MAURITIUS CARDIAC REGISTRY

THE FIRST EPIDEMIOLOGICAL SURVEY OF CARDIOVASCULAR DISEASE

MINISTRY OF HEALTH AND WELLNESS
SEPTEMBER 2025

Investigation Team

Dr Nilesh Mohabeer

National Coordinator for Cardiac Registry, Senior Cardiologist MOHW

Principal Investigator

Dr A.Dinassing

Ag Director General Health Services, Ministry of Health and Wellness

Mr G.Hurbissoon

Former Director Nursing

Mr S.Munohur

Former Chief Health Records Officer

Dr O.Shamloll, Dr R.Jugessur, Dr V.Seeram-Indur, Dr S.Bucktowar, Dr D. Busgopal ,

Dr A.M Soreefan

Consultant in Charge, Cardiac Unit, MOHW

Mr Muzammil Hosenally

Chartered Statistician,Senior Lecturer in Statistics at the University of Mauritius

Mr Pavn Shamachurn

IT Engineer, Managing Director, WebEvolutions Ltd

Data Entry Recorders

DRAGJH: Sandoram T, Rima JF, Nawah K, Ruttun K, Ramdawa JK, Jharia S, Mungrah MN, Mahabally Z, Niamut MU, Callychurn S, Raudhay CK,

JNH: Jomahur M, Gunnoo V, Chinna-Veeranna P, Khorug H, Hardass A, Mohabir L, Ragaven K, Jomahur M

BCH: Erriah B, Bhantoo NK, Nugessur S, Nayeck A, Ramjattan S, Descubes MM, Halukory R, Heeatun-Jagurnath H

VH: Tataree R,Maiharaub N, Bissessur V, Emamdeen F, Khodaboccus J, Bakha N, Chiniah E, Rambhujun MD, Palian M, Collimallay-Pillay , Mahadeo MA, Auckbarally N, Moidin MY, Lackman K, Auckloo S

Foreword

In line with the Government policy to promote research in Mauritius, it is my great pride to see the publication of the first ever Study of Cardiovascular Diseases (CVDs) across the island. Cardiovascular disease is one of the leading causes of morbidity and mortality in our country, placing a significant burden on patients, families, and our healthcare system.

The National Cardiac Registry is not only a collection of data on CVDs but an important tool in understanding why and how our population develops heart problems. This is a landmark survey that will not only help us to provide better treatment for our patients, but also to strengthen our capacity for prevention of Non-Communicable Diseases (NCDs) in Mauritius.

Prevention lies at the heart of effective healthcare. This registry will support the development of targeted strategies—whether in reducing tobacco use, improving diets, encouraging physical activity, or enhancing early detection programs—that address the root causes of cardiovascular diseases. We now know who has a higher risk of developing CVDs, therefore, allowing the Ministry of Health and Wellness to design a targeted approach to specific cardiovascular problems.

Our vision is to allow every citizen to have full access to information they need to understand the risk factors that cause heart problems. We have the duty to harness all the information we can get to reduce the burden of cardiovascular disease, improve outcomes and save lives.

I call upon all stakeholders to remain steadfast in their commitment to the registry's growth and sustainability. Together, we can ensure that the National Cardiac Registry serves as a cornerstone of a healthier future for our nation.

Finally, I extend my deepest gratitude to Dr Nilesh Mohabeer, Senior Cardiologist and National Coordinator for Cardiovascular Research in Mauritius, and his team, who have contributed to this wonderful achievement, which shows the commitment of the medical staff to work diligently in the improvement of the health sector.

Anil Kumar BACHOO, *G.O.S.K.*
Minister of Health and Wellness

Table of Contents

I. Background

1.0 Cardiovascular Diseases are the number one cause of death globally: more people die annually from CVDs than from any other cause. An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke.[1] The age adjusted Death Rate is 115.32 per 100,000 of population ranks Mauritius #94 in the world.[2].

2.0 There are a number of different physiological and behavioural risk factors for CVD, including smoking, high cholesterol, high blood pressure, poor diet, harmful drinking and physical inactivity . It is also linked to a range of environmental and social factors, including air pollution and financial inequalities as well as family history as a key factor . Non-modifiable risk factors include age, gender and ethnicity.

3.0 In this context, it is important to identify and analyse the various risk factors associated with these diseases. Till now, no thorough or comprehensive research and analysis on the impact of CVDs in Mauritius has been published in leading medical journals.

4.0 To better diagnose, treat and prevent the disease locally, it is essential to better understand the disease in the local population. A National Registry on Cardiovascular Diseases is important as it will help create a standardised database for each patient with international standards. The data gathered will facilitate clinical research, registry reporting, administrative reporting and regulatory compliance, and patient care. It will also allow us to develop a National Strategy on Prevention and Treatment of CVDs, while improving existing treatment protocols, focusing on a patient-centered health system and developing a Healthy Nation.

5.0 The Cardiac Registry is a patient registry which will serve as an interactive database that collects, organises, and displays health care information about Cardiovascular Diseases in Mauritius.

---

[1] WHO Factsheets- https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

[2] World Health Rankings https://www.worldlifeexpectancy.com/mauritius-coronary-heart-disease

II. Rationale for a Cardiac Registry

1.0 A Unique Platform. Mauritius has a small population. It comprises a mixture of various races and communities which represent a stepping stone for a study of any non-communicable disease for the African, Asian and European population, that, though carried out locally but can have a major role at regional and international levels. Its population is as follows: Hindu 48%, Roman Catholic 23.6%, Muslim 16.6%, Christian 8.6%, other 2.5%. Hindus and Muslims originate from India and other parts of Asia, while Creoles and Christians from Africa and Europe respectively.

2.0 Data relating to population, the main source of which is the Civil Status Office, have previously been obtained from Statistics Mauritius, by the Health Statistics Unit, collected from the Health Records Division and other Sections/ Units/Divisions of the Ministry of Health and Wellness as well as from the Commission for Health and Others in Rodrigues. Data on the causes of illness and death are compiled according to the 10th Revision of the International Classification of Diseases of the World Health Organisation.

3.0 Data collected is primarily based on age, incidence and death rates. It is also focussed on attendance and hospitalisation rates and staff to patient ratio. It is however not enough to fully understand the disease. We need to identify various factors such as Personal History, Physical Exam, Laboratory values, Diagnostic Values, Treatment Plan, Adverse event and Complications, and any other parameters important for the research.

.

4.0 The National Health Accounts Report 2020 indicates that the country spent an estimated amount of Rs 8.08 billion on NCDs in 2019 , out of which, spending on Cardiovascular diseases and Diabetes were to the extent of Rs 3.98 billion and Rs 1.19 billion respectively. Unless prompt action is taken, this number is expected to increase due to the increasing incidence of CVDs.

III. Objectives

a. Collect the health, well-being, diagnostic, treatment and outcome data for every patient within the population defined by demographics (age, gender, or other social determinants), geography (region), or risk factors (diabetes, hypertension, others)

b. Evaluate available treatments, procedures, and therapies, and to understand how patients with different characteristics respond to various treatments

c. Use the registry to track and understand the effectiveness and safety of treatment provided by healthcare professionals to cardiac patients

d. Develop guidelines and decision support tools, accelerate research, and advance care through collaborative quality improvement

e. Provide access to Ministries, local and international research studies to develop policies on prevention and treatment

IV. Methodology

IV.(i) Target Population

All patients undergoing treatment or suffering from CVD in Public Hospitals.

IV. (ii) Duration

Month 1- Pilot Project at Dr A.G.Jeetoo Hospital

Year 1 - 4 Regional Hospitals around the island

Started in September 2022, this research was carried out in 4 out of five regional hospitals (Dr A.G. Jeetoo H, Victoria H, Jawaharlall Nehru H and Bruno Cheong H) for a period of 6 months.

IV. (iii) Teams Involved

a. Steering Committee - To ensure design of project, oversight on project progress, reevaluation of project needs and completion of research
   - Headed by the Director General of MOHW, , Principal Investigator (Dr N. Mohabeer), Consultant Cardiologist , Chief Records Officer, Director of Nursing, HR Manager, and IT Coordinator

b. Investigating Team - Principle investigator (Dr N.Mohabeer), Data entry recorders, trained nurse, statistician, record officer, epidemiologist and IT Technician

IV. (iv) Expected Outcomes

- A comprehensive national database of patients with cardiac diseases.
- Improved quality of care through benchmarking and continuous monitoring
- Policy-relevant insights into trends in CVD and effectiveness of interventions.
- Contribution to the global evidence base on cardiovascular disease in small island developing states.

V. Summary

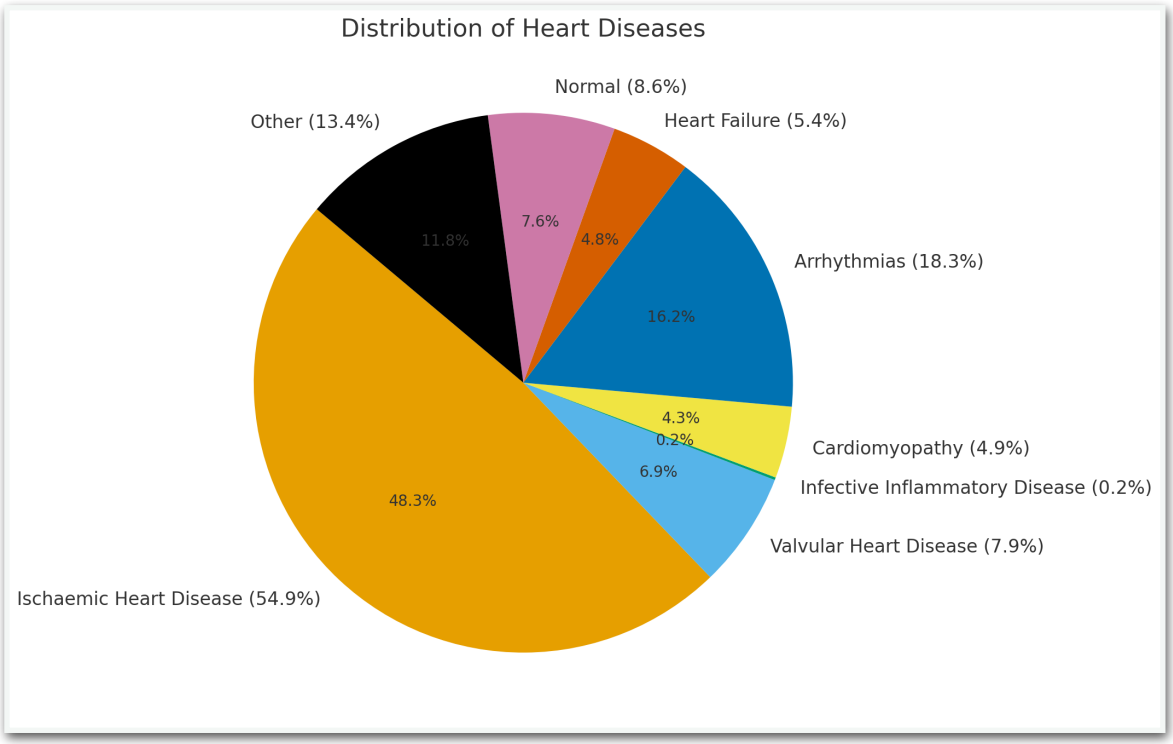
Mauritius is one of the few countries in the world with free quality universal access to health for all residents and foreigners with work permit. This includes free access to diagnosis, investigation and treatment, most importantly, advanced specialised treatment such as Coronary Angioplasties, pacemaker implantation, Cardiac Surgeries like CABG and valvular replacement.

A cardiac registry is an important tool to understand CVDs in the local context. It will help better diagnose , treat heart related diseases but most importantly identify factors that can help focus on prevention. It will serve as a **c**entralised data source to inform public health action, clinical training, and prevention campaigns, ensuring interventions are cost-effective and targeted.

It will provide a robust evidence base for help improve , guiding national health strategies, and strengthening the overall healthcare system response to one of the country's greatest public health challenges.

1. Distribution of Cardiovascular Disease in Mauritius

Knowing the distribution of cardiovascular disease (CVD) is vital for effective public health planning and clinical care. By understanding how CVDs affect Mauritians, we can identify high-risk groups and focus on targeting diagnosis and treatment policies. Local treatment guidelines can be established in line with international ones by adapting them to the local population. It is important to have a national health policy with is evidence-based with healthcare that is efficient, equitable, and tailored to the needs of the most affected communities.



1.1 Key Findings

- **Ischaemic Heart Disease (54.9%)**
  Ischaemic Heart Disease account for more than half of all CVDs, confirming international trends. At the same time, it underlines prevalence of associated risk factors in Mauritius and increasing burden for Coronary Angioplasty and Coronary Bypass Surgeries, waiting list including higher mortality.

- **Arrhythmias (18.3%)**
  it the second largest ground of CVDs. Though it has a lower mortality rate, it underlines a need to focus on these diseases as well, in addition to most commonly known Coronary Artery Disease. Its importance cannot be neglected as it is often unknown or misunderstood by the population at large but Healthcare providers also. A common complication is Heart Failure, which leads to lower morbidity and poor quality of life.

- **Valvular Heart Disease (7.9%)**
  It represents a small fraction of CVDs, but its role cannot be neglected. The effective control of Rheumatic Heart Disease over the last decades has helped curb valvular diseases as a whole.

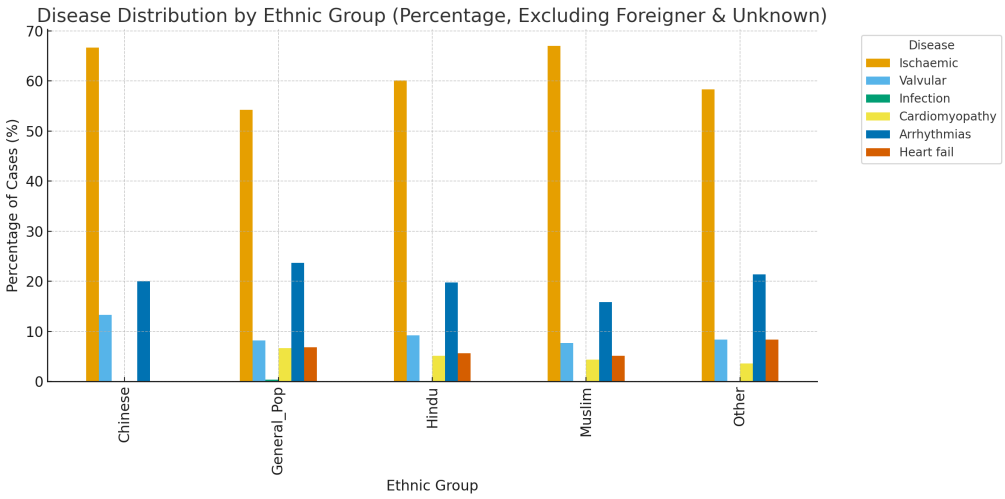
- **Heart Failure (5.4%)**
  It is a syndrome caused by an impairment in the heart's ability to fill with and pump blood. This incidence is based on patients presenting with Heart Failure as **first/lone symptoms**. Heart Failure associated with other CVDs is present in more that 10% of patients .

