring and evaluation frameworks, designed communication materials and prepared detailed project reports for the project. PHED will select the technology vendor for the CWTPs and help establish 20 to 30 CWTPs in 2022.

### Looking ahead

In 2022, CHAI intends to work with the Government of **Rwanda** to disseminate the results from the **Rwanda** evaluation, showcasing the impact that the approach has had on stunting, alongside the success of the local joint venture. CHAI plans to review the nutrition landscape to identify opportunities to apply a similar model in other settings.

In **India**, CHAI's focus in 2022 will be on dissemination and documentation of program learnings, and on institutionalization of program interventions in the state of Madhya Pradesh. This includes conducting an endline assessment across the state to measure impact and determine potential focus areas in the future. We also aim to have approximately 40 CWTPs operational across five fluoride affected districts of Madhya Pradesh by the end of 2023. This scale up will be achieved through self-help groups, making it a viable source of income given their established credibility and relatively easy access to credit.



*A healthcare worker retrieves vaccines from cold chain equipment (CCE) in Lagos, Nigeria. Photo by Prince Friday.*

# Vaccines

Immunization is a powerful tool for saving lives and improving health outcomes globally. Each year, national immunization programs reach approximately 27 million infants in sub-Saharan Africa alone, and since the Expanded Program on Immunization (EPI) was launched in 1974, vaccines prevent an estimated two to three million deaths globally among children annually.

For every dollar invested in immunization, there is a US\$16 return, making it one of the most cost-effective public health interventions available. Despite these tremendous successes, significant gaps remain, with two million children (primarily in lower-income and lower-middle-income countries) dying each year from vaccine-preventable diseases, and an estimated 25 million children still under-immunized each year.

Since 2010, CHAI has worked with governments, in-country partners, and global stakeholders to improve immunization coverage and reduce inequity, especially in the most vulnerable communities, to sustainably reduce mortality and morbidity from vaccine-preventable diseases. We accelerate the uptake of new or under-used vaccines, especially those requiring new or complex delivery platforms. We also help improve vaccine cold chains and logistics systems, and service delivery to increase effective, affordable immunization coverage for everyone. Finally, as immunization programs transition from Gavi, the Vaccine Alliance, and other global support mechanisms, we work with governments to ensure their program can be sustained and thrive beyond donor support.

## Introducing new vaccines

With continued lockdowns and a necessary focus on launching COVID-19 vaccines in 2021, country EPI programs did not have much capacity to consider the introduction of other new vaccines. Unfortunately, many programs also saw a drop in coverage of recently introduced vaccines.

In **Indonesia**, an estimated 10,000 children's lives are lost to pneumonia each year. Despite the tremendous challenges and delays caused by the COVID-19 pandemic, the government undertook a massive effort to introduce PCV vaccines into its routine public immunization program, while also introducing COVID-19 vaccines in 2021. Following a great deal of advocacy and effort to navigate complex regulations and coordinate across multiple ministerial stakeholders, CHAI and partners supported the government to access the vaccine doses at a significantly reduced

cost (approximately one-fifth of the cost). This was done through Gavi's innovative Advanced Market Commitment (AMC) financing mechanism which provides equitable access to vaccines to countries regardless of income status. The first 1.6 million doses of the PCV vaccine arrived in Jakarta in April 2021 and were successfully introduced in the four provinces of NTB, Babel, East Java, and West Java, covering 14 percent of total births in **Indonesia**.

In **Cameroon**, the hepatitis B vaccine (HBV) is included in the pentavalent vaccine which provides protection to a child from five life-threatening diseases – diphtheria, pertussis, tetanus, hepatitis B and Hib. However, the first dose of the pentavalent vaccine is typically administered six weeks after birth, leaving infants unprotected against HBV over this period. When given within 24 hours of birth, the HBV vaccine confers immunity in over 95 percent of infants.

Delayed access to HBV vaccine puts infants at significant risk of perinatal infection—a major concern given the high prevalence of HBV infection among pregnant women (over eight percent) and the elevated risk of mother-to-child transmission in the country.

CHAI helped conduct a trial intervention across 15 facilities in Adamawa, Center, and West regions to improve the timeliness of administration of the current birth dose vaccines (BCG and OPV0) to aid the rollout of the HBV vaccine in **Cameroon**. CHAI developed facility-specific workflows, particularly around vaccine storage and data management to fully integrate birth dose vaccination into maternity and newborn care services. We clarified roles and responsibilities for all staff involved in delivering birth-dose vaccinations. In addition, we trained facility staff on the established workflows and conducted birth dose refresher trainings including immunization basics, safety information and contraindications, multi-dose vial hesitancy, and the importance of incorporating birth dose conversations into routine antenatal care.

The study demonstrated a substantial increase in the proportion of children receiving both OPV0 and BCG within 24 hours of birth: a 47 and 46 percent increase respectively between baseline and end-line. The study findings will facilitate the rollout of the HBV vaccine nationally.

## Improving vaccine supply and cold chains

In many countries, vaccine distribution below the regional or district level is ad hoc and requires

collection by health workers, even when national guidelines indicate otherwise. These ad hoc systems create supply chain and service delivery challenges. Health workers may find it difficult to maintain stock at health facilities. Whether the worker leaves the facility to collect more stock or lets supplies run low, this can interrupt service delivery. It also perpetuates poor stock management practices, contributing to either too much or not enough stock in certain facilities. CHAI is working with governments to implement and assess downstream and last-mile distribution systems to identify options that are suitable for scale within national systems.

We supported three counties in **Kenya** to establish distribution pilots which enabled vaccines to be delivered from regional to sub-county stores and from sub-county to health facilities monthly. The responsibility of distribution was shifted from health workers to sub-county managers who could carry out the distribution as they carried out support supervision to all the facilities. This created reliable delivery at each tier of the supply chain. The distribution process also allowed for integration of other functions such as pharmacist supervision and medical technician repair and maintenance process.

The initiative was so successful that in one county, Uasin Gishu, facility stockouts were reduced to 12 percent from nearly 86 percent. Additionally, time to resolve stock-outs was reduced; in Kwale, for example, over 80 percent of stockouts were resolved in less than seven days. Better order fulfillment further supported the reduction in stockouts; in Kwale, completed county orders improved from 48 percent to 71 percent. Inspired by these results, additional counties in **Kenya** have adopted a similar distribution model.

In **Ethiopia**, the government's national cold storage capacity became insufficient when new vaccines, including COVID-19 ones, were added to the immunization schedule. To solve the issue, the Ethiopian Pharmaceutical Supply Agency (EPSA) and the Ministry of Health began expanding cold room storage in 2020. Five cold rooms and one freezer room were installed that first year. In 2021, CHAI worked with EPSA technicians to install an additional cold room and freezer room, relocate three cold rooms to the EPSA compound, and renovate several more across six regional hubs. In addition, we installed 12 low-temperature cold rooms at EPSA headquarters to store Pfizer's Comirnaty vaccine for COVID-19.

**Indonesia** had an outdated vaccine cold chain equipment inventory, which COVID-19 vaccinations rapidly exposed. We worked closely with the national and subnational EPI teams to update cold chain inventory and developed a cold chain planning tool tailored to **Indonesia's** context to assist with capacity

calculation and future planning, especially considering the accelerated plan of new vaccines introduction. From this, we helped develop a national vaccine cold chain roadmap and updated inventory at more than 10,000 primary care facilities in the country. This led to increased cold chain sufficiency across the country, from 74 percent in 2020 to 93 percent in 2021. It also increased optimality—the percentage of facilities with freeze-protected fridges—from 22 percent in 2020 to 24 percent in 2021 in CHAI focal provinces. CHAI is completing the handover process to the government in 2022.

In **Vietnam**, after helping the government replace aging vaccine refrigerators in 2020, CHAI developed an online cold chain equipment management platform in 2021 for two provinces, which the national EPI is now preparing to roll out nationwide. This platform allows decision-makers from the provincial to national levels quickly determine if equipment is functioning efficiently, needs maintenance, or to be upgraded.

### Supporting sustainable access to vaccines

In 2021, 25 million infants were not fully vaccinated with DTP3, a combination of vaccines against diphtheria, whooping cough, and tetanus. Just over 18 million had not receive even one dose. In 2021, we worked with **Cameroon, Ethiopia, Kenya, Nigeria, Papua New Guinea, and Uganda** to improve DTP3 immunization.

CHAI's approach was anchored to developing, testing, and scaling innovative interventions that increase equitable, routine immunization coverage and strengthen non-traditional vaccination touchpoints; for example, at birth, nine months, and adulthood.

