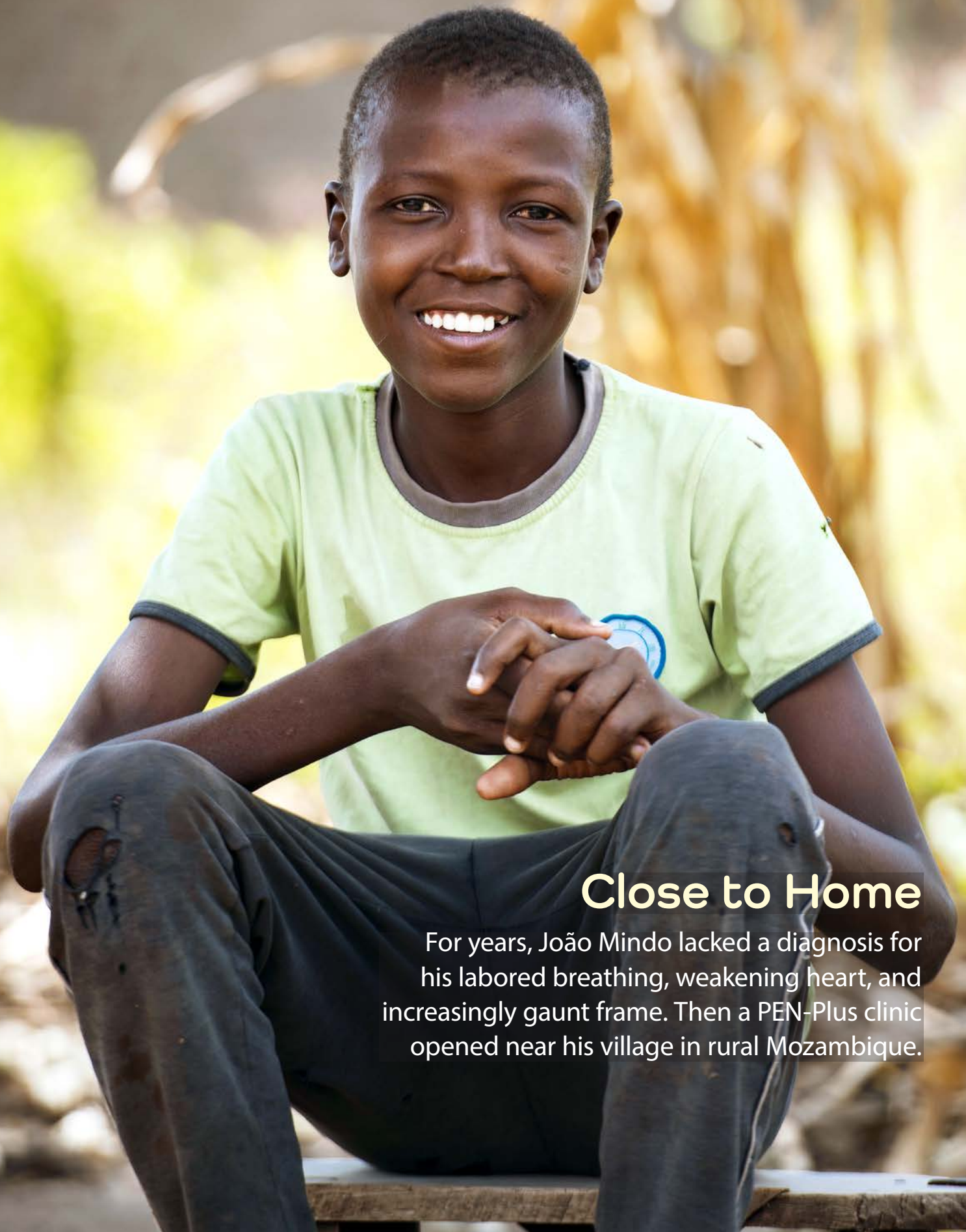


PEN-PLUS

Delivering Healthcare and Hope to People Living with Severe Noncommunicable Diseases in Africa



Close to Home

For years, João Mindo lacked a diagnosis for his labored breathing, weakening heart, and increasingly gaunt frame. Then a PEN-Plus clinic opened near his village in rural Mozambique.

Features

- 04 **Close to Home**
With his symptoms worsening, João Mindo had neither a diagnosis nor hope. Then a PEN-Plus clinic opened nearby.
- 08 **Design for Life**
PEN-Plus has proved to be effective in delivering both healthcare and hope.
- 12 **Words into Action**
The first International Conference on PEN-Plus in Africa was game-changing on many levels.
- 16 **The Faces of PEN-Plus**
Clinicians pioneered PEN-Plus using technical solutions, yet the people—the patients, providers, and partners—are also at the core of the model’s success.
- 24 **The Unfolding Promise**
PEN-Plus, which originated in Rwanda, now provides care across Africa—and beyond.

Departments

- 02 **From the Regional Director**
A welcome from Dr. Mohamed Yakub Janabi
- 03 **The Shared Vision**
No disease should be treatable in one country and yet a death sentence in another.
- 30 **PEN-Plus in Action**
The PEN-Plus clinic in eastern Uganda began as a gathering under a tree and has blossomed from there.
- 32 **Raised Stakes**
Estrela Anselmo lives close enough to a city to access care for her type 1 diabetes. Even so, her challenges underscore the urgent need for PEN-Plus to be scaled up nationally.
- 34 **PEN-Plus at a Glance**
Where a person lives should never determine *whether* a person lives. The PEN-Plus model offers a solution.
- 36 **Partner Perspective**
A call to action from Dr. Ana Mocumbi
- 38 **PEN-Plus in the Present**
A PEN-Plus update from Dr. Kofi Mensah Nyarko
- 40 **PEN-Plus in the Future**
A look ahead from Dr. Benido Impouma

Cover photo: João Mindo received his diagnosis—and learned he would need lifesaving surgery—within weeks of the opening of a PEN-Plus clinic near his home.

COVER PHOTO: © IVAN SIMONE CONGOLO / WORLD HEALTH ORGANIZATION; PHOTOS: THIS SPREAD, CLOCKWISE FROM TOP LEFT: COURTESY OF RUTH NGWARO; © MICHAEL DUFF / WORLD HEALTH ORGANIZATION



23
ALL HEART:
Kenyan-born Ruth Ngwaro translates her experience living with congenital heart disease into advocacy for others.



21
SAVING LIVES:
Emmanuel Joseph Fofanah has served as a clinical officer at the PEN-Plus clinic in Kono, Sierra Leone, for the past two years.



18
TRUE PARTNERSHIP:
“The staff at the sickle cell clinic at Atutur General Hospital are the only reason my children are still alive,” said Ategei Safia, who has learned how to manage sickle cell crises at home.



Together, type 1 diabetes, sickle cell disease, and childhood heart disease kill more than 100,000 children, adolescents, and young adults living in some of the poorest areas of Africa yearly. These diseases are the primary focus of PEN-Plus, an integrated service delivery model that enables countries to provide care to people living with severe, chronic noncommunicable diseases in resource-limited communities. PEN-Plus has already helped reduce inequities, empowered people living with these conditions, and improved health outcomes.

The PEN-Plus model complements the WHO Package of Essential Noncommunicable (PEN) Disease Interventions by bridging the access gap in treatment and care of patients with chronic and severe NCDs.

PEN-Plus implementation is being led by the WHO Regional Office for Africa, the NCDI Poverty Network, and other partners. These collaborators—with financial support from The Leona M. and Harry B. Helmsley Charitable Trust—have also come together to organize the second International Conference on PEN-Plus in Africa, hosted by the Government of Nigeria in July 2025.

ICPPA 2025 follows the success of the first ICPPA, held in the United Republic of Tanzania in April 2024. That conference served as a platform to explore collaborations and align the PEN-Plus initiative with existing public health programs across the region.

This second meeting is designed as a technical, working session under the theme “Advancing implementation of PEN-Plus for severe NCDs in Africa: technical innovations, operational insights, and scalable solutions.”

Participants can expect to leave with concrete, practical implementation objectives, informed by discussions on best practices, challenges, case studies, and opportunities. The meeting will bring together regional and global experts in severe NCDs, while also amplifying the voices of people living with these conditions and key stakeholders, such as community organizations.

PEN-Plus exemplifies the operationalization of equity in health, within the broader agenda of universal health coverage and leaving no one behind. I reaffirm the commitment of the WHO Regional Office for Africa to supporting the continued implementation of PEN-Plus and similar initiatives, toward our shared goal of ending disease in Africa.

Professor Mohamed Yakub Janabi
Regional Director
WHO Regional Office for Africa

PEN-Plus, a magazine of the World Health Organization Regional Office for Africa, is published on the occasion of the second International Conference on PEN-Plus in Africa, held in Abuja, Nigeria, in July 2025. This issue of the magazine, like the conference itself, represents a collaboration of the WHO Regional Office for Africa, The Leona M. and Harry B. Helmsley Charitable Trust, the NCDI Poverty Network, and the Government of Nigeria. The Helmsley Charitable Trust provided the funding.

