



Increasing equitable
access to cardiac
health care in Africa



Mozambique

Medical Infrastructure development - First Cardiac Centre in Mozambique

Professor Yacoub and the Chain of Hope team were invited to participate as founding members for the creation of the first cardiac surgical service in Mozambique, in collaboration with three other European and Mozambican NGOs: La Chaine de L'Espoir, Cadeia d'Esperanca, Un Coeur Pour Tous and Amigos do Coração. This resulted in 2001 in the conversion of a military hospital into the first Heart Centre in the country called the Instituto do Coração.

Prior to 2001 all cardiac patients in Mozambique needed to be flown out of the country for urgent treatment overseas. Since the inauguration of the Instituto do Coração, Chain of Hope under the guidance of Professor Yacoub has been sending cardiac training missions to Maputo over 16 years sponsoring cardiac training visits until 2017 with Professor Yacoub leading many of the surgical training sessions. The local team are now self-sufficient and are able to operate on many heart patients unassisted.



Example of a Chain of Hope cardiothoracic knowledge-exchange programme in Mozambique.

Instituto do Coração, Maputo, Knowledge Exchange Programme

Cardiothoracic 8 week Training Programme

Week 1:

Monday	Tuesday	Wednesday	Thursday	Friday
Meeting with local team re. guidelines/ protocols.	9.00 : Introdução ao treino e exame diagnóstico 10.30 : Intervalo 11.00 : Embriogénese cardiovascular 11.30 : Circulação Fetal 12.00 : Almoço 13.00 : Anatomia e fisiologia do coração 14.00 : Ciclo cardíaco e débito cardíaco 15.00 : Regulação da frequência cardíaca e tensão arterial 16.00 : Fim	8.30 : Revisão do dia anterior 9.30 : Anatomia e fisiologia do sistema respiratório 10.30 : Intervalo 11.00 : Intubação endotraqueal 11.30 : Modos ventilatórios 12.00 : Almoço 13.00 : Análise de gasometrias 14.00 : Interpretação de raios x 15.00 : Hipertensão pulmonar 16.00 : Fim	8.30 : Revisão do dia anterior 9.00 : Exame físico 10.00 : Monitorização cardíaca invasiva 10.45 : Intervalo 11.00 : Gestão da administração de fluidos intravenosos 12.00 : Almoço 13.00 : Eletrólitos 14.00 : Balanço hídrico e cálculos de medicação 16.00 : Fim	8.30 : Revisões do dia anterior (balanço hídrico e cálculos de medicação) 9.30 : Bypass cardiopulmonar 10.30 : Intervalo 11.00 : Hemorragia e anti coagulação pós-cirúrgica 12.00 : Almoço 13.00 : Sangue e os seus derivados 14.00 : Baixo débito cardíaco e complicações pós cirúrgicas 15.00 : Resposta inflamatória 16.00 : Fim

Surgical training programmes in Mozambique

Chain of Hope has been delivering knowledge-exchange programmes at the Instituto do Coração for 17 years from 2001 to 2018, rotating with visits from other NGOs. Professor Yacoub worked with the local surgical teams at the Heart Institute in Maputo training Mozambican surgeons, led by Dr Adriano Tivane and Dr Sozinho Estefane. Simultaneously the anaesthetic, cardiology, perfusion and nursing teams were being trained by Chain of Hope and other visiting NGOs. The local surgical and Intensive care teams are now self-sufficient, operating on congenital and rheumatic lesions as well as treating adult cardiac patients unassisted. The local teams are now doing 150 cardiac surgeries on their own per year.



The Chain of Hope team.

Creation of Research Institute in Inharrime – rural Mozambique

Professor Yacoub went on to develop a research Institute in Inharrime in the north of Mozambique twinning this institute with the Harefield Research Foundation (Magdi Yacoub Institute in the UK),

Inharrime is a coastal district of Mozambique located at least 400 km from any major referral centre for cardiovascular diseases. Most of the people are agricultural workers with a very low income. Less than 1% of households have access to electricity and piped water. In Inharrime an in-depth study was carried out to examine the prevalence, type and severity of a neglected tropical heart disease called Endomyocardial Fibrosis. It is a debilitating disease of unknown origin that affects the lining of the heart cavities (the endocardium) of the lower chambers of the heart (the ventricles) leading to the

replacement of the cells with fibrous tissues (Fibrosis), with the long term result being heart failure and premature death.



Population based study on Endomyocardial Fibrosis published in New England Journal of Medicine. Please click here for the full article

Endomyocardial Fibrosis (EMF), the most prevalent form of restrictive cardiomyopathy globally, lacks specific treatments and is associated with a poor prognosis due to late-stage diagnosis. This population-based study published in New England Journal of Medicine, investigated the prevalence and characteristics of EMF in a rural area of Mozambique using transthoracic echocardiography.

KEY FINDINGS:

- **Prevalence:** EMF was found in 19.8% of the 1063 screened participants, with the highest prevalence in individuals aged 10–19 years (28.1%) and a higher rate in males compared to females (23.0% vs. 17.5%).
- **Distribution and Severity:**
 - Biventricular EMF was the most common form (55.5%), followed by right-sided EMF (28.0%).
 - The majority of cases showed mild-to-moderate structural and functional abnormalities, with only 22.7% of affected individuals exhibiting symptoms.
- **Family Clustering:** Familial occurrence of the disease was frequently observed.

CONCLUSION:

EMF is highly prevalent in this rural Mozambican population, especially among adolescents and young adults. Echocardiography proved effective in identifying early, asymptomatic stages of the disease, offering new insights into its epidemiology and potential pathogenesis. Early detection may provide a foundation for future interventions and research into disease mechanisms.

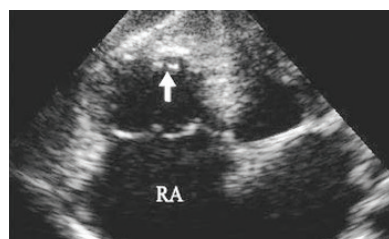
Professor Ana Olga Mocumbi

Professor Ana Olga Mocumbi was sponsored to do her PhD at Imperial College by Professor Yacoub. She is now an Associate Professor of Cardiology at Universidade Eduardo Mondlane and Lead Researcher at the Non-Communicable Diseases Division of the Instituto Nacional de Saúde (both in Mozambique) and Affiliated Professor at the Department of Global Health at the University of Washington.

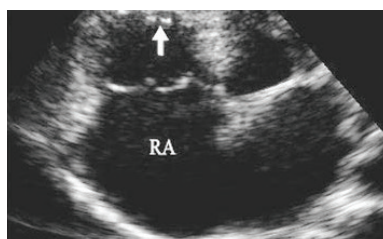
Her research focus is neglected cardiovascular diseases. She co-Chairs the Pan African Society of Cardiology Taskforce on Reproductive Health Services for Women with Cardiovascular Disease, the Working Group on Rheumatic Heart Disease Prevention and Control at the World Heart Federation, and the Non-Communicable Diseases and Injuries of the Poorest Billion Global Network.