Missed opportunities for vaccinations occur when children visit health facilities, whether for their own care or accompanying a caretaker, and are not screened or provided with the vaccinations they require. In **Uganda**, these visits represent a huge unrealized opportunity to increase vaccine uptake and ensure completion of a child's full immunization schedule.

A CHAI assessment in 14 districts found only 42 percent of health facilities conducted systematic screening for vaccination. When screening did occur, 26 percent of children dropped out between the screening and immunization points. The assessment also revealed access challenges faced by caretakers. For instance, 42 percent of those surveyed reported that vaccination hours were incompatible with their schedule and 35 percent reported long waiting times as a deterrent.

CHAI identified limited immunization session availability and ineffective referrals as key factors



contributing to missed opportunities for vaccination in health facilities. In response, we supported health facilities to implement daily static immunization sessions, screen every child that visits, and ensure immunizations are offered and available to all eligible children. To reach the most children in need, this work focused on 10 facilities with the highest numbers of unimmunized children in each of the 14 districts.

CHAI trained national supervisors to mentor health workers to screen and vaccinate all eligible children, including those referred from other clinical departments or facilities.

In addition, we supported clinics to optimize clinical workflows, including task shifting to increase health workers' capacity to implement daily static immunization sessions in line with the national immunization policy. Health facilities also received support to better communicate with their communities about the daily availability of immunization services.

At the health facility level, systematic screening for vaccination and daily immunization sessions increased by 58 percent and 39 percent respectively between December 2018 and November 2021. As a result, 11 percent more children received their third dose of DTP3, and 72 percent more children received the second dose of human papillomavirus vaccine (HPV2) in September 2021 compared to the same month in 2020, before the interventions. In addition, the 14 focus districts consistently achieved higher vaccination coverage than the national average throughout 2021.

The same assessment found that in the 14 focus districts, health facilities were unable to systematically identify underserved communities within their catchment areas. This was due to the limited interaction between health facilities and communities, leading to a poor understanding of the barriers to seeking care.

To address this, CHAI piloted an intervention that monitors geographic variations in care-seeking trends in high-volume health facilities, detecting villages with the highest number of unimmunized (zero-dose) children within their catchment areas. We trained national supervisors to mentor health workers to make better use of available data, including evaluating uptake data, ways daily vaccinations are conducted, and optimization of community outreaches, to systematically identify underserved villages within their catchment areas. The team supported dialogue between health workers and their communities which then informed intervention design. Some of the interventions we used include empowering community leaders with the correct information to sensitize their communities, engaging vaccine-resistant subgroups, optimizing immunization outreach sessions,



*64% of unvaccinated children in Central Province, Papua New Guinea, received vaccines in 2021*

assuring immunization service availability at local health facilities, and working with the community to track children who fail to complete their full immunization schedule.

This work led to increased vaccination rates in underserved villages. The number of children from underserved villages vaccinated against DTP3, MR1 and HPV2 at static sites increased by 40 percent, 49 percent, and 96 percent, respectively, within seven months. The number of children vaccinated against HPV2 and MR1 dramatically improved through optimizing the location, time, and frequency of outreach sessions, by 222 percent and 117 percent respectively.

### Using data for decision-making

Challenges with management systems and capacity of national immunization programs hamper progress against achieving high immunization coverage rates. One challenge countries face is a lack of visibility and use of high-quality data for performance monitoring and decision making.

**Papua New Guinea** has the lowest rate of routine immunization coverage and the highest levels of child mortality in the Pacific region. Between the early 2000s and 2018, national immunization rates dropped dramatically from 70 percent to less than 40 percent, leading to polio and measles outbreaks in 2018. Today, coverage varies widely by province and district with geographically harder-to-reach and more insecure locations consistently achieving lower coverage.

To stem the immunization rate drops, CHAI helped the ministry of health build institutional capacity across all government levels. Nationally, we supported the government with immunization program review and led the core planning committee to outline and prioritize strategies for the new **Papua New Guinea National Immunization Strategy (NIS) 2021-2025**, which has been endorsed by key senior staff across different provincial health authorities. Subnationally, CHAI worked with Central Province to improve planning, implementation, monitoring, and evaluation of the immunization program. We worked closely with frontline workers and provincial health authorities to ensure a seamless feedback loop between the two and effectively course correct. As a result, in 2021 at least 4,500 of 7,000 unvaccinated children in Central Province were vaccinated. The program even

reached last-mile healthcare sites that have not received care since 1998. In parallel, CHAI conducted a detailed diagnostic assessment to establish root causes of poor performance and explore the challenges associated with planning and execution of immunization outreaches. This should inform the design of locally appropriate interventions in **Papua New Guinea** that CHAI plans to pilot in 2022. These works were made possible with support from the Bill & Melinda Gates Foundation as well as the Accelerated Immunization and Health System Strengthening (AIHSS) program, a **Papua New Guinea** government initiative supported by the governments of Australia and New Zealand and Gavi.

In **India**, CHAI works with the states of Bihar, Madhya Pradesh, and Uttar Pradesh—which account for 11 million births (42 percent of annual births in **India**). Full immunization coverage has reached 70 percent across **India** and in the three states where CHAI works, but equitable access remains elusive despite significant government effort and a reliable supply of vaccines and cold chain equipment. In pursuit of 90 percent immunization coverage, CHAI works to improve data-driven decision-making, managerial capacity, program governance, and demand generation for immunization services.

We supported the regularization of sub-district level immunization program review meetings across 100 sub-district units in Uttar Pradesh, with a structured agenda, data analytics and follow-up mechanisms for action. Similarly, CHAI enabled the state of Madhya Pradesh to roll out standard operating procedures for review meetings in 52 districts, with easy-to-use toolkits and progress dashboards. The strengthening of these review meetings has empowered local program managers to look for solutions to their unique coverage and equity challenges.

Quality and timely reporting of coverage data is critical to identify and close immunization gaps. CHAI has trained government immunization data handlers and associated staff in all 165 districts across the three states so they may undertake quality data analytics to support program managers and reduce data entry errors.

Automated dashboard creation tools as well as data quality validation tools have been rolled out to these data handlers with a view towards transitioning data analytics capacity in the government system.

CHAI has supported the creation and roll out of a job aid, the immunization wheel, which has proven successful in facilitating frontline workers to calculate accurate due dates for childhood vaccinations, reducing dropouts and increasing timeliness of vaccination. The immunization wheel has been rolled out to 280,600 frontline workers in the states of Uttar Pradesh and Madhya Pradesh, along with instructional training on how to use them for creating awareness amongst caregivers.

### Looking ahead

We will continue working with governments and partners to reach more children with lifesaving vaccines and reduce the over 1.5 million deaths vaccine preventable diseases still bring each year. We are increasingly focused on children and communities that barely get any vaccines as they represent the bulk of under-immunized and are often missed by other essential health services too.

We will continue to support countries to introduce new vaccines that are appropriate to their context in order to ensure accelerated and sustainable protection. We will pay special attention to hepatitis birth dose, HPV, and a potential COVID-19 program routinization.

We also aim to promote the strengthening of vaccine delivery systems as part of a more holistic approach to improving health programs and systems. We believe that the substantive reach of existing immunization systems can be a backbone for other health services.

We will continue to work with multiple focus countries, global manufacturers, global policymakers, and key funders for immunization so that the impact of CHAI's work goes beyond its focus countries.

## CROSS-CUTTING EXPERTS:

# Digital Health

*Our programs aim to save lives and reduce disease, while helping governments create sustainable health systems. Our teams of science, business, and technical experts work with program and country teams across the organization to support that goal. Throughout this year's Annual Report, we will highlight the collaboration between our cross-cutting groups and our program and country teams.*

The Digital Health program was established in May 2021 to drive a thoughtful and impactful approach to use digital technologies at CHAI. The new program consolidated existing staff and efforts across teams, including those working on malaria health informatics, logistics information management systems, and health financing technologies, into a cross-cutting program to drive and support existing and new digital health work across programs and countries.

### Supporting the rollout of electronic supply chain systems

CHAI has served as a key steward for over seven years of OpenLMIS, an open-source electronic logistics management information system (LMIS) built to manage health commodity supply chains. In 2020, CHAI worked with OpenLMIS developers to create a new, simplified configuration of OpenLMIS that can be quickly deployed for the integrated management of COVID-related supplies. This reduced the deployment time of OpenLMIS from nine to three months across our partner countries.