- **Cardiomyopathy (4.9%)**
  Structural heart muscle diseases form a smaller but important share of the total, often associated with genetic or acquired factors.

- **Infective/Inflammatory Heart Disease (0.2%)**
  This is rare in the dataset, but cases of myocarditis or endocarditis remain critical given. The low incidence of infective/inflammatory conditions suggests effective preventive and treatment measures or under diagnosis. , though even a small number of cases can be clinically significant or under diagnosed.

1.2 Ethnic Specific Disease

CVDs according to ethnic groups is as follows:



- **Chinese:** Ischaemic HD– 66.7%, Arrhythmias – 20.0%, Valvular HD– 13.3%, Infective HD – 0%, Cardiomyopathy – 0.1%, Heart failure – 1%

- **General Population:** Ischaemic HD– 54.2%, Arrhythmias – 23.7%, Valvular HD – 8.2%, Heart failure – 6.8%, Cardiomyopathy – 6.6%, Infective HD – 0.4%

- **Hindu**: Ischaemic HD– 60.2%, Arrhythmias – 19.7%, Valvular HD– 9.2%, Heart failure – 5.7%, Cardiomyopathy – 5.2%, Infective HD– 0.1%

- **Muslim**: Ischaemic HD– 67.0%, Arrhythmias – 15.9%, Valvular HD– 7.7%, Heart failure – 5.1%, Cardiomyopathy – 4.3%, Infective HD– 0%

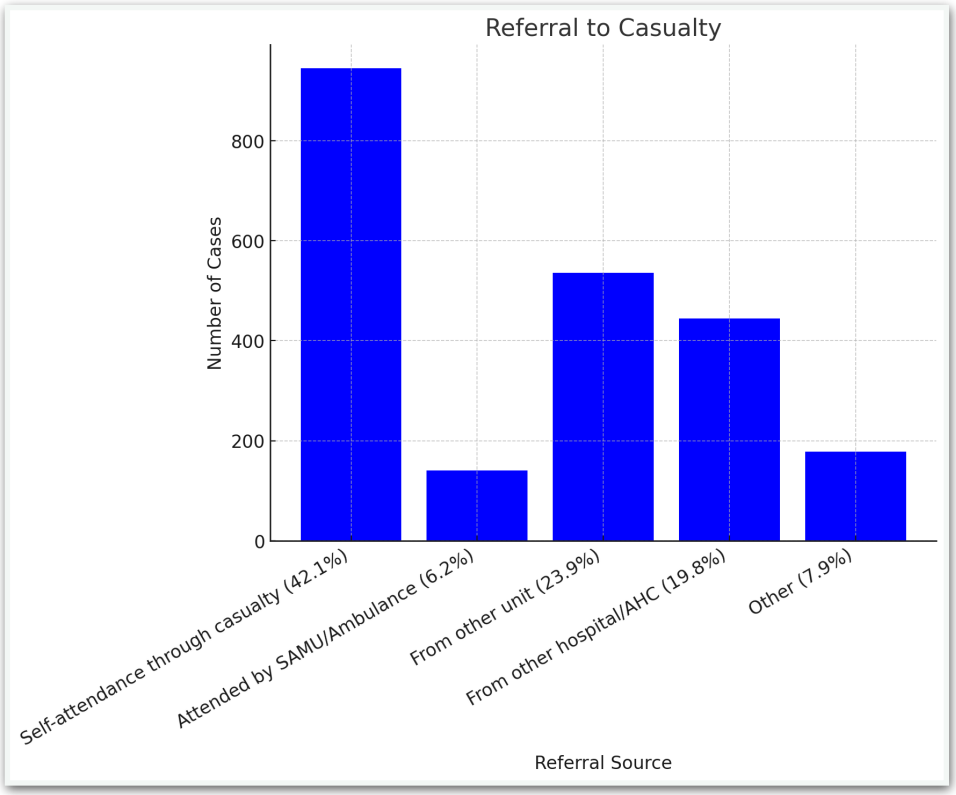
- **Other**: Ischaemic HD– 58.3%, Arrhythmias – 21.4%, Valvular HD– 8.3%, Heart failure – 8.3%, Cardiomyopathy – 3.6%, Infective HD – 0%

Ischaemic Heart Disease remain the highest disease in all groups, followed by Valvular HD and others, representing a national trend. These findings suggest that prevention strategies and public health interventions need to be developed with focus on causes of why these communities are affected, including genetic predisposition.

2. Referral to Cardiac Unit

- **42.1%** of CVD patients prefer to attend hospitals by their own means of transport as **self-attendance through casualty**
- **23.9%** of cases were from **referral from other units** such as medical unit, etc
- **19.8%** of cases were referred from **Mediclinics , Area Health Centers or other hospitals** , thereby showing importance on Primary health care, and need to diminish burden on Accident and Emergency Units at hospitals
- **6.2%** of patients used emergency services like **SAMU/ambulance**
- **7.9%** were categorised as other referrals, highlighting diverse but less common pathways of entry.

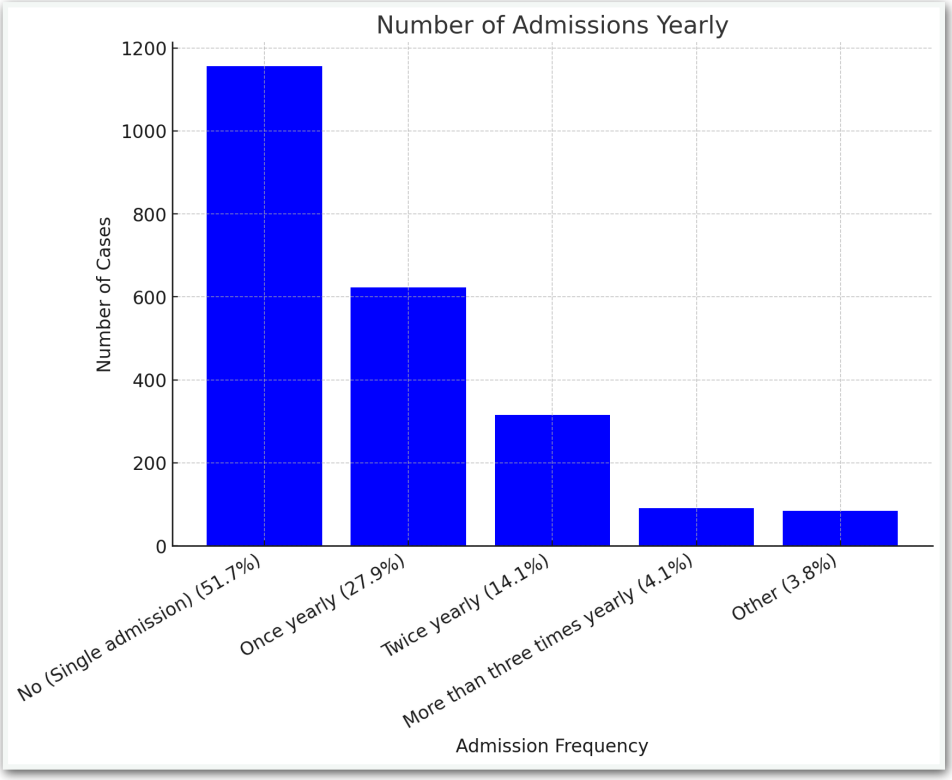
These findings underscore the importance of strengthening **Primary and Secondary Health Care,** while optimising emergency services.



3. Yearly Admissions

- **51.7%** of patients were admitted **only once**
- **27.9%** required hospitalisation **once yearly**
- **14.1%** were admitted **twice yearly**
- **4.1%** had **recurrent admissions ,** more than **three times a year**
- **3.8%** fell into other categories.

This shows that more than 50% of admissions were either isolated. However, other patients needed regular admissions as CVD is a chronic disease associated with many complications. This data can also help focus on better bed rotation and need for additional beds as well.



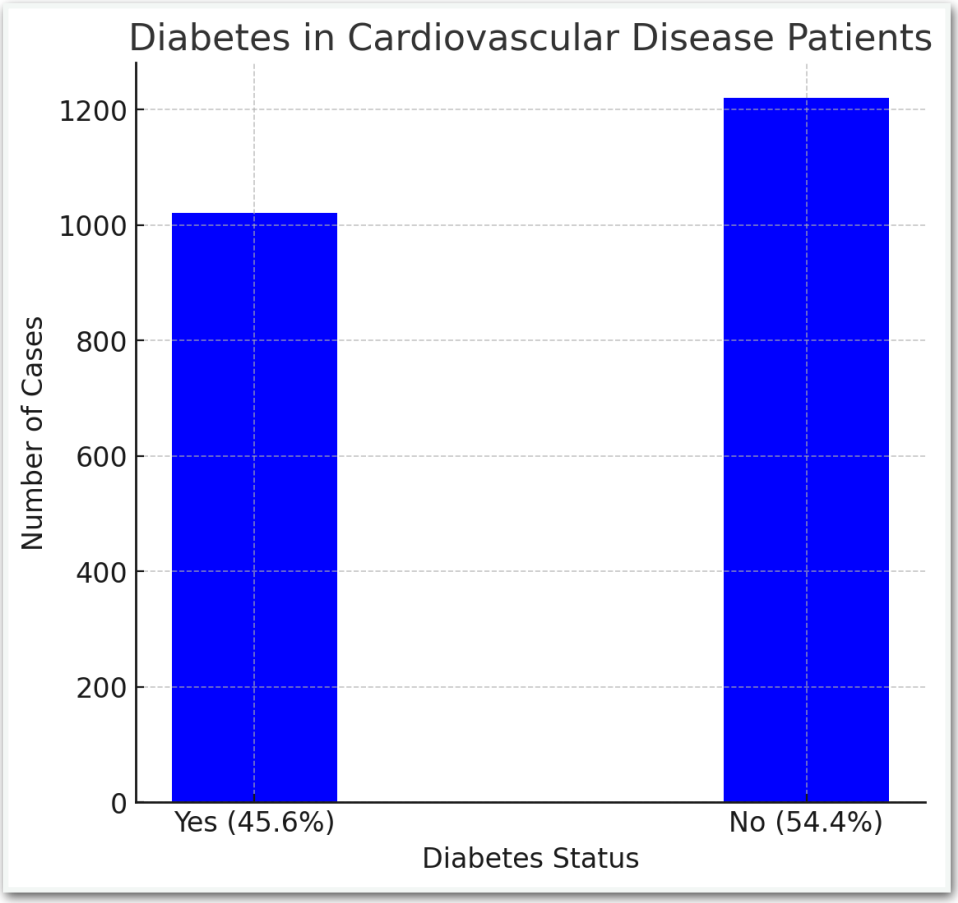
4. CVD Risk factors

Cardiovascular disease (CVD) is driven by a combination of modifiable and non-modifiable risk factors. Major contributors include smoking, hypertension, diabetes, dyslipidaemia, obesity, physical inactivity, and unhealthy diets, while age, sex, family history, and ethnicity also play an important role. Emerging influences such as stress, inflammation, and environmental factors are increasingly recognised. Understanding these risks is essential for guiding prevention strategies and targeted interventions, particularly in high-burden populations.

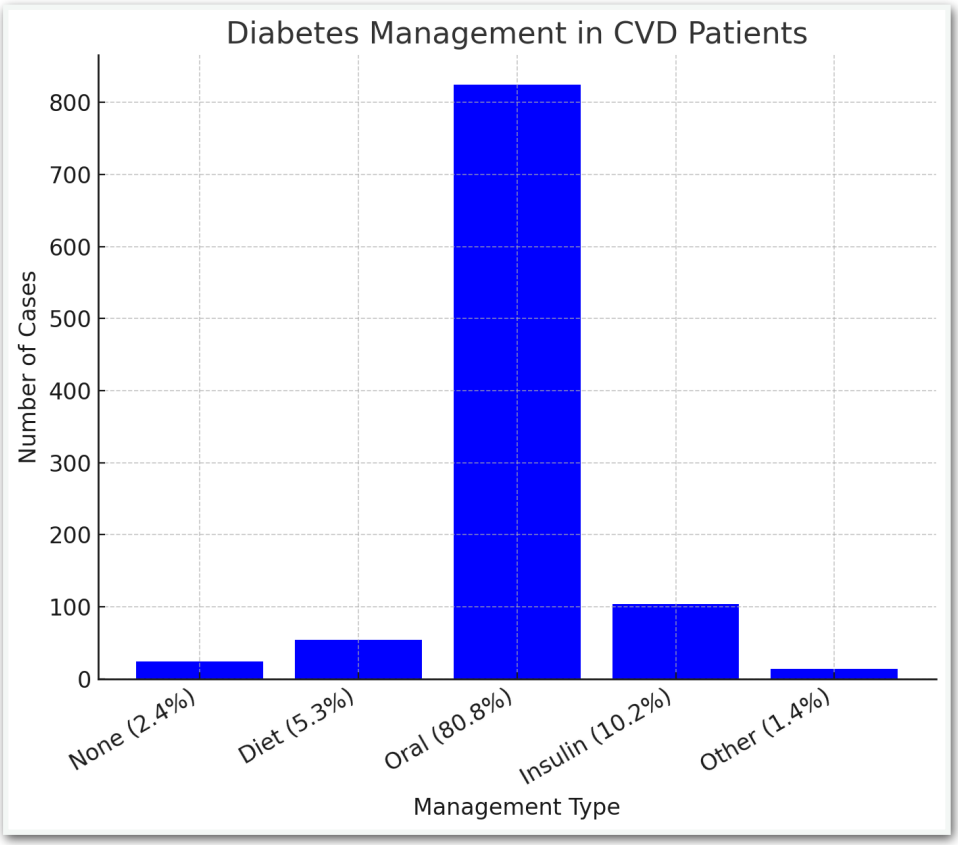
4.1 Diabetes Mellitus in CVD

Diabetes mellitus is a major risk factor for cardiovascular disease (CVD), specially Type 2 DM. Diabetes entail macrovascular and microvascular complications, including Coronary Artery disease, cerebrovascular disease, heart failure, peripheral vascular disease, chronic renal disease, diabetic retinopathy and cardiovascular autonomic neuropathy, among others. Diabetes Mellitus is often associated with obesity, dyslipidaemia and hypertension. Proper control and treatment of DM is critical as both the prevalence and economic burden is on the rise.

- **45.6%** of CVD patients were found to have **Diabetes Mellitus**, while **54.4%** did not. This shows the high prevalence of diabetes, as a major cause of mortality and morbidity in CVDs.