Echocardiograms Showing Types and Degrees of Severity of Endomyocardial Fibrosis.

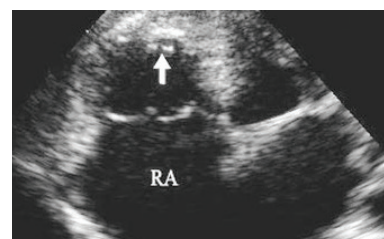
Panel A shows mild left endomyocardial fibrosis with occupation of the left ventricular apex (arrow). The interventricular septum is dense, with a thickened anterior mitral leaflet.



Panel B shows moderate right endomyocardial fibrosis, with obliteration of the trabecular part and fibrous floor of the right ventricular cavity (arrow). The right atrium (RA) is dilated.



Panel C shows severe bilateral endomyocardial fibrosis, with obliteration of the left ventricular apex (arrow), thickened valves, and biatrial dilatation.





Cardiac Centre Ethiopia

Opening of the first ever Cardiac Centre in Ethiopia

Under the guidance of Professor Magdi Yacoub's work with the Chain of Hope, there has been significant infrastructure developments in Africa in the field of paediatric and adult cardiac surgery, cardiology and interventional catheterisation for patients suffering from correctable heart disease.

The work of the Chain of Hope in Ethiopia began in 2000 with the signing of a Memorandum of Understanding with the Ethiopian NGO, the Children's Heart Fund of Ethiopia. The focus of this work was to save the lives of children suffering from heart disease by flying emergency children to hospitals where there were cardiac facilities to save their lives. The long term goal was to establish these services in Ethiopia where the expertise and infrastructure was lacking.

In 2009 after a nine year collaboration with the Children's Heart Fund, the

Cardiac Centre, Ethiopia (CCE) was inaugurated, established as an NGO hospital to enable free accessible treatment for Ethiopian children and adults. The opening of the hospital was attended by President Meles Zenawi.

Vice President of Chain of Hope, Professor Marc de Leval procured and raised funds through the Oak Foundation and Chain of hope for brand new equipment for the two cardiac theatres plus equipping the 10-bedded Intensive Care with ventilators and monitors, for state-of-the art care of Ethiopian heart patients.

In 2015 Professor Yacoub signed an MOU with the Egyptian Agency for Partnership and Development to donate a new catheter laboratory for installation at the Cardiac Centre in Addis Ababa for interventional cardiology training and treatment programmes.

Cardiac Surgical and interventional cardiology training missions to Ethiopia

Professor Yacoub helped establish the first ever Cardiac Centre in the country of Ethiopia through the collaboration of the Chain of Hope with the Children's Heart Fund of Ethiopia and Dr Belay Abegaz in 2009. Professor Yacoub initiated the training and development of the local team, leading cardiac surgical training programmes through the Chain of Hope as well as sponsoring medical personnel to train at his hospital in Aswan and further afield at the Narayana Health City in Bangalore, India.

One Paediatric cardiologist and 2 adult cardiologists from Ethiopia were sponsored for overseas Training programmes at Guys and St Thomas NHS Trust in London and Northwestern University in Chicago.

The local team are now autonomous and operate on a range of cardiac lesions unassisted. Chain of Hope educational teams led by Professor Sir Magdi Yacoub, Professor Sir Shakeel Qureshi, Professor Jonathan Clague and Mr Hasnat Khan deliver intensive training sessions throughout the year to assist in the training and treatment of complex cardiac lesions for Ethiopian children suffering from correctable heart disease.

Initiatives to Tackle Rheumatic Heart Disease

There is a need for more research into the root causes and impacts of RHD across Africa, including its development through rheumatic fever.

Prevalence studies in Ethiopia have been sponsored by Chain of Hope and the European Heart For Children charities to better understand the incidence of RHD in Jimma, in the western highlands of Ethiopia led by Professor David Phillips from Southampton University with Dr Tadesse Gemechu from Jimma University. Their research was published in **Preventive Cardiology** titled '**Community-based prevalence study of rheumatic heart disease in rural Ethiopia**'. [Click here to view the publication.](#)

With support from Chain of Hope, The Cardiac Centre in Addis Ababa is establishing a specialised warfarin clinic aimed at post-operative valve patients to ensure careful anticoagulation management for heart patients.

The Chain of Hope charity has sponsored INR (International Normalised Ratio) machines and test strips, which are sent out to the Cardiac Centre and regional cardiac units located in Awassa, Gondar, and Bahir Dar.

Chain of Hope has also provided supplies of warfarin, the anticoagulant medication used to prevent blood clotting. This sponsorship ensures that patients receive the necessary medication for effective anti-coagulation to prevent fatalities. Dr Suie Kotit and Dr Shehab Anwar from the Aswan Heart Centre are acting as advisors to the Cardiac Centre in Addis Ababa in establishing a rheumatic heart disease (RHD) registry, which will track the health and treatment progress of RHD patients with the aim of improving long-term patient outcomes.



Example of a Chain of Hope Perfusion Lecture Series - Childrens Cardiac Centre, Addis Ababa

Week One:

	Monday	Tuesday	Wednesday	Thursday	Friday
9.00	Perfusion History	Cardiac Physiology	Blood Pump Mechanics	Respiratory Physiology	Oxygenators
10.30	TF	JH	TF	JH	TF
Coffee					
11.00	Perfusion History	Cardiac Electro Physiology	Paediatric Perfusion	Cell Salvage / Haemodilution	Oxygenators
12.30	TF	JH	JH	TF	TF
Lunch					
13.00	Blood Grouping	Filtration	Perfusion for Non Cardiac Surgery	Effects of Bypass on Vital Organs	Intra Aorta Balloon Counter Pulsation
14.30	Blood Safety	JH	TF	JH	JH
Break					
15.00	Perfusion Parameters	Myocardial Preservation	Hemostasis	Perfusion Safety	Paediatric ECMO
16.30	JH	TF	JH	TF	JH



Aswan Heart Centre

Creation of the Aswan Heart Centre (AHC)

The Magdi Yacoub Heart Foundation (www.myf-egypt.org) was registered as an NGO in Egypt. The MYF worked in collaboration with the Chain of Hope to open the Aswan Heart Centre in 2009. The heart hospital was created to serve the Egyptian Population.

Aswan Heart Centre as well as being a Centre of Excellence, acts as a training centre and serves as a gateway to Africa. It is a purely NGO hospital where all patients receive treatment and follow up free of charge. At the same time, an agreement was signed between the Aswan Heart Centre and Chain of Hope for two children per month from Africa to undergo open heart surgery under Professor Yacoub's care and that of his team. Where possible, African medics would accompany the sick children to witness the surgery and learn from the state-of-the art care that has developed in Aswan.

AHC training programme for Egypt

There are three levels of training programmes at the Aswan Heart Centre.

Observership programme for undergraduate medical students coming on rotation to the Aswan Heart Centre. This is communicated through the website with an email observership@aswanheartcentre.com. These are rotational training programmes encompassing the different disciplines in cardiovascular medicine. There are no registration fees to attend the training programmes.