In 2021, CHAI supported the deployment of OpenLMIS's COVID edition in **Cameroon**, the **Democratic Republic of Congo (DRC)**, **Eswatini**, and **Nigeria**. In **Nigeria**, OpenLMIS has been implemented in 15 states to manage the COVID-19 vaccine supply chain. In **Cameroon**, it has been introduced at 300 national, regional, and district sites that manage COVID-19 commodities such as personal protective equipment and testing kits, as well as medical oxygen equipment such as ventilators, pulse oximeters, and piping. In **DRC**, OpenLMIS was piloted in three sites to manage COVID-19 laboratory commodities.

In **Eswatini**, the Ministry of Health faced problems with the paper-based logistics management system which caused delays in the procurement of commodities, resulting in increased stockouts. CHAI supported the ministry to introduce an electronic logistics management system based on OpenLMIS to address the country's supply chain challenges and ensure an efficient and uninterrupted supply of drugs, medical supplies, lab reagents, and other medical commodities

for improved patient outcomes. The system allows hospitals and clinics to electronically order medical supplies from Central Medical Stores (CMS) and helps monitor the availability of stock from both facility and CMS levels. This bi-directional visibility of available stock between the facilities and CMS allows the ministry to allocate commodities efficiently based on need in real-time.

### Strengthening information systems and use of geographic data

The limited availability of a single source of information about village, district, province, and state boundaries, location of health facilities, and numbers of community health workers can limit the ability of ministries of health to provide robust, accessible healthcare. Ministries and various departments and stakeholders have multiple sources for these data, challenges in consolidating the various sources due to variations in spellings, tracked indicators, and depth of data collected, and tracking historical changes in the data. The lack of comprehensive lists limits strategic planning, deployment of interventions and resources, health worker payments, supply chains, and the ability to assess and monitor the health of populations.

The development and use of functional national master lists of health facilities that use geographic coordinates, official geographic boundaries for villages, settlements, and districts, and/or community health workers can close these gaps.

In **Lao PDR**, the Common Geo-Registry is a single source of reference information system for the standardization, management, and use of geographic data. The registry has triggered new ways of using in-country geospatial data to improve access to care including the development of health facility and community worker master lists. For the first time, the geolocation of village malaria workers down to the sub-village level is possible. The system matches the workers with their base locations called administrative units (health facilities, districts, and provinces) allowing the ministry of health to quickly identify human resource shortages, and recruit, train and



*1,700 facilities in Mozambique now reporting via a national electronic system for integrated disease surveillance*

deploy workers based on the need. This has allowed health facilities to quickly fill community health worker shortages, rapidly respond to malaria cases, and manage outbreaks.

We supported the development of standard operating procedures, technical working groups, and governance mechanisms to keep these lists up-to-date and used. The registry also integrates with major information systems to ensure a single reference list across data systems.

Community care sites provide an initial level of healthcare for people living in remote areas. These sites, usually run by trained volunteers, can provide basic yet lifesaving testing and treatment of cholera, malaria, and pneumonia. In **DRC**, until recently, their locations were based on outdated and limited population data, meaning that community care sites were not located where they were most needed. With CHAI's support through the exemplar utilization of Geo-Referenced Infrastructure and Demographic Data for Development (GRID3) data project, the Ministry of Health is now trialling the use of a range of geospatial data that optimizes locations, improving access for the most vulnerable.

The methodology combines satellite data, micro population surveys, and modeling to produce open-source maps which incorporate metrics such as population density, infrastructure, and geographic features that are helpful for understanding access to healthcare services. CHAI has provided technical support to **DRC** to trial the use of GRID3's geospatial data to select the location of 10 community care sites across two health zones in Kasai province—the region with the highest rate of child mortality in the country.

CHAI continues to work with ministries of health in **Burkina Faso**, **Ethiopia**, **Ghana**, **Kenya**, **Mozambique**, and **Sierra Leone** to strengthen capacity to use geospatial data and geographic information systems to inform primary healthcare planning and service delivery. In **Kenya**, we are using geospatial data to refine vaccine coverage estimates; in **Ghana** to visualize gaps in lifesaving treatment access for sickle cell disease; in **Ethiopia** to optimize oxygen supply for COVID-19 treatment and in **Sierra Leone** to capture all at-risk girls for HPV vaccinations.

## Strengthening disease surveillance systems

Disease surveillance is the continuous, systematic collection, analysis, and interpretation of health-related data of a particular disease or diseases. Disease surveillance data serves as an early warning system for impending outbreaks that could become public health emergencies; identifies health or disease trends, guiding priority-setting and planning of public health policy and strategies; it enables monitoring and evaluation of the impact of an intervention; and helps track progress towards specified goals.

In **Mozambique**, we helped design and roll out a national electronic system for integrated disease surveillance reporting for over 1,700 facilities. The system will help resolve longstanding data fragmentation issues across disease programs and facilities and improve data sharing by allowing facilities and labs to input data directly into the system. Despite the challenging environment, in **Haiti**, we initiated the launch of a new mobile application to allow reporting by community health workers and mapping of malaria cases. In **Vietnam**, we have improved the electronic disease surveillance system, simplified data collection forms and malaria case investigation procedures, and incorporated new dashboards that allow data visualization at the community level.

## Looking ahead

CHAI and the World Health Organization's Regional Office for Africa are undertaking a new ambitious effort to digitize public health campaigns in Africa. The initiative aims to work with governments in at least three countries to improve coverage and efficiency of campaign activities for malaria (bednet distribution, insecticide spray, and severe malaria chemotherapy campaigns), immunization (polio, COVID-19, meningitis, and other vaccine-preventable diseases), neglected tropical diseases (mass drug administration), and others. Campaign activities that may be made electronic include microplanning, supply chain management, campaign worker training, intervention delivery, payment, and monitoring and evaluation. Rather than introduce standalone digital campaign tools, we aim to integrate tools across different campaigns, and where possible, into government-owned routine health systems. A key goal is also to build consensus between donors, campaign implementers, and ministries of health around an approach for campaign digitization and integration, and to produce global guidance for these activities.



## STAFF REFLECTION

# Nomfundo Mncina

Universal Health Coverage Analyst, CHAI Eswatini

I was raised on the principles of “buntfu,” the understanding that our humanity is bound to how we treat our fellow human beings. This concept was solidified through the courses I took at school, my community engagement activities, and the career I pursued after graduation. My college major was International Political Economy because I aspired to discover innovative ways to accelerate economic growth, lift people out of poverty, and eliminate inequalities.

I joined CHAI in April 2021, during a time of great uncertainty. Eswatini was entering its second year of the COVID-19 pandemic, and we had already lost so many of our loved ones. Before joining the organization, I felt overwhelmed by the destruction the pandemic was causing and felt a great sense of helplessness. My path to health wasn’t linear, and I thought public health only applied to medical professionals such as doctors and nurses. However, during the pandemic, I observed how COVID-19 exposed and amplified the already existing inequalities in our societies. Those with resources had access to quality healthcare and received medical attention faster. Countries with higher income had earlier and greater access to lifesaving vaccines. Witnessing these differences informed my understanding of the social determinants of health and the underpinning knowledge that: where you were born and who you are still determine your access to healthcare. It was this gnawing realization that strengthened my resolve to join CHAI and contribute to eliminating these barriers.

Although I’ve been with CHAI for only a year—a relatively short tenure—my work has been incredibly dynamic. Our support for the government has been wide-ranging. I’ve been on projects such as introducing novel digital surveillance tools to improve monitoring and evaluation in Mass Drug Administration for Neglected Tropical Diseases; using behavioral insights in health campaigns to increase coverage and improve efficiency; and generating costing evidence for primary healthcare to attain universal health coverage. Primary healthcare is the bedrock for achieving equitable access to all. This understanding was even more evident during the COVID-19 lockdown, where movement was restricted, and people in hard-to-reach areas struggled to get the healthcare they needed.

*“I am inspired by how CHAI is committed to our mission to save lives and see the work succeed. CHAI’s dedication to improving people’s lives and our entrepreneurial approach make our efforts feel purposeful, compelling, and enjoyable!”*

In addition to the extraordinary work we do, I have come to appreciate the flexibility we have at CHAI, which allows staff to work across programs, drawing from our colleagues’ vast and diverse knowledge. By leaning on each other and working collaboratively, we bring a holistic approach when supporting the Ministry of Health. This diversity has proven to be instrumental when facing challenges. The year 2021 posed multiple trials. In addition to people becoming sick and some even losing their lives to COVID-19, the country faced a tumultuous period of civil unrest. The culmination of these disruptions resulted in multiple national lockdowns, which disrupted our work. However, using an entrepreneurial spirit and agility, we shifted to apply behavioral insights from canceled campaigns for deworming to accelerating and strengthening ongoing COVID-19 vaccination efforts.