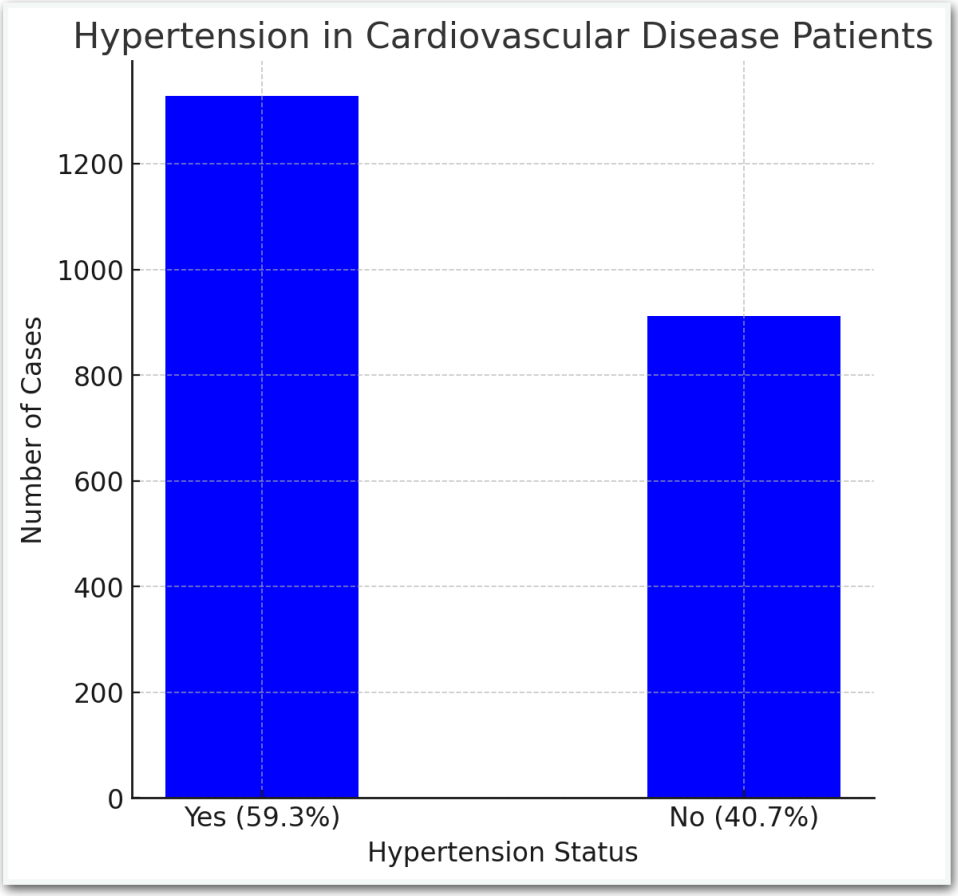
- **80.8%** of CVD patients with Diabetes Mellitus were managed with **oral medications**
- **10.2%** required **insulin therapy**
- A smaller proportion relied on **dietary control alone 5.3%**
- only **2.4%** had no specific treatment.
- **1.4%** were classified under other forms of management (including SGLT2-i, DDP4-i, others)



These findings highlight the predominance of **oral therapy in diabetes management among CVD patients**. The introduction of SGLT-2 inhibitors and DPP4-inhibitors have proven to have cardio-protective benefits and treatment with these should be encouraged as they decrease major adverse cardiovascular events.

4.2 Hypertension in CVD

Hypertension is one of the most common and significant, yet often ignored or underestimated risk factor for CVDs. Mechanisms of action include endothelial damage, left ventricular hypertrophy, and accelerated atherosclerosis, thereby increasing the risk of ischaemic heart disease, heart failure, stroke, and arrhythmias.



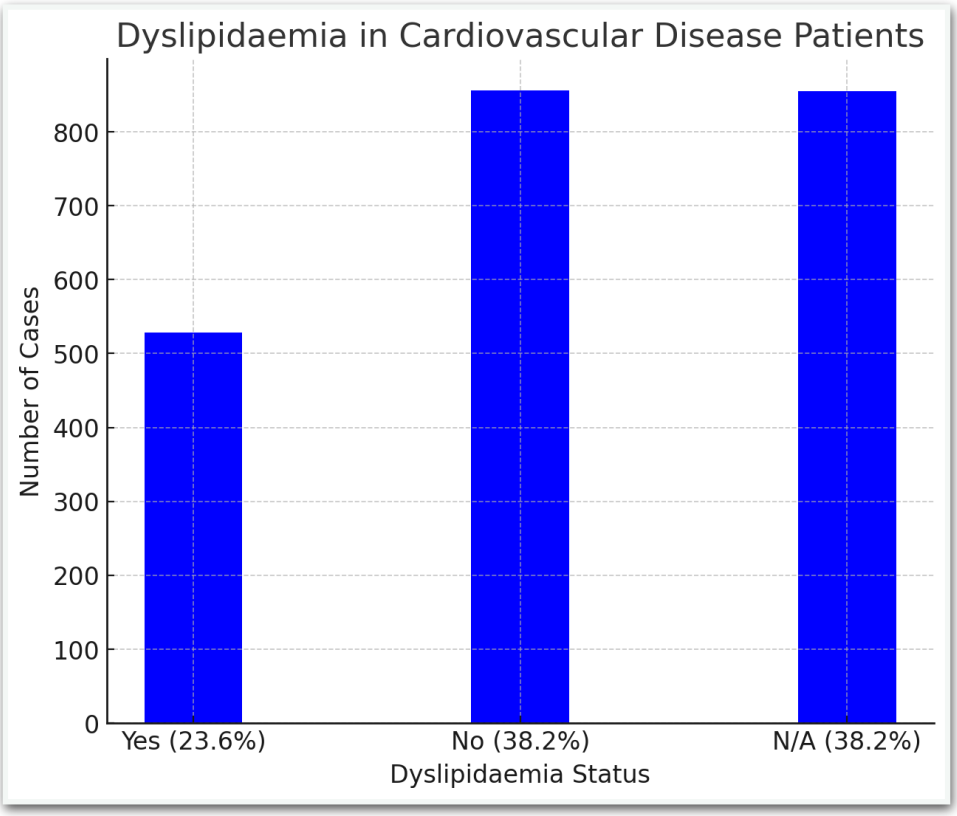
- **59.3% of CVD patients** had **hypertension**, while **40.7%** did not.

The presence of HBP in more than 50% of CVD patients is a new and surprising finding as emphasis is more often placed on Diabetes Mellitus rather than HBP. This is because HBP has been previously under-diagnosed in CVDs due to probably the lack of symptoms associated with raised blood pressure, until a patient develops a Cerebrovascular Accident or organ damage. We therefore need to focus on better BP control in patients with suspected CVDs.

4.3 Dyslipidaemia in CVD

- **23.6%** of CVD patients were found to have **dyslipidaemia**, while **38.2%** did not.
- **38.2%** of CVD patients did not have a lipid profile (Cholesterol level test) done.

This highlights both the importance of dyslipidaemia as a risk factor and the need for more adequate Cholesterol screening in patients.

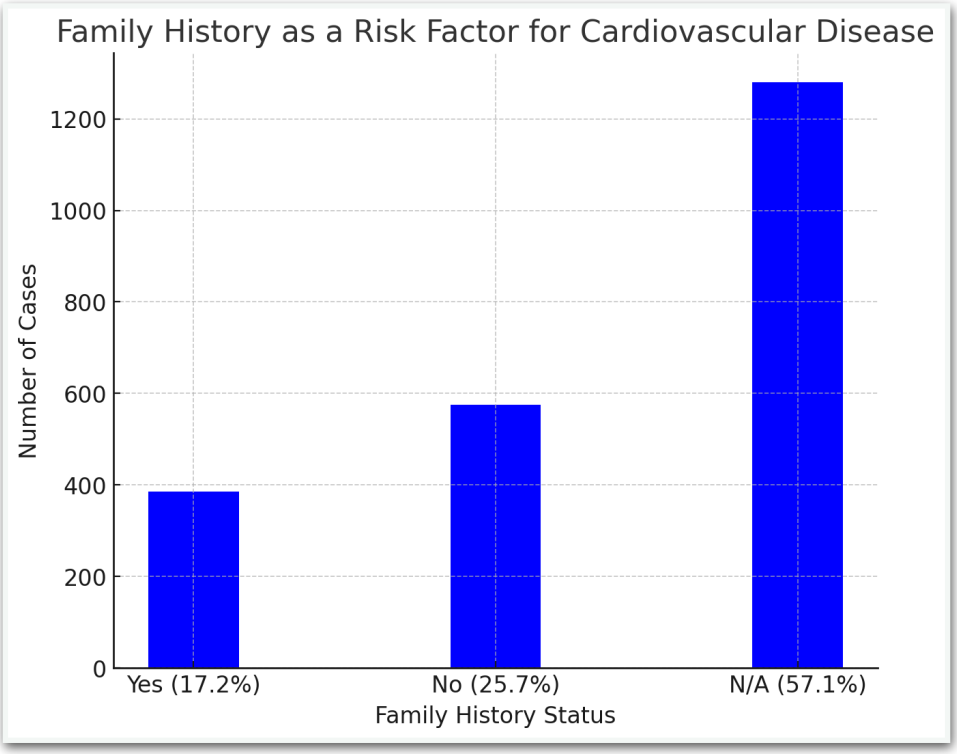


4.4 Family history as risk factor for CVD

Among **non-modifiable risk factors** for cardiovascular disease (CVD), family history can significantly increase an individual's risk. This is due to genetic predisposition and shared lifestyle which can affect a family, group of people or community. Patients with a positive family history are more likely to develop conditions such as Coronary artery disease, diabetes mellitus , hypertension, and dyslipidaemia at an earlier age. Identifying family history during clinical evaluation is therefore essential, as it helps in risk stratification, early screening, and implementing preventive strategies for high-risk individuals.

- **17.2%** of CVD patients reported a **positive family history**, while **25.7%** did not.
- In **57.1% of patients** , information on family history was **not recorded** .

This suggests family history is underestimated or under documented in history taking, specially at casualty level. More emphasis should be laid on collecting family history status as this an important tool in understanding the disease.

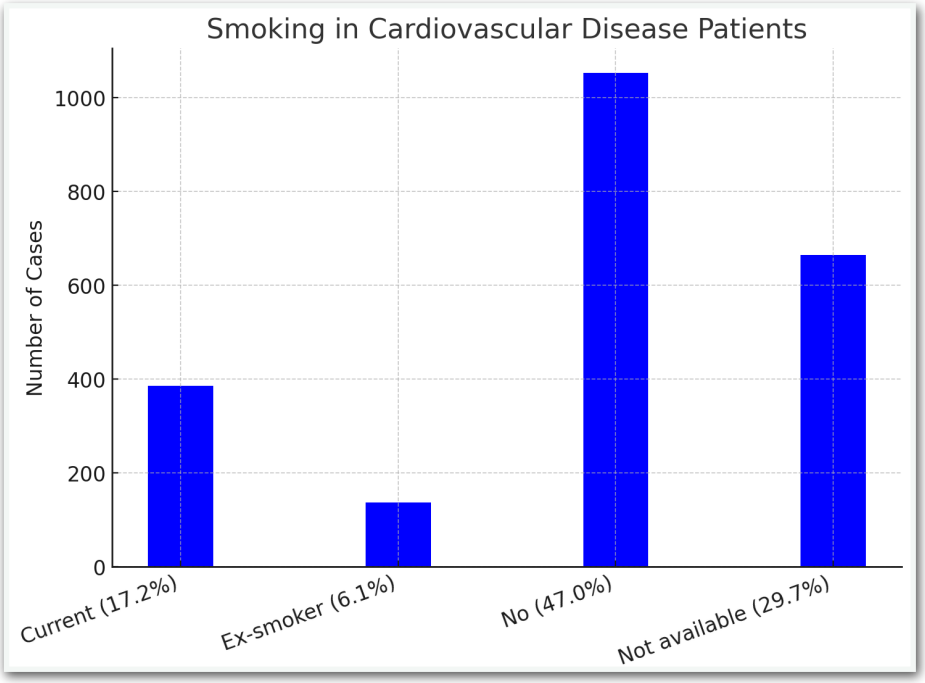


4.5 Smoking

Smoking is a major modifiable risk factor in cardiovascular disease (CVD). It contributes to endothelial damage, accelerates atherosclerosis, increases blood clotting, and reduces oxygen delivery to the heart. Smoking is strongly linked to higher rates of myocardial infarction, stroke, peripheral vascular disease, and sudden cardiac death. If stopped at the appropriate time, this can help reduce cardiovascular outcomes.

- **17.2%** of CVD patients were identified as **current smokers**
- **6.1%** were **ex-smokers**
- **47.0%** reported **no history of smoking**
- **I**n **29.7%,** smoking status was **not available**.

These findings highlight smoking as an important risk factor in CVD while also underscoring the need for better documentation of smoking habits to guide prevention and cessation efforts.



Despite national prevention campaigns and high prices, smoking among CVD patients remain high. counselling, smoking cessation interventions, and long-term prevention strategies should be maintained amid high mortality in CVDs.

4.6 Chronic Kidney disease

Chronic Kidney Disease (CKD) is often associated with hypertension, diabetes, and dyslipidaemia. CKD accelerates atherosclerosis, promotes vascular calcification, and increases fluid and electrolyte imbalances, all of which contribute to CVDs.

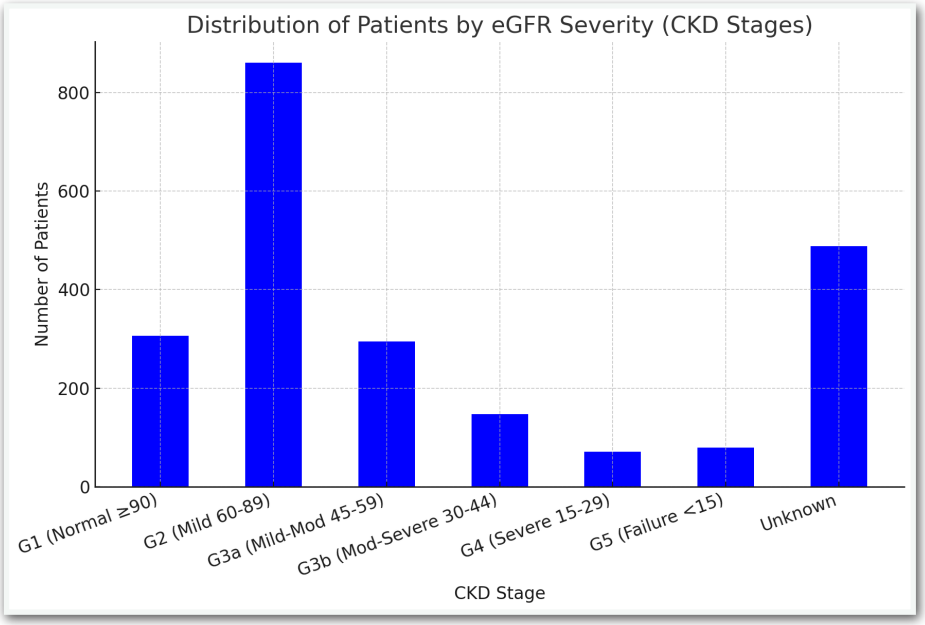
In the absence of eGFR being routinely calculated for CVD patients, eGFR was calculated using the CKD-EPI 2021 race-free equation (sex- and age-adjusted).

