ANNUAL REPORT

2022

The Mueller Health Foundation

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

The Mueller Health Foundation Vision

A LETTER FROM THE PRESIDENT

Our team at The Mueller Health Foundation would like to start by expressing our most heartfelt gratitude to the entire TB community as well as our partners and collaborators for the tremendous amount of work that has been completed over the past 12 months. We are so grateful for the commitment and resilience of all of those fighting to make a difference for those affected by tuberculosis (TB)!

Throughout 2022, the world has continued to face health crises, including increased frequencies of infectious disease outbreaks and the increasing threat of antimicrobial resistance. The COVID-19 pandemic has continued to not only have direct impacts on the global community and the way we lead our lives, but it has also significantly set back progress on fighting other infectious diseases, such as HIV, TB, and malaria; these are all diseases that often kill more people in the poorest countries than COVID-19 itself. Furthermore events such as the war in the Ukraine not only brought with it a humanitarian crises but its own set of health emergencies, especially for those affected by tuberculosis, who had and continue to have difficulty accessing and continuing treatment for the disease.

As we look forward to 2023, the global community must continue to anticipate a future where health crises continue to emerge from multiple directions and we must continue to foster the spirit of collaboration to be able to nimbly and speedily tackle challenges. What we should learn from prior years is that we need to stop tackling diseases in silo and truly leverage international networks and share knowledge to learn from each other to tackle health crises in a more holistic manner. We also must continue to place emphasis on shifting our mindset away from simply treating the disease and to focus on holistically treating the patient by taking into account barriers that they may face well beyond successfully completing treatment. Patient-centered care is truly essential in creating the best environment for effectively fighting and winning the battle against infectious diseases. With this also comes increased responsibility to harness the power of community-led responses. We at the Mueller Health Foundation truly believe in the importance of working closely with patients and supporting projects that focus on working directly with communities. It is of utmost importance to us to continue to build and earn the trust of patients and communities affected by TB and only by coming together and listening to their needs can we begin the journey to address the challenges posed by global health crises more effectively.

Once again, we thank the TB community for continuing to believe in this cause and encourage everyone to actively join the fight against TB and infectious diseases around the globe in 2023!

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

MHF 2022 HIGHLIGHTS IN NUMBERS

MHF Investments Made

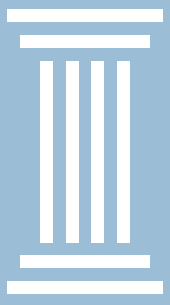
$ 575,945 USD
Distributed in New Grant Funds in 2022

$ 2,170,356 USD
Committed through 2024

MHF Committed Funds comprise **1.6 %** of the global funds committed by private philanthropies in 2021 to Tuberculosis. (1)

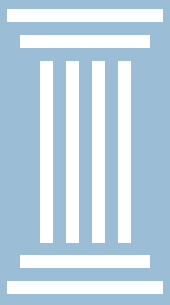
Grant Funds Spent by Strategic Pillar

$ 545,945 USD



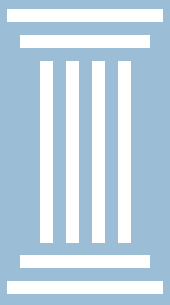
I. Clinical Research and Science

$ 5,000 USD



II. Data and Technology

$23,000 USD



III. Education and Awareness

(1) Based on estimates provided in the report titled "Tuberculosis Research Funding Trends, 2005–2021" published by the Stop TB Partnership in November 2022.

Creating Awareness and Telling Stories

We at The Mueller Health Foundation strongly believe in giving a voice to those affected by tuberculosis. Throughout 2022, thanks to a great repository of stories collected by the Centers for Disease Control (CDC), 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

Our Hero Rat Carolina

We at The Mueller Health Foundation have been sponsoring our littlest TB hero over the past year. 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 signifiant impact in improving the diagnosis of TB for patients. Below is a snapshot of what Carolina and her rat friends have accomplished so far!

Picture and Impact Credit: APOPO HeroRats

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

Community Building: Social Media and Conferences

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. We also believe in continuous education and attending conferences to learn about the latest developments in our sector.

Our Social Media Community

123 % Increase in Twitter Followers

33 % Increase in LinkedIn Followers

262% Increase in Instagram Followers

NEWS

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

On average, our posts on social media throughout the year have a **15% 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)

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**

Participated in 14 Conferences

Focus of the Conferences:

Global TB Awareness: 5
Local TB Awareness: 5
Best Practices in Philanthropy: 4

(2) Analysis and ranking is based on Hootsuite's Social Score and Annual Analytics Report

TBConnect Blockchain Application

The Mueller Health Foundation is excited about the creation of the first version 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. This year, we have officially launched the TBConnect Blockchain Application and in collaboration with our partners at REACH, we have successfully completed extensive testing of the application and on-boarded new users. Below is a brief snapshot of what we have accomplished through the testing period.