© World Health Organization 2025

**International Conference on
PEN-Plus in Africa 2025**

Regional Office for Africa
World Health Organization
Cité du Djoué, P.O. Box 06
Brazzaville, Republic of Congo
Telephone: +(47 241) 39402
Email: afrgocom@who.int

ICPPA 2025 Steering Committee

Joana Ansong, MPH, PhD; Antonio Armando, MD, PhD; Gene Bukhman, MD, PhD; Neil Gupta, MD, MPH; Benido Impouma, MD, MPH, MBA, PhD; Akpaka Kalu, MBBS, MPH; Yuka Makino, PhD, MPH; Ana Mocumbi, MD, PhD; Kofi Mensah Nyarko, MBChB, MPH, PhD; James Reid, MPA

Disclaimers. The authors alone are responsible for the views expressed in this publication, and such views do not necessarily represent the views, decisions, or policies of the World Health Organization.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city, or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by WHO in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by WHO to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO be liable for damages arising from its use.



Mind the Gap

No disease should be treatable in one country and yet a death sentence in another.



BRINGING IT HOME: During a home visit, PEN-Plus nurse Euna Museva takes a blood sample from Ruvarashe Chikombe, a three-year-old living with sickle cell disease in the Masvingo Province of Zimbabwe.

Where a person lives should never determine whether a person lives. Yet without access to treatment, half of the nearly one thousand children born with sickle cell disease in sub-Saharan Africa each day will die before their fifth birthday.

Each year, severe noncommunicable diseases kill more than half a million children, adolescents, and adults in Africa alone. Just four conditions—type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease—account for as many as 100,000 of those annual deaths. And these tragedies persist even though proven, cost-effective treatments have long been routinely available in high-income countries, sometimes for decades or, in the case of insulin, for more than a century.

Noncommunicable diseases, which now represent the most significant gap in universal health coverage for the poorest billion, have been identified as global health priorities. Yet policies and funding devoted to these diseases still focus almost entirely on those often linked to lifestyle-associated risk factors. This agenda effectively excludes the world's poorest people, who suffer a heavy burden of noncommunicable diseases without preventable causes.

The avoidable deaths from these diseases occur primarily in rural areas of sub-Saharan Africa, where healthcare for these and other severe conditions often remains unavailable. As a result, beautiful young lives are lost, often before their diseases are even recognized. With PEN-Plus, an innovative healthcare delivery model, this tragedy is as unnecessary as it is unjust. ■



IMMEDIATE IMPACT: Within weeks of the opening of a PEN-Plus clinic in Nhamatanda, Mozambique, João Mindo, seated in the red chair near his mother and baby sister, received a diagnosis—and lifesaving care.

CLOSE *to* HOME

With worsening symptoms, João Mindo had neither a diagnosis nor hope. Then a PEN-Plus clinic opened nearby.

When João Mindo visited Mozambique’s PEN-Plus clinic in February 2023, the month it opened, his heart was weak, his breathing labored, and his face gaunt. Fortunately, he was right where he needed to be.

João’s acute health problems began in 2020. For three long years, he struggled to walk, eat, and even breathe. It wasn’t until the PEN-Plus clinic opened at Nhamatanda Rural Hospital, 20 kilometers from his home, that João finally received a diagnosis: rheumatic heart disease.

Paper Trail

João, now 15, lives with his widowed mother and three siblings in a home without electricity or plumbing in a rural area of central Mozambique. The family’s only means of support is his mother’s small-scale farming.

“We were told he needed surgery for his heart condition,” said João’s older brother, Lazaro. “My mother was heartbroken João had received such a serious diagnosis, and she had difficulty accepting that he needed surgery. I told her we had to pursue treatment for him.”

The severity of his condition meant João would need to undergo surgery to repair his mitral and tricuspid valves at ICOR (the Heart Institute) in Maputo, 800 kilometers to the south. First, though, a complication required resolution. João’s family had lost their identification papers in 2019 when Cyclone Idai devastated the area. Without those papers, João could not fly to the capital.

“The lack of resources in the area often means we have to solve one problem before we can confront the next,” said Dr. Ana Mocumbi, a co-chair of the NCDI Poverty Network



THE PATH TO HEALTH

Top left: João Mindo undertakes laboratory testing in preparation for his heart surgery. **Above:** João and his brother, Lazaro, spend time together at ICOR (the Heart Institute) in Maputo after the surgery. **Left:** Dr. Ana Mocumbi, a co-chair of the NCDI Poverty Network, and Dr. Raoul Bermejo, a healthcare specialist for UNICEF, talk with João during a visit to the newly opened PEN-Plus clinic in Nhamatanda in March 2023. Looking on is Dr. Prebo Barango, then a medical officer with the WHO Regional Office for Africa and now a cross-cutting specialist on noncommunicable diseases at the World Health Organization headquarters in Geneva.



LONG-TERM INVESTMENT: After the surgical repair of his mitral and tricuspid valves, João Mindo receives his ongoing care close to home at the PEN-Plus clinic that diagnosed his rheumatic heart disease. Here, Dr. Lindolfo dos Santos measures João’s arm circumference during a routine visit.

and an associate professor of cardiology at Universidade Eduardo Mondlane in Maputo. “João didn’t have the identification papers required to fly within Mozambique, so we had to make him exist on paper before he could travel for his surgery.”

Under Dr. Mocumbi’s leadership, the Maputo co-secretariat of the NCDI Poverty Network provided all the necessary support for João to undergo surgery, which included securing identification papers, arranging a free roundtrip flight for João and Lazaro, and even negotiating an agreement with Lazaro’s school to ensure he could continue his studies while accompanying his brother.

João and Lazaro stayed in the capital for three months. There João’s recovery went as well as his surgery. The brothers are now back in their hometown with their mother.


“I will forever be grateful that everything went well,” Lazaro said, “and I expect João to have a healthy life.”

Free to Run

In rural Mozambique, Dr. Mocumbi said, severe noncommunicable diseases often go undiagnosed and untreated. João was lucky, and his story highlights the importance of access to treatment and financial and social support to help young people like him defy the odds.

“The PEN-Plus program continues to ensure that João has free and consistent access to lifesaving care—including medicines and specialized treatment,” Dr. Mocumbi added. “This has not only improved his health but also alleviated his family’s financial pressures. That is our dream for all PEN-Plus patients.”

For João, PEN-Plus has provided more than care; it has restored his freedom. “Before I got sick, I would run and run,” João said. “But later, when I tried to run, I fell. My heart would beat so fast, and I couldn’t even play anymore. Since my heart surgery, though, I am fine.” ■

A young boy with dark skin and short hair is smiling and looking through a vertical metal bar. He is wearing a dark blue t-shirt with a small red star logo on the left chest. The background is a blurred indoor setting.

DESIGN *for* LIFE

PEN-Plus has proved to be effective in delivering both healthcare and hope.

As an infant, Tawonashe Mugura was always in and out of the hospital. Sometimes he had difficulty breathing; other times, he became jaundiced. His pain was so severe he cried constantly. The provincial hospital in nearby Masvingo, Zimbabwe, treated his symptoms, but he still lacked a diagnosis.

Then, when he was nine months old, an aunt provided a critical clue: Three of her grandfather's siblings had died of sickle cell disease. A test confirmed Tawonashe's diagnosis. After he received treatment for sickle cell, both his crying bouts and hospitalizations decreased. Yet his parents still faced a terrible dilemma—pay for his treatment or feed the family.

To stretch the medicine for a few more days, Tawonashe's parents occasionally missed a dose or underdosed their son. Several times a year, he would be hospitalized with severe joint pain, difficulty breathing, and abdominal and chest pain. Those visits usually corresponded with the times he lacked adequate dosing.

In 2022, after presenting to the hospital with diabetic ketoacidosis, a potentially fatal condition, Tawonashe received a second diagnosis: type 1 diabetes. Fortunately, insulin treatment allowed him to stabilize.

YOUNG WARRIOR: Tawonashe Mugura, an 11-year-old with both sickle cell disease and type 1 diabetes, receives his care at the PEN-Plus clinic at Masvingo General Hospital in southeastern Zimbabwe.

“The PEN-Plus clinic has been a silver lining in our lives. I feel we have gotten another chance to breathe.”

In June 2023, Tawonashe enrolled in the PEN-Plus clinic at Masvingo Provincial Hospital. The clinic now provides him with continuous pharmaceutical support, including hydroxyurea for his sickle cell disease, insulin for his diabetes, and pain medications. The nurses educate him about his illnesses, and he receives free routine laboratory and radiology tests.

“With this treatment, we hope to reduce both his sickle cell complications and his hospitalizations in general,” said Dr. Alvern Mutengerere, project manager for noncommunicable diseases at SolidarMed, the implementing partner for the PEN-Plus clinic in Masvingo. “Tawonashe is exactly the kind of patient for whom PEN-Plus was designed.”



STAYING STRONG: Tawonashe Mugura joins his parents, Stella and Tranos Mugura, for a family portrait at their home in Masvingo, Zimbabwe.

System Integration

PEN-Plus, an integrated healthcare delivery model, was developed in Rwanda to provide lifesaving care to children and young adults living with severe, chronic noncommunicable diseases in extreme poverty. More than a dozen countries—including 11 in Africa—are now implementing the model, and the World Health Organization Regional Office for Africa is undertaking a significant expansion of PEN-Plus on the continent.

PEN-Plus complements the WHO Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care by focusing on first-level hospitals and care for severe, chronic conditions such as type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease.

The PEN-Plus strategy seeks to increase coverage of these less common but more severe conditions by decentralizing services normally available in many low- and lower-middle-income countries only at tertiary

referral centers. By providing training, mentorship, and supervision, PEN-Plus also strengthens WHO PEN services at mid-level facilities, such as district hospitals.