Students benefit from observing the advanced diagnostic tools in the 2 Labs – Life science and Biomedical engineering to do flow dynamic studies, segmentation using MRI for 3D modelling for better diagnostic care and optimal planning for the surgery.

The Aswan Post-graduate Programme is communicated through the universities across Egypt.

Training of African medical personnel at the Aswan Heart Centre

Doctors and nurses are sponsored by the Chain of Hope to come to the Aswan Heart Centre for specialist training placements in cardiac medicine from across the African continent.

Examples include:

- Dr Lamin Jaiteh, paediatrician specialising in cardiology from the Gambia
- Maane Rahmatulai, radiologist training in echocardiography from the Gambia
- Dr Cornelius Sendagire from Uganda Heart Institute training in cardiac anaesthesia
- Agnes Nabuuma from Uganda Heart Institute training in cardiac nursing
- Harriet Namukwaya from Uganda Heart Institute training in cardiac nursing
- Carolyn Nakigozi from Uganda Heart Institute training in cardiac perfusion
- Anna oketayot from Uganda Heart Institute training in cardiac nursing
- Dr Judith Namuyonga from Uganda Heart Institute training in paediatric cardiology
- Dr Helen Befekadu from the Cardiac Centre Ethiopia training in Paediatric Intensive Care
- Bezawit Bekele from the Cardiac Centre Ethiopia training in Perfusion medicine
- Hayat Kadir from the Cardiac Centre Ethiopia training in Perfusion medicine
- Dr Tadesse Gemechu from Jimma University, Ethiopia training in echocardiography
- Dr Noel Kayange from Blantyre university, Malawi training in echocardiography.



Paediatric Intensive Care, Aswan Heart Centre

CARDIOVASCULAR RESEARCH

Opening of Research Building at the Aswan Heart Centre – 2016

The Aswan Heart Research Programme contributes to solving one of the biggest challenges in Egypt, MENA Region and Africa: Cardiovascular Disease (CVD).

Their aim is to promote better understanding of disease mechanisms and enhance early prediction and diagnosis of CVD with the ultimate aim of developing innovative personalised therapeutic solutions and advanced healthcare management strategies.

The integrated research programme ranges from Population Studies to Disease-Based Studies addressing research questions with particular relevance to the Egyptian population, the MENA region and Africa. The cardiovascular clinical and research efforts at AHC include population studies, tertiary clinical services, basic science, as well as engineering and translational medicine.

In 2019 Siemens signed an agreement with the Aswan Research Centre. The agreement was the first of its kind in Africa to address the growing challenges present in Egypt and Africa in the area of cardiovascular diseases, paediatric congenital and non-invasive cardiac imaging.

This agreement intensified the work between MYF's Aswan Heart Research Centre Biomedical Engineering and Innovation Laboratory (BME), and Siemens Health Engineers through Egypt's Scientific Collaboration Division.

"We do believe that the breakthroughs in research today provide the medical treatments of tomorrow. This is why we focus in our Research Programme on projects that will help deepen the understanding of various heart diseases and shed light on possible therapeutic strategies. Our aim is to understand heart diseases in a comprehensive way.

This will:

- Improve the Health of the nation through policies to, for example, eradicate Rheumatic Heart Disease and other neglected CV diseases.
- Have an overall effect on Child Health in the region and beyond.
- Stimulate Biotechnology in the region.
- Help to guide, evidence based policies in Public Health and Preventive medicine."

Magdi Yacoub

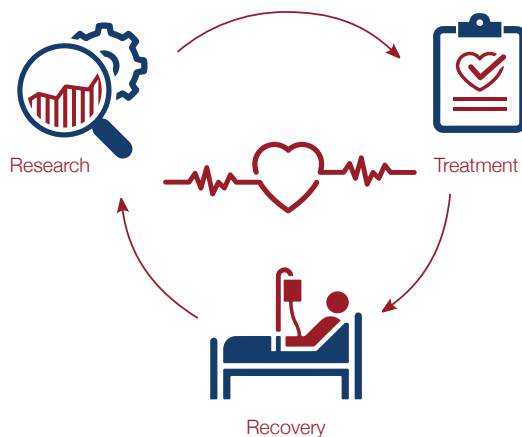
Professor Sir Magdi Yacoub, FRS, OM

From Bench to Bedside:

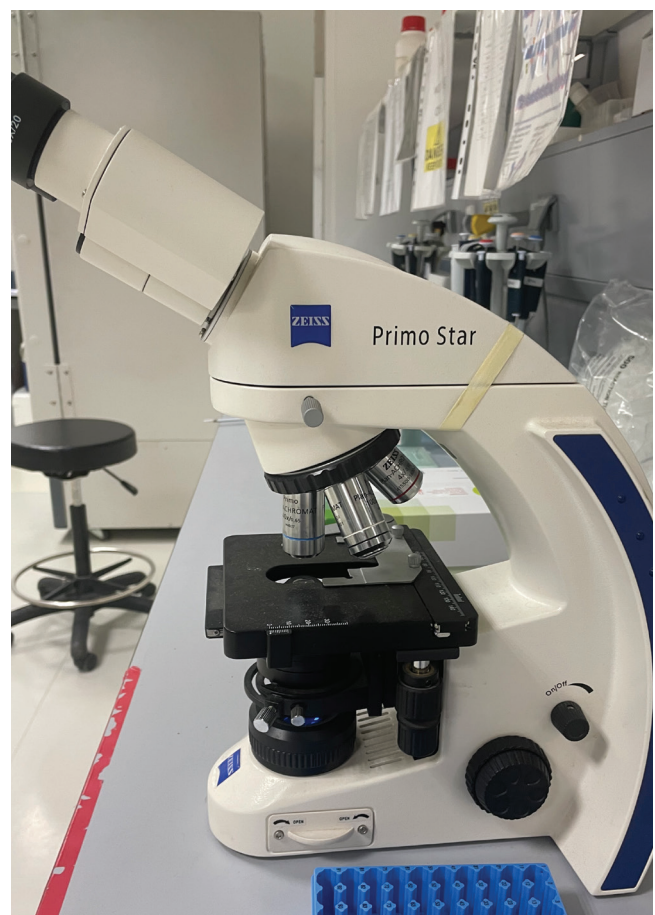
Translational Research

Bringing together teams from different disciplines and scientific backgrounds is essential to bridge the gap between bench (laboratory) and bedside (patient care), and ultimately reflect on the health and wellbeing of both healthy individuals and patients.

Physicians, Engineers, Life Scientists, Bioinformaticians, Computer Scientists, Physicists, Radiologists, Epidemiologists and Scientists from other disciplines are interacting closely to understand heart diseases and find innovative treatment options.



