

ANNUAL REPORT

2023



“Our hope is to live in a world where every person has access to effective treatment options for infectious diseases and more and more infectious diseases ultimately become eradicated.”

The Mueller Health Foundation Vision



A LETTER FROM THE PRESIDENT

Dear Members of the TB Community,

As we reflect on the past year, I am filled with immense gratitude for the dedication and resilience displayed by all those involved in the fight against tuberculosis (TB). On behalf of The Mueller Health Foundation, I extend our deepest appreciation to our partners, collaborators, and every individual committed to making a difference in the lives of those affected by TB.

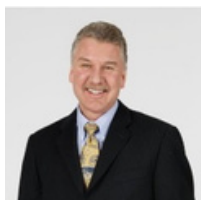
In 2023, the world continued to grapple with health crises, from infectious disease outbreaks to the escalating threat of antimicrobial resistance. The lingering impacts of the COVID-19 pandemic have underscored the interconnected nature of global health challenges, emphasizing the need for a unified and holistic approach to disease prevention and control. Additionally, conflicts such as the war in Ukraine and Israel have further compounded existing health emergencies, making access to TB treatment even more challenging for affected individuals.

Looking ahead, it is imperative that we remain vigilant and proactive in our efforts to address emerging health threats. We must heed the lessons of the past and eschew siloed approaches in favor of collaborative solutions that leverage international networks and shared knowledge. Moreover, we must continue to prioritize patient-centered care, recognizing and addressing the multifaceted barriers that individuals face in accessing and adhering to TB treatment.

At The Mueller Health Foundation, we are steadfast in our belief in the power of community-led responses. By working closely with patients and supporting projects that directly engage with affected communities, we strive to foster trust and partnership in our collective journey towards better health outcomes. Only through genuine collaboration and listening to the needs of those we serve can we hope to overcome the challenges posed by global health crises.

Once again, I extend my sincerest thanks to the TB community for your unwavering dedication and commitment. Together, let us continue to stand united in the fight against TB and infectious diseases worldwide in 2024 and beyond.

With gratitude and solidarity,



A handwritten signature in black ink that reads "P. Mueller". The signature is fluid and cursive.

Prof. Dr. Peter Mueller
Founder and President
The Mueller Health Foundation

MHF 2023 HIGHLIGHTS IN NUMBERS

MHF Committed Funds comprise **1.1 %** of the global funds committed by private philanthropies in 2022 to Tuberculosis. (1)

MHF is **one of only twenty-five** philanthropic funders globally that have contributed funds toward TB Research and Development efforts. (1)

MHF Investments Made

\$ 584,739 USD

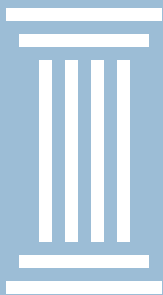
Distributed in New Grant Funds in 2023

\$ 2,170,356 USD

Committed through 2024

Grant Funds Spent by Strategic Pillar in 2023

\$ 499,339 USD



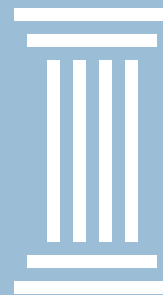
I. Clinical Research and Science

\$ 25,000 USD



II. Data and Technology

\$85,400 USD



III. Education and Awareness

(1) Based on estimates provided in the report titled "Tuberculosis Research Funding Trends, 2005–2022" published by the Stop TB Partnership in November 2023.

Creating Awareness and Telling Stories

We at The Mueller Health Foundation strongly believe in giving a voice to those affected by tuberculosis. Throughout 2023, thanks to a great repository of stories collected by the Centers for Disease Control (CDC), APOPO HeroRats, and TB Alert!, we have made great efforts to amplify patient voices by including these stories in our monthly newsletter as well as posting weekly videos and inspirational lessons learned on our social media channels from those directly affected by TB.



Picture Credit: CDC TB Personal Stories, APOPO HeroRats, TB Alert!

Our Hero Rat Carolina

We at The Mueller Health Foundation have been sponsoring our tiniest TB hero over the past two years. She is a HeroRat named Carolina trained by the APOPO non-profit organization, which operates across Africa. Carolina is a specially trained rat that assists her handlers in sniffing out tuberculosis on sputum samples from patients. The samples have been heat treated to ensure that the HeroRats and trainers do not become infected with TB. Carolina, along with 10 other HeroRats, works in a TB testing facility in Tanzania. Additional HeroRat teams work in Mozambique and Ethiopia. Together these little heroes are able to make a significant impact in improving the diagnosis of TB for patients. Below is a snapshot of what Carolina and her rat friends have accomplished so far!