Disease Integration

The PEN-Plus approach is as simple as it is effective: In aiming for an optimal configuration of scarce healthcare resources, PEN-Plus trains mid-level providers such as nurses and clinical officers to deliver crucial, integrated services—including diagnosis, symptom management, and psychosocial support—across a range of severe, chronic noncommunicable diseases.

The innovation is in the design. PEN-Plus clinics optimize infrastructure and human resources by clustering conditions and interventions that can benefit from shared space, training, workflow patterns, and skills, including the management of medications with narrow therapeutic windows, such as insulin and anticoagulants.

Patient-Centered Approach

For Tawonashe, the delivery of that design has proved lifesaving.

“The PEN-Plus clinic has been a silver lining in our lives,” said Tawonashe’s mother, Stella Mugura. “I feel we have gotten another chance to breathe. And I am thankful for our education about sickle cell; I thought it was a death sentence, but now we have hope.”

The clinic has also relieved the family’s financial pressures.

“PEN-Plus has lifted a huge burden from us,” Stella Mugura said. “The extended help from SolidarMed and the clinic reminds me of the meaning of my son’s name. In English, *tawonashe* means ‘we have seen God.’ Indeed, we have seen God in our lives.”

Tawonashe has found inspiration in his journey. “When I grow up, I want to be a doctor so I can treat myself and others,” he said. “And now my dream will succeed because of PEN-Plus.” ■

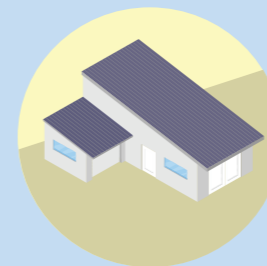
BETTER BY DESIGN

PEN-Plus bridges gaps across health systems, treatment protocols, and solidarity movements to save lives.



Referral Hospitals

Specialists in referral hospitals provide PEN-Plus clinicians with training and mentorship. In turn, PEN-Plus clinicians send patients to referral hospitals for acute specialty interventions and provide follow-up care, such as anticoagulation treatment for people who have had heart valve replacements.



First-Level Hospitals

The PEN-Plus model trains nurses, clinical officers, and other mid-level providers to treat severe, chronic conditions; secures lifesaving medicines and supplies; and brings advanced care closer to home for the millions of people living in the rural and near-urban areas of sub-Saharan Africa.



Health Centers

The frontline clinicians of WHO PEN provide outpatient primary care to people with common noncommunicable diseases. Together, WHO PEN and PEN-Plus offer people with noncommunicable diseases a strong system of care across both time and health-system levels.

HEALTH SYSTEMS

The WHO Package of Essential Noncommunicable Disease Interventions for Primary Health Care (WHO PEN) provides protocols and tools that help countries integrate and scale up care of more common and less severe noncommunicable diseases—such as hypertension and type 2 diabetes—at the primary or **health center level**. PEN-Plus complements WHO PEN by focusing on care for people with less common, yet more severe noncommunicable diseases at **first-level hospitals**, also known as district hospitals. PEN-Plus providers receive training and mentorship from specialists at **referral hospitals**, refer patients to those hospitals for acute specialty interventions such as surgery, and provide essential chronic-care services following those interventions.

TREATMENT PROTOCOLS

PEN-Plus brings the needed expertise to treat severe, chronic noncommunicable diseases to first-level hospitals by training health workers to provide **essential endocrine, hemoglobinopathy, and cardiac services** through a single point of care. Nurses and clinical officers with this advanced training can offer such services as **echocardiography** for patients with rheumatic and congenital heart disease and **management of medications with narrow therapeutic windows**, such as insulin, anticoagulants, heart failure medications, and morphine for pain control.



Type 1 Diabetes

Sickle Cell Disease

Rheumatic Heart Disease

Congenital Heart Disease

SOLIDARITY MOVEMENTS

Advocacy, policy, funding, and technical partners from around the world have joined the WHO Regional Office for Africa and the NCDI Poverty Network in seeking to enable millions of people living with severe noncommunicable diseases in rural areas of low- and lower-middle-income countries to receive lifesaving care previously available only at referral hospitals in large cities. These partners work with Ministries of Health to implement PEN-Plus wherever it is needed. By joining advocates across disease communities—particularly those for type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease—this partnership seeks to create synergies across efforts and to advocate for funding for PEN-Plus internationally.



WORDS *into* ACTION

The first International Conference on PEN-Plus in Africa, held in Dar es Salaam in 2024, gave a major boost to efforts to provide care for people living with severe, chronic noncommunicable diseases.

Six-year-old Janice climbed the stage, took her place beside the podium, and lifted a colorful placard above her head. She then softly recited into the microphone the words printed on the placard. “Children across Africa are fighting type 1 diabetes, sickle cell disease, and heart disease,” she said. “These are life-threatening without easy access to care.”

As Janice stepped to the front of the stage, nine-year-old Ryan followed with his placard and a warning. “NCDs are responsible for over 70 percent of deaths globally, with a rapidly increasing burden in Africa,” he said. “Every life counts. It’s time for action—not tomorrow, but today.”

Seven more Tanzanian children spoke, and once all nine had assembled across the stage, they raised their placards to reveal the message their T-shirts spelled out: #BeatNCDs.

The children’s message, delivered during the opening ceremony of the first International Conference on PEN-Plus in Africa (ICPPA 2024), resonated throughout the three-day meeting. More than 400 participants had gathered in response to the urgency of delivering care to people living with severe noncommunicable diseases. Fortunately, they could also focus on a promising solution: PEN-Plus, an innovative and integrated healthcare delivery model that has proved increasingly effective since its genesis in Rwanda nearly two decades ago.

YOUNG ADVOCATES: During the opening ceremony of the first International Conference on PEN-Plus in Africa, Tanzanian children—including six-year-old Janice (left) and nine-year-old Ryan—delivered important messages about noncommunicable diseases.





ADVOCATES FOR THE FUTURE: Schoolchildren offered messages about noncommunicable diseases during the opening ceremony of the first International Conference on PEN-Plus in Africa.

A Cure for Inequity

PEN-Plus complements the WHO Package of Essential Noncommunicable Disease Interventions in Primary Health Care (WHO PEN), which prioritizes a set of cost-effective interventions that can be delivered even in resource-limited settings. WHO PEN increases access to care by offering treatments for more common yet less severe NCDs, such as hypertension and type 2 diabetes, at primary healthcare facilities.

In turn, PEN-Plus extends access to care to the millions of people living with severe, chronic conditions—such as type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease—in rural areas of the African Region.

The innovation of the PEN-Plus strategy lies in the decentralization of the equipment and expertise required to treat people with severe NCDs to first-level referral facilities, such as district hospitals. The strategy calls for requisite medicines and supplies to be secured

and for nurses, clinical officers, and other mid-level providers to be trained to deliver the necessary advanced services through a single point of care.

The model's notable success in increasing access to lifesaving treatments has led all 47 Member States of the WHO African Region to endorse PEN-Plus as their official strategy for caring for people with severe NCDs. To date, 11 of the 20 African countries that have initiated PEN-Plus are actively implementing the program.

An Accent on Integration

The proven success of PEN-Plus also drew participants from 52 countries to ICPPA 2024, which was led by the World Health Organization Regional Office for Africa in partnership with The Leona M. and Harry B. Helmsley Charitable Trust, the NCDI Poverty Network, and the United Republic of Tanzania. Participants included health experts, policymakers, people with lived

experience, advocates, civil society organization officials, donors, and private-sector representatives.

Conference speakers highlighted dramatic inequities in access to prevention, diagnosis, treatment, and ongoing care for people living with severe NCDs. The presenters also offered best practices and explored strategies for increasing opportunities to align PEN-Plus with regional public health programs.

Conference leaders committed to advocating for an increased focus on severe NCDs within existing health systems and on extending prevention, diagnosis, treatment, and quality care to the primary health level. The leaders also urged governments to take action to ensure quality services, reduce the known risk factors for NCDs, and increase domestic investments.

By the end of the conference, two clear messages had emerged, according to Dr. Benido Impouma, director of the Communicable and Noncommunicable

THE GROWING COMMITMENT

Top right: The first International Conference on PEN-Plus in Africa drew participants from 52 countries. Middle right: Edith Mukantwari (left) shares her lived experience with type 1 diabetes in Uganda during a panel discussion with several of her fellow Voices for PEN-Plus advocates, including Arafa Said (center), a sickle cell warrior from the United Republic of Tanzania, and Moses Echodu (right), a childhood cancer survivor from Uganda. Bottom right: Taking a playful pause during the conference are, from left, Dr. Benido Impouma, director of the Communicable and Noncommunicable Disease Cluster at the WHO Regional Office for Africa; Dr. Gene Bukhman and Dr. Ana Mocumbi, co-chairs of the NCDI Poverty Network; and James Reid, program officer for type 1 diabetes at The Leona M. and Harry B. Helmsley Charitable Trust.



Disease Cluster in the WHO Regional Office for Africa. First, PEN-Plus is a reliable system with a proven track record, capable of delivering essential care to those living with severe NCDs in rural areas of sub-Saharan Africa.

And second, investing in PEN-Plus represents a historic and pivotal collective action that can improve and even save millions of lives. The model can reduce healthcare costs, enhance health system capacities, boost productivity, promote equity, and contribute to achieving both universal health coverage and Sustainable Development Goals.