RESEARCH IS AT THE HEART OF TREATMENT - IMPROVING PATIENT RECOVERY
REFLECTING THE LINK BETWEEN BED + BENCH



The three Pillars of the Aswan Heart Research Programme

The Aswan Heart Research Programme is comprised of three main disciplines; Clinicians, Engineers and Scientists:

Clinical Research

The AHC Clinical Programme provides a rich, wide and arguably unique resource covering Adult Cardiology, Pediatric Cardiology and Cardiac Surgery. The Centre's state-of-the-art infrastructure includes strong non-invasive and invasive diagnostic and treatment facilities. Observational research using practice and disease-based registries help shaping the Research Programme at AHC. Comprehensive databases play an important role in facilitating research into outcomes and facilitate the understanding of outcomes by addressing questions difficult to answer through clinical trials.

The Research contributes to understanding the disease landscape in the population, monitoring different patient management strategies and the implementation of novel therapeutic strategies, particularly in certain cardiovascular disorders including Inherited Heart Muscle Disease, Heart Failure, Rheumatic Heart Disease, Congenital Heart Disease, Valvular Heart Disease and Aortopathies, Coronary Artery Disease and Pulmonary Hypertension. This is crucial in order to provide the evidence base for recommendations in practice guidelines and performance indicators used as quality measures.

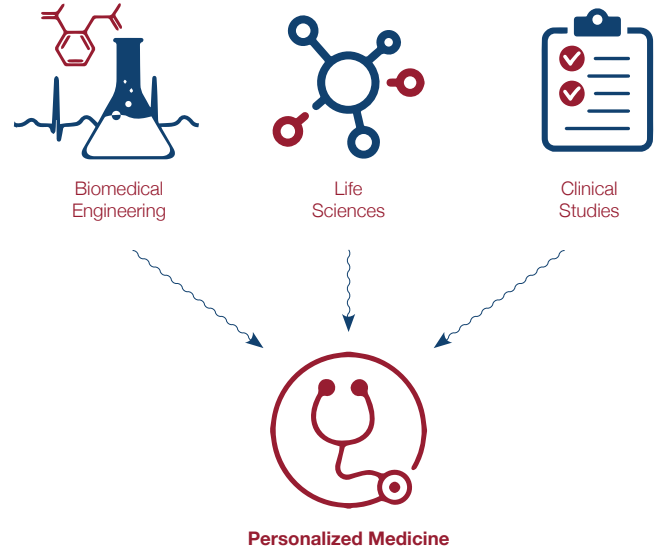
Biomedical Engineering and Innovation Laboratory

The Biomedical Engineering and Innovation Laboratory: is an interdisciplinary department for cardiovascular engineering research, with a focus on analysing structure and function of the heart and arteries in different Congenital and acquired cardiovascular diseases. A team of mechanical and biomedical engineers, computer scientists, physicists, nano-technologists, and other related disciplines, are working together towards improving the clinical value of imaging through enhancing diagnosis, optimising therapy and leveraging personalised treatment through predictive modelling.

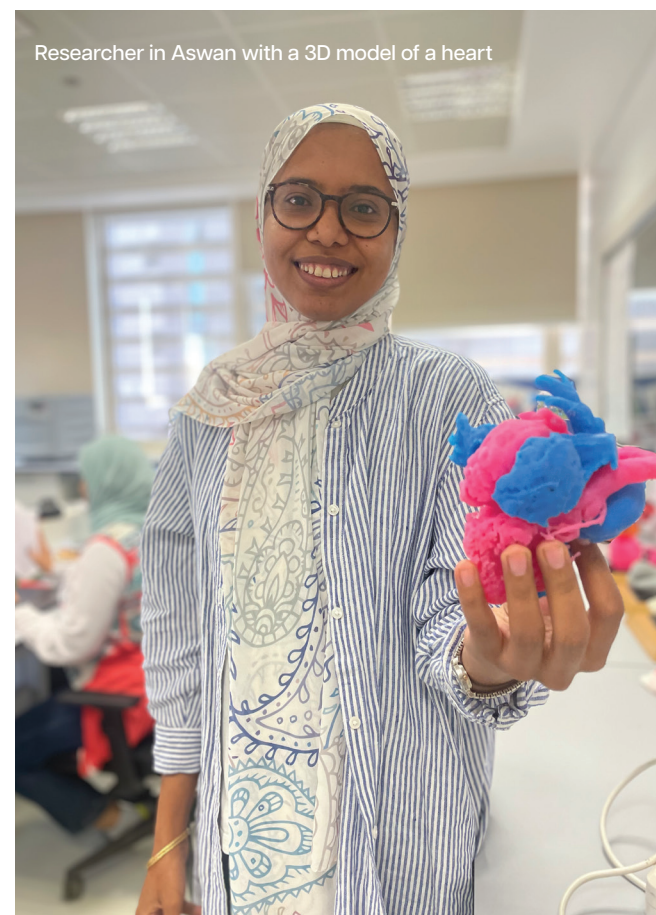
In collaboration with international academic partners and industries, the team is utilising advanced multi-modality imaging combined with novel computational modeling tools and 3D Printing to better understand the complex mechanical, electrical and fluid dynamics aspects of the heart and develop innovative algorithms, technologies and solutions for our patients.

Life Sciences Department

The strategy of the Life Sciences department is driven by the need to translate modern Life Sciences into clinically relevant advances in CVD by integrating high quality multi-disciplinary biomedical Sciences with biomedical Engineering and Clinical activity primarily focussing on translational research. The work focuses on laboratory-to-bedside research projects that investigate molecular, cellular and physiological mechanisms that underlie normal and abnormal cardiovascular function. The approaches range from studying the implications of CVD on atoms, DNA, RNA, proteins, cells and organs in the human body and also in the Egyptian population. The studies conducted involve biomedical scientists, epidemiologists and bioinformaticians who work with team members from the other two pillars.



The goal is to contribute to improving prevention, diagnosis and treatment of human cardiovascular disease using cutting edge technologies and advanced molecular and biotechnical techniques.