NAME: CAROLINA

GENDER: FEMALE

SCIENTIFIC NAME: CRICETOMYS ANSROGEI

DATE OF BIRTH: SEPTEMBER 5, 2016

OCCUPATION: TUBERCULOSIS DETECTION RAT

LOCATION: TANZANIA

FAVORITE FOOD: PEANUTS

FAVORITE PASTIME: GROOMING

MEASUREMENT: 64 CM

WEIGHT: 2.2 POUNDS

PERSONALITY: CUTE AND HARDWORKING



Carolina and her trainer Ezekiel



Carolina at work

Impact of APOPO's HeroRats

25,208

Additional TB cases detected by Carolina and other HeroRats



848,169

Total samples screened by Carolina and other HeroRats



252,772

Total potential TB infections halted by Carolina and other HeroRats by preventing further spread



Community Building: Social Media aConferences

At MHF, we are always eager to showcase our work and the work of our grantees and partners across a variety of different outlets. We have worked hard this year to expand our followers and to create an engaged online community across the globe to help us increase awareness for TB and infectious diseases.

FOLLOWERS

457

is the number of new follower that we have gained in 2023 across our social media channels.

Across our four platforms, this expands our total number of followers to more than

>1,000

NEWS AND TOPICS



Throughout the year, we provided our followers with a summary of all the latest TB news in our monthly newsletter **The Monthly Dose**.

Knowledge Sharing Across Six Different Topic Areas



Monthly TB Statistics



Bi-Monthly Fun Fact About Tuberculosis



Monthly Update on Our TB-Sniffing Rat Carolina



Weekly Patient Stories



Scientific Publication of the Month



Bi-Monthly Inspirational Quotes for Patients

POSTS

572

Unique posts were created by MHF throughout 2023 across our social media accounts.

>6,600

is the average number of users on social media that were reached by each MHF post throughout 2023.

On average, our posts on social media throughout the year have a **22% higher engagement rate** than the current non-profit industry average. MHF is ranked consistently in the top performing organizations on social media based on posting frequency, follower engagement, and increase in followers. (2)



Community Building: Conferences and Events

At The Mueller Health Foundation, we believe in continuous education and attending conferences to learn about the latest developments in our sector. Furthermore, we also dedicate our time to support the TB Community by participating in global meetings and helping to draft documents as well as supporting event planning efforts to further help raise awareness for TB.

UN HIGH-LEVEL MEETING ON TUBERCULOSIS 2023



Our MHF Executive Director participated in a working group comprised of academics and researchers, who contributed to the drafting of an updated resolution document during the multi-stakeholder meeting for the UN High-Level Meeting on Tuberculosis. The UN High-Level Meeting on Tuberculosis, convened by the United Nations General Assembly, serves to mobilize political commitment and action at the highest levels to address the global TB epidemic. These gatherings bring together world leaders, policymakers, health experts, civil society organizations, and other stakeholders to discuss challenges, share best practices, and commit to concrete actions aimed at accelerating progress towards ending TB as a public health threat. The meeting held in September 2023 resulted in the adoption of updated resolutions aimed at strengthening global efforts to combat TB. Below is a summary of key achievements from the High-Level Meeting on Tuberculosis:

OUTCOMES

- ✔ Member states committed to providing life-saving treatment for up to 45 million people between 2023 and 2027, including up to 4.5 million children and up to 1.5 million people with drug-resistant tuberculosis.
- ✘ Member states failed to attach deadlines to these commitments which had been prioritized by TB-affected communities in their 'Deadly Divide' Accountability Report.
- ✔ Member states agreed to provide up to 45 million people with preventive treatment, including 30 million household contacts of people with tuberculosis, including children and 15 million people living with HIV.
- ✘ Member states failed to agree to several other key measures requested in the TB Community's Key Asks document, including a strong, robust, system of accountability in the Political Declaration to ensure regular and timely monitoring and follow-up, as well as weakened language on having a safe and effective new TB vaccine available in the next five years.
- ✔ Member states also committed to increasing annual global TB funding levels to over four times the current level (\$5.4 billion) towards reaching \$22 billion annually by 2027, increasing to \$35 billion by 2030.
- ✔ Member states also committed to mobilize \$5 billion a year by 2027 for tuberculosis research and innovation - a five times increase from the current \$1 billion a year - towards the development of point of care diagnostics, vaccines for all forms of tuberculosis, and shorter, safer and more effective treatment regimens.