“During the opening ceremony of ICPPA 2024, children delivered urgent messages about the impact of NCDs in the African Region,” Dr. Impouma said. “We are proud that the conference served as a catalyst for immediate action. And we are eagerly continuing our work together to secure a better future for all people with severe NCDs, by bringing lifesaving care closer to home.” ■

FEELING NO PAIN

Fourteen-year-old Sara shares a lighthearted moment with her six-year-old sister, Linda, after their visit to the PEN-Plus clinic in Nhamatanda, Mozambique, where they receive treatment for their sickle cell disease.

The **FACES** of **PEN-PLUS**

Clinicians pioneered PEN-Plus by devising a series of technical solutions, yet the people—the patients, providers, and partners—are also at the core of the model's success.

When sisters Sara and Linda return home with their mother after a visit to the PEN-Plus clinic in Nhamatanda, Mozambique, they carry more than the supply of the hydroxyurea pills they will need until their next appointment. They also carry the lessons that clinic staff members taught them about managing their sickle cell disease.

“A people-centered approach to health delivery is organized around the health needs and expectations of people rather than diseases,” said Dr. Ana Mocumbi, a cardiologist based in Maputo, Mozambique, and a co-chair of the NCDI Poverty Network. “The PEN-Plus model views patients, their families, and their communities as participants and beneficiaries of their care. As part of this holistic care, patients and their families receive the education and support they need to make decisions and participate in their care.”

Championing this approach is an international partnership that includes the World Health Organization Regional Office for Africa, the NCDI Poverty Network, and other organizations that support work in the sentinel diseases of PEN-Plus: type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease. The collaborators are working across diseases and across borders to build a global solidarity movement aimed at ensuring that people living with severe noncommunicable diseases everywhere have access to the lifesaving care they need and deserve.

That work has already transformed Sara's and Linda's lives. Before the PEN-Plus clinic opened just 20 kilometers from their home, the sisters were often in too much pain to attend school or play with their friends.

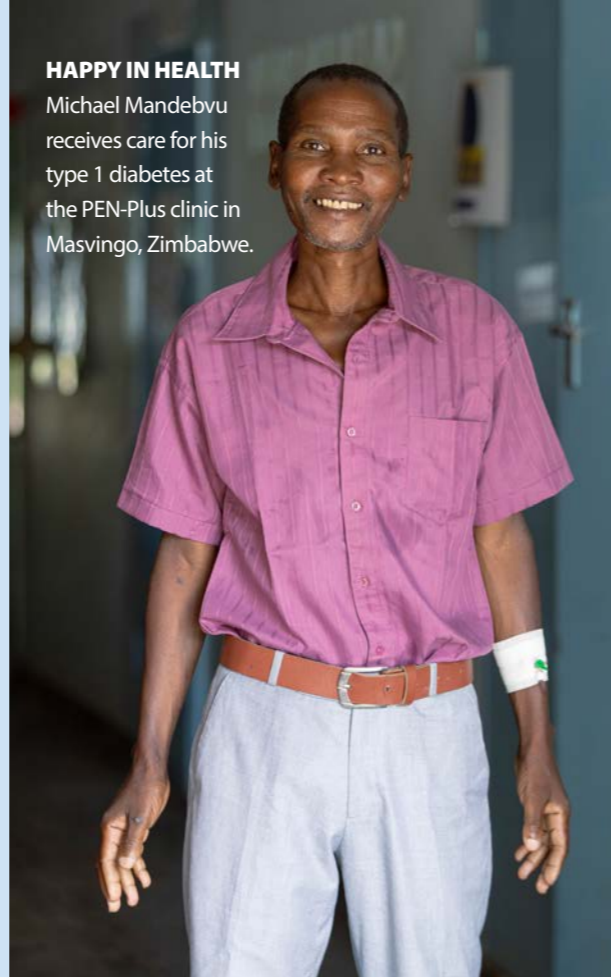
Now that Sara is getting the care she needs, her clinicians report that her light cannot be dimmed. “I was born this way, but I'm happy anyway,” she said. “I want to show the world I am feeling good.” ■

PHOTO: © IVAN SIMONE CONGOLO / WORLD HEALTH ORGANIZATION

PHOTOS: © MICHAEL DUFF / WHO (TOP LEFT); © BADRU KATUMBA / WHO (BOTTOM LEFT)



HAPPY IN HEALTH
Michael Mandebvu receives care for his type 1 diabetes at the PEN-Plus clinic in Masvingo, Zimbabwe.



PICTURE PERFECT

Top left: Salimatu Sesay, shown with sons Abubakarr (left) and Alusine, relocated her family five hours to Koidu, Sierra Leone, to be close to the PEN-Plus clinic that diagnosed her rheumatic heart disease.

Bottom left: Ategei Safia poses for a family portrait with her son, 14-year-old Emong Abdul Shakur, and 11-year-old Anyait Stella, both of whom receive treatment for sickle cell disease at the PEN-Plus clinic in Atutur, Uganda. Ategei and her husband informally adopted Stella, whose family could not care for her. "I adopted Stella," Ategei said, "because I was sure she was going to die if I did not do something." **Above:** Agnes Mangenge receives treatment at the PEN-Plus clinic in the Masvingo Province of Zimbabwe for congestive heart failure and chronic liver failure.

PHOTOS: © TAPADZWA UFUMELI / WHO (TOP AND BOTTOM LEFT)

PHOTO: © MICHAEL DUFF / WORLD HEALTH ORGANIZATION



INSPIRATION TO HELP OTHERS

Umu Barrie, a schoolteacher in Koidu, Sierra Leone, was on her way to a university class when she suddenly collapsed. Her friends rushed her to the emergency department, but by the time they arrived she had already lost consciousness. A week later, she received her diagnosis: type 1 diabetes. She now receives treatment at the PEN-Plus clinic at Koidu Government Hospital. "Receiving this treatment has encouraged me to be a role model," she said. "I am now living my life to the full, and I want to help other people with diabetes change their lives."

The PATIENTS



LEARNING CURVES

Left: Nurse Lilian Phillie leads a daily health discussion at the PEN-Plus clinic in Kono, Sierra Leone. **Above:** PEN-Plus master trainer Naasson Nduwamungu teaches point-of-care echocardiography to Laetitia Twizerimana in Rwinkwavu, Rwanda. **Below:** At the PEN-Plus clinic in Nhamatanda, Mozambique, Dr. Lindolfo dos Santos talks to patients and caregivers about nutritional considerations for people living with sickle cell disease. Clinic staff initiated this series of one-hour peer support sessions to enable patients with the same conditions to find community, receive psychological support, and learn valuable tips for managing their condition.



CLINICIANS WITH HEART

Above: To be able to give his patients the best care possible, Emmanuel Joseph Fofanah, a clinical officer at the PEN-Plus clinic in Kono, Sierra Leone, has undertaken comprehensive training in diagnosing and treating acute noncommunicable diseases. **Right:** Akuyo Regina, a nursing officer, gives encouragement to a patient's mother at the PEN-Plus clinic at Atatur General Hospital in Uganda.



The PROVIDERS



A



B



C



E



D



F

CHALLENGES ACCEPTED

A. Eunice Owino, a sickle cell warrior from Kenya, serves as an advocate for Voices for PEN-Plus, a program of the NCDI Poverty Network. **B.** David Panzirer (left), a trustee of The Leona M. and Harry B. Helmsley Charitable Trust, and Dr. Aaron Kowalski, chief executive officer of Breakthrough T1D, visited the PEN-Plus clinic in Nhamatanda, Mozambique, in 2023. **C.** Moses Echodu, a childhood cancer survivor from Uganda, lends his expertise to both Voices for PEN-Plus and the Uganda Child Cancer Foundation. **D.** Representatives from the American Heart Association, Breakthrough T1D, The Helmsley Charitable Trust, the NCDI Poverty Network, UNICEF, and the World Health Organization Regional Office for Africa gather at Universidade Eduardo Mondlane, the Maputo co-secretariat of the NCDI Poverty Network, in 2023. **E.** Kenyan-born Ruth Ngwaro, who serves as a Voices for PEN-Plus advocate, lives with congenital heart disease. **F.** Voices for PEN-Plus advocate Tinotenda Dziki, who lives with type 1 diabetes in Zimbabwe, is a certified diabetes educator and a global advocate for T1International.

The PARTNERS



HEALING CIRCLE: Medson Boti, a clinical officer at the PEN-Plus clinic in Lisungwi, Malawi, talks with seven-year-old Kevini Jamu, who receives free, specialized care for his sickle cell disease.

PHOTO: KARIN SCHERBRUCKER / SLINGSHOT MEDIA FOR PARTNERS IN HEALTH

Felix Maniriho was a shy eight-year-old with large, soulful eyes and a weakened heart when he became an early patient of a new model of care.

It was 2007, and Felix appeared at the Mulindi Health Centre in eastern Rwanda struggling to breathe. After the nurses ruled out tuberculosis, they began suspecting a heart ailment.

Using a portable ultrasound machine—a point-of-care technology then relatively new to the rural, remote area—a cardiologist could see that Felix’s mitral valve had been destroyed. That damage, coupled with a loud heart murmur, led to the diagnosis: rheumatic heart disease.

The condition—attributed to an autoimmune reaction to strep throat—was once the leading cause of heart disease in the United States. During the 20th century, with improved living conditions and the development of antibiotics, the disease had largely disappeared from the United States and other high-income countries. Yet the World Health Organization estimates that rheumatic heart disease, the most commonly acquired heart condition in people under age 25, still claims nearly 300,000 lives each year, mostly in low- and lower-middle-income countries.

the UNFOLDING PROMISE

PEN-Plus, which originated in Rwanda, now provides care across Africa—and beyond.