Researcher in Aswan with a 3D model of a heart

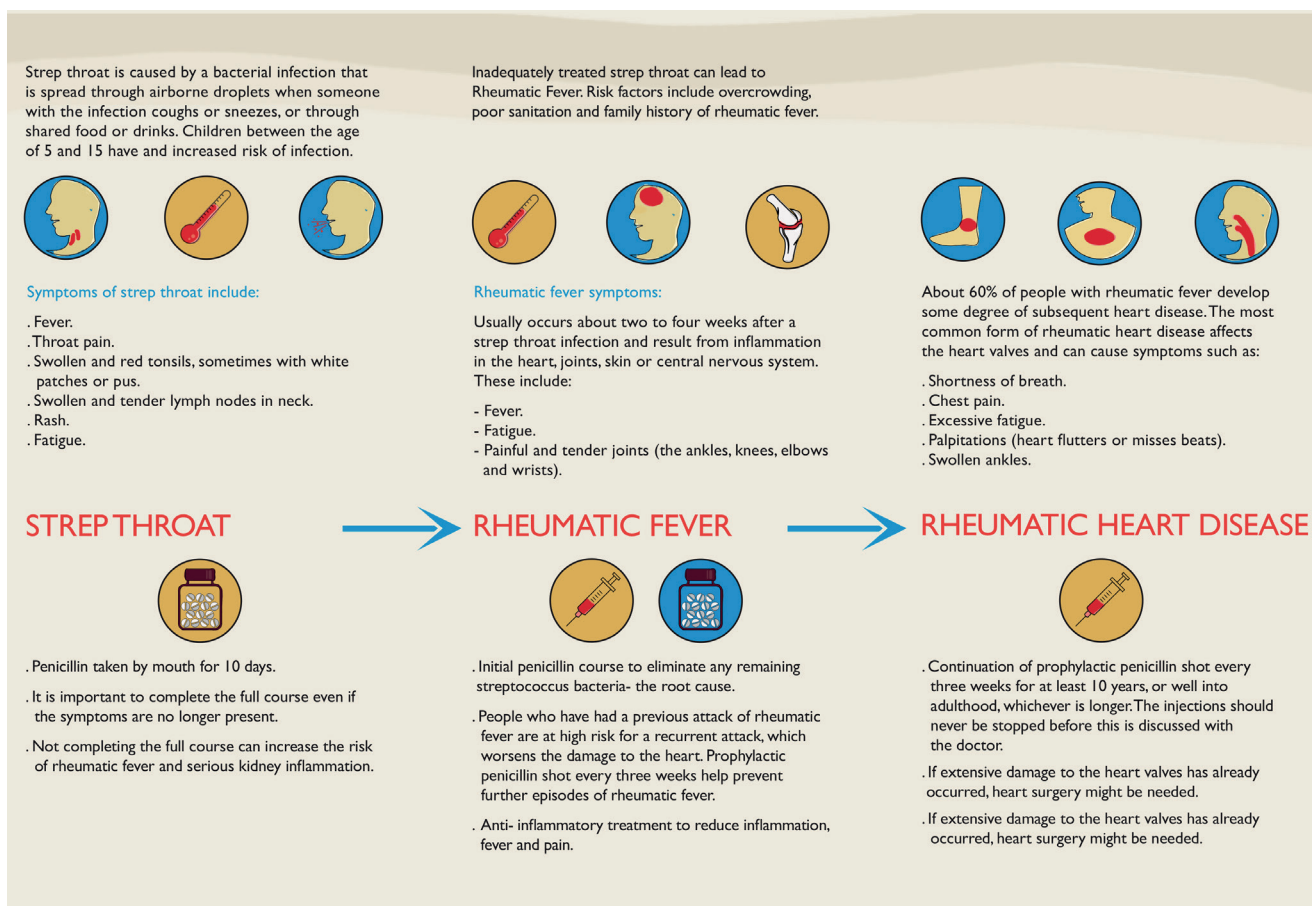
Rheumatic Heart Disease Prevention

Rheumatic Heart Disease (RHD) is responsible for an estimated 1.4 million deaths each year globally. Despite the severity of this issue, systematic and contemporary data on rheumatic heart disease remain limited. This lack of data, coupled with the silent yet devastating toll the disease takes, particularly in Africa, underscores the urgent need for targeted intervention. A multi-faceted approach to address this pressing health issue is urgently needed and local efforts need to be scaled up.

The Cairo Accords

The Cairo Accords, detailed in the article **Towards the Eradication of RHD**, represent an international initiative to combat rheumatic heart disease (RHD). The accords aim to improve RHD prevention and treatment globally, with a focus on increasing awareness, strengthening healthcare systems, and enhancing the availability of necessary medications and interventions. The document also outlines key strategies for reducing RHD incidence, with an emphasis on collaborative action between governments, health organisations, and stakeholders.

For more detailed information, you can view the full article [here](#).



Aswan Rheumatic Heart Disease Registry (ARGI)

The Aswan Rheumatic Heart Disease Registry (ARGI) has been established in response to the growing burden of rheumatic heart disease.

The ARGI registry seeks to systematically collect and analyse disease-specific and region-specific data on rheumatic heart disease, with the goal of advancing both regional and global understanding of rheumatic heart disease epidemiology. By capturing detailed clinical and demographic information, ARGI will provide insights into the patterns, outcomes, and management challenges associated with rheumatic heart disease in the Aswan region and beyond, supporting the development of targeted interventions and policy changes to improve patient outcomes and care access.

In addition to research, Chain of Hope and Aswan Heart Centre have prioritised training healthcare professionals on best practices for diagnosing and treating RHD, especially in young children. A research paper titled 'The Aswan Rheumatic heart disease reGIstry: rationale and preliminary results of the ARGI database' was published in *Frontiers in Cardiovascular Medicine* in September 2023. [Click here](#) to view this document.

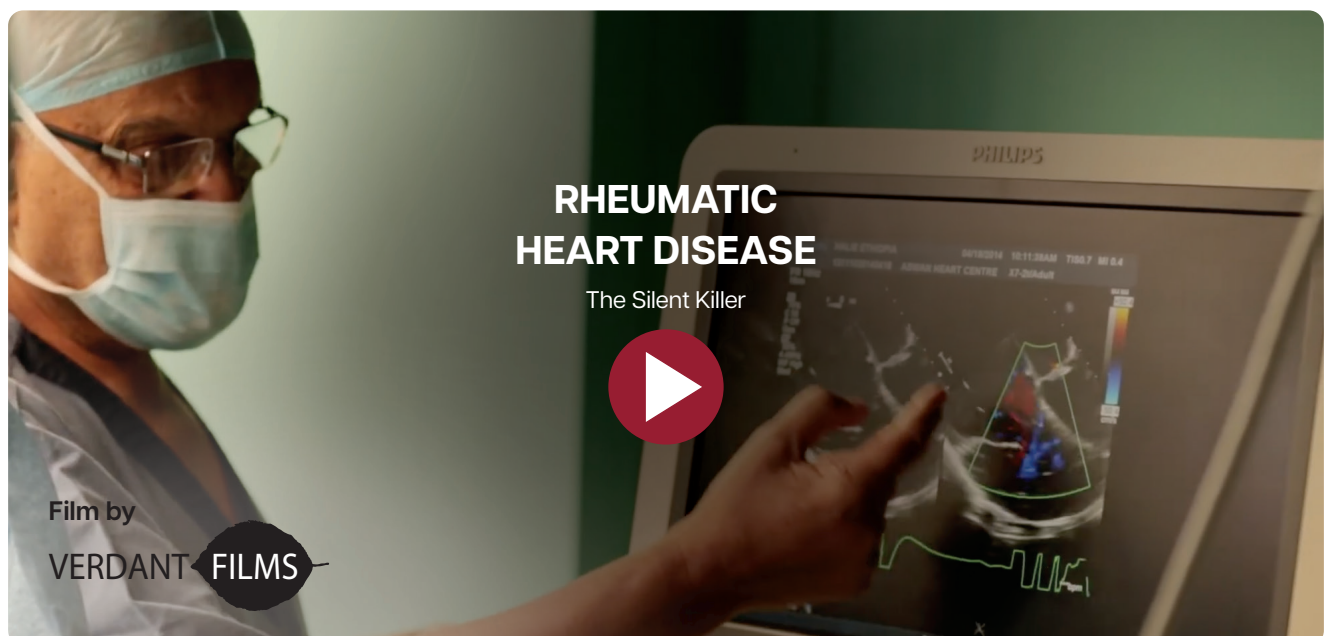
Effectively combatting rheumatic heart disease in Africa requires a comprehensive approach that meets immediate clinical needs and builds long-term prevention. Through data collection, clinical training, surgical intervention, and public awareness, these efforts can strengthen healthcare resilience and offers lasting hope for communities affected by rheumatic heart disease in low-resource settings.