Community Building: Conferences and Events

WORLD TB DAY NYC

The Mueller Health Foundation participated in the NYC World TB Day Annual Conference titled “A Future Free of TB: New Paths Forward” on March 17th, 2023 in the lead up to World TB Day on March 24th. This vital event focused on TB prevention and elimination efforts in New York City, with MHF contributing to the planning and organization of a pre-conference gathering. This special gathering was dedicated to recognizing and celebrating the resilience of TB survivors, patients, and clinicians, featuring compelling speakers sharing their personal stories of overcoming TB challenges. The atmosphere was vibrant, with a live marching band adding to the spirit of the occasion. The Mueller Health Foundation also helped to facilitate a social media campaign titled #MyWishforTBCare to allow conference participants to share their vision for better TB treatment and care. The conference was jointly hosted by the Health Department, the Global Tuberculosis Institute at Rutgers University, and the Center for Continuing & Outreach Education at Rutgers Biomedical Health Sciences.

MY WISH FOR THE FUTURE OF TUBERCULOSIS CARE:

"WE ARE ALL CALLED TO BE PART OF THE SOLUTION TO WIN THE FIGHT AGAINST TB BY EXPLORING OPPORTUNITIES AND ENHANCING CULTURAL AWARENESS IN THE AIM TO MAKE EACH PATIENT FEEL LISTENED, LOVED AND VALUED."

MAGGY NGOBBI
TB SURVIVOR

SHARE YOUR BIGGEST WISH FOR THE FUTURE OF TB CARE USING THE HASHTAG:
#MYWISHPORTBCARE

MY WISH FOR THE FUTURE OF TUBERCULOSIS CARE:

"IT IS AN AMAZING TIME TO BE A TB DOCTOR. FOR THE FIRST TIME IN DECADES, WE HAVE SHORTER, SAFER TB TREATMENTS. MY WISH IS TO SEE THESE TREATMENTS AVAILABLE EVERYWHERE THEY ARE NEEDED, EVEN AS WE REMEMBER THAT PREVENTION--THROUGH TREATMENT OF LATENT INFECTION AND ADDRESSING SOCIAL INEQUITIES--IS THE BEST MEDICINE."

DR. CARALEE CAPLAN-SHAW
DIRECTOR, TB PROGRAM
DIRECTOR, BELLEVUE CHEST SERVICE

SHARE YOUR BIGGEST WISH FOR THE FUTURE OF TB CARE USING THE HASHTAG:
#MYWISHPORTBCARE

MY WISH FOR THE FUTURE OF TUBERCULOSIS CARE:

"I HOPE MORE FUNDS WILL BE INVESTED TO SUPPORT TB PATIENTS MORE HOLISTICALLY THROUGHOUT THEIR TREATMENT JOURNEY. ACCESS TO MENTAL HEALTH SERVICES, NUTRITIONAL SUPPORT, AND EDUCATIONAL MATERIALS FOR THE COMMUNITY TO ADDRESS THE STIGMA ASSOCIATED WITH TB ARE ESSENTIAL FOR PATIENTS AND THOSE AFFECTED BY TB."

JUDITH MUELLER
EXECUTIVE DIRECTOR
THE MUELLER HEALTH FOUNDATION

SHARE YOUR BIGGEST WISH FOR THE FUTURE OF TB CARE USING THE HASHTAG:
#MYWISHPORTBCARE



TBConnect Blockchain Application

The Mueller Health Foundation is excited about the creation of its Ethereum blockchain application TBConnect, which aims to create a global network of key stakeholders in the field of tuberculosis to allow for improved information exchange and collaboration. TBConnect is designed from the ground up to foster an open environment where ideas can flow freely between all stakeholders. This is achieved by onboarding all parties on a unified platform, including but not limited to scientists and researchers, practitioners and healthcare workers, non-profits and government bodies, lateral partners and organizations, and the wider public. The novel portal empowers all parties with an open platform where they can freely voice their opinions, network with a diverse group of stakeholders, and disseminate their ideas and share information far and wide.

Key Updates



The MHF team, together with the developer, streamlined the backend systems of TBConnect to be more efficient and to improve operating speed and functionality.



Together with our partners at REACH, the MHF team continues to build out the body of knowledge on the TBConnect Blockchain Application. TBConnect already hosts more than 60 initial documents related to TB awareness and education.

Recognition of TBConnect

Owing to its revolutionary, first-of-its-kind approach in the field of tuberculosis, TBConnect is already gaining wide recognition. While still in its infancy, the next-generation portal has already been nominated for the Digital Revolution Award in addition to the 2024 BUPA Everywoman in Technology award.