My colleagues have demonstrated an incredible degree of resilience and perseverance throughout these challenges. I am inspired by how CHAI is committed to our mission to save lives and see the work succeed. CHAI’s dedication to improving people’s lives and our entrepreneurial approach make our efforts feel purposeful, compelling, and enjoyable! ●

# UNIVERSAL HEALTH COVERAGE

**Despite significant increases in access to healthcare over the past few decades, half the world still lacks basic health services.** COVID-19 has only exacerbated pressures on health systems and economies. Many governments are committed to achieving universal health coverage. This means everyone, including the poor and vulnerable, has access to the essential services they need, when and where they need them, without paying more than they can afford.

With support from Sida, the Bill & Melinda Gates Foundation, Global Financing Facility (GFF) through the World Bank Group, and others, CHAI is working with governments to invest in primary healthcare as a crucial first step toward universal health coverage. There is no one formula to design, plan, finance, and manage health systems. Every country is different. While the goals may be similar, the priorities and approaches to carry them out cannot be the same. ●

**Programs:**

Health Financing • Health Workforce

**Countries:**

Bangladesh • Burkina Faso • Eswatini • Ethiopia • India • Malawi • Nigeria • Rwanda • South Africa • Zambia • Zimbabwe



*A workshop on health budget tracking and advocacy in Kano, Nigeria. Photo by Ishaq Muawiya Musa.*

# Health Financing

Regardless of how much money is available, the way health is financed can have a massive impact on a country's health system and disparities in health outcomes. As the long-term economic impacts of the pandemic become apparent, finance and health ministries are bracing for a prolonged period of fiscal constraints. While many countries have seen an influx of funds earmarked for COVID-19 response, there is a risk that critically needed resources will be diverted from essential services, including primary healthcare. CHAI has been working with governments to assess and direct health funds to essential services now and improve budget planning and monitoring in the future.

## Ensuring funds get to where they are needed most

Constraints triggered by the pandemic continue to cause fluctuations in the resources available for health services. Many facilities have experienced disruptions in cash flow and supplies that affect the quality—or even the availability—of services offered. For patients, this means unexpected and at times catastrophic out-of-pocket costs. In 2021, we helped governments reform provider payment mechanisms to better meet patients' needs and improve funding predictability.

We worked with **Ethiopia** and **Rwanda** to improve the predictability of funding for primary healthcare and reduce administrative burden. CHAI partnered with the Ethiopian Health Insurance Agency (EHIA) and **Rwanda** Social Security Board (RSSB) to shift from a fee-for-service model (paying providers for the volume of services rendered) to capitations (paying providers a fixed amount per patient up front). If properly implemented and monitored, capitation's fixed reimbursement rate allows for cost-containment and reduces the burden of processing claims and administrating payments. With a fixed budget given upfront, predictable revenue will allow providers increased financial autonomy to deliver needed care quickly and efficiently without delays. In **Ethiopia**, this included piloting capitation in four districts and documenting the learnings for national reform. Those learnings were then shared between the governments of **Ethiopia** and **Rwanda**, as **Rwanda** prepared to launch a national capitation reform campaign.

With limited resources and expanding health needs, governments must constantly make trade-offs. In 2021, CHAI supported countries to make difficult decisions around which interventions would be funded. **Rwanda's** community-based health insurance (CBHI) scheme

covers most of the population but struggles to keep up with expanding services. To keep the program sustainable, the government, with CHAI's support, published a ministerial order in September 2021 that outlines an evidence-based methodology, which will maximize limited resources during future revisions of the benefits package. The methodology calls for public and private stakeholders, including the ministries of health and finance, universities, patient groups, and others to be part of the decision-making process.

In **South Africa**, the government's health budget was slashed by US\$1 billion in the 2021/2022 financial year as the economic and fiscal effects of COVID-19 response led to budget cuts across sectors. CHAI helped the National Department of Health and National Treasury allocate other resources to ensure the continuity of essential health services despite the cut. We also helped review budget proposals to increase and protect existing health budgets nationally and provincially.

**India's** national health insurance scheme aims to provide financial protection from catastrophic expenses to the country's poorest and most vulnerable citizens. CHAI worked with the National Health Authority (NHA), which manages the scheme, to improve enrollment and use of these essential health services. We supported the NHA data insights team, which CHAI helped establish, to monitor and analyze data on patient use and hospital claims to understand patterns in service use and the impact of insurance coverage across geographies and populations. This resulted in the introduction of new reimbursable services for maternal and child health, including for delivery.

A major challenge of the insurance scheme is efficient enrollment of beneficiaries, especially in accurately matching personal information to the eligibility database. CHAI worked with the government on revamping the scheme's auto-approval algorithms to double auto-enrollment rates in 2021 to nearly 25 percent, leading to a saving of an estimated 1.9 million people hours of processing time.

**Eswatini** has made progress toward universal health coverage with an increase in domestic financing for health (only 25 percent of public health spending relies on donors). However, the country still struggles to provide primary healthcare to a substantial portion of the population either because services are not available or of poor quality. In 2021 CHAI supported the ministry of health to better track how money was spent



**US\$1.38M** mobilized to support introduction of HPV vaccine in Eswatini, expected to reach 134,000+ girls in the next five years

through quarterly regional review meetings, as well as costing both the national non-communicable disease strategy and an operational plan for the elimination of mother-to-child HIV transmission. Where the budget came up short, we supported the ministry to mobilize resources to cover the gaps. This included support to mobilize US\$1.38 million for the first introduction of the HPV vaccine, which is expected to reach more than 134,000 girls in the next five years.

### Aligning external funds with government plans

Where donor funding continues to play a significant role, CHAI works with countries to shift to a new paradigm where governments manage external funds to better align with their priorities, improve efficiency in spending, and health system sustainability.

In **Burkina Faso**, the ministry of health prioritized an agenda of “One Plan, One Budget, One Report” to reduce fragmentation and duplication within the public health sector. In 2021, we supported the government to use resource mapping—the tracking of donor and government funding flows to health—to identify funding gaps and coordinate new resources to the areas of greatest need in 2022. The results will also be used to plan for longer-term initiatives, including an upcoming comprehensive reform of the country’s primary care system.

With CHAI’s support, **Malawi** completes a similar resource tracking exercise annually to monitor the 77 percent of the national health budget that comes from donors. However, several comparable exercises were also being conducted in parallel. In 2021, CHAI helped create efficiency to combine three key resource-tracking exercises, allowing the government and donors new visibility into health system financing flows. We used the results to help develop a strategic plan and gap analysis so the ministry of health could systematically work with major donors to align funding with the government’s needs.

**Zimbabwe** saw a substantial increase in domestic funding for health, which helped bring the total health budget up from US\$672 million in 2020 to US\$1.15 billion in 2021. However, the country continues to depend on Development Assistance for Health (DAH) funding to purchase drugs, medical supplies, and other equipment. The funding is chiefly allocated to communicable diseases like HIV and sexually

transmitted infections, leaving less than one percent of DAH funding available for non-communicable diseases, which are the biggest killers in the country.

CHAI worked with the government to explore innovative taxes that could be directed to emerging program areas traditionally neglected by domestic and external funding sources. We also supported the government to better track and monitor financing flows within the health sector to ensure resource allocation reflected the health sector’s needs.

Globally, we have begun working with the Global Financing Facility and the World Health Organization to document countries’ experiences using resource tracking to align external funds and government priorities. This includes developing a practical resource guide that stakeholders can use to introduce the approach in their own countries.

### Translating funding to improvements in service delivery

Even when health budgets allocate the funding needed, this does not always translate to affordable, quality healthcare for patients when they arrive at health facilities. Over the last year, CHAI worked with ministries of health to address this gap in care. We shifted our work toward subnational government agencies, health facilities, and communities to identify challenges, trace them back to financial and management root causes, and develop and test solutions.

In **Nigeria**, the federal government has committed one percent of revenue to basic healthcare services through the Basic Healthcare Provision Fund, but there have been significant management and operational challenges in capacitating state health insurance agencies to manage these funds to improve service delivery. In Kano, **Nigeria**’s most populous state and home to nearly 20 million people, CHAI worked with the state government to build a team to deliver on the country’s commitment to provide affordable essential services to the entire population. For example, while facilities were receiving funds through capitation, there was little guidance or data to inform how the money should be spent. The team worked in nearly a quarter of the state’s facilities to develop improvement plans to reduce bottlenecks and strengthen management and data systems to ensure funds are spent in the most impactful way.