The MHF team created a set of 12 comprehensive training modules to provide users with step-by-step instructions on how to use the system.

The MHF team created a comprehensive User Manual to accompany the TBConnect Blockchain Application.

Together with our partners at REACH, the MHF team built out the body of knowledge on the TBConnect Blockchain Application with more than 30 initial documents related to TB awareness and education.

Feedback from our TBConnect Users:

- **6 out of 7 users found the TBConnect Blockchain Application user-friendly and very easy to use.**
- **100% of our users find the TBConnect Blockchain Application valuable in sharing documents and making information more accessible**
- **All users stated that the TBConnect Blockchain Application is useful to their organization.**

"Great access to quality TB materials for reference and capacity building."

"The TBConnect portal provides us many features which are useful for networking."

"It's a good portal for sharing information."

"It helps to securely share the datasets and documents with the concerned users through which experience sharing and cross-learning will happen. Also, it helps in reducing time in searching for quality TB related contents"

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 (DRTB). 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 DRTB 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. An overview of key activities that have been completed in the first six months of the project are provided below.

Overview of Key On-Going Activities

- **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.**
- **An outline of the community care model and package of person-centered services.**
- **A Standard Operating Procedure and tools for the community care model.**
- **Two short films on drug-resistant TB.**
- **Successful testing of MHF's TBConnect Blockchain Application, including populating the portal with information and documents related to TB.**

Workhshops for a DRTB Community Care Model in India

Picture Credit: REACH

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 past first year, 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 is currently also working 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 first year of the project is provided below.

Overview of Key On-Going Activities

Completed the scRNA-seq road maps assessing the differential drug susceptibility for Mtb in the mouse lung for the frontline drugs INH, RIF, EMB, and PZA.

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.

Continue to develop a pipeline for onboarding new compounds, most specifically host-active compounds with the capacity to impact sensitivity of Mtb to known frontline drugs.

Continue 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.

Continue initial drug/drug assessment studies on host-active compounds in combination with appropriate anti-TB drugs assessed in the scRNA-seq road map.

Diabetes Mellitus and TB Pilot Study in Malawi

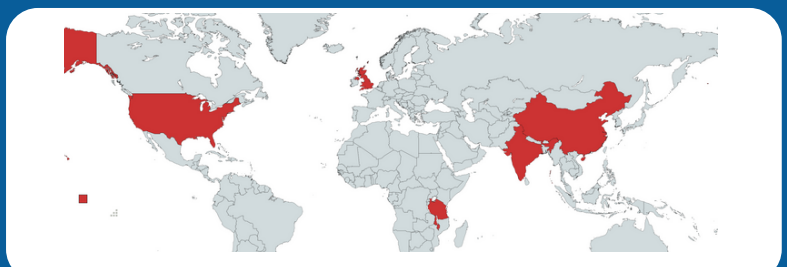
It is a widely accepted fact that comorbidities often have an adverse effect on treatment outcomes. The main aim of the pilot study in Malawi is to better understand the fundamental impacts of comorbidities, specifically diabetes mellitus (DM), in the context of TB treatment. Malawi is facing a dual burden of communicable and non-communicable diseases including TB and diabetes mellitus (DM), respectively. Data on the prevalence of DM among TB patients are not collected by the Malawi National TB Control Programme, therefore, it not known if DM is a significant risk factor for TB among Malawians. Additionally, HIV infection (PLHIV) is the strongest risk factor for development of TB among PLHIV in Malawi. While the success of the Malawi antiretroviral therapy program has reduced the incidence of HIV-associated TB, it has increased the risk of metabolic syndromes, which in turn, predispose PLHIV to DM. In order to gain a better understanding of the relationship between DM and TB, MHF has initiated a pilot study together with David Russell's Lab at Cornell University and Queen Elizabeth Central Hospital in Malawi, with the aim to perform bronchoalveolar lavage to recover airway macrophages from healthy and diabetic donors. A brief overview of the activities conducted within the first three month of the pilot project are provided below.

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.**
- **In the process of recruiting suitable candidates in Malawi.**

Our Global Reach

We at the Mueller Health Foundation are proud to have been able to expand our grant-making activities to include making international grants in 2022. We are truly excited about our successful expansion and are now 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 supports, 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!

REACH leading the fight against TB

Cornell University

University of Liverpool

25 Years 1995 - 2020

BioXcel Medicines Through Ingenuity

InveniAI Innovate with Intelligence

apopo Saves Lives

NGOsource

ValueCoders On-Demand Software Teams

twilio

mongoDB.

ethereum

Bessemer Trust

Twilio SendGrid

aws nonprofits

Hemenway & Barnes LLP


The Mueller
Health Foundation