EARLY DAYS: Gedeon Ngoga, one of the first clinicians to be trained in the advanced noncommunicable disease care that would eventually become PEN-Plus, always wanted to be a nurse. “As a child, I didn’t know the difference between nurses and doctors,” he said. “All I knew is that the people in white coats had the power to help sick patients become healthy, and that is what I, too, wanted to do.”

At the time of Felix’s diagnosis, Rwanda had only one pediatric cardiologist for a country of nearly 10 million people: Dr. Joseph Mucumbitsi, who had recently returned to his home country from Belgium to practice at the King Faisal Hospital in the capital city of Kigali. The few patients sent outside the country for cardiac surgery were those identified in the capital; cardiac diagnoses and care were largely inaccessible in rural areas, where most of the population lived.

The cardiologist who had diagnosed Felix’s condition—Dr. Gene Bukhman, a Brigham and Women’s Hospital physician then based in Rwanda—worked with Dr. Mucumbitsi to send

Felix to a cardiac surgery center in Sudan that provided free heart surgeries.

“The surgeons had two options for Felix: a biological valve, which carried the risk of wearing out quickly, and a more durable mechanical valve, which would require Felix to be on a blood thinner and be monitored clinically for the rest of his life,” said Dr. Bukhman, a Harvard Medical School faculty member who also worked with Partners In Health. “The clinic didn’t have the capacity for long-term follow-up, so the surgeons chose the biological valve.”

Felix’s valve did wear out. By then, though, the Rwanda Ministry of Health and a team of clinicians at Inshuti Mu Buzima (Partners In Health–Rwanda)—including Dr. Bukhman—had made significant

strides in developing strategies for treating severe, chronic noncommunicable diseases. When Felix returned to Sudan for a second replacement surgery, he was able to receive a mechanical valve.

Integration Within the System

Fortunately for Felix, the collaborators had begun designing an integrated care-delivery model for noncommunicable diseases at two rural district hospitals two years earlier.

“At the time, clinics had guidance for treating more common, yet less severe diseases such as hypertension,” said Dr. Bukhman. “Yet they lacked integrated strategies for caring for more complex chronic diseases. That was the gap we were

“Our healthcare delivery model aims to serve all Rwandans, especially the most vulnerable.”

seeing in the health system. We realized the district hospitals had a crucial role to play.”

Dr. Agnes Binagwaho, then Rwanda’s minister of health, was eager to collaborate with Inshuti Mu Buzima on integrating the treatment of severe noncommunicable diseases into the district hospitals.

“The Government of Rwanda views healthcare as a basic human right and, as such, our healthcare delivery model aims to serve all Rwandans, especially the most vulnerable,” she wrote in a foreword to a Partners In Health guide on chronic care integration for endemic noncommunicable diseases in 2011. “This rights-based approach is at the root of Rwanda’s health strategy.”

Integration Across Diseases

Type 1 diabetes, sickle cell disease, and childhood heart disease customarily fall into disparate clinical specialties. Even so, those conditions share certain disheartening characteristics. They’re all severe, chronic noncommunicable diseases that cannot be prevented. Their treatment protocols

are complex. And, when left untreated, they kill children, adolescents, and young adults living in rural areas of sub-Saharan Africa at devastating rates.

Fortunately, these diseases also share a clinical cadence, and it was in that pattern of services that the clinicians in Rwanda found another solution of integration.

“These diseases all require a diagnosis, symptom management, psychosocial support, palliative care, referrals for surgical and other specialty care when necessary, and long-term monitoring,” said a member of the team, Dr. Charlotte Bavuma, now an endocrinologist at Centre Hospitalier Universitaire de Kigali. “So we organized the clinics to optimize both infrastructure and human resources.”

The team clustered conditions and interventions to take advantage of shared space, training, workflow patterns, and competencies, including the ability to manage medications with narrow therapeutic windows, such as insulin, heart failure medications, and anticoagulants. The two or three advanced nurses who

staffed each clinic saw 10 to 20 patients a day. Physicians supervised initial consultations and provided guidance on complex cases, and specialists visited the clinics every month or two to confirm diagnoses and consult on complex cases. The clinics also became national training sites for a three-month course designed to prepare nurses to deliver advanced care for severe noncommunicable diseases.

Delivery of Hope

After joining Inshuti Mu Buzima in 2007, Gedeon Ngoga became one of the first clinicians to be trained in the new model.

“My biggest challenge as a nurse is working with limited resources,” said Ngoga, who now serves as a clinical advisor in the NCDI Poverty Network. “It breaks my heart to see the devastating levels of poverty that many of our patients face, and it is difficult to provide comprehensive care to these vulnerable people. But nothing is better than seeing a patient smile after many years of critical sickness and hopelessness.”

PEN-Plus Milestones

What began as an innovation born of necessity in Rwanda has grown into a proven, internationally adopted evidence-based clinical strategy for delivering healthcare to people living with severe noncommunicable diseases in poor, rural areas far from the specialty services of high-level care facilities.

2006

Rwanda’s Ministry of Health, with support from clinicians at Inshuti Mu Buzima (Partners In Health–Rwanda) and Harvard Medical School, begins designing a new care-delivery model for severe, chronic noncommunicable diseases such as type 1 diabetes and rheumatic heart disease.



2016

The Rwanda Ministry of Health has scaled this model to all 42 district hospitals in the country, with progressively decentralized services for more common noncommunicable diseases—such as hypertension, type 2 diabetes, and asthma—to the health center and community levels. Based on that success, Partners In Health begins working with additional Ministries of Health to introduce the model in Haiti, Liberia, and Malawi.

2017

Brigham and Women’s Hospital and Harvard Medical School host a meeting with representatives from the World Health Organization Regional Office for Africa to explore approaches for treating less common yet more severe noncommunicable diseases, such as type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease.



2019

In advance of a regional meeting in Kigali, the World Health Organization adopts “PEN-Plus” as the official name of the model, acknowledging its value as a complement to WHO PEN.

2020

Led by its co-chairs, Drs. Gene Bukhman and Ana Mocumbi, the Lancet Commission on Reframing Noncommunicable Diseases and Injuries for the Poorest Billion—which began in 2015—publishes a report detailing gaps in access to treatment for severe noncommunicable diseases. The Lancet Commission also calls for significant new resources to end the avoidable suffering and death these diseases cause among the world’s poorest people.

Drs. Bukhman and Mocumbi go on to launch the NCDI Poverty Network in collaboration with the National NCDI Poverty Commissions of 15 low- and lower-middle-income countries with large populations of people living in extreme poverty.



One of his most memorable experiences during those early years, Ngoga added, was when he cared for a young man with type 1 diabetes who was on the brink of death. “I felt so drawn to him,” Ngoga said. “I couldn’t bear to see another patient die at a young age of a manageable disease. He eventually recovered fully from his clinical crisis. Seeing him healthy and happy again was incredibly rewarding.”

A Complement to WHO PEN

By 2016, the Rwanda Ministry of Health had scaled the model to all 42 district hospitals in the country and progressively decentralized services for more common noncommunicable diseases—such as hypertension, type 2 diabetes, and asthma—to the health center and community levels. Based on that success, Partners In Health began working with additional Ministries of Health to introduce the model in Malawi, Liberia, and Haiti.

By then, Dr. Bukhman had joined with Dr. Ana Mocumbi, a cardiology professor at Universidade Eduardo Mondlane in Maputo, Mozambique, in co-chairing the Lancet Commission on Reframing Noncommunicable Diseases and Injuries for the Poorest Billion, a panel of 23 global health experts. Also by then, the World Health Organization had launched the WHO Package of Essential

Noncommunicable Disease Interventions for Primary Health Care (WHO PEN), a prioritized set of cost-effective interventions that clinicians could deliver at an acceptable quality of care, even in resource-poor settings.

In 2019, the World Health Organization recognized the Rwanda-developed model of healthcare delivery as “PEN-Plus” in acknowledgment

“Nothing is better than seeing a patient smile after many years of critical sickness and hopelessness.”

of its capacity to complement WHO PEN by focusing on diseases that require specialized skills and cannot be managed effectively with simple, standardized protocols at health centers or in the community. PEN-Plus also strengthens WHO PEN, as nurses and clinical officers with advanced skills in noncommunicable disease care provide training, supervision, and mentorship

to WHO PEN staff. With this training, health center staff learn how to provide a higher quality of care to people with less severe noncommunicable diseases and to recognize and refer people with severe conditions to PEN-Plus clinics.

In 2020, the Lancet Commission published a landmark report that found that, among the world’s poorest billion, noncommunicable diseases cause an annual burden of death and disability totaling 93.8 million avoidable disability-adjusted life years. People younger than 40 carried more than half that burden, with more than a third borne by children and adolescents.

The Lancet Commission also found that, without integrated care delivery strategies to provide chronic care to people living with severe noncommunicable diseases in resource-limited rural areas, each year hundreds of thousands of the world’s most vulnerable children, adolescents, and young adults go without lifesaving care for conditions that almost always lead to premature death if left untreated.

Commission members recognized that these deaths were not inevitable, and they concluded their report with a call for global solidarity and plans to launch an international network to catalyze financing and technical partnerships in support of PEN-Plus implementation. Later that year, the Commission’s



TAKING CARE: Namazzi Mercy, a medical intern, takes the blood pressure of 11-year-old Lubwama Jackson, who receives treatment for his sickle cell disease at the PEN-Plus clinic in Nakaseke, Uganda.

co-chairs joined National NCDI Poverty Commission representatives from 15 low- and lower-middle-income countries to form the NCDI Poverty Network.