In **Malawi**, the Global Fund to Fight HIV/AIDS, TB and Malaria is the largest health sector donor in the country. However, during the last funding cycle (2015-2017), only 81 percent of the grant was spent, leaving US\$65 million unspent due to implementation challenges. CHAI strengthened routine financial



management of Global Fund grants, resulting in real-time information sharing, problem solving, and reprogramming of funds at risk of not being used. As a result, during the current funding cycle, the grant absorption rate increased to 95 percent and unspent funds worth US\$61 million for HIV/AIDS and US\$7 million for malaria were identified and re-programmed in time.

CHAI also continued supporting district health management teams in seven districts in **Malawi** to optimize how funds are budgeted and spent. This included introducing an action tracker tool to monitor progress made against budgets throughout the year and provide accountability between the government and its partners.

### Looking ahead

As governments and donors face difficult tradeoffs due to the pandemic, many are turning to primary healthcare as a cost-effective way to make health systems more resilient to COVID-19 and other emerging threats. More and more governments are committing to primary healthcare reforms that strengthen service delivery and remove financial barriers for the most vulnerable patients.

CHAI has received requests to support governments as they make primary healthcare a cornerstone of universal health coverage plans. In 2022, we will focus on work with a few governments to demonstrate success, sharing learnings with countries across sub-Saharan Africa.



Community health worker Angela Katito gives a health talk on nutrition to mothers in an open air space in Katete village, Zambia. Photo by Carol Milambo Mufana.

# Health Workforce

A skilled health workforce is the backbone of every health system, yet the World Health Organization (WHO) estimates a shortage of 18 million health workers by 2030, mostly in low- and middle-income countries. COVID-19 has only made the situation worse, stretching doctors, nurses, midwives, and other health workers beyond their breaking point and causing many to leave their profession early, increasing financial pressures on already strained health systems.

Beyond the pandemic, there is chronic underinvestment in education and training of health workers in some countries as well as budgetary challenges in many countries leading to health worker shortages and labor market imbalances.

CHAI works with governments to identify their health workforce needs and develop sustainable systems to plan, train, and manage health workers to provide quality health services, and to do so in a way that builds domestic institutional capacity.

## A strategy refresh at CHAI

In 2021, CHAI undertook a strategy refresh process for the health workforce program. We wanted to step back and examine what we consider the major challenges and opportunities in most of the countries where we work and ensure the technical assistance we provide governments is relevant and appropriate—particularly in light of global economic contractions and the need to support greater efficiency and optimization within health workforce. With input from internal leaders at CHAI, government partners, and external experts, we plan to roll out the new strategy in 2022.

At the same time, the health workforce team spearheaded the development of a community health strategy for the organization. Community health worker (CHW) is an umbrella term that includes a variety of paid or volunteer positions. CHWs go through a much shorter training period than professionals; however, as members of the communities which they serve, they are invaluable as health advocates and often agents of change.

Qualified, paid, and supported CHWs have enormous potential to improve health access and coverage by bringing services closer to the people who need them, and creating effective referral networks from communities to health facilities. For their potential to improve health and stimulate economies, CHWs have been found to have a return-on-investment of up to 10:1. However, the CHW landscape in many of the

countries where CHAI works is fragmented and donor-driven; many CHWs are unpaid or underpaid and at the same time overburdened and management systems are weak. In 2020, several CHAI program teams raised common challenges related to the organization and delivery of community-based services. To align on the roles that CHAI can play to help governments optimize community health systems, in 2021, CHAI convened an internal technical working group to develop an organizational strategy to guide our support of partner governments to strengthen national CHW programs. This strategy will draw on the work that CHAI has been doing with governments in [Zambia](#), [Zimbabwe](#), and other countries to strengthen national CHW programs, and will inform CHAI's engagement in several new countries. Specific recommendations for CHAI's community health strategy will be shared in 2022.

## Expanding access to quality essential care through health worker planning, training, and infrastructure

CHAI supports governments to develop their health workforces by ensuring they have evidence-informed plans and robust systems for training, deploying, and supporting health workers in [Rwanda](#). CHAI provided technical assistance to the Human Resources for Health Secretariat (HRHS) to implement its National Strategy for Health Professions Development (NSHPD) 2020-2030 on several immediate government priorities related to national large-scale health workforce development. This included reviewing and refining standards for teaching hospitals, second-level teaching hospitals and training institutions, which are critical to ensuring high quality of clinical training for all cadres of health professionals in [Rwanda](#). CHAI also supported the government to launch several medical fellowship programs through the University of [Rwanda's](#) School of Medicine and Pharmacy; these are set to begin in 2022 and will enroll the country's first nationally trained pediatric surgeons, dermatologists, and gynecologic oncologists, among others.

To meet the demand for basic nursing care and expand access to quality care at all levels of the health system in [Rwanda](#), the government introduced an Associate Nurse Program with CHAI support. In September 2021, 210 students were admitted to the program across seven secondary schools. Upon completion of their studies, graduates will be equipped to either provide basic nursing care at community or health facility level; the expansion of this cadre will strengthen the

quality of basic care and enable specialized nurses to have more time dedicated to specialized nursing care in **Rwanda**.

Access to quality healthcare in **Bangladesh** is limited with most services delivered by private hospitals and financed by out-of-pocket payments. Much of the population cannot afford private care, resulting in overcrowded public hospitals and little access to specialty care.

In 2021, CHAI, with funding from Grameen Bank, supported MASS Design to design a 500-bed tertiary care hospital, medical school, and health technology school in Dhaka, **Bangladesh**. The teaching hospital will provide quality, subsidized care for poorer populations, while also serving as a training site for future health professionals. The hospital is designed to host centers of excellence for emergency care and obstetrics and will include a 14-department outpatient care unit.

The Swedish government provided **Zambia** with phase-two funding for a national package of evidence-based interventions to drive sexual, reproductive, maternal, newborn, child, adolescent, and nutrition (SRMNCAN) healthcare in Eastern and Southern provinces. While the government of **Zambia** previously had tremendous success rolling out the first phase of the program, several challenges were identified around program coordination and management. For example, measuring progress toward programmatic targets had been challenging because neither baseline data nor gap analyses—for example of health worker training needs—were available.

To address this, during the second phase of the project, CHAI is partnering with the Ministry of Health to provide joint accountability for implementing SRMNCAN interventions. CHAI supported the government with essential planning functions such as generating and using evidence to optimize resource allocation.

As part of this role and with the aim of optimizing resource allocation for SRMNCAN outcomes, CHAI began the process of supporting the MOH to determine health worker requirements using CHAI's Workforce Optimization Model (WFOM). Results can be used to identify areas of over or under-staffing and inform redistribution of existing health workers as well as allocation of new workers. The WFOM will be completed in 2022 and its findings will inform the deployment of health workers in Eastern and Southern Provinces.

In addition, in September 2021, the Zambian government announced the planned recruitment of 11,000 health care workers. An up-to-date Establishment Register (ER) is crucial in highlighting gaps in the establishment. The MOH ER had not been updated since 2016, thus posing a challenge to the



**500-bed tertiary care hospital, medical school, and health technology school designed in Dhaka, Bangladesh**

recruitment process. To address this, CHAI supported the MOH to update its ER in December 2021. The updated ER will provide evidence for recruitment process taking place in 2022, which in turn will help the government best target this significant planned expansion.

### Looking ahead

Building on the themes coming out of our strategy refresh, CHAI plans to double down on its support to governments to maximize the impact of their health workforces through evidence-based planning, stronger management systems, and prioritized support to primary care health workforces, including CHWs.

Though health workers are critical to service delivery, health workforce is an underfunded investment area in development. CHAI has been engaging with major funders to better understand perceptions and challenges related to health workforce investment in the countries where we work and to identify high impact investment areas. The insights we have gathered will be summarized in a health workforce investment case and broadly disseminated with government partners and donors with the aim of increasing and optimizing investment in government-led workforce initiatives as part of a critical global commitment to PHC and UHC.