Clinical Interventions and Surgical Training

Responding to the severe and often fatal consequences of untreated rheumatic heart disease, Chain of Hope in Africa and Aswan Heart Centre in Egypt have conducted numerous surgeries on children and young adults suffering from valve diseases—primarily mitral and aortic valve complications. One key focus has been on training local surgeons to perform mitral valve repair surgeries. This technique emphasises conserving the patient's own heart tissue, a practice that often proves more beneficial than replacing with an artificial valve and the consequent lifelong need for anti-coagulation post-operatively and the complications this brings.

Awareness and Prevention

There is a need for a greater emphasis on raising public and community awareness about rheumatic heart disease, a largely preventable disease that originates from untreated rheumatic fever. Through educational campaigns and community outreach, more efforts are needed to spread knowledge about early symptoms and treatment options for rheumatic fever to prevent the onset of rheumatic heart disease.



Please see examples of publications of research into rheumatic heart disease undertaken by the Aswan team:

- ♥ [Prevalence and prognostic value of echocardiographic screening for rheumatic heart disease](#)
- ♥ [African leaders take action on RHD: The 4th All-Africa Workshop on Acute Rheumatic Fever and Rheumatic Heart Disease & African Union RHD Communiqué](#)
- ♥ [Rheumatic aortic valve disease - when and who to repair?](#)

Ballana - a Landmark Study

The Ballana Heart Study is a longitudinal 30 year research study in a village close to Aswan, Upper Egypt that aims to advance and deepen understandings of heart disease.

Ballana is a small village near Aswan with a stable population that is accessible to the Aswan Heart Centre research team. It has a strong community spirit, with the villagers exhibiting an eagerness to participate. This study, conducted over a 30-year period, began data collection in January 2018. Beyond the initial collection of pillar data for the study, an agreement has been signed between the Aswan Heart Centre and Ballana residents, and the team has also received government approval to launch and proceed with the study.

The objectives of the study are to define the frequency, nature, and severity of cardiovascular diseases affecting the people of Ballana. The aim is to define the cardiovascular proteins, genes, and risk factors as well as their association to cardiovascular disease.

In order to accomplish these goals, a random sample of 1,000 households was created to determine a baseline screening of participants such as demographics, notable risk factors, and unique genetic indicators. Researchers from Aswan Heart Centre perform a cross-sectional data analysis and report on this information throughout the 30 year study period. A Ballana resident has been recruited to serve as the community liaison officer, which is essential to the integration of the research programme in Ballana. In addition the research team is guided by a Steering Committee chaired by a Principal Investigator, and includes two senior clinicians, two senior scientists, one senior manager and one epidemiologist. After three years, a first follow-up will be done with all participants to check for cardiovascular events of significance and any changes in risk factors or genetic indicators. This follow-up will be continued every three years for 30 years in order to conduct conclusive data analysis on all participants over time with a final report on the findings.

The aim of the Ballana Study is to define the genetic indicators, risk factors and observable characteristics of cardiovascular disease in order to further understandings of prevention.

“Knowing more about a person’s genetic composition can greatly enhance the effectiveness of drugs and treatment programmes”

Professor Sir Magdi Yacoub



Sequencing of the human genome

The Aswan Research Centre aims to help in understanding the genome of the Egyptian people so that this new effective type of medicine can be deployed, Yacoub says. “Through this centre and our young scientists who are busy researching the genome of our community, we will bring a great benefit to the world. This will not only help our people, but will also contribute to science because we find that a lot of the mutations and abnormalities in the genome occur here among our population. This will definitely add to the whole body of knowledge in this area.”





Magdi Yacoub Global Heart Hospital – Cairo

Cardiovascular Disease in Egypt

Cardiovascular disease is the leading cause of death among non-communicable diseases in Egypt,

Risk factors for cardiovascular diseases continue to rise at an alarming rate. Cardiovascular care is critically important in Egypt due to several interrelated factors:

Demand Constraints in Egypt

The availability of medical treatment is insufficient to meet regional demand, leading to preventable deaths. Addressing this gap is critical. The Aswan Heart Centre has been stretched beyond capacity, unable to meet the growing demand for cardiovascular treatment. To address this, the Magdi Yacoub Heart Foundation's Board of Trustees decided to establish the

Magdi Yacoub Global Heart Centre (MYGHC) in Cairo. This facility will integrate treatment, research, and talent development, building on the Aswan Heart Centre's legacy of excellence while tripling its capacity.

The Vision: Expanding Access to World-Class Treatment

Goals:

1. Expand Capacity:

- Treat up to 12,000 patients annually (tripling current numbers).
- Accommodate up to 120,000 outpatients annually.
- Increase capacity to treat neonates with congenital heart disease, potentially saving more than three times as many lives.

2. Enhance Neonatal Care:

- Treat congenital heart disease cases, aiming to improve survival rates to 95%, and reduce neonatal mortality.

3. Build Telemedicine Facilities:

- Support patients in remote areas of Africa.

4. Expand Training Programmes:

- Train 1,750 healthcare professionals annually, compared to 550 today.
- Focus on professionals from Egypt and the broader MENA, GCC, and Africa regions.

5. Develop Advanced Scientific Research:

- Establish a cutting-edge research centre focusing on congenital heart diseases, precision medicine, and diseases prevalent in the developing world, like rheumatic diseases.
- Build a convention centre to host global medical conferences.

The MYGHC: Features and Infrastructure

The MYGHC is being built on 35 acres in 6th of October City, with 27 acres dedicated to the hospital and 8 acres reserved for future expansion. Designed by Foster and Partners in collaboration with Dar Al-Handasah, the centre prioritises environmentally friendly, healing-enhanced, and stress-free environments.

Key Features:

1. Hospital Facilities:

- 300 beds (150 for adults and 150 for paediatric patients).
- 40% of beds reserved for intensive care and coronary high-dependency units.
- A central hub with five operating theatres, five catheterisation labs, and a hybrid operating room.
- A diagnostic imaging centre with state-of-the-art technology.
- 35 outpatient clinics to handle over 80,000 annual visits.
- Emergency department.