An Expanded Regional Strategy

In 2022, all 47 member states of the WHO African Region voted to adopt PEN-Plus as *the* strategy for providing care to people living with severe noncommunicable diseases. The WHO African Region has since set a series

of ambitious goals: to have 50 percent of member states rolling out PEN-Plus services to district hospitals by 2025, 65 percent by 2028, and 70 percent by 2030.

In 2023, with a grant from The Leona M. and Harry B. Helmsley Charitable Trust, the WHO African Region began leading a continent-wide implementation of PEN-Plus. The grant supports efforts to strengthen and expand PEN-Plus in 20 additional countries, starting with Lesotho, Niger, and the Republic of Congo.

“PEN-Plus has proven its value for expanding lifesaving care in resource-limited areas,” said Dr. Mocumbi. “In Rwanda, we watched the model’s impact grow exponentially when the Ministry of Health integrated PEN-Plus into its national strategy for caring for people living with severe noncommunicable diseases. Now, with leadership from the WHO African Region, we cannot wait to see the model create new pathways to critical care for communities across the continent.” ■

PEN-Plus
Milestones
continued

2021

The Leona M. and Harry B. Helmsley Charitable Trust and JDRF International—now known as Breakthrough T1D—award a three-year grant to support the NCDI Poverty Network. Later that year, the three organizations and their partners pledge to work together to secure significant annual funding for PEN-Plus implementation by 2030.

2022

All 47 Member States of the WHO African Region adopt PEN-Plus as *the* official strategy for providing care to people living with severe noncommunicable diseases.

In 2022 and 2023, eight African countries—Ethiopia, Kenya, Mozambique, Sierra Leone, Uganda, the United Republic of Tanzania, Zambia, and Zimbabwe—join Rwanda, Malawi, and Liberia in launching



their first PEN-Plus clinics. Six others—Benin, Burkina Faso, Cameroon, the Democratic Republic of the Congo, Ghana, and Nigeria—establish National NCDI Poverty Commissions and begin planning PEN-Plus implementation.

PHOTO: WORLD HEALTH ORGANIZATION

2023

The Helmsley Charitable Trust awards a three-year grant to the WHO African Region to support expansion of PEN-Plus to 20 additional countries. In announcing the grant, Dr. Gina Agiostratidou, program director for type 1 diabetes at The Helmsley Charitable Trust, says, “WHO Africa’s diverse NCD programming and regional expertise make them an ideal partner in our mission to ensure that everyone with a severe NCD has

access to quality care and support—no matter where they call home.”

The WHO African Region sets the ambitious goal of having 50 percent of member states roll out PEN-Plus services to district hospitals by 2025, 65 percent by 2028, and 70 percent by 2030.



2024

The WHO African Region hosts the first International Conference on PEN-Plus in Africa, in collaboration with The Helmsley Charitable Trust, the NCDI Poverty Network, and the United Republic of Tanzania. Held in Dar es Salaam, the event attracts the interest and support of more than 400 participants—including health experts, policymakers, and advocates—from 52 countries.



2025

Lesotho, Niger, and the Republic of Congo initiate PEN-Plus, bringing the total to 20 countries in the African Region.

In Abuja, the WHO African Region holds the second International Conference on PEN-Plus in Africa, in partnership with The Helmsley Charitable Trust, the NCDI Poverty Network, and the Government of Nigeria.

Anatomy of a Clinic

The PEN-Plus clinic in eastern Uganda began as a gathering under a tree and has blossomed from there.

FOR YEARS, THE LEAFY CANOPY OF A MAJESTIC acacia has provided visitors to Atutur General Hospital in eastern Uganda with more than a respite from the hot sun; it has also sheltered an open-air clinic for people living with sickle cell disease.

“A critical lack of funding meant the hospital couldn’t expand to accommodate all the people who needed care,” said Dr. Wubaye Dagnaw, then the East Africa regional advisor for the NCDI Poverty Network. “On clinic days, hundreds of children with sickle cell disease would gather under the tree for their treatment. To call these circumstances less than ideal for providing care would be a dramatic understatement.”

Fortunately, this PEN-Plus clinic now has a dedicated home in a specially constructed structure adjacent to the hospital. The clinic held its groundbreaking in May 2023 and its official opening six months later. The implementing partner for the clinic, the Uganda Initiative for Integrated Management of Noncommunicable Diseases, now works with the Uganda Ministry of Health to support both the PEN-Plus clinic in Atutur and one housed at Nakaseke General Hospital in central Uganda.

Funded through the NCDI Poverty Network in collaboration with the Ministry of Health, the 325-square-meter structure houses three consultation rooms, a treatment room, a training center that can accommodate more than 80 participants, a laboratory, a counseling room, a pharmacy, a data center, an office, and a staff tearoom. The reception area can host several dozen people at a time.

“After years of carrying the extra burden of clinic days under a tree,” said Dr. Dagnaw, “patients now receive their treatment in the setting they deserve.” ■



BREAKING NEW GROUND: Clockwise from top left: Before the PEN-Plus clinic was built at Atutur General Hospital, people with sickle cell disease would gather under a tree to receive their treatment; Joyce Apolot, a senior nursing officer, prepares medical supplies and equipment at the PEN-Plus clinic on a Tuesday, the designated clinic day for people with sickle cell disease; medical interns gather outside the newly constructed clinic; Dr. Siprian Achau examines a young patient; Dr. Sarah Asio, medical superintendent at Atutur General Hospital, and Daniel Aloi cannot contain their excitement as they tour the clinic under construction.

LEAVE NO ONE BEHIND

Estrela Anselmo is one of the fortunate ones; she can access specialized care in the city. Even so, her challenges underscore the urgent need for PEN-Plus to be scaled up nationally.



THE POWER OF HOPE

Above: Enjoying time together are, from left, Dr. Apoorva Gomer, associate director of advocacy for the NCDI Poverty Network; Artemisa and Estrela Anselmo; and Dr. Aaron Kowalski, chief executive officer of Breakthrough T1D. **Below:** Dr. Gomer teaches Estrela how to use a glucometer while Ivanilson Abilio, membership and engagement manager for the Maputo Co-Secretariat of the NCDI Poverty Network, translates. **Left:** Artemisa Anselmo retrieves the container holding Estrela's insulin from its storage place in the cool dirt.



IN THE FALL OF 2022, ESTRELA ANSELMO, then an 11-year-old living near Maputo, the capital of Mozambique, developed painful ulcers on her feet that wouldn't heal. She stopped attending school because she could no longer walk. Workers at the local health clinic said both feet needed to be amputated.

Fortunately, Estrela's mother, Artemisa, managed to get her daughter to a district hospital in Maputo. After several delays, Estrela was diagnosed with type 1 diabetes. Soon after, though, she suddenly lost consciousness. She was rushed to a referral hospital in the city, where she recovered after five days in a coma.

Although Estrela's feet—and her life—were saved, her challenges did not end there. The home she shares with her widowed mother, her three siblings, her grandparents, and four other members of her extended family lacks refrigeration. So her family keeps her insulin cool by storing it in a small container buried in the ground near the water pump.

A refrigerator was not the only advantage that Estrela's family lacked. Without a glucometer, Artemisa would try to estimate her daughter's glucose levels by monitoring her moods and the color of her blood. "We needed to control her diabetes with a machine we did not have," Artemisa said.

In March 2023, when members of the NCDI Poverty Network and its partners visited Estrela, they brought her a glucometer and arguably something just as valuable: hope.

Among those visiting were Dr. Aaron Kowalski, chief executive officer of Breakthrough T1D, and Dr. Apoorva

Gomber, associate director of advocacy for the NCDI Poverty Network, both of whom live with type 1 diabetes. Dr. Gomber sat down with Estrela, pulled out her own glucometer, and showed Estrela how to check her glucose level.

Until then, Estrela had never met anyone else with type 1 diabetes. She was shocked to learn that people with the disease could not only live into adulthood but also have a long life; she had just been awaiting her impending death.

After convincing Estrela that death was not imminent, Dr. Gomber said, "I felt the warmth of her fingers around mine. A spark seemed to light within her, and I could see her lips twitching." For the first time since her diagnosis, Estrela smiled.

For all the radiance of that moment, Estrela's grim assumption was not entirely misplaced; in sub-Saharan Africa, children living with type 1 diabetes in extreme poverty often die within a year of diagnosis.

Estrela does not have access to PEN-Plus services, given that the country's only PEN-Plus clinic is more than 800 kilometers to the north. Geography has been kind, though; she lives just 15 kilometers from the hospital that saved her life. Many living in rural areas far from the capital are less fortunate.

"Estrela's story reminds us of the urgent need for more resources to allow a faster national scale-up of PEN-Plus in many countries in sub-Saharan Africa," Dr. Gomber said. "I will keep fighting for her and everyone else living with type 1 diabetes. I remember when I was diagnosed at the age of 13 in India; the feeling of being alone can be overwhelming. Yet hope and community can be powerful healers." ■

PEN-Plus at a Glance

Where a person lives should never determine whether a person lives. And yet many people with severe noncommunicable diseases in rural areas of sub-Saharan Africa are at high risk of chronic suffering—and even death—simply because they lack access to the specialized care they need.

The Problem



In many parts of sub-Saharan Africa, treatment for people with **severe, chronic noncommunicable diseases—such as type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease**—is available only at referral hospitals in major cities, leaving rural communities without vital access to care.