Nominated for
2024 BUPA
Everywoman
in Technology



Nominated for
Digital
Revolution
Award

HIGHLIGHTS FROM OUR GRANTEES AND PARTNERS

REACH

The Mueller Health Foundation has partnered with the Resource Group for Education and Advocacy for Community Health (REACH) on the creation and implementation of a community care model for people with drug-resistant tuberculosis (DR-TB). The main outcome of this two year project is to reduce morbidity and mortality due to drug-resistant TB through decentralized care at the community level in India. India currently has the highest number of people with TB and DR-TB in the world, with almost a quarter of the total burden. When effectively implemented, community-based care has been shown to improve adherence and treatment success rates, reduce loss to follow up and minimize delays. Community care models and a more holistic and patient-centered approach can also help to address limitations of facility based interventions, such as limited mobility of patients and high costs associated with attending regular visits. Community care models also have broader applicability, not only in India but in the rest of the world, and MHF has been in active dialogue with public health agencies across the United States to share findings and lessons learned from this project.

Overview of Key Activities



Completed a rapid assessment report, including the landscape mapping on DRTB across India and conducting interviews and workshops with stakeholders including health professionals, community workers, policy makers, and patients.



Finalized Standard Operating Procedures and tools for the community care model.



Distributed two short films on drug-resistant TB.



Continue use of MHF's TBConnect Blockchain Application, including populating the portal with information and documents related to TB.



Conduct capacity building efforts for REACH staff, healthcare providers, tertiary hospitals, and TB Officers.



Continue coordinating and implementing the community care model and package of person-centered services.



Host support group meetings for TB patients and their families.



Continue data collection on DR-TB patient cohort.

REACH

EDUCATION

Capacity Building Activities

- ✓ The project team completed a one-day comprehensive training program on Drug-Resistant Tuberculosis to build the capacity of the REACH staff. The training focused on basics of DR-TB, Diagnosis of DR-TB and treatment guidelines of the National TB Elimination Program.
- ✓ More than 186 private practitioners were sensitized about the services being provided to ensure early detection of DR-TB. They were individually met by the program team and briefed on the project activities.
- ✓ The team briefed 27 District TB Officers and DR-TB Coordinators about the project objectives and interventions. Additionally, the project team engaged with the Directors of two DR-TB tertiary centers to discuss the guidance needed to facilitate the Pre-treatment evaluation and admission protocols for PwDRTB from the private sector.



Patient Centered Care Support Services

A patient-centric approach is considered to be the key to delivering high-quality healthcare. TB programs are now increasingly adopting newer strategies by engaging with the local communities to strengthen patient-centric approaches. Care and support services need to be individualized for each person with TB in health care settings, prioritizing needs according to their socio-economic status. While diagnosis and treatment are vital factors for a person with DR-TB, assessing the individual, family, and social environment becomes critical to ensure continuum of care during the treatment period. Integrated care and support can improve patient experience and treatment outcomes ensuring better outcomes and reducing spread in the community. REACH provided comprehensive care services through the following approaches:



PATIENT SERVICES

REACH

Support Group Meetings for TB Survivors and Their Families

REACH hosted support group meetings to create a platform for interaction to ensure good quality of services is provided to the people with DR-TB. These meetings provided an opportunity to educate on DR-TB, exchange personal experiences, clarify doubts on treatment related issues, address concerns on adverse drug reactions, share coping mechanisms, and provide emotional support and motivation or a person with DR-TB. REACH conducted these meetings twice a month for people with DR-TB and their family members at the Nakshatra centers. After the meetings, the participants were provided with travel support and a kit with vegetables to be used at home.

SUCCESS

In its first year, the project administered more than 1000 Line Probe Assay (LPA) tests and identified more than 100 people with DR-TB.

**WORLD TB DAY
ACTIVITIES 2023**



Educational Puppet Show by students from Madras School of Social Work



Educational Play by students from Madras School of Social Work



Dr.M.Jagadeesan taking the pledge along with participants on the occasion of World TB Day



Captive audience for the World TB Day event

Two short films titled “Drug-resistant TB: What the Survivors Really Want” and “A New Dawn” showcasing DR-TB patient experiences were released on YouTube and shared on Twitter, Facebook, and WhatsApp. Educational pamphlets and flyers about DR-TB and TB testing are continuously distributed to patients, caretakers and families, and the community.