The distribution of patients by eGFR severity is as follows:

- **13.6%** of CVD patients had normal kidney function **(G1 ≥90)**
- **38.3%** had CKD **stage G2 (60–89 mL/min/1.73 m^2)**
- **13.1%** had CKD stage **G3a (45–59)**

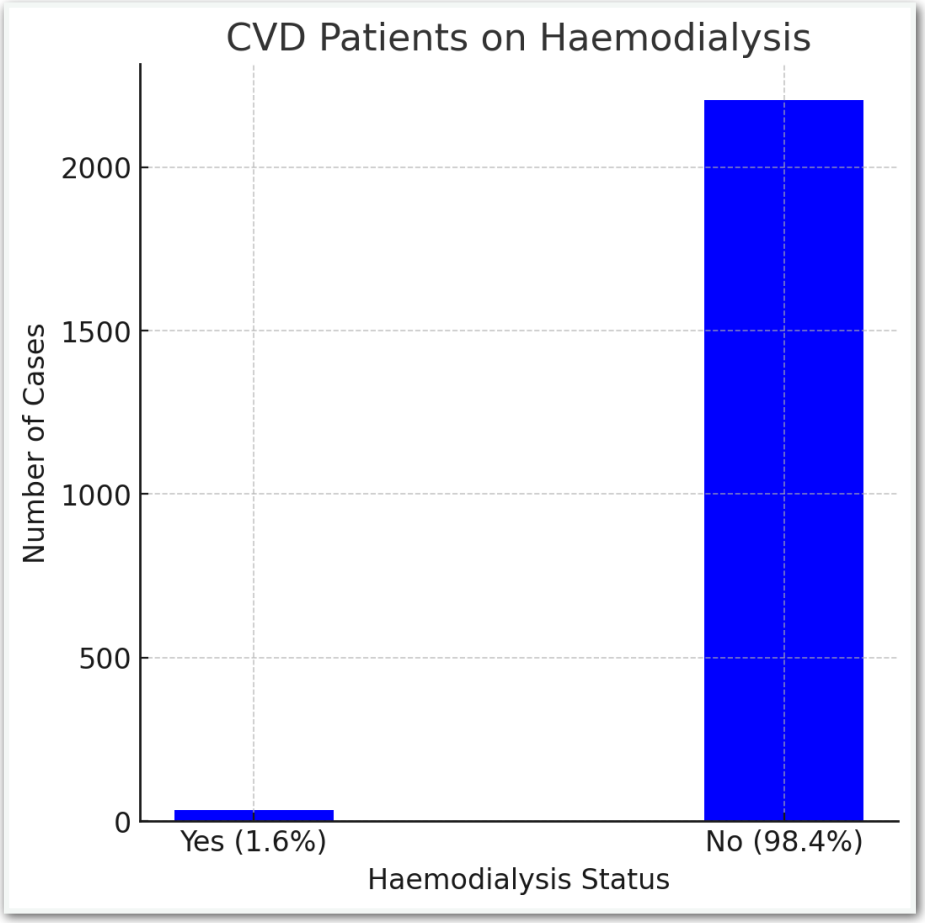
A smaller but significant number of patients were in **advanced stages:**

- **6.5%** in **G3b (30–44)**
- **3.2%** in **G4 (15–29)**,
- **3.5%** in **G5 (<15),** reflecting severe kidney impairment and kidney failure
- in **21.7% cases** the eGFR stage could not be determined.



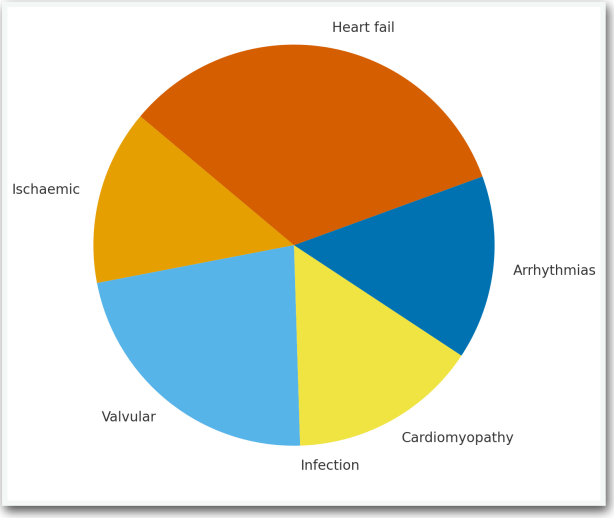
Among cardiovascular disease patients with advanced kidney failure:

- **1.6%** were on **haemodialysis**, while the vast majority **98.4%** were not.



4.7 Anaemia

- **19%** of all CVD patients are seen to have at least one episode of anaemia.
- **42%** of Heart Failure patients had atleast one episode of anaemia incidence
- Valvular disease: **28.4%**
- Ischaemic HD :**17.9%**
- Arrhythmias and Cardiomyopathy are clustered around **18–19%** each.



The treatment of Heart Failure and Arrhythmias should be focussed on treatment of underlying anaemia. Bleeding represent a major complication in IHD patients.

5. Screening in CVD

5.1 BMI

BMI (Body Mass Index) is a simple measure used to estimate whether a person has a healthy body weight for their height. High BMI often reflects **overweight or obesity**, which is a major risk factor for cardiovascular disease. A higher BMI is strongly linked with conditions that drive CVD:

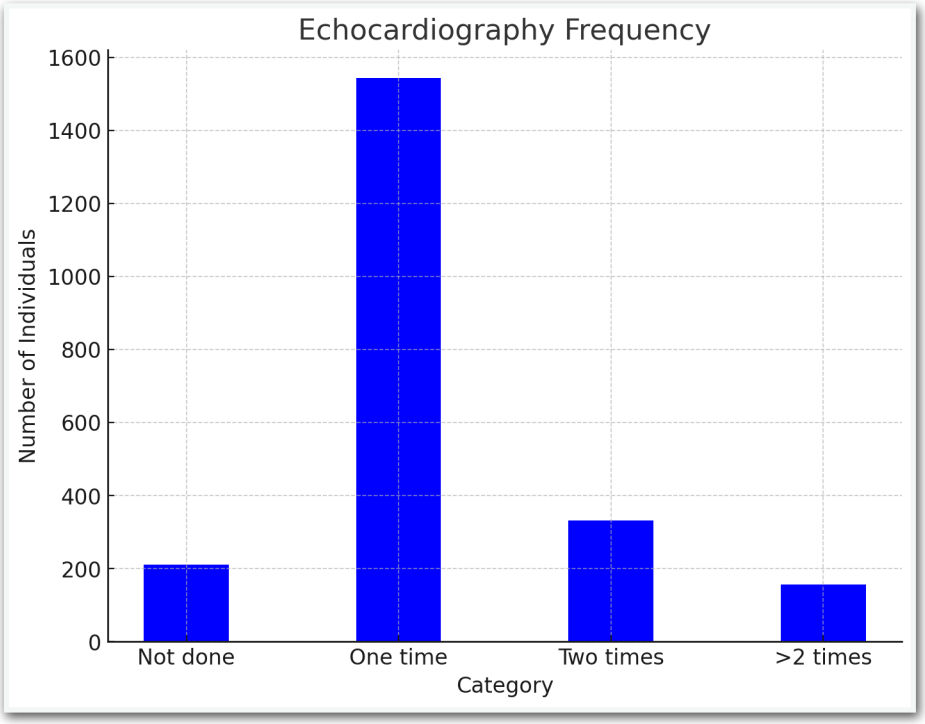
- Hypertension (high blood pressure), Dyslipidaemia (high LDL cholesterol, low HDL, high triglycerides), Type 2 diabetes and insulin resistance, Sleep apnea, which further stresses the heart

Only **22.1 % of CVD** patients had a recorded BMI, highlighting the need to record BMI for all patients once stabilised, with regular monitoring.

5.2 Echocardiography

Echocardiography is the most effective imaging modality in screening and diagnosis of CVDs. It also helps as a marker for CV improvement and is used as a risk stratification tool.

- **68.8%** of CVD patients underwent echocardiography **at least one time**
- **14.8%** had echocardiography done **twice**
- **7.0%** had **more than two studies**
- **9.4%** had **no** echocardiography recorded

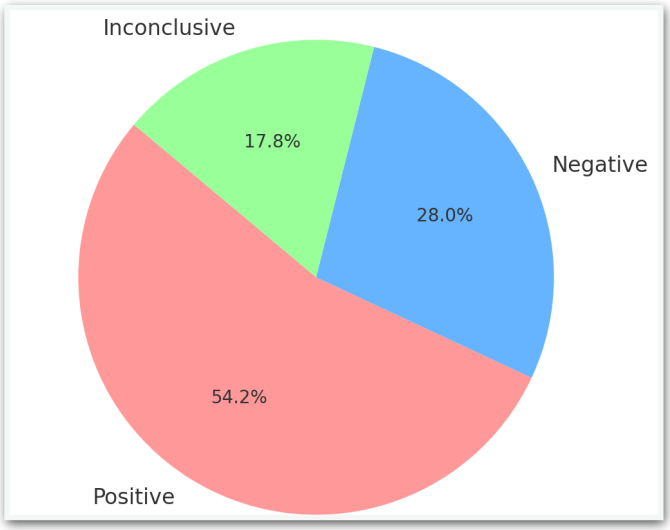


The following EF were obtained from Ischaemic Heart Disease patients:

- **Normal EF (>50%)**: This group had the highest share of MI cases, accounting for **75%** of all cases.
- **Mid-range EF (41–49%)**: Around **11%** of MI cases were observed here.
- **Low EF (<40%)**: Represented **8.3%** of MI cases.
- **Unclassified**: About **5.7%** of cases could not be grouped due to incomplete EF data.

5.3 Stress test (Exercise Tolerance test)

An **Exercise Tolerance Test** is a medical procedure used to check for coronary artery disease or to evaluate how well treatments (like stents or medications) are working. The most common method was Stress Test (Treadmill).



- **18.8%** of IHD patients were found to have done an Exercise Stress test **once**.
- **54% of patients** had **a Positive result**
- **28%** tested **Negative**
- **18%** were **inconclusive results**

The high rate of positive results does not mean that all these patients were found to have blocked coronary arteries. This could be interpreted as false positive results or wrongly interpreted results also.

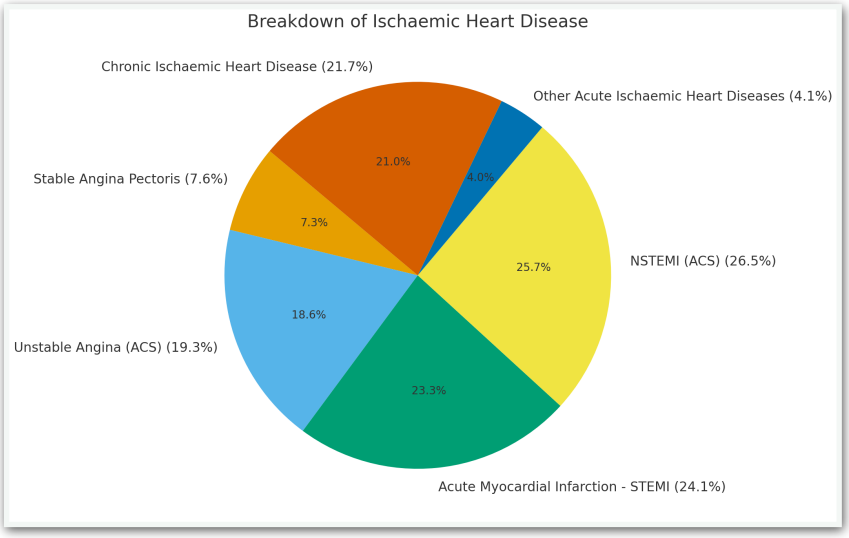
6. Ischaemic Heart Disease

Ischaemic Heart disease accounts for the majority of CVDs, mostly of atherosclerotic origin. While risk of CVDs increases with age, various risk factors have shown to considerably increase their incidence, such as Diabetes Mellitus, Hypertension, Smoking, Dyslipidaemia, Genetic predisposition and others.

Ischaemic heart disease (also called coronary artery disease) occurs when the blood supply to the heart muscle is reduced due to narrowing or blockage of the coronary arteries, usually from atherosclerosis (plaque build-up). This leads to an imbalance between oxygen demand and supply.

Major Clinical Forms:

- **Stable angina** – chest pain or discomfort during exertion, relieved by rest or medication.
- **Unstable angina** – sudden, unpredictable chest pain, often a warning sign of heart attack.
- **Myocardial infarction (ST Elevation MI, NSTEMI** – prolonged blockage leading to death of heart muscle tissue.
- **Chronic ischaemic heart disease** – long-term consequences such as heart failure, arrhythmias, or recurrent angina.



The distribution of ischaemic heart disease is as follows:

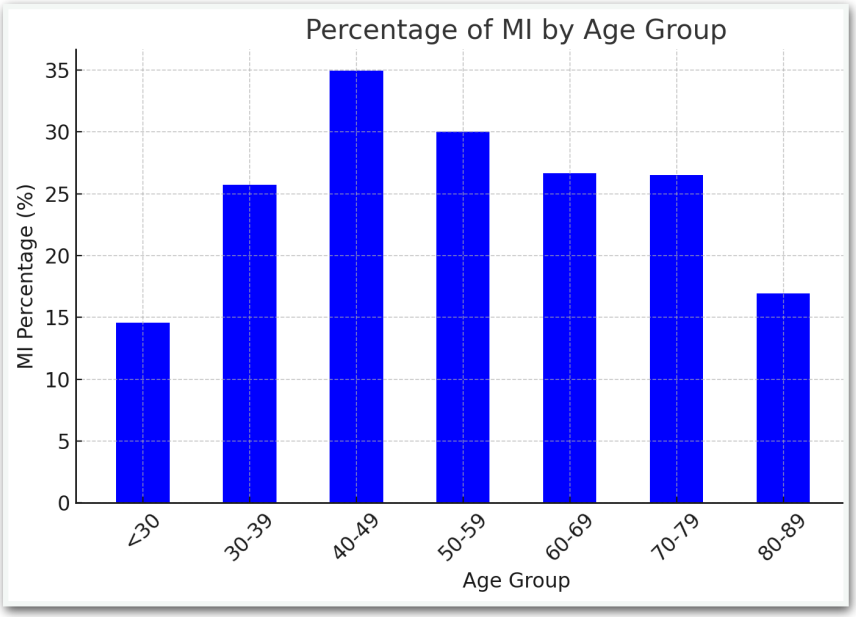
- **ST Elevation Myocardial Infarction : 24.1%**
- **Non ST Elevation Myocardial Infarction: 26.5%**
- **Unstable angina : 19.3%**
- **Chronic IHD: 21.7%**
- **Stable angina: 7.6%**
- **Other acute IHD: 4.1%**

Acute coronary syndromes (NSTEMI, STEMI, unstable angina) form the majority of Coronary Artery Disease, reflecting their critical role in the burden of CVDs.