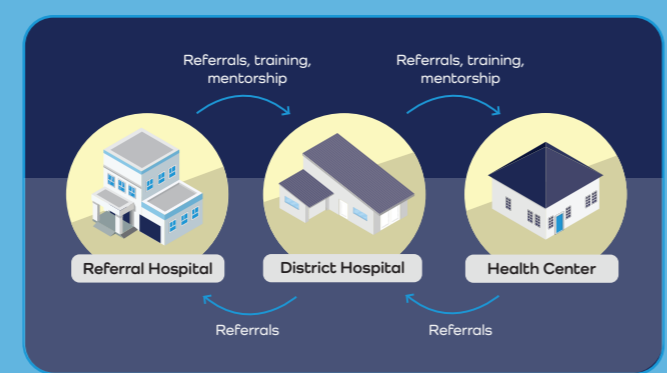
Many people living with these diseases and their families face devastating costs or forgo care altogether, risking disability and even death.



Deaths that noncommunicable diseases cause among children, adolescents, and young adults in the African Region each year: **>540,000**

The Solution: PEN-Plus

PEN-Plus is a proven, integrated, decentralized, community-focused, and person-centered healthcare delivery model that bridges the service gap for people living with severe noncommunicable diseases by bringing lifesaving quality care closer to home.



PEN-Plus brings high-level expertise in the chronic care of severe noncommunicable diseases to first-level hospitals, also known as district hospitals.



To optimize scarce healthcare resources, PEN-Plus trains and equips nurses, clinical officers, and other mid-level providers to deliver crucial services—including diagnosis, symptom management, and psychosocial support—across a range of severe noncommunicable diseases.



The WHO African Region, the NCDI Poverty Network, and Ministries of Health have joined with advocacy, policy, funding, and technical partners from around the world to enable lifesaving care through PEN-Plus.

PEN-Plus Across Africa

Twenty countries in sub-Saharan Africa are in various stages of initiating, implementing, or scaling up PEN-Plus. More than 15,000 people are receiving treatment for severe noncommunicable diseases in PEN-Plus clinics across 11 of those countries.

- Phase 2: Service Delivery Model**
Lesotho, Nigeria
- Phase 3: Initial Implementation**
Benin, Burkina Faso, Cameroon, Democratic Republic of the Congo, Ghana, Mozambique, Niger, Republic of Congo
- Phase 4: Scale-Up in Phased Fashion**
Ethiopia, Kenya, Liberia, Malawi, Sierra Leone, Uganda, United Republic of Tanzania, Zambia, Zimbabwe
- Phase 5: Nationwide Coverage (>60 Percent)**
Rwanda
- Not Applicable**



Severe NCDs in Africa: A Snapshot

- <1 year**
The average life expectancy for a child newly diagnosed with type 1 diabetes in rural sub-Saharan Africa.¹
- >50%**
The odds that babies born with sickle cell disease will die before their fifth birthday.²
- >70%**
The odds that a nine-year-old with rheumatic heart disease in a low-income country will die before the age of 25.³

These tragedies are avoidable. Political leaders, donors, and partners must seize the occasion of the International Conference on PEN-Plus in Africa and commit to PEN-Plus as the proven system for delivering lifesaving care to people living with severe, chronic noncommunicable diseases in rural sub-Saharan Africa.

The World Health Organization's goal, by 2030, is for 70 percent of the African Region Member States to have national plans for integrated care, noncommunicable disease training for health workers, and essential medicines in district hospitals.

Sources: World Health Organization Regional Office for Africa; Lancet Commission on Reframing Noncommunicable Diseases and Injuries for the Poorest Billion

¹ Beran D and Yudkin JS. Diabetes care in sub-Saharan Africa. The Lancet 2006;368:1689–95.
² Modell B and Darlison M. Global epidemiology of haemoglobin disorders and derived service indicators. Bull World Health Organ 2008;86(6):480–487.
³ Hewitson J and Zilla P. Children's heart disease in sub-Saharan Africa. SA Heart J 2010;7(1):18–29.



Scan the QR code to view the online edition of the PEN-Plus magazine of the World Health Organization Regional Office for Africa.

PEN-Plus Milestones

- 2006**
Clinicians in Rwanda begin designing a new model for delivering healthcare to people living in rural sub-Saharan Africa.
- 2015**
This new model enables the number of people receiving care for type 1 diabetes to increase by a factor of 10, from around 200 to 2,000.
- 2019**
The World Health Organization Regional Office for Africa adopts "PEN-Plus" as the official name of the model, in recognition of the model's role as a complement to the WHO Package of Essential Noncommunicable Disease Interventions for Primary Health Care, better known as WHO PEN.
- 2020**
The NCDI Poverty Network launches shortly after publication of the Lancet Commission on Reframing Noncommunicable Diseases and Injuries for the Poorest Billion report, which identifies gap in access to treatment for people living with severe noncommunicable diseases.
- 2022**
All 47 Member States of the WHO African Region adopt PEN-Plus as their official strategy for providing care to people living with severe noncommunicable diseases.
- 2024**
In Dar es Salaam, Tanzania, the WHO African Region hosts the first International Conference on PEN-Plus in Africa.
- 2025**
In July, the WHO African Region hosts the second International Conference on PEN-Plus in Africa, this time in Abuja, Nigeria. As of that month, 20 countries in the African Region have initiated, implemented, or scaled up the PEN-Plus model, resulting in more than 15,000 people receiving treatment for severe noncommunicable diseases.

2030
The WHO African Region, the NCDI Poverty Network, and other partners seek even more significant global funding for PEN-Plus by 2030, to help save countless more lives, transform noncommunicable disease care, and accelerate progress toward universal health coverage.

NEW PROMISE

Elisa Edson, an eight-year-old with type 1 diabetes, awaits her appointment at the PEN-Plus clinic in Nhamatanda, Mozambique. “I thought my daughter had fallen victim to witchcraft for being born with a health condition, and I doubted she would have any chance to live,” said Elisa’s mother. “But the PEN-Plus clinic changed our knowledge about her disease.”

THE POWER OF UNITY

Together, we can combat injustice and complacency while supporting people who live with severe noncommunicable diseases.

By Ana Mocumbi, MD, PhD

THROUGHOUT THE HISTORY OF GLOBAL HEALTH efforts, policymakers have argued that the limited healthcare resources available in low-income countries are best spent on prevention, leaving many of the world’s poorest people to die of treatable diseases.

More than two decades ago, though, Partners In Health proved that notion wrong, by showing that novel, community-based treatment strategies could deliver high-quality healthcare to people living even in the poorest settings. In so doing, Partners In Health inspired a paradigmatic shift in global health, one that replaced complacency and pessimism with audacious humanity.

In that same tradition, the NCDI Poverty Network has joined with the WHO Regional Office for Africa and other partners to respond to the moral imperative of providing high-quality healthcare to those who need it most. Our partnership—a collaboration of advocacy, policy, funding, and technical partners from around the world—works to expand PEN-Plus services for people living with severe noncommunicable diseases in currently participating countries as well as to set the stage for introducing PEN-Plus to additional countries.

Hundreds of thousands of children, adolescents, and young adults living with severe, chronic noncommunicable diseases in the rural areas of low- and lower-middle-income countries are relying on us to end a great injustice.

The PEN-Plus model uses principles of science-based evidence to ensure the best possible outcomes for patients and health systems. Data from microcosting studies in Rwanda have found, for example, that the start-up costs for PEN-Plus clinics—including new construction, equipment, and initial training—amount to around US\$50,000 per facility serving 250,000 people.

To manage 500 to 1,000 patients on an ongoing basis, these clinics would have operational costs of an estimated US\$70,000 per year, which represents around US\$100 per patient, or about 30 cents a person on a population basis. Despite this relatively low cost, research from the Lancet Commission on Reframing Noncommunicable Diseases and Injuries for the Poorest Billion found that low-income countries cannot finance their most basic services without external support for at least a decade.

But we are optimistic there is a solution. And together, we are that solution. If we can marshal the voices, energy, and passion of even just the type 1 diabetes, sickle cell disease, and childhood heart disease communities, we believe we can find the resources to right a cruel injustice. ■

Ana Mocumbi, MD, PhD, is a co-chair of the NCDI Poverty Network and a cardiologist on faculty at Universidade Eduardo Mondlane in Maputo, Mozambique. She served as a co-chair of the 1996–2020 Lancet Commission on Reframing Noncommunicable Diseases and Injuries for the Poorest Billion, which led to the creation of the NCDI Poverty Network.

PHOTO: © IAN SIMONE CONGOLO / WORLD HEALTH ORGANIZATION

LESSONS LEARNED

The WHO African Region countries working in various stages of PEN-Plus implementation play critical roles in refining best practices—and paving the way for future expansion.

By Kofi Mensah Nyarko, MBChB, MPH, PhD

TWENTY AFRICAN COUNTRIES HAVE ALREADY initiated PEN-Plus, with 11 of those actively implementing the model. Each of these first-wave countries has conducted a baseline assessment and achieved at least the first phase of the five-phase PEN-Plus Implementation Framework.

Rwanda, where PEN-Plus originated nearly two decades ago, refined the model in the early years. The country has continued to be a frontrunner in the rollout of PEN-Plus, having scaled up from just three rural hospitals to all district hospitals nationally.