## STAFF REFLECTION

# Isaac Kagula

**Senior Human Resources and Administration Manager, Zambia**

I joined CHAI in September 2013 on the Human Resources for Health team as Senior Program Officer for the Community Health Assistants program. Before that, I worked in a couple of organizations in the private sector in Zambia in human resources (HR) and program management. I had been looking for a place where my skills and competencies would be appreciated, but most importantly where I would be allowed to be myself, my contributions truly valued, and my personal vision of working for an organization that prioritizes fair access to health and development for all realized.

My first impression of CHAI was that it placed a high premium on new staff. Little did I know that the warm treatment I received was what everyone at CHAI receives regardless of their level or how long they have been with the organization. My colleagues made sure that my orientation was easy and enjoyable. It did not take me long to find my feet and feel at home. My second observation was how everyone was so into CHAI's mission of saving lives that it showed in how they passionately went about their business, whether interacting with our government colleagues or the beneficiaries of our services. I soon found out that this came from the fact that CHAI has a strong value system.

When I moved to my current role as in-country HR manager, eight months from the time I joined the organization, it was my turn to ensure that not only current staff, but newcomers equally receive the warmth that I did during their stay at CHAI. I have also grown in leaps and bounds both personally and in my

career thanks to the platform that CHAI continues to offer me and my colleagues.

In my role, I have been mentored by the best and receive top support from my supervisor and peers alike. I have found it easy to transfer this positive vibe to my colleagues across the organization. CHAI to me is a family of individuals of diverse backgrounds and skills and a unique spirit of teamwork and oneness that is easily replicated in our personal lives. Staff are allowed to be themselves at all times and to try out and bring forward ideas that ensures everyone looks forward to coming to the office the next day.

In the last few years when the COVID-19 pandemic has not spared anyone, CHAI has proven to me that its staff are truly its greatest asset. The resilience and desire to continue saving lives even when going through difficult times has left me in awe. Amidst the most evident disruption to the way we work, all program teams were able to meet their targets!

***“Everyone was so into CHAI’s mission of saving lives that it showed in how they passionately went about their business, whether interacting with our government colleagues or the beneficiaries of our services.”***

The greatest challenge is ensuring all my colleagues are continuously energized to carry CHAI's mission forward, knowing that the organization is where it is today because of their contribution and that they are ever valued. That CHAI considers its staff its most valued asset is my daily motivation and it was easy to design a work-life balance policy that was not just tailored for the times but placed staff wellness at the center. CHAI remains the workplace of choice for many past, current, and future employees and a strong partner to the government. ●



Healthcare providers gather in front of Matumbo Rural Health Clinic in Shiwang'andu District, Zambia. Photo by Dominic Mukumbila.

# NON-COMMUNICABLE DISEASES

**Non-communicable diseases (NCDs) such as heart disease, cancer, chronic respiratory disease, and diabetes are now the leading cause of death globally, exceeding all communicable disease deaths combined.** The WHO estimates that each year, NCDs kill at least 41 million, the equivalent of 71 percent of all deaths globally; more than 15 percent of these deaths are people between the ages of 30 and 69. Deaths from NCDs in low- and middle-income countries account for at least 77 percent of the global count. Cardiovascular diseases account for most deaths, followed by cancers, respiratory diseases, and diabetes. While in high-income countries mortality from NCDs has been steeply declining for decades, over the next decade, deaths from NCDs are expected to grow significantly in low- and middle-income countries. ●

**Programs:**

Cancer • Diabetes and Hypertension • Sickle Cell Disease

**Countries:**

Cambodia • Cameroon • Ethiopia • Ghana • Kenya • Nigeria • Uganda • Zambia



Disseminating cancer patient education materials at National Hospital Abuja, Nigeria. Photo by Tony Ayenson.

# Cancer

In 2020, cancer accounted for approximately 10 million deaths or nearly one in six deaths globally. The most common cancers globally are breast, lung, colon, rectum, and prostate cancers. Seventy percent of cancer deaths occur in low- and middle-income countries. Cancer is a significant and growing issue in sub-Saharan Africa, with cases expected to nearly double by 2030. In 2020 alone, there were an estimated 800,000 new cases and 500,000 deaths in the region where patients are twice as likely to die from cancer than in the United States.

CHAI is working with the American Cancer Society 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.

As of 2021, breast cancer had become the world's most frequently diagnosed cancer, affecting over two million people every year. In CHAI-supported countries, nearly 350,000 women will develop breast cancer each year, and more than 167,000 will die from the disease. Up to 90 percent of women diagnosed with breast cancer in high-income countries are alive after three years, but in CHAI-supported countries, the rate is as low as 38 percent. Many of these deaths could be prevented with improved symptom identification, better access to early diagnosis, and high-quality treatment.

In 2021, the World Health Organization (WHO) formed the Global Breast Cancer Initiative (GBCI) with the aim of mobilizing governments, partners, and resources to avert 2.5 million cancer deaths by 2040. The initiative is built on three pillars: health promotion for early detection, timely diagnosis, and comprehensive treatment and supportive care.

In **Ethiopia**, between 2018 and 2021, a partnership between Norwegian Cancer Society, CHAI and the Ministry of Health reduced the time between diagnosis and treatment of breast cancer from an average of four months to just seven days. As a result, 82 percent of women diagnosed with breast cancer were started on treatment at regional hospitals, up from just 33 percent at the main hospital in Addis Ababa, and the total number of patients treated increased by 58 percent.

In 2021, CHAI, with the support of the Norwegian Cancer Society, initiated a new three-year program with the Federal Ministry of Health, aimed at increasing early detection and diagnosis at lower levels of care, in addition to supporting the 15 hospitals currently providing treatment.



**58%** increase in total number of patients treated for breast cancer in Ethiopia due to reduced time between diagnosis and treatment, from 4 months to 7 days

In line with the GBCI, CHAI also worked to increase the number of medications offered through the Cancer Access Partnership (CAP)—a partnership to increase access to cancer medications in low- and middle-income countries—to include additional medicines specifically needed for the management of breast cancer which had been prohibitively priced and unaffordable until now. The number of partners in the CAP increased from three (Novartis, Pfizer, Viartis) to four with the inclusion of Biocon Biologics, and the number of products grew from 20 to 36. Thirty-one countries in sub-Saharan Africa and Asia have access to the medications.

To operationalize the CAP and enable access to the products and prices, CHAI also supported governments and other buyers to develop robust national demand forecasts that informed procurement in **Cameroon**, **Kenya**, **Nigeria**, and **Zambia**.

In **Nigeria**, CHAI further supported the Ministry to expand from 10 to 14 hospitals that provide medicines under the CAP. The hospital expansion, in combination with the increased number of products in the partnership, doubled the monthly number of patients purchasing medicine in the pharmacy from an average of 50 to over 100. By the end of 2021, over 1,700 Nigerian cancer patients had accessed treatment through the mechanism.

In **Cameroon**, the government approved a consolidated and coordinated procurement mechanism across seven cancer treatment centers following a demand forecasting and procurement planning exercise that highlighted the value of joint procurement. In **Zambia**, the first consolidated, evidence-based forecast shone a light on the need for increased funding for cancer medicines as the government plans for expansion of cancer treatment services to additional hospitals and brought together key stakeholders in medicines procurement for the first time to plan for purchasing.

In **Kenya**, to improve the accessibility, availability, and affordability of essential chemotherapy medicines, 104 cancer medicines were incorporated into the **Kenya**



*31 countries are now accessing medications through the Cancer Access Partnership in sub-Saharan Africa and Asia*

Essential Medicines List. The result is a list with a 93 percent concurrence to the WHO Essential Medicines List—the highest match in the East African region. CHAI developed a National Oncology Dashboard to aggregate data from the [Kenya](#) Health Information System (KHIS) to support strategic planning, forecasting, quantification, decision-making and management of commodities. Adverse drug reactions and poor-quality commodities are also reported on the Oncology Dashboard to enhance pharmacovigilance and post-market surveillance of oncology products.

By using the dashboard to aggregate patient and commodity data from facilities, monthly reporting improved from 9 percent to 91 percent on average from the previous year. CHAI visualized data from the dashboard to identify the most consumed products across the regional chemotherapy centers that led to a conditional grant from the government to provide 23 of the products free of charge to patients. These have reduced patient load at referral centers as chemotherapy products are now readily available at the regional centers. Expiries and wastage have reduced to near zero with the visibility created by the dashboard across the regional centers on what

they are holding so that items about to expire can be redistributed. The central medical stores KEMSA is also able to see the consumption trends across the country and even make decisions on what to stock and in what quantities.