6.1 IHD according to age and sex

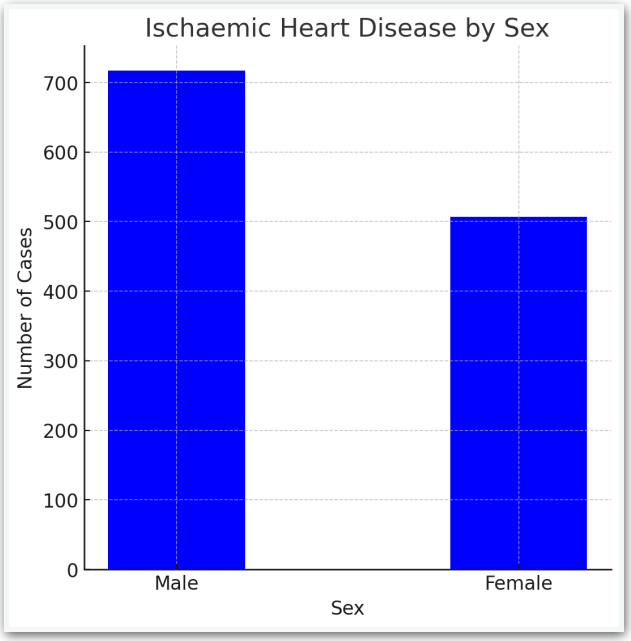
Myocardial Infarction (STEMI and NSTEMI) is a major cause of mortality and morbidity among CVDs. Where it was once associated with age, the last quarter century has seen more and more patients diagnosed at a younger age. In Mauritius, the trend has been similar. The findings in this registry is probably the most awaited result, as witnessed by cardiologists in their daily practice.

`



In terms of absolute number, the majority of Myocardial infarctions happen at the age of **60-69 years**. However, the **35%** of MI happen between **40-49 years ,** which is the greatest percentage of people per age group. The remaining findings are as follows:

- **< 30 years** (young adult age) **: 15%**
- **30–39 years** (Early middle age) : **26%**.
- **50–59 years** (Late Middle Age) **: 30%.**
- **60–69 years**: **27%.**

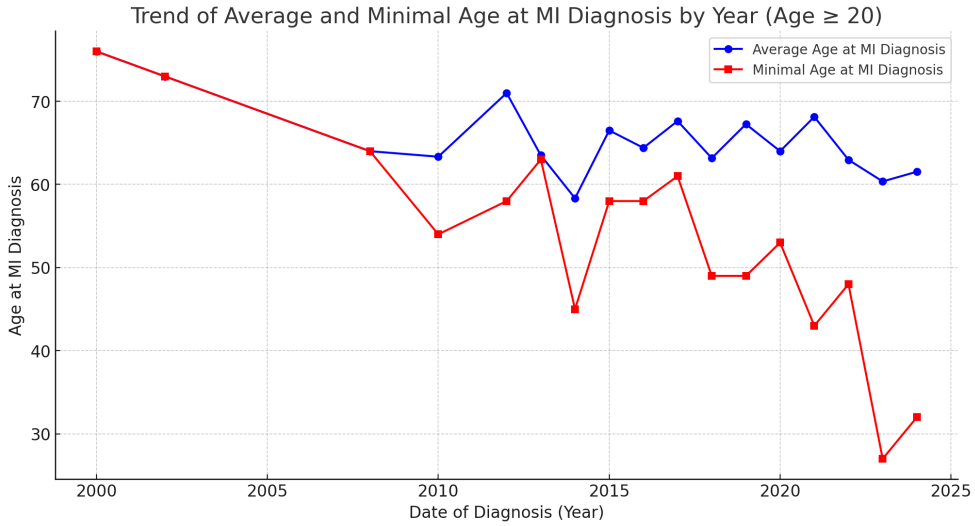


- Men **(62.3%)** are more at risk and affected than women **(43.4%)**, in line with international trends.

6.2 Diagnosis of Myocardial Infarction at a Younger age

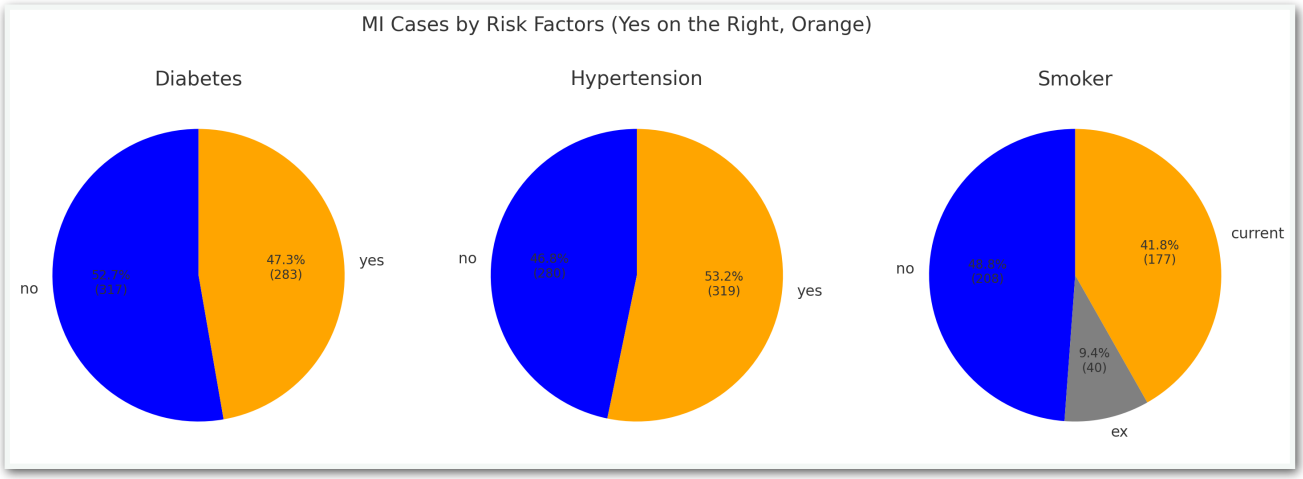
The findings in this study show that MI occurs in younger patients with a rapid worsening over the last 15 years.

- Average age of MI has decreased from around **72 in 2012** to around **60 years in 2025**
- Youngest age of MI has decreased from around **55 in 2010** to around **30 years in 2025** in the study group



6.3 Myocardial Infarction according to Risk Factors

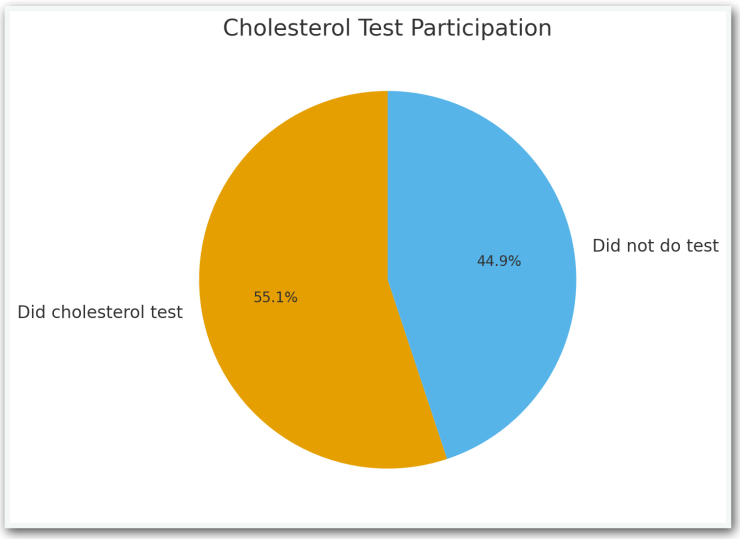
Major risk factors for Ischaemic Heart Disease include Diabetes Mellitus, Hypertension, smoking and dyslipidaemia among others. It was important to find whether the findings were similar in Mauritians and their prevalence.



- **Diabetes: 47% o**f MI patients have Diabetes Mellitus
- **Hypertension: 53%** of MI patients have Hypertension
- **Smoking: 36%** current smokers**, 9.4%** ex-smokers**. (42% - Non-smokers)**

6.4 Dyslipidaemia in IHD patients

- Only **55.1 %** of patients with IHD admitted in public hospitals had cholesterol levels done on admission or follow-up, showing the need for all patients to undergo cholesterol screening.



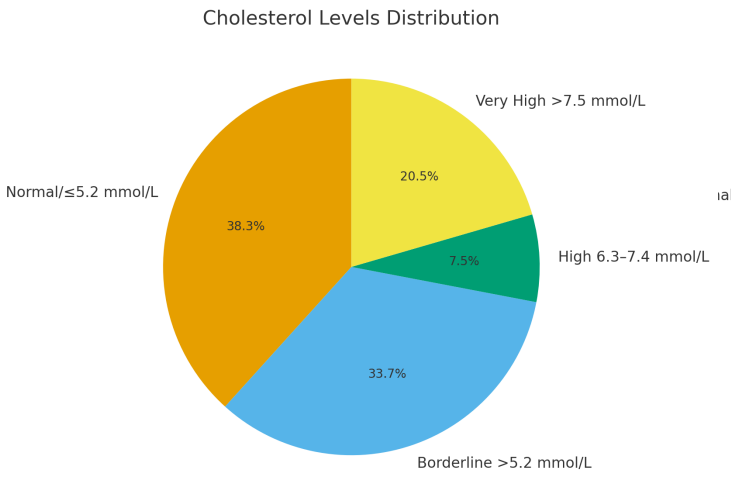
Among individuals who were tested, the distribution of **cholesterol levels** was as follows:

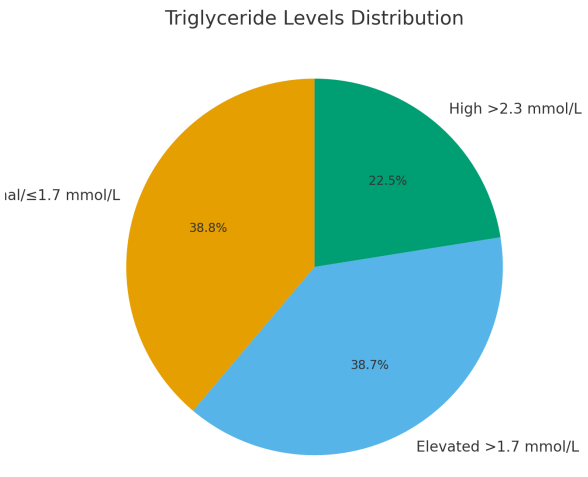
- Normal (≤5.2 mmol/L): 38.3%
- Elevated (>5.2 mmol/L): 33.7%
- High (6.3–7.4 mmol/L): 7.5%
- Very High (>7.5 mmol/L): 20.5

Triglyceride Levels

- Normal (≤1.7 mmol/L): 51.0%
- Elevated (>1.7 mmol/L): 49.9%
- High (>2.3 mmol/L): 29.0%

The results indicate that **61.7%** of tested individuals had cholesterol levels above the normal threshold (>5.2 mmol/L).





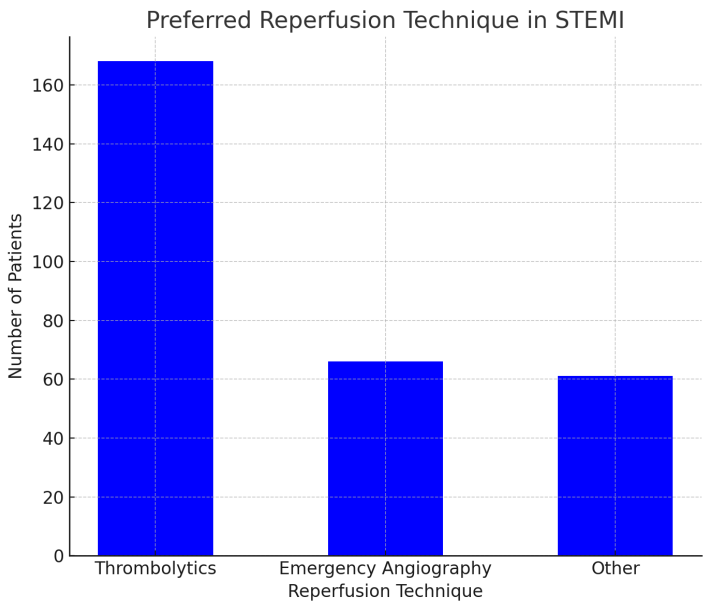
This indicates a considerable proportion of the population is at risk for lipid-related cardiovascular complications. It is to be noted that HDL monitoring has started only since 1 year, thereby obtaining only Calculated LDL level.

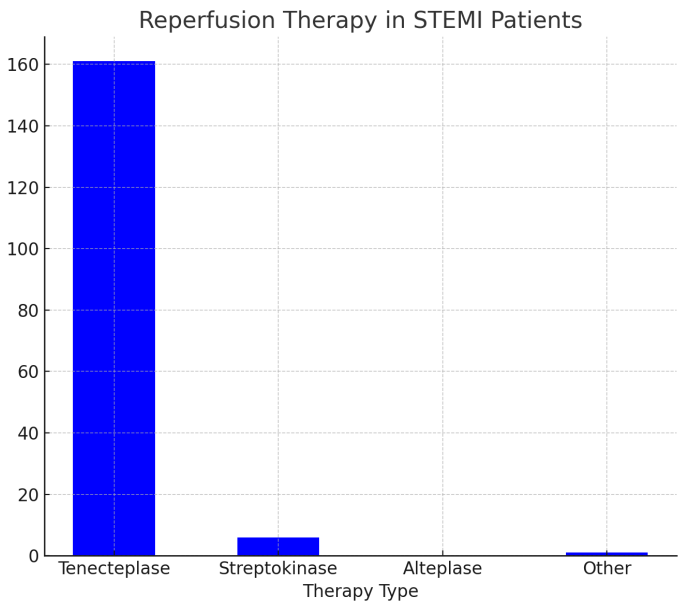
6.5 Reperfusion in STEMI

Reperfusion refers to restoring blood flow in coronary arteries and blood supply to the heart.