Dr. M.Jagadeesan, City Health Officer, releasing “A New Dawn” a film on DR TB



Distribution of Flyers and Pamphlets on DR TB

**MOVIES
AND FLYERS**

David Russell's Lab at Cornell University

The Russell Lab at Cornell University has developed a novel approach to analyze how individual host immune cells react divergently to the bacteria that cause tuberculosis. Over a four year period, together with The Mueller Health Foundation, the Russell Lab is building on this platform of single cell profiling of active Mycobacterium tuberculosis (Mtb) infection in vivo to assess the relative susceptibility of Mtb subpopulations to the actions of current and emerging anti-tuberculosis drugs. The goal is to generate a "road map" that connects drug susceptible and drug tolerant bacterial populations and facilitates the rational design of combinatorial anti-tuberculosis drug regimens to provide more effective coverage of the total bacterial population. This could increase efficacy and shorten the course of treatment. Due to the host cell responses to TB infection being epigenetically controlled, the collaboration further focuses on a new approach that takes epigenetic reprogramming into consideration. Over the first two years of this collaboration, the project has been generating single cell RNA-seq maps for frontline drugs that are mapped to relative sensitivity of Mtb in different host cell subsets to these drugs. The rationale being that the intracellular environment exploited by Mtb has a major impact on bacterial susceptibility to drug action, and that the diversity of host cell types would drive differential drug action, promote induction of drug tolerance, and render some bacteria inherently insensitive to the drugs. The team also worked on screening a library of inhibitors of host epigenetic modeling to modify the host environments and render more bacteria susceptible to frontline drugs. A brief overview of key activities from the second year of the project is provided below.

Overview of Key On-Going Activities in Year 2



Completed the scRNA-seq road maps assessing the differential drug susceptibility for Mtb in the mouse lung for the newer frontline drugs Linezolid, Pretomanid and Bedaquiline. Additionally, the team developed a new in vitro platform for functional profiling of compounds that either (i) work independently of host environment, (ii) work antagonistically to host environment, and (iii) work synergistically with host environment.



Completed the preliminary assessment of inhibitors of epigenetic modification identified in macrophage physiology readouts for their capacity to modulate macrophage behavior and bacterial survival in vivo. The team has collected the in vivo data in support of epigenetic modifier efficacy and plans to use the new platform to screen in vitro prior to returning to in vivo.



Continued initial drug/drug assessment studies on host-active compounds in combination with appropriate anti-TB drugs assessed in the scRNA-seq road map. The team completed the screening of the epigenetic compound library in combination with Moxifloxacin and identified compounds that improve drug action. Compounds were selected for a new informer deck that is in the process of being cross screened in combination with other frontline TB drugs.

Diabetes Mellitus and TB Pilot Study in Malawi

An ongoing project is a pilot study in Malawi, which aims to understand the fundamental impacts of comorbidities, specifically diabetes mellitus (DM), in the context of TB treatment. Malawi faces a dual burden of communicable and non-communicable diseases, including TB and DM. Unfortunately, data on the prevalence of DM among TB patients are not collected by the Malawi National TB Control Programme, leaving us unaware of whether DM is a significant risk factor for TB among Malawians. Furthermore, HIV infection is the strongest risk factor for the development of TB among people living with HIV (PLHIV) in Malawi. While the success of the Malawi antiretroviral therapy program has reduced the incidence of HIV-associated TB, it has also increased the risk of metabolic syndromes, predisposing PLHIV to DM. To gain a better understanding of the relationship between DM and TB, MHF has initiated a pilot study in collaboration with David Russell's Lab at Cornell University and Queen Elizabeth Central Hospital in Malawi. The study aims to perform bronchoalveolar lavage to recover airway macrophages from healthy and diabetic donors, shedding light on this crucial intersection of diseases. Due to natural disasters, including the flooding of key hospital infrastructure in 2023, current activities are delayed and are partly on hold. However, MHF remains committed to its mission, and aims to resume activities in 2024.

Overview of Key On-Going Activities



Obtained Institutional Review Boards (IRB) Approval to conduct the pilot study.



Assembled list of suitable candidates in Malawi based on pre-determined set of characteristics to participate in the pilot study.



Waiting to resume recruiting suitable candidates in Malawi.

Our Global Reach

We are very proud to see our grantees making a truly needed impact across four different continents including Africa, Asia, Europe, and North America.



THANK YOU

We would like to express our deepest gratitude to our supporters, grantees, partners, and collaborators, for their time, insight, wisdom and contributions. Our work would not be possible without the many individuals from academic institutions, scientific and medical experts, biotech- and high-tech companies, multilateral agencies, non-governmental organizations and global networks, who willingly gave their time, experience and contributions to make a difference in the fight against TB and infectious diseases!