Malawi's national scale-up is well under way, with more than 440 clinicians and nurses trained and each of the six secondary-level health facilities providing PEN-Plus care to over 300 patients living with severe noncommunicable diseases. In collaboration with the WHO Regional Office for Africa and other partners, the Malawian Ministry of Health successfully piloted the model in Neno, one of the poorest districts in the country. Over the next five years, the Ministry aims to scale up the PEN-Plus initiative to incorporate 26 district and community hospitals across Malawi's three regions.

Nine other African nations—Ethiopia, Kenya, Liberia, Mozambique, Sierra Leone, Uganda, the United Republic of Tanzania, Zambia, and Zimbabwe—have begun PEN-Plus implementation by establishing at least their first clinics and training sites. Another nine countries—Benin, Burkina Faso, Cameroon, the Democratic Republic of the Congo, Ghana, Lesotho, Niger, Nigeria, and the Republic of Congo—have launched the PEN-Plus initiation process.

Most significantly, more than 15,000 people living with severe NCDs across the African Region now receive treatment at PEN-Plus clinics.

Based on the experiences of these countries, the PEN-Plus strategy continues to evolve, guided by crucial lessons to maximize each country's capacity for providing care to people living with severe NCDs in Africa. Our immediate priorities include expanding coverage, strengthening systems, boosting resources, and enhancing operational capacity.

A key step is to disseminate widely the *PEN-Plus Operational Manual*, a simplified, hands-on guide and reference document that all our 47 Member States can easily adapt for use.

We have learned that ensuring an adequate capacity for PEN-Plus implementation requires a sustained and supervised clinical practice rather than just the rollout of short courses. Innovative solutions—such as Mozambique's model of pairing training sites with newly placed family physicians in rural hospitals—are promising for large-scale implementation.

Future efforts will strengthen both WHO PEN and PEN-Plus, ensuring comprehensive management of both common and severe NCDs at lower levels of care. The African Region will also prioritize digital health solutions to expand NCD care access in underserved areas, improving diagnosis and follow-up.

Strategic partnerships and collaboration remain pivotal, and the WHO Regional Office for Africa will continue to engage partners to support scale-up, ensuring access to quality services, essential medicines, technologies, and capacity-building of the health workforce across the region to meet the growing demand for NCD care. ■

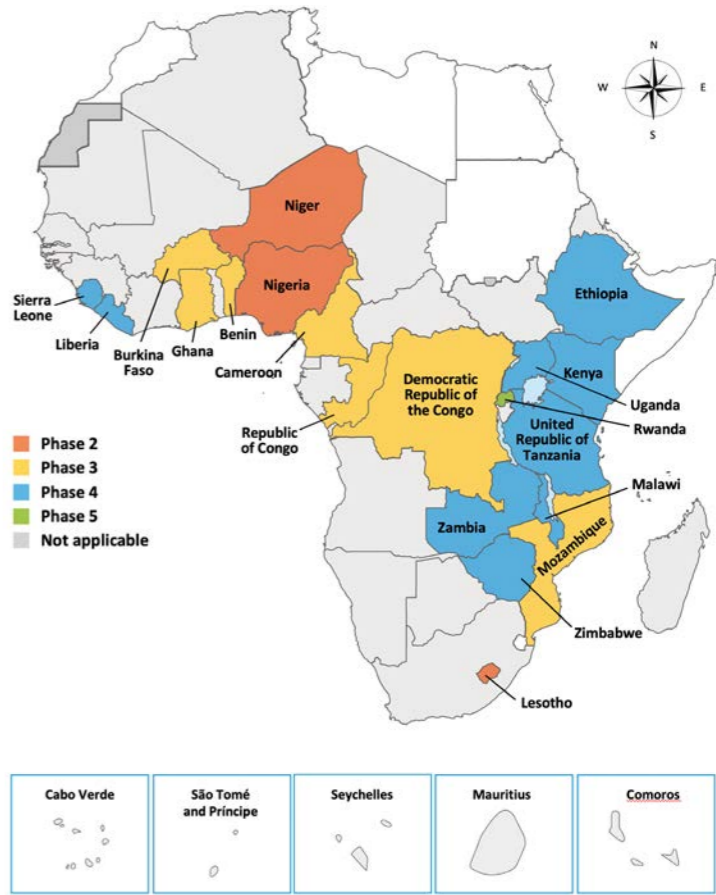
Kofi Mensah Nyarko, MBChB, MPH, PhD, leads the Noncommunicable Diseases and Mental Health Team of the WHO Regional Office for Africa.



ESSENTIAL SCREENING
Okoboi George Williams, the microscopist for the PEN-Plus clinic at Atutur General Hospital in Uganda, tests blood samples for sickle cell disease.

PEN-Plus Countries by Phase*

- Phase 1**
Assessment of Existing Healthcare Systems and Facility Readiness
All the countries listed below have completed Phase 1
- Phase 2**
Development of a Service Delivery Model
Lesotho, Niger, and Nigeria
- Phase 3**
Initial Implementation
Benin, Burkina Faso, Cameroon, Democratic Republic of the Congo, Ghana, Mozambique, and Republic of Congo
- Phase 4**
Scale-Up in Phased Fashion
Ethiopia, Kenya, Liberia, Malawi, Sierra Leone, Uganda, United Republic of Tanzania, Zambia, and Zimbabwe
- Phase 5**
Nationwide Coverage (>60 Percent)
Rwanda



*As of July 2025

The Big Picture

The WHO Regional Office for Africa seeks to integrate PEN-Plus with existing health systems to ensure comprehensive care for all people living with severe noncommunicable diseases.

By Benido Impouma, MD, MPH, MBA, PhD

THE FIGHT AGAINST SEVERE NONCOMMUNICABLE

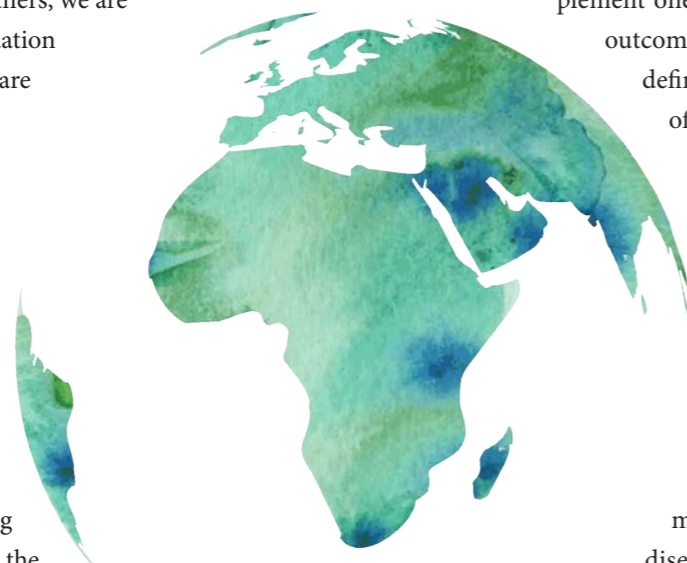
diseases in Africa is gaining ground through the PEN-Plus model of care. At the WHO Regional Office for Africa, our ambition goes beyond our current achievements.

In collaboration with our partners, we are meticulously laying the foundation for a future where lifesaving care is accessible to all, leaving no one behind.

In the African Region, we have been supporting Member States to develop and implement robust national coordination mechanisms for PEN-Plus implementation. We are actively using a whole-of-government approach while also including community structures and the private sector.

Additionally, we have provided technical guidance for the development of national operational plans and leveraged our normative functions to provide tools that can be adapted to develop models of care that are easily integrated into existing health systems.

To truly realize this expansive vision of PEN-Plus, however, we need critical advancements. The scaling up of services, for example, requires greater investments in health systems to improve access to quality essential services without any financial risk to beneficiaries.



Fortunately, the synergy we have witnessed between WHO PEN and PEN-Plus has been transformative. Implementing this operational framework has unequivocally demonstrated how these two initiatives complement one another to improve patient outcomes and to achieve a clearly defined pathway for continuity of care, from early detection to treatment to follow-up.

Currently, the PEN-Plus model focuses primarily on four severe conditions that disproportionately burden communities in resource-poor settings: type 1 diabetes, sickle cell disease, and rheumatic and congenital heart disease. This focus is only the initial phase of much greater ambitions, however. Our long-term goal is for the PEN-Plus model to evolve into a well-integrated, person-centered, and affordable approach for treating all severe noncommunicable diseases.

This is the promise of a future where health equity becomes a reality for everyone across Africa. ■

Benido Impouma, MD, MPH, MBA, PhD, is director of the Communicable and Noncommunicable Diseases Cluster at the WHO Regional Office for Africa.

BRIGHT FUTURES: Eighteen-year-old Farida Aguti (left) and her 22-year-old sister, Rukia Aumo, smile broadly outside the PEN-Plus clinic in Atutur, Uganda, where they receive ongoing care for their sickle cell disease.



ILLUSTRATION: STOCK
PHOTOS: © BADRU KATUMBA / WORLD HEALTH ORGANIZATION (THIS PAGE); © MICHAEL DUFF / WORLD HEALTH ORGANIZATION (BACK COVER)



BACK IN PLAY: Six-year-old Fatmata Fofanah receives care for her congenital heart disease at the PEN-Plus clinic that Partners In Health runs in Kono, Sierra Leone. The treatment has enabled her to resume playing with friends.



International Conference on PEN-Plus in Africa

World Health Organization—Regional Office for Africa
Cité du Djoué, P.O. Box 06
Brazzaville, Republic of Congo

ORGANIZING PARTNERS FOR ICPPA 2025