- **56.8%** were thrombolysed in STEMI
- Drug of Choice: Tenecteplase **(95.8%)**
- Streptokinase **(3.6%)** was used in the past, and its use has not been stopped
- **Emergency angiography: 14.4%**
- **Other approaches** represented **20.7%.** This could be explained by improper diagnosis, use of other drugs such as glycoprotein IIb/IIIa inhibitors, improper documentation, inadequate time for thrombolysis , etc.

It is to be noted that 24/7 Primary PCI has been introduced only as from **2021**.





Reasons why thrombolytic were not administered, either immediately or not at all :

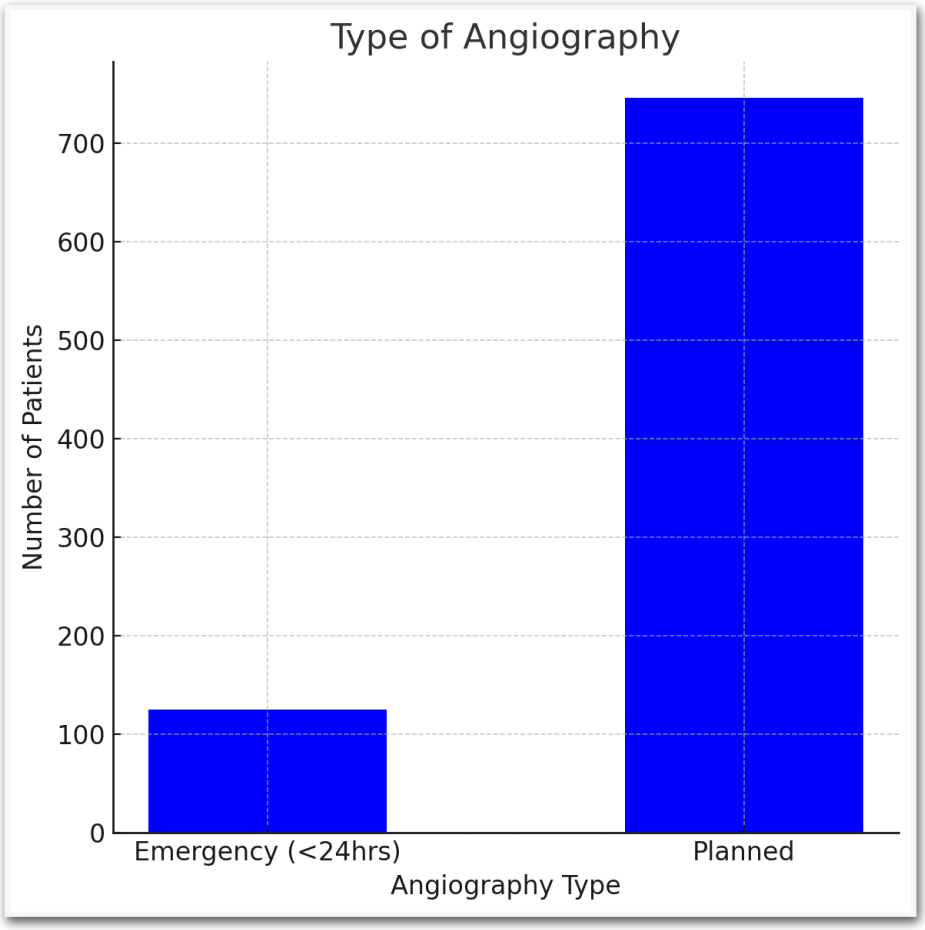
- no reason documented: **62.3%**
- recent surgery/trauma: **4.9%**
- severe uncontrolled hypertension: **4.9%**
- prior intracranial haemorrhage: **3.3%**
- known bleeding or recent ischaemic stroke: **1.6%**

Other absolute contraindications such as pregnancy, recent bleeding, suspected aortic dissection, or active peptic ulcer were not reported.

6.6 Coronary Angiography

Coronary angiography is a diagnostic tool to identify partially or total occluded coronary arteries. It was carried out as follows:

- **Planned procedure: 85.6%** (including planned angiography for routine patients on a waiting list, angiography for patients 24 hours thrombolysis, etc)
- **Emergency angiography within 24 hours : 14.4%**



Reasons for routine Coronary Angiography:

- **Routine admissions** for ACS, chest pain, or other causes: **69.3%**
- **Positive stress test: 16.1%**
- **Directly from OPD: 10.9%**
- **Surgical** referral such as **MVR/AVR/DVR : 1.8%**

This highlights that most angiography procedures are initiated following **acute or symptomatic presentations**, with non-acute referrals forming a smaller share.

Number of Coronary Angiography done per patients is as follows:

- **87%** of patients underwent CAG **1 time**
- **10.4%** underwent CAG **2 times**
- **2.6%** had it performed **> 2 times**

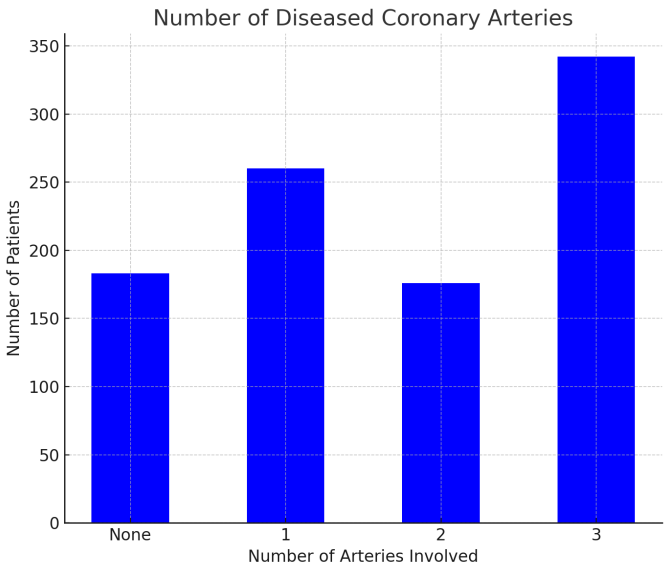
6.7 Diseased Coronary Arteries

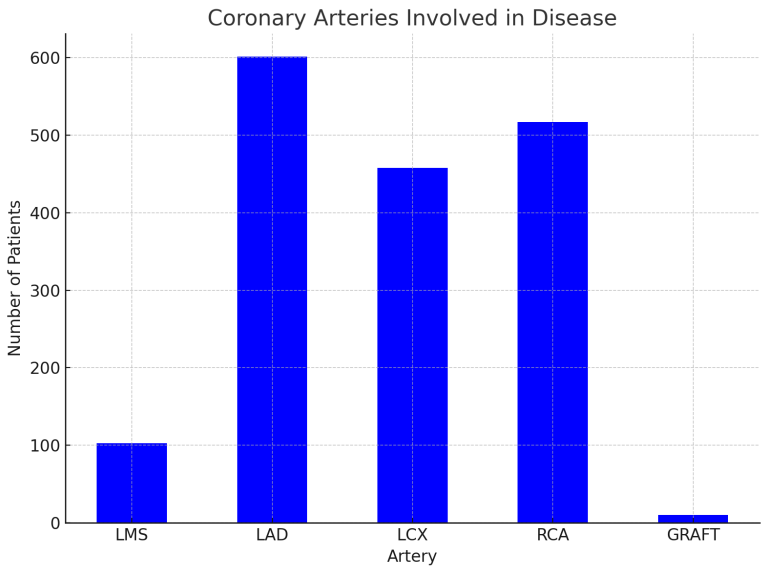
The complexity and number of diseased Coronary Arteries confirm that multi-vessel disease is common among IHD patients:

- **3-vessel disease** (LAD, LCX and RCA) **: 35.6%**
- **2-vessel disease: 18.3%**
- **Single-vessel disease: 27.1%**
- **19.0%** of patients had **no significant coronary artery disease** on angiography

Most affected arteries found in Coronary Angiography were:

- **Left anterior descending artery** (LAD)**: 77.4%**,
- **Right coronary artery** (RCA)**: 66.6%**
- **Left circumflex artery** (LCX)**: 59.0%**
- **Left main stem** (LMS) **: 13.3%**
- **Graft involvement** (after CABG)**: 1.3%**

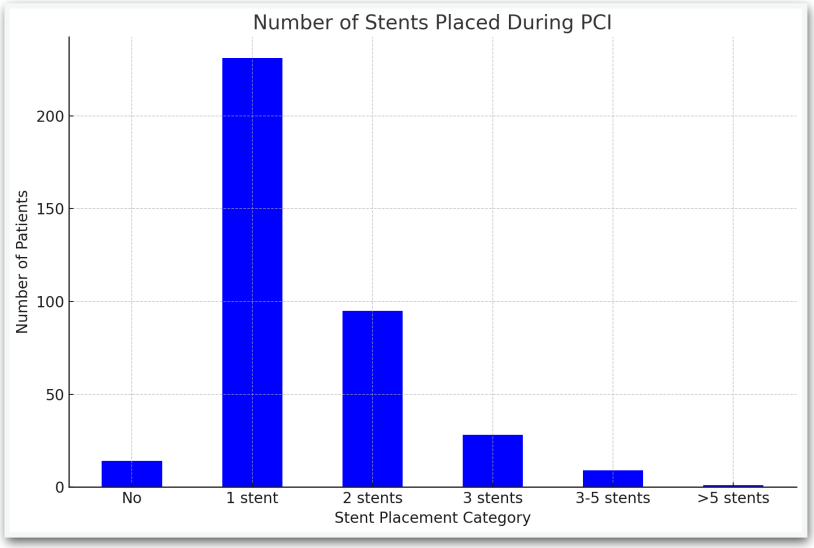




6.8 Coronary Angioplasty

Coronary Angioplasty is the procedure where stents are implanted in an artery. The number of stents implanted per patient is as follows:

- **1** stent**: 61.1%**
- **2** stents**: 25,1%**
- **3** stents**: 7.4%**
- **3–5** stents**: 2.4%**
- **> 5** stents**: 0.3%**
- **PTCA without stent** implantation/with **failed stent** implantation **: 3.7%**



Type of stents used:

- **Drug-eluting stents (DES): 91.2%**
- **Bare metal stents (BMS): 5.2%**

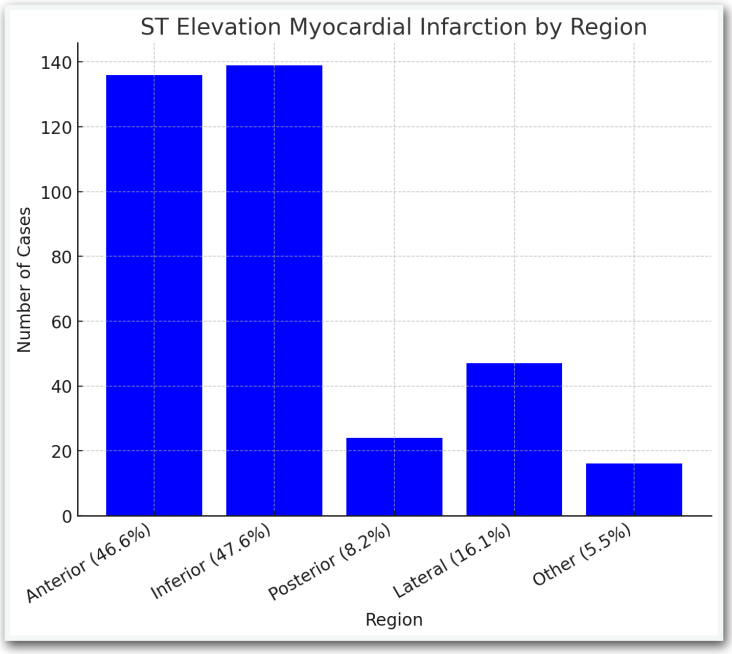
Since 2014, use of BMS stents has been stopped due to better safety and efficacy of DES.

- **Drug-eluting balloons (DEB): 10.2%**

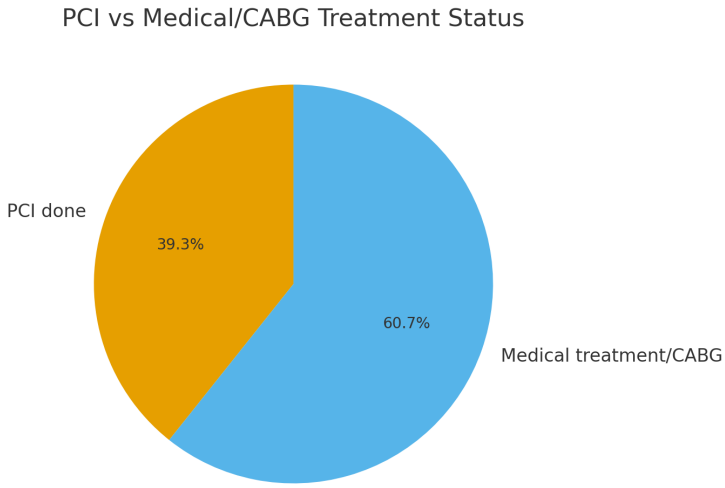
6.9 ST Elevation MI according to localisation

Patients with STEMI presented with Myocardial Infarction according to the following localisations:

- **Anterior: 46.6%**
- **Inferior: 47.6%**
- **Posterior: 8.2%**
- **Lateral: 16.1%**
- **Other: 5.5%**



This distribution reflects the predominance of Inferior and Anterior myocardial infarctions, and the corresponding arteries affected.

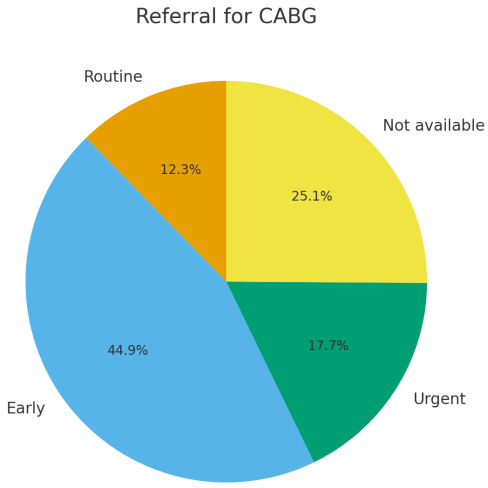


- The majority of patients (**60.7%**) will multi-vessel disease were managed with **medical therapy or CABG** rather than PCI. A smaller group (**39.3%**) underwent Coronary Angioplasty.
- CABG was performed in only **15.0%** of all IHD patients.