2. Research and Innovation:

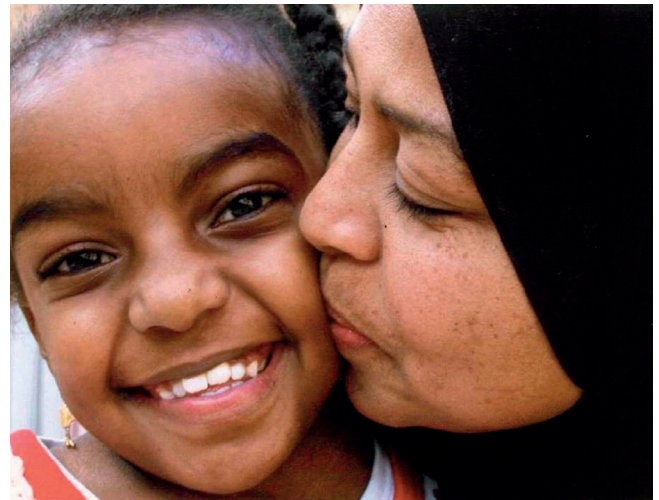
- Integrated scientific research centre with cutting-edge technology.
- Dedicated space for research on cardiovascular diseases prevalent in developing regions.

3. Residential and Training Facilities:

- 1,200 residential units for staff and patient relatives.
- A convention centre accommodating 700 delegates with an electronic library and telemedicine capabilities.

Impact of the MYGHC

The establishment of the MYGHC in Cairo will have a transformative impact, saving more lives, providing better healthcare access, and fostering innovation. The facility will triple its treatment capacity while expanding research and training, ensuring excellence in cardiovascular care throughout Egypt and the region. The MYGHC will also be a gateway to Africa for training African medical teams as well as treating African patients in need of urgent care through the Chain of Hope partnership.



Rendered image of The Global Heart Centre, Cairo



Rwanda-Egypt Heart Centre

The Heart Care and Research Foundation Rwanda Overview

The Heart Care and Research Foundation Rwanda, inspired by Professor Sir Magdi Yacoub's vision, aims to deliver high-quality cardiothoracic healthcare to underserved populations in Africa. Since 2009, the NGO hospitals, including the Cardiac Centre Ethiopia and Aswan Heart Centre in Egypt, have treated over 40,000 patients free of charge.

Rwanda-Egypt Heart Centre: Advancing Cardiovascular Health

Currently under construction in Kigali's Masaka Health City, the Rwanda-Egypt Heart Centre seeks to improve cardiovascular health in Rwanda and beyond. A flagship project of The Heart Care and Research Foundation, in collaboration with the Rwandan Ministry of Health and the Egyptian Ministry of Foreign Affairs, it will provide cutting-edge cardiovascular care, conduct innovative research, and train local professionals in cardiology, cardiac

surgery, and anaesthesia. Training initiatives are supported by the Magdi Yacoub Heart Foundation at the Aswan Heart Centre.

Vision and Objectives

The Centre integrates advanced medical technologies, state-of-the-art facilities, and comprehensive training to develop sustainable healthcare infrastructure in Rwanda. By reducing reliance on external aid, it aims to build a robust, self-sufficient system. Equipment grants are provided by the Egyptian Agency of Partnership for Development through Egypt's Foreign Ministry.

Funding and Training Support

Start-up funding is provided by the Sawiris Foundation and Chain of Hope. The cardiac nurse and perfusionist training at the Aswan Heart Centre is also part sponsored by Chain of Hope. The nurses will earn a Master's in Advanced Cardiovascular Nursing from the British University in Egypt.

Design

Julia Backhaus from Flux Architects has donated her time for the design of the Hospital. The focus has been on the development of an environmentally focused design, combining traditional materials with modern architectural innovations. Key features include energy-efficient systems such as solar panels, natural cross-ventilation, and high thermal mass materials that regulate indoor temperatures. Patient-centered spaces like green courtyards and therapeutic outdoor areas are integral to the design, promoting recovery and well-being. These design strategies reflect the Centre's broader commitment to sustainability and environmental stewardship.

Sustainability and Community Impact

A cornerstone of the Centre's philosophy is sustainability, as evidenced by its eco-friendly infrastructure and resource-efficient practices. Its efforts contribute to long-term improvements in public health while reducing the environmental impact of healthcare delivery. By making advanced cardiac care accessible in Rwanda, the Centre alleviates the financial and logistical burdens of seeking treatment abroad for patients and their families.

This holistic vision underscores the Rwanda-Egypt Heart Centre's role as a leader in transforming healthcare access and quality in the region. For further details, visit www.rwandaheartcentre.org.

The Heart Care and Research Foundation Rwanda will equip a 32 bed state-of-the-art hospital and research facility. The Foundation has been allocated a four hectare plot of land on the Masaka site in Kigali by the Rwandan government. It is envisaged to be an integral part of the Rwandan healthcare city which is being planned in this area of Masaka, next to the existing Masaka Hospital, the future University of Global Health Equity and the future relocation of the University of Kigali.

Core Services

The Rwanda-Egypt Heart Centre will provide a wide range of medical services, including consultations, advanced diagnostics (e.g., ECG, echocardiograms, and X-rays), catheterisation labs, and surgical interventions. It will also house dedicated spaces for training healthcare professionals, fostering expertise in cardiovascular medicine for the region.

The Centre is a hub for groundbreaking cardiovascular research, aimed at addressing the specific needs of African populations. It collaborates with international partners to advance medical knowledge and practice. Training initiatives are integral to its mission, equipping Rwandan healthcare professionals with skills to deliver world-class cardiac care.





Burundi

Cardiac Care for Burundi and Children

Chain of Hope has provided critical support to ensure Burundian children with treatable heart conditions receive timely and effective care. The charity's approach includes capacity building, state-of-the-art medical equipment, and access to international treatment options.

The Challenge: Poverty and Child Health in Burundi

Burundi, one of the poorest countries in the world, faces significant challenges in child health. With over **70% of the population living below the poverty line**, access to quality healthcare is a luxury for many. Child mortality remains alarmingly high at **47 deaths per 1,000 live births**, and treatable conditions like congenital heart disease are often fatal due to delayed or inaccessible care. Malnutrition, which affects nearly **50% of children under five**, exacerbates health complications, including heart disease. These challenges underscore the urgency of improving cardiac care as part of broader efforts to address child health.

Aligning with the Sustainable Development Goals (SDGs)

The work of Chain of Hope aligns closely with several SDGs, particularly:

- **SDG 3: Good Health and Well-Being**
By improving access to life-saving cardiac care and diagnostics, Chain of Hope is directly contributing to reducing child mortality and ensuring healthy lives for all ages.
- **SDG 4: Quality Education**
Healthy children are better equipped to attend school, unlocking future opportunities and breaking cycles of poverty.
- **SDG 17: Partnerships for the Goals**
Through international collaborations with institutions like the Leipzig Heart Centre, Harley Street Clinic, and Aswan Heart Centre, Chain of Hope exemplifies the power of partnerships in addressing global health inequities.

Building Local Expertise and Capacity

Dr. Marc Nimburanira, a Burundian physician received specialised training at the Aswan Heart Centre in Egypt. Equipped with this expertise, he has brought advanced cardiac diagnostics and treatment options closer to home for countless patients in Burundi.

To enhance local diagnostic capabilities, Chain of Hope donated two state-of-the-art echocardiography machines to Dr Marc in Bujumbura and to Partners in Health working in the rural areas. These machines allow for precise evaluation and monitoring of heart conditions, enabling timely and effective interventions.