### Looking ahead

Going forward, CHAI will work to support international initiatives such as the GBCI, Global Initiative for Childhood Cancer (GICC), Global Accelerator for Pediatric Formulations (GAP-f) Network, and the Global Platform for Access to Childhood Cancer Medicines. This is critical for building the childhood cancer market by funding both current procurement and development of future optimal pediatric formulations.

In 2022, CHAI will aim to support national governments to set up sustainable breast cancer screening, diagnosis, and comprehensive treatment programs in alignment with the global burden of disease and the vision of the WHO to tackle the disease. We will initiate implementation of two demonstration projects on innovative cancer medicines in [Nigeria](#) and [Uganda](#). The aim of these projects is to establish the feasibility of providing these medicines safely and effectively in settings with limited resources. We will also continue engaging with ministries of health and other key cancer stakeholders to address medicines availability challenges, access to other components of cancer care including diagnosis and radiotherapy, and continual improvement in data management systems.

*Diabetes screening performed during COVID-19 vaccination visit in Cheang Toeng commune Tramkak District, Takeo Province, Cambodia. Photo by Am Vichet.*





# Diabetes and Hypertension

Each year 4.2 million adults die from diabetes globally. Diabetes affects over half a billion people worldwide, of which approximately 80 percent live in low- and middle-income countries. While most cases worldwide are type 2 diabetes, type 1 diabetes risks imminent death if not appropriately managed with insulin. In high-income countries, life expectancy for those living with type 1 diabetes is equal to the general population, but in low- and middle-income countries, it is much lower due to disparities in access to diagnosis and quality treatment. Further, an estimated 10 to 25 percent of people with type 2 diabetes require insulin.

Cardiovascular diseases (CVDs) caused 17.9 million deaths in 2016, representing more than 30 percent of global mortality. Low- and middle-income countries account for over 75 percent of these deaths, half of which take place in people under the age of 70. Hypertension, diabetes, and high cholesterol are the three main metabolic risk factors of CVDs. When uncontrolled, these risk factors can lead to debilitating and potentially fatal outcomes that include heart attacks and strokes; 80 percent of all CVD mortality is due to these two severe outcomes. Fatal outcomes due to uncontrolled hypertension alone cause approximately 10.5 million deaths every year. Across CHAI's focus countries worldwide, over 33.5 million patients are considered "high-risk" for these severe outcomes, driven by sub-optimal access to care and life-saving health commodities.

## Integrated testing

In **Eswatini**, 40 percent of adults over the age of 40 on antiretroviral therapy for HIV have a risk factor for cardiovascular disease. A quarter have hypertension. The COVID-19 pandemic disrupted access to services for NCD patients in **Eswatini**. In response, the Ministry of Health and CHAI worked rapidly to decentralize care for NCDs from tertiary to primary care facilities. This included the integration of NCDs and HIV service delivery and strengthening community health workers in screening and counseling NCD patients. In 2021, 52,975 NCD patients were seen for diabetes, hypertension, and asthma, including those requiring care for both NCDs and HIV.

In **Cambodia**, NCDs are a large and growing public health challenge. NCDs kill nearly 60,000 Cambodians every year, and one in every four Cambodians dies prematurely (before the age of 70 years), from one of the four main NCDs. Targeting at-risk people over 40 with routine check-ups can provide early

detection before diseases become unmanageable and untreatable.

With the rollout of COVID-19 vaccinations in early 2021, many Cambodian adults that would otherwise be unlikely to receive NCD screening came in contact with health workers. CHAI recognized this unprecedented opportunity and began working with the Cambodian government to design and implement a pilot program providing adults over 40 with diabetes and hypertension screening while they received their COVID-19 vaccinations.

The pilot began in June 2021 at 10 large vaccination sites and later shifted to fixed health centers to promote program sustainability. CHAI provided trainings for health workers and equipped them with necessary test kits and other essential supplies, and skills to support patient follow up. CHAI also assisted with program monitoring and evaluation. When vaccination was shifted to health centers, CHAI collaborated with the WHO and government to align the Package of Essential Noncommunicable (PEN) scale up to ensure access to treatment following screening. This included eight sites in Takeo province and three sites in Kampong Chhnang province. Through this pilot, 7,435 adults were screened for diabetes and/or hypertension, 37 percent of whom had an abnormal result for blood pressure and diabetes. Over 2,326 individuals were referred to nearby health facilities for confirmatory diagnosis and treatment, and 327 consequently accessed treatment. All those tested also received counseling on risk factors, early warning signs of disease, and the importance of early screening and prevention.

## Access to diabetes commodities

Access to appropriate care, insulin, and related commodities is a major problem for many people living with diabetes in low- and middle-income countries. In **Ethiopia**, it is estimated that close to 70 percent of individuals living with diabetes, particularly in rural areas, remain undiagnosed; in **Kenya**, this is approximately 44 percent. In low-income countries, only about 23 percent of people living with diabetes



**7,400+** adults receiving COVID-19 vaccinations in Cambodia were screened for diabetes and/or hypertension, 37% of whom had an abnormal result

receive treatment. For those who are diagnosed and have access to treatment, glycemic control is low: in **Ethiopia**, between 18 and 51 percent of patients on treatment had glycemic control. In **Kenya**, approximately 7 percent of people living with diabetes achieved control.

In 2021, with support from the Leona M. and Harry B. Helmsley Charitable Trust, CHAI began work to improve access to affordable, high-quality diagnosis, treatment, and monitoring for people living with type 1 diabetes and those with type 2 diabetes who require insulin in **Ethiopia**, **Kenya** and other low- and middle-income countries. To achieve these aims, CHAI is engaging with manufacturers to improve affordability and availability of essential diabetes commodities including insulin, insulin delivery devices, glucose monitors and related consumables, and diagnostics. In tandem, CHAI is working to promote increased uptake of these products in **Ethiopia** and **Kenya** by supporting

governments to strengthen diabetes care at the primary healthcare level.

### Looking ahead

In 2022 and beyond, CHAI will continue its efforts to establish a multi-country program to improve access to affordable, quality-assured medications for people living with diabetes or hypertension. We will leverage simplified national hypertension and diabetes control guidelines to generate demand for essential NCD medicines and strengthen medication procurements and health financing approaches. We will also help create enabling policy environments for long-term clinical NCD control programs, including medication supply, and strengthening global availability of quality, affordable preferred medications through global market shaping.

## Sickle Cell Disease

In **Ghana**, CHAI has been supporting the government to improve newborn care by expanding access to cost-effective screening services for sickle cell disease (SCD) and establishing an integrated treatment care management pathway for babies with SCD. Since the program's inception, newborn screening services have expanded from two to 12 of the 16 regions within the country. Currently, over 17,000 babies have been screened and over 270 newborns diagnosed with SCD, to be linked to care.



## STAFF REFLECTION

# Lorraine Kabunga

Associate Director – Programs, Uganda

My first assignment at CHAI back in 2013 changed what had originally been planned as a one-year stint into an eight-year career. Yet, it feels like I just started yesterday.

I joined CHAI as an analyst through the Global Health Corps (GHC) fellowship. I had previously worked on the frontlines at the Mulago National Referral Hospital as a pharmacist, providing patient care in the hospital wards. I then worked for the Infectious Diseases Institute as part of the logistics team, coordinating the supply chain management of HIV drugs.

My interest in working at the national level to influence policy decisions affecting the entire health system led me to CHAI. My first task was to help the government drive uptake for a simple, lifesaving diarrheal combination treatment, oral rehydration salts (ORS) and zinc, within the public sector. Our problem was multifaceted. Zinc was not widely available in the market due to higher pricing. Health facility essential medicine budgets in the public sector were already constrained to accommodate a more expensive product. Demand among private sector frontline health workers was limited. Our intervention was therefore intricate, addressing both supply and demand market failures in the public and private sector.

We engaged the country's largest procurement, warehousing, and distribution agency for public facilities to explore more competitive pricing and introduce a co-packaged formulation of the two treatments. Using data, we convinced more than 3,000 health facility managers to place orders of the new affordable combined formulation and ensure its integration within existing health budgets. Our private sector team led nationwide trainings with frontline

healthcare providers and negotiations with first-line importers to register more affordable and quality brands. By the end of the program, we had increased ORS order volumes among facilities from one million doses to 2.1 million doses, the number of ORS suppliers from two to six, and zinc suppliers from one to five.