6.10 Referral for Coronary Bypass Grafting

Patients were referred for CABG as follows:

- **Routine** referrals**: 12.3%**
- **Early** referrals**: 44.9%**
- **Urgent** referrals**: 17.7%**



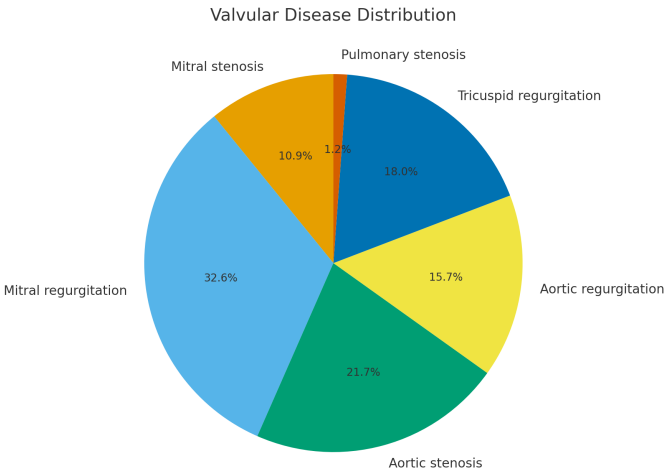
- **25.1%** of referral details were **not available.**

7. Valvular Heart Disease

Valvular Heart Disease (VHD) refers to any abnormality or dysfunction of one or more of the heart's four valves: mitral, aortic, tricuspid, or pulmonary. They either have a reduced/narrowed flow- stenosis or a leakage- regurgitation.

Findings of Valvular disease were as follows:

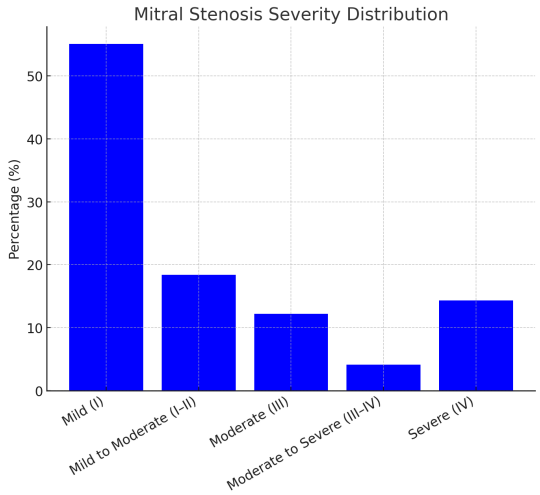
- Mitral regurgitation**: 30.9%**
- Aortic stenosis**: 20.6%**
- Tricuspid regurgitation**:17.1%**
- Aortic regurgitation**: 14.9%**
- Mitral stenosis**: 10.3%**
- Pulmonary stenosis**: 1.1%**

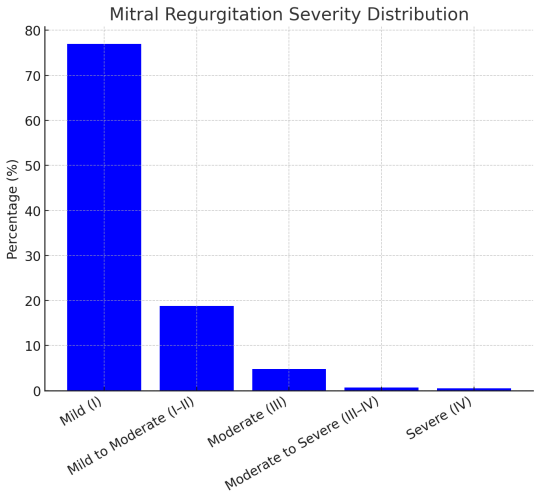


7.1 Mitral Stenosis vs Mitral Regurgitation

Mitral (Valve) Stenosis was observed in patients as follows:

- Mild stenosis**: 55.1%**
- Mild to moderate stenosis**:18.4%**
- Moderate stenosis**: 12.2% M**
- Moderate-to-severe stenosis**: 4.1%**
- Severe stenosis**: 14.3%**





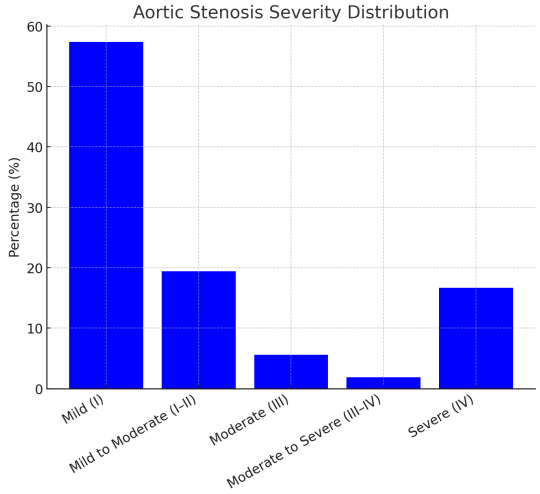
Mitral regurgitation was represented as follows:

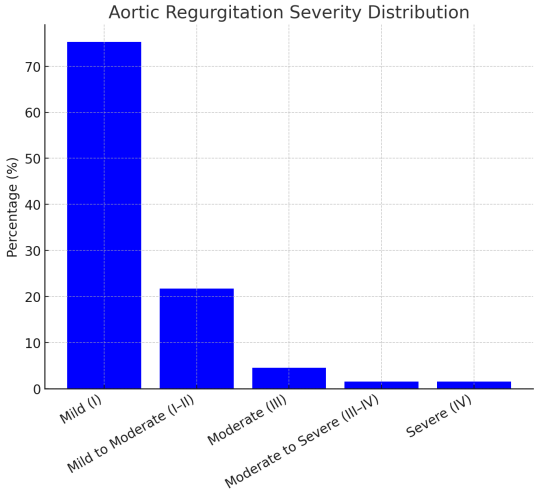
- Mild regurgitation**: 77.0%**
- Mild to moderate regurgitation **: 18.8%**
- Moderate regurgitation**: 4.8%**
- Moderate-to-severe regurgitation**: 0.7%**
- Severe regurgitation**: 0.5%**

7.2 Aortic Stenosis vs Aortic Regurgitation

Aortic stenosis was present in patients as follows:

- Mild stenosis**: 57.4%**
- Mild to moderate stenosis: **19.4%**
- Moderate stenosis**: 5.6%**
- Moderate-to-severe stenosis**: 1.9%**
- Severe stenosis: **16.7%**





7.3 Valvular Replacement

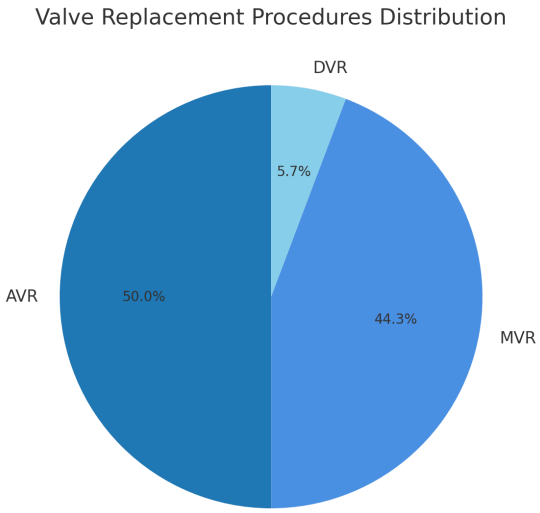
Valvular replacement is a procedure where the valves are the heart are replaced wither by a metallic or a bioprosthetic valve.

The majority of valve replacement surgeries involved a **single valve:**

- **Aortic Valve Replacement** (AVR)**: 20.0%**
- **Mitral Valve Replacement** (MVR)**: 17.7%**

- **Dual valve replacement** (DVR):**2.3%**

A further study at the Cardiac Centre will give better information about Valvular Replacement in Mauritius.



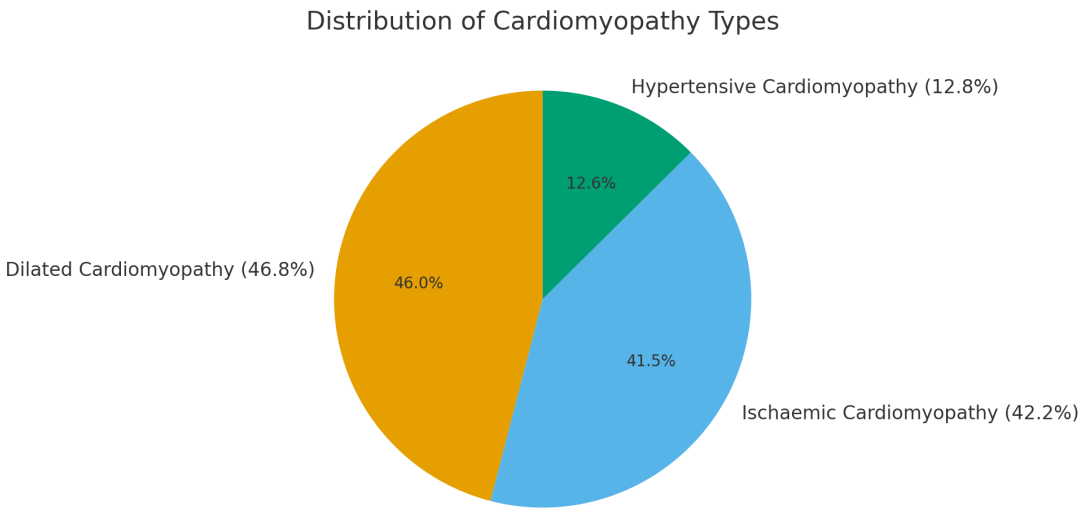
8. Cardiomyopathy

Cardiomyopathy is a a condition whereby the heart's ability to pump normally is affected. This is due to dilated, impaired or thickened myocardium. It is a serious diseased which often presents with Heart Failure, fatal arrhythmias and sudden cardiac death.

The main types of Cardiomyopathy present in the survey are:

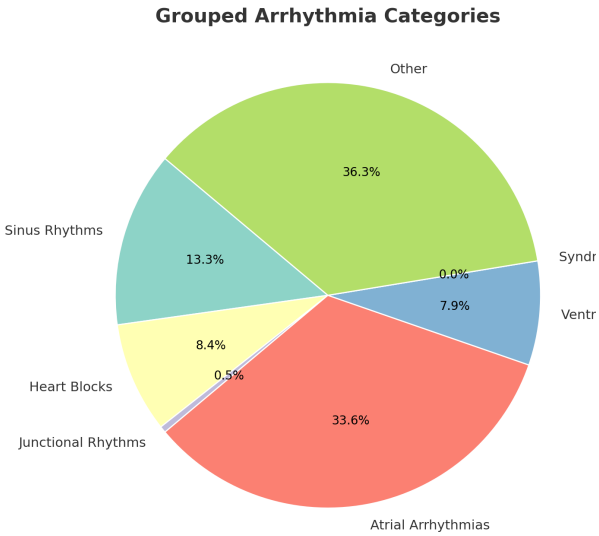
- **Dilated Non-Ischaemic Cardiomyopathy** (DCM): **46.8%**
- **Hypertrophic Cardiomyopathy** (HCM): **12.6%**
- **Ischaemic Cardiomyopathies: 42.2%**

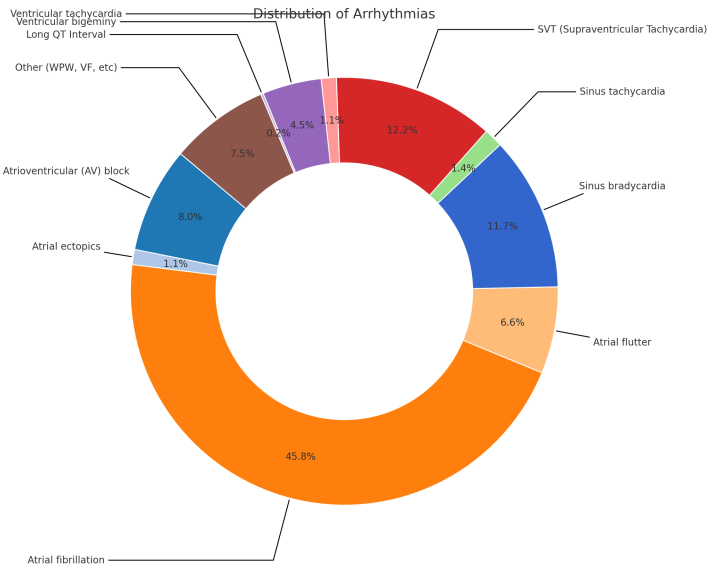
It is to be noted that peripartum cardiomyopathy was included in the DCM group.



9. Arrhythmias

An **arrhythmia** is a condition of irregularity of the heart rhythm whereby it is also either too fast or too slow.





The findings are as follows:

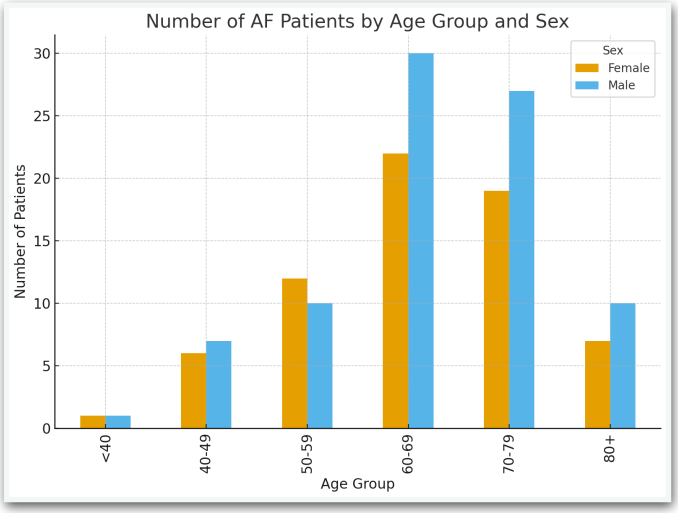
- Atrioventricular (AV) block: **8.0%**
- Atrial ectopics:**1.1%**
- Atrial fibrillation:**45.8%**

- Atrial flutter: **6.4%**
- Supraventricular tachycardia (SVT): **12.2%**
- Ventricular tachycardia: **1.1%**
- Ventricular fibrillation: **0.5%**
- Ventricular bigeminy: **4.5%**
- Wolff–Parkinson–White (WPW) syndrome:**0.3%**
- Long QT interval: **0.2%**
- Other: **7.4%**

9.1 Atrial Fibrillation

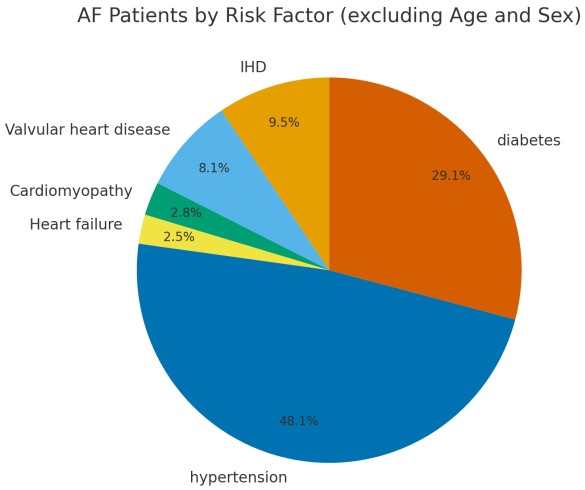
Atrial Fibrillation is strongly associated with advanced age, hypertension, heart failure, and ischaemic and structural heart disease, infections and others. It is present as follows:

- **8.8%** of all CVDs
- **45.8**% of all arrhythmias
- **Male** patients are more affected than **female** patients
- **Male** patients are affected in **60–79** age group
- **Female** cases peak in **50–59** age group
- **Elderly** patients are mostly affected, on average in the **60–79 years** age group
- Few patients are in the **<40 age group**
- **Rivaroxaban or other NOACs** use was not mentioned in the study as their availability in public hospitals occurred after the start of the study

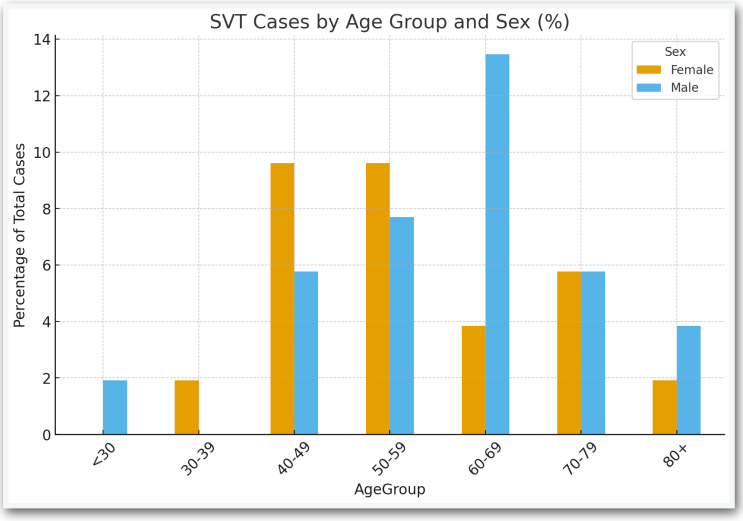


Atrial Fibrillation is present in patients with the following diseases:

- Hypertension**: 48.1%**
- Diabetes**: 29.1%**
- Ischaemic Heart Disease**: 9.5%**
- Valvular Heart disease**: 8.1%**
- Cardiomyopathy**: 2.8%**
- Heart failure**: 2.5%**



9.2 Supraventricular Tachycardia



SVT represent **12.8%** of all arrhythmias and was found be present as follows:

- **Male** and **female** patients were represented in almost equal distribution
- **Male** patients developed SVT at a later age, suggesting that Ischaemic Heart disease could be a possible cause
- **Female** patients with SVT were most commonly present in the **40-49** and **50-59** age groups
- No sub-classification of SVT was available

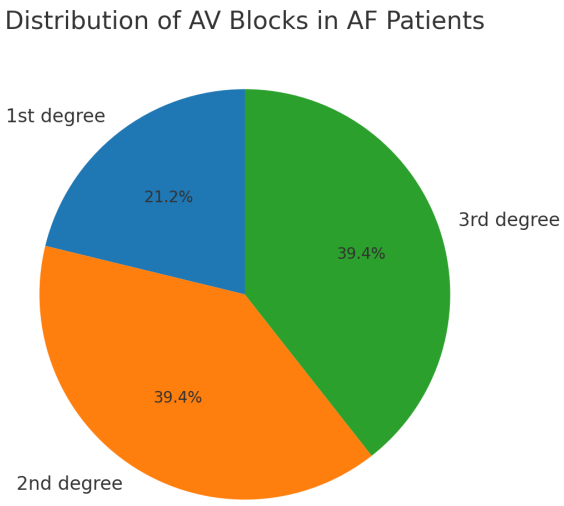
9.3 Ventricular Arrhythmias

Ventricular Arrhythmias are more dangerous than atrial arrhythmias , often proving fatal if not treated in time. They are often present in Ischaemic Heart disease and Cardiomyopathy. They can cause syncope, cardiac arrest and sudden cardiac death. They are present as follows:

- Ventricular Tachycardia: **1.1%**
- Ventricular Fibrillation: **<1%** (for patients currently under treatment in OPDs)
- Ventricular Bigeminy: **4.7%**

9.4 AV Block

AV Block represents **1.5 %** of all CVD and **8.4%** of all arrhythmias, as is represented as follows:



Reported cases account for:

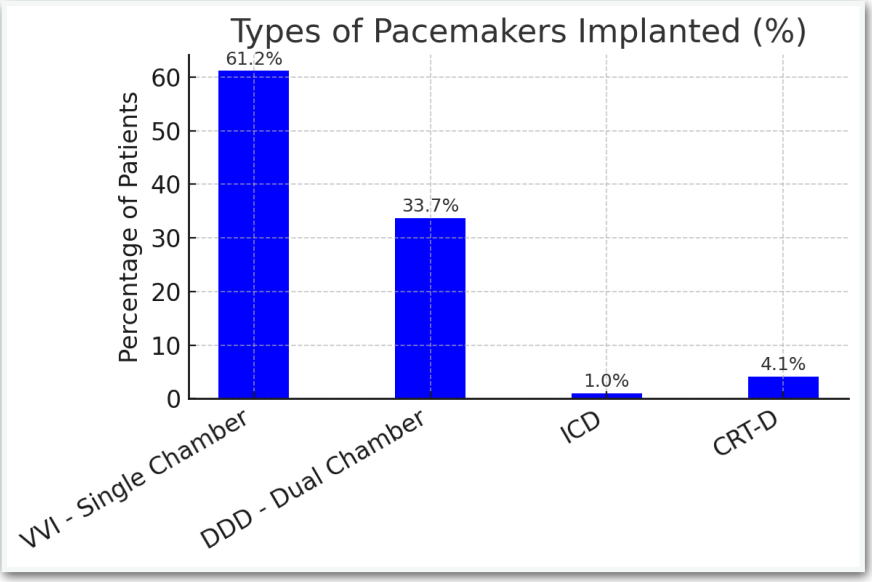
- High degree **AV blocks** (2nd and 3rd degree): **78.8%**
- **4.4%** of all CVDs have had a pacemaker implanted, with **35%** of them having required a box change.

Types of Pacemaker used:

- **VVI** Single chamber devices**: 61.2%**
- **DDD** Dual chamber pacemakers**: 33.7%**

Other types of pacemakers used in **Ventricular tachycardia, Dilated/Ischaemic Cardiomyopathy** include**:**

- **CRT-D** Triple chamber pacemakers **: 4.1%**
- **ICD** Implantable cardiac defibrillators**: 1%**

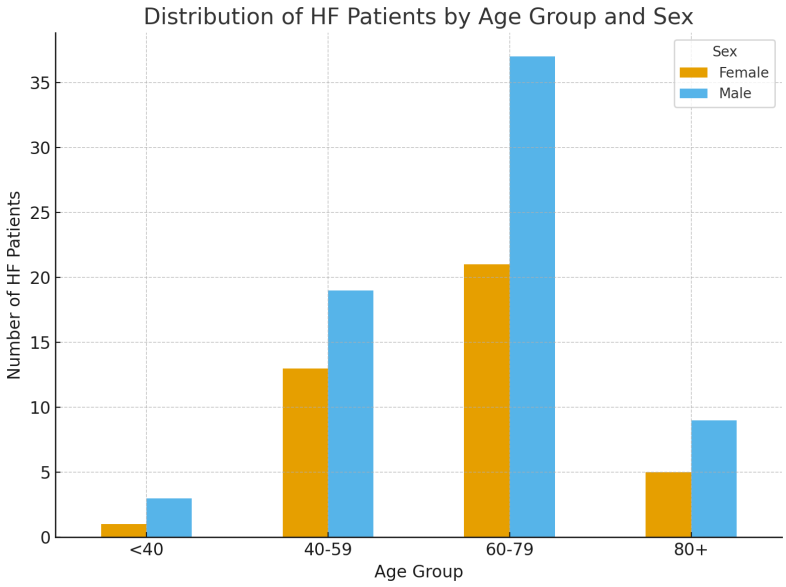


10. Heart failure

Heart Failure presentation as **first symptoms** accounts for **4.6%** of all CVDs. They are classified as follows :

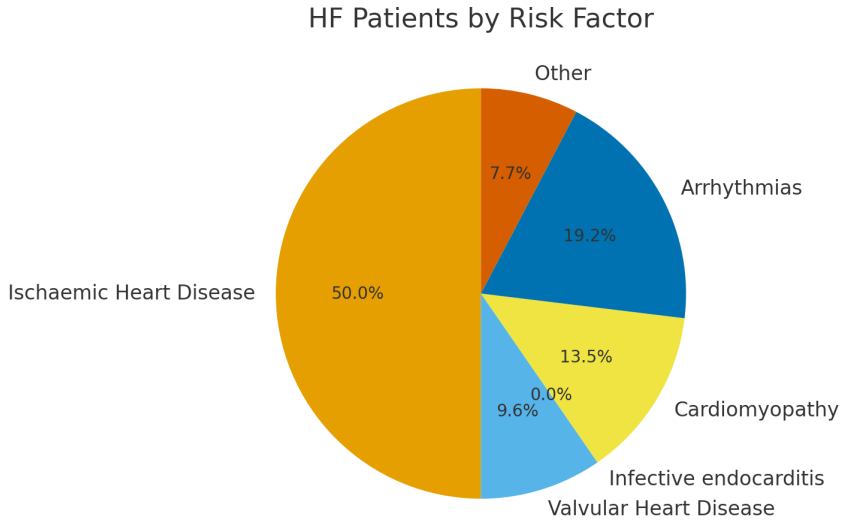
- Acute Left Ventricular failure **LVF: 56.3%**
- Congestive Cardiac Failure **CCF: 46.2%**
- The majority of HF patients fall in **60–79 age group** for both males and females, followed by the **40–59 age group**.

Right heart Failure was not included in the study due to absent echocardiography findings among other markers.



The causes of heart failure are:

- Ischaemic Heart Disease:**50%**.
- Arrhythmias: **19.2%**
- Cardiomyopathy: **13.5%**
- Valvular Heart Disease: **9.6%**
- Others**: 7.7%**



11. Drugs in CVD Management

Drugs (mostly oral) used in the management of CVDs are as follows:

1. **Statins** (68.4%)
   - Foundation of lipid management.
   - Indicates strong adherence to secondary prevention strategies.
2. **Aspirin** (51.1%)
   - Standard anti-platelet agent for ischaemic heart disease and stroke.
   - Over half of patients are on it.
3. **Clopidogrel** (38.2%)
   - Used with aspirin in dual anti-platelet therapy (DAPT).
   - Reflects high rates of ACS and stenting.
4. **Metoprolol** (28.5%)
   - Primary β-blocker used, likely for heart failure and angina.
5. **Lasix** (27.0%)
   - Heavy reliance shows high heart failure burden.
6. **TNT** (23.1%)
   - Nitrates for angina.
7. **Losartan** (20.0%)
   - Preferred ARB, commonly for hypertension and HF.
8. **Enalapril** (17.2%)
   - ACE inhibitor, still widely used but less than ARBs.
9. **Carvedilol** (12.2%)
   - β-blocker, particularly in HF patients.
10. **Amlodipine** (11.1%)
    - Calcium channel blocker of choice.

Moderate Usage

- **Aldactone** (9.2%): Potassium-sparing diuretic, common in HF.
- **ISMN** (8.7%): Long-acting nitrate for angina.

- **Sustac** (8.4%): Another nitrate option.
- **Warfarin** (6.2%): Anticoagulation in AF/valvular disease.
- **OTHER** (18.1%)
- **NONE** (14.7%): Not on CVD medication, possibly mild or early disease.

Less Common but Important

- **Cordarone** (Amiodarone , 3.4%): For arrhythmias.
- **Digoxin** (4.1%): For AF/HF, but declining in modern use.
- **Plavix** (3.0%): Brand version of clopidogrel, smaller subgroup.
- **Esidrex** (2.6%): Thiazide diuretic for hypertension.
- **Metformin** (2.7%) & **Glicazide** (1.0%): Diabetes overlap.
- **Tildiem** (Diltiazem, 3.7%) & Verapamil (1.3%): Non-dihydropyridine CCBs, less frequent.

Rarely Used

- Atenolol (0.7%) & Inderal (0.1%): Older β-blockers, largely replaced.

Statins, aspirin, and clopidogrel are mostly used in ischemic heart disease.

Common drugs in Heart failure are Lasix, Aldactone, Metoprolol, Carvedilol.

Older drugs (Atenolol, Inderal, Digoxin) are much less used.

14.7% on no CVD drugs: suggests early-stage disease or non-adherence.

SGLT-2 inhibitors and DPP4-inhibitors were not available at the start of the study.

12. Recommendations

It is important to continue the Cardiac Registry on a regular basis, not only as an epidemiological tool but also to assess efficacy of screening and treatment protocols. In this context, it should be compared with international CVD databases to benchmark outcomes.

The main goal of this Cardiac Registry is to focus on prevention on CVDs. It is essential to:

1. Increase national budget of prevention of NCDs
2. Intensification of sensitisation on smoking cessation , salt and sugar control, increase in physical activity
3. Target patients in high risk group and early screening of CVDs
4. Better HBP and DM control with introduction of single pill combination therapy to improve compliance
5. Age-targeted screening programmes for specific diseases in the development of CVDs
6. Community adapted prevention campaigns specially in Ischaemic Heart Disease
7. Proper documentation of BMI, smoking history and family history
8. Compulsory LDL-C monitoring as part of cholesterol/lipid profile for all Ischaemic HD and Aortic Stenosis patients
9. Consider Lipoprotein (a) as a diagnostic marker for dyslipidaemia
10. Compulsory eGFR monitoring for all patients as well as Pro-BNP use in acute setup
11. Improve diagnosis of CVDs at Primary Health care levels
12. Better population education on arrhythmias like Atrial Fibrillation, increased access to Novel anticoagulants and AF screening in elderly
13. Introduction of cardiac rehabilitation
14. Strengthening and update of national treatment protocols
15. Encourage studies on genetic predisposition and ethnicity-related CVD patterns.
16. Genetic testing in CVDs and as well as DM, HBP and Dyslipidaemia
17. Support clinical trials on novel therapies and cost-effectiveness of interventions in Mauritius.
18. Awareness on other causes of IHD like hazardous gases, carbon, chemicals e.g in jobs like painters, bus drivers and conductors, workers handling human waste or sewage, and others
19. Awareness on energy drinks and other cardiotoxic substances or drugs
20. CT angiography introduction for IHD diagnosis to decrease waiting list for CAG

Summary: Mauritius should scale up prevention, improve documentation, expand early detection, and strengthen hospital-based acute and chronic care to reduce the CVD burden.

References

1. WHO Factsheets- https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)
2. World Health Rankings https://www.worldlifeexpectancy.com/mauritius-coronary-heart-disease
3. National Health Accounts 2020
4. NCD Surveys 2015, 2021
5. Health Statistics Report 2013-23