International Treatment Programme

For cases requiring procedures unavailable in Burundi, Chain of Hope has established a lifeline for urgent care through partnerships with world-class cardiac centres. Facilities such as the Leipzig Heart Centre in Germany, the Harley Street Clinic in London, and the Aswan Heart Centre have provided life-saving interventions for children in critical need.

Future Vision: Rwanda-Egypt Heart Centre

Looking to the future, the Rwanda-Egypt Heart Centre in Kigali is poised to become a regional hub for advanced cardiac care. Expected to open soon, the centre will provide accessible treatment for children from Burundi and neighbouring countries, significantly reducing the financial and logistical barriers of seeking care abroad. This aligns with SDG 3 by improving regional healthcare infrastructure and fostering equitable access to specialised care.



SUSTAINABLE DEVELOPMENT GOALS



Chain of Hope, Magdi Yacoub Heart Foundation, and the Sustainable Development Goals in Africa

Executive Summary

Chain of Hope, in partnership with the Magdi Yacoub Heart Foundation (MYHF) and its flagship institution, the Aswan Heart Centre (AHC), is dedicated to transforming cardiac care across Africa. Together, these organisations work to reduce child and infant mortality from congenital and acquired heart disease by combining life-saving paediatric cardiac surgery, medical training, and infrastructure development.

Their vision is being expanded through the Rwanda-Egypt Heart Centre (REHC) - a new, state-of-the-art cardiac centre inspired by the Aswan model - which will serve as a regional hub for cardiac care, training, and research in East and Central Africa.

These initiatives directly support several Sustainable Development Goals (SDGs), most notably SDG 3: Good Health and Well-Being, while also advancing SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), SDG 10 (Reduced Inequalities), and SDG 17 (Partnerships for the Goals). By linking clinical excellence with sustainable capacity-building, the partnership between Chain of Hope, MYHF, AHC, and REHC focus not only on saving lives today but also strengthening healthcare systems, building human capital, and stimulating economic growth across the African continent.

Programmes in Africa

Chain of Hope and the Magdi Yacoub Heart Foundation have a shared mission: to close the gap in access to paediatric cardiac services across Africa.

Direct Clinical Care: Through medical missions and permanent cardiac centres such as the Aswan Heart Centre in Egypt, the Cardiac Centre in Addis Ababa and the upcoming Rwanda- Egypt Heart Centre, thousands of children receive complex cardiac surgeries that would otherwise be unavailable locally.

Training and Capacity Building: The Aswan Heart Centre serves as a centre of excellence for training surgeons, cardiologists, anaesthetists, and nurses from across Africa. Chain of Hope complements this through mentorship programmes, skill transfer, and professional exchanges. The Rwanda-Egypt Heart Centre will extend this educational legacy by training East African clinicians in cutting-edge cardiac care, thereby creating a self-sustaining network of skilled professionals across the continent.

Infrastructure Development: MYHF and Chain of Hope jointly invest in the design, construction, and equipping of modern cardiac units and catheterisation laboratories. The Rwanda-Egypt Heart Centre is an NGO hospital developed in partnership with the Egyptian Agency of Partnership for Development of the Egyptian Ministry of Foreign Affairs together with the Rwandan government and supported by Chain of Hope. It will provide advanced paediatric and adult cardiac services. The hospital is working closely with the Aswan Heart Centre for the knowledge exchange programme in cardiovascular medicine. In the future it will serve as a training and research hub in Central Africa. The development of dedicated Heart Centres reduce reliance on overseas referrals and ensure that high-quality cardiac care is accessible within Africa.

Local Employment and Economic Growth: Each new cardiac unit creates skilled employment opportunities - surgeons, nurses, technicians, engineers, administrators, and support staff - thus contributing to local economies while improving health outcomes. Aswan Heart Centre now employs over 700 members of staff.

Mapping Activities to the Sustainable Development Goals

SDG 3: Good Health and Well-Being

At the heart of this collaboration lies a commitment to improving child health and survival. Through the Aswan Heart Centre and the new Rwanda-Egypt Heart Centre, the partnership is committed to the delivery of world-class cardiac surgeries and post-operative care, directly reducing mortality from congenital and acquired heart disease across Africa.

SDG 4: Quality Education

Both AHC and Chain of Hope prioritize the training of African healthcare professionals. The Aswan Heart Centre has become a model for education and research excellence, offering fellowships and training programmes that empower local clinicians. The Rwanda-Egypt Heart Centre will replicate this model, ensuring ongoing education and knowledge transfer throughout the region.

SDG 8: Decent Work and Economic Growth

By establishing permanent cardiac facilities, the partnership creates sustainable employment for healthcare professionals and technical staff. These centres also foster innovation and professional development, contributing to long-term economic resilience in local communities.

SDG 9: Industry, Innovation, and Infrastructure

The Aswan Heart Centre has emerged as a beacon of medical innovation in Africa, pioneering advanced surgical techniques for congenital heart disease. The Centre has developed groundbreaking procedures, including a "Modified Mustard" technique for babies presenting late with Transposition of the Great Arteries (TGA) and a novel approach for treating Truncus Arteriosus, which avoids artificial conduits by utilizing the infant's own tissue to repair the defect. These surgical innovations not only aim to enhance surgical outcomes but also demonstrate the Heart Centre's commitment to building resilient healthcare infrastructure through research, technology, and the development of sustainable, patient-centered solutions.

SDG 10: Reduced Inequalities

By focusing on underserved populations, these initiatives reduce disparities in access to life-saving cardiac care. From Egypt to Rwanda, Ethiopia, and across Africa, children and families who once faced insurmountable barriers now have the possibility to receive equitable, high-quality treatment.

SDG 17: for the Goals

Collaboration is central to this vision. Chain of Hope, MYHF, and AHC work in partnership with governments, local hospitals, NGOs, and international volunteers to share expertise and resources. The Rwanda-Egypt Heart Centre exemplifies this collaborative spirit, built on a strong partnership between Egypt, Rwanda, and the global medical community.

Examples of Impact in Africa

Aswan Heart Centre, Egypt has treated tens of thousands of children and trained hundreds of African healthcare professionals, serving as a beacon of excellence and innovation in cardiac care.

Chain of Hope missions deliver essential surgeries and capacity-building programmes, helping to establish local cardiac services across Africa.

The upcoming Rwanda-Egypt Heart Centre will provide advanced paediatric and adult cardiac services while serving as a training and research hub for the region, expanding the Aswan model's reach and sustainability.

Conclusion

Together, Chain of Hope, the Magdi Yacoub Heart Foundation, and the Aswan Heart Centre - soon joined by the Rwanda-Egypt Heart Centre - embody a transformative, continent-wide approach to achieving the Sustainable Development Goals in Africa.

By combining immediate, life-saving interventions with long-term investment in training, research, and infrastructure, these organisations are not only saving lives but also building a sustainable, equitable, and self-reliant healthcare future for Africa.



“He who has health, has hope.”

Thomas Carlyle



www.chainofhope.org



www.myf-egypt.org



The Heart Care & Research Foundation
Rwanda - Egypt Heart Centre

www.rwandaheartcentre.org