*“My interest in working at the national level to influence policy decisions affecting the entire health system led me to CHAI.”*

It was here that I was introduced to CHAI's catalytic approach using data analytics, stakeholder engagement, and policy to drive transformative impact nationwide. Since then, I've been fortunate to work across a number of programs (vaccines, medical oxygen, malaria, assistive technologies, HIV) and grow into my current role—providing strategic oversight of CHAI Uganda's market access and supply chain work across a number of maternal and child health commodities. Looking back to when I had just graduated and started out in my career, I never imagined my interest in the science of drugs could one day become helpful in navigating health commodity supply chains, and most importantly, help me be part of programs that will shape the healthcare outcomes for future generations of Ugandans. I am grateful for this opportunity. ●

## CROSS-CUTTING EXPERTS:

# Assistive Technology

*Our programs aim to save lives and reduce disease, while helping governments create sustainable health systems. Our teams of science, business, and technical experts work with program and country teams across the organization to support that goal. Throughout this year's Annual Report, we will highlight the collaboration between our cross-cutting groups and our program and country teams.*

According to the World Health Organization (WHO), 2.5 billion people worldwide need assistive technology, an umbrella term related to the delivery of assistive products and services, such as wheelchairs, hearing aids, eyeglasses, prosthetics, and communication devices. This number is predicted to grow to 3.5 billion by 2050. Yet, many people that need these products—to learn, work, or fully participate in society—lack access to them, with the gap most prominent in low- and middle-income countries where access can be as low as 3 percent of the need.

## Global partnerships to move the needle

CHAI has partnered with the Global Disability Innovation Hub under the UK Aid-funded AT2030 program, with UNICEF and ATscale, the Global Partnership for Assistive Technology, to dramatically increase access to assistive technology by making it more available and more affordable. We work with governments and partners in 14 countries in Africa and Asia to shape markets for the needed assistive products and create sustainable demand. Our partner countries are [Cambodia](#), [Ethiopia](#), [Indonesia](#), [Kenya](#), [Lesotho](#), [Liberia](#), [Nigeria](#), [Malawi](#), [Mozambique](#), [Rwanda](#), [Sierra Leone](#), [South Africa](#), [Uganda](#), [Zambia](#), and [Zimbabwe](#).

We support the development of data systems, national policies and strategies, procurement guidelines, and product standards for assistive products. CHAI completed market analysis on five priority products and related services—wheelchairs, hearing aids, prosthetics, eyeglasses, and personal digital devices—to help stakeholders understand what interventions may be required to overcome market barriers. We are now using these market analyses to inform work with governments to close the gap in access to assistive technologies.

## A government-led approach to providing assistive products and services

Contributing to this inequity is that assistive technology in lower-income countries is primarily donated by charitable organizations, with limited

government involvement. As a result, service delivery systems often operate in parallel to public systems, are unevenly distributed, and rely on unpredictable donor funding.

CHAI works with governments to support a radical shift away from siloed approaches to integrate assistive technology provision into public systems. Starting in 2018, we supported governments to conduct comprehensive analysis on the current state of assistive technology services, which laid the foundation for the development and launch of ambitious national plans.

As a result, [Malawi](#) launched its first-ever National Medical Rehabilitation Policy with a costed implementation plan being finalized. [Sierra Leone's](#) Ministry of Health and Sanitation launched an Assistive Technology Policy and Strategic Plan 2021-25 that includes 40 potential activities as a road map to achieve the five policy objectives outlined in the document. [Ethiopia](#), [Kenya](#), and [Liberia](#) have also launched similar multi-year strategic plans.

The WHO first published its Essential Medicines List in 1977. The list has proven instrumental to improve healthcare, lower costs, and make health products more accessible. Today, national medicines lists are in place in most WHO member states. Mirroring this success, the WHO published a priority Assistive Products List in 2018. The list includes 50 products across a spectrum of needs. However, few countries have developed national versions.

CHAI worked with governments to create technical working groups tasked with developing national lists. Specialist sub-committees focused on specific categories, including hearing, vision, mobility, cognitive, and communication. The committees prioritized products based on need and disease burden; how easy the technology would be to maintain, including spare part availability in country; and cost of the product. As a result, [Ethiopia](#) became the first African country to launch a national assistive products list in April 2021. The list includes 44 products. [Sierra Leone](#) launched its list in November 2021, with 70

products. **Liberia**, **Nigeria**, and **Rwanda** are finalizing their own lists to be launched in 2022.

### Providing access to affordable eyeglasses

Poor vision is the most common form of impairment in **South Africa**, affecting one in 10 citizens. Poor vision can usually be treated with a pair of eyeglasses. Approximately 85 percent of the population is uninsured, relying on the public health sector in their province for eye care services as well as provision of eyeglasses for those who need them. However, due to poor supply chains and budgetary constraints, provinces often cannot provide these services.

Integrating an optical lab that manufactures eyeglasses into the public health system can ensure sustainable provision to the population. CHAI tested this theory with the KwaZulu-Natal Provincial Department of Health, who set up a “hub and spoke” delivery model. We streamlined the process of getting eye exams and prescriptions at surrounding districts (the spokes) to producing the glasses at a central location (the hub). CHAI helped the Provincial Department of Health in determining the budget required to provide eyeglasses to uninsured residents.



*50% cost reduction for producing custom-made eyeglasses in KwaZulu-Natal, South Africa, as a result of the hub and spoke delivery model*

As a result, the province was able to reduce the cost of producing custom-made eyeglasses by about 50 percent. Today, those who need them can receive a new pair of glasses for under US\$12.

### Looking ahead

Countries have now developed ambitious national plans for increasing access to assistive technology and are ready to implement. We will help governments with key activities to improve the demand and supply for assistive products, including strengthening data systems; integrating assistive products into government procurement; and developing policy to improve and maintain the quality of products and services.



A vision center at Themba Hospital in South Africa. Photo by Amy Montalvo.

# FINANCIALS

Clinton Health Access Initiative, Inc. and subsidiaries. Years ended December 31, 2020 through 2021.

## Consolidated statement of activities

	2021	2020
<b>Revenues and support</b>		
Contributions	US\$970,580	US\$632,088
Grants	-	196,994,197
In-kind contributions	1,618,438	4,773,269
Other	103,555	302,800
Net assets released from restrictions	217,422,994	444,005
<b>Total revenues, gains, and other support</b>	<b>220,115,567</b>	<b>203,146,359</b>
<b>Expenses</b>		
Program services	203,267,889	186,996,041
Management and general	15,454,340	15,909,953
Fundraising	714,647	538,820
<b>Total expenses</b>	<b>219,436,876</b>	<b>203,444,814</b>

## Consolidated statements of financial position

	2021	2020
<b>Assets</b>		
Cash and cash equivalents	US\$14,615,257	US\$17,310,119
Cash and cash equivalents limited as to use	108,342,070	92,964,395
Advances and deposits	1,773,519	1,222,518
Grants receivable	5,995,702	3,381,471
Prepaid expenses	1,765,326	1,488,518
Property and equipment	245,053	193,775
<b>Total assets</b>	<b>132,736,927</b>	<b>116,560,796</b>
<b>Liabilities and net assets</b>		
Accounts payable	6,313,656	5,539,686
Accrued expenses	7,538,211	8,192,417
Deferred revenue	106,067,327	92,627,321
<b>Total liabilities</b>	<b>119,919,194</b>	<b>106,359,424</b>
<b>Net assets</b>		
Without donor restrictions	10,542,989	9,864,298
With donor restrictions	2,274,744	337,074
<b>Total net assets</b>	<b>12,817,733</b>	<b>10,201,372</b>
<b>Total liabilities and net assets</b>	<b>132,736,927</b>	<b>116,560,796</b>

# ACKNOWLEDGMENTS

**CHAI's work is possible thanks to a committed network of donors and partners.**

Abt Associates Pty Ltd  
Access Health International  
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Cooperation Agency  
The Aurum Institute  
The Brigham and Women's Hospital  
The Children's Investment Fund Foundation  
The Susan Thompson Buffett Foundation  
The Task Force on Global Health  
Touch Foundation  
UBS Optimus Foundation  
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UK Foreign, Commonwealth and Development Office  
Unitaid  
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United Nations Foundation  
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Clinton Health Access Initiative, Inc. (CHAI)  
383 Dorchester Avenue, Suite 400  
Boston, MA 02127 USA

+1 617 774 0110  
[info@clintonhealthaccess.org](mailto:info@clintonhealthaccess.org)

For all press inquiries, please contact:  
[press@clintonhealthaccess.org](mailto:press@clintonhealthaccess.org)

[www.clintonhealthaccess.org](http://www.clintonhealthaccess.org)