

Singapore Myocardial Infarction Registry Annual Report 2022

National Registry of Diseases Office December 2024

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1. GLOSSARY

AMI	Acute myocardial infarction
ASIR	Age-standardised incidence rate
ASMR	Age-standardised mortality rate
BMI	Body mass index
CFR	Case fatality rate
CI	Confidence interval
CIR	Crude incidence rate
CMR	Crude mortality rate
DTB	Door-to-balloon
ECG	Electrocardiogram
ED	Emergency Department
ICD	International Classification of Diseases
IQR	Interquartile range
MHA	Ministry of Home Affairs
МОН	Ministry of Health
MONICA	Monitoring Trends and Determinants in Cardiovascular Disease
NRDO	National Registry of Diseases Office
NRIC	National Registration Identity Card
NSTEMI	Non-ST-segment elevation myocardial infarction
SCDF	Singapore Civil Defence Force
SMIR	Singapore Myocardial Infarction Registry
STEMI	ST-segment elevation myocardial infarction

2. EXECUTIVE SUMMARY

This annual report presents data on trends for incidence, mortality, 30-day case fatality, presenting symptoms, risk factors, time to treatment and length of hospitalisation for Singapore residents with acute myocardial infarction (AMI) for the latest 10 years period, from 2012 to 2022.

The number of AMI episodes increased by about 44% from 9,124 episodes in 2012 to 13,137 episodes in 2022. The age-standardised incidence rate (ASIR) remained relatively unchanged at 223.3 and 217.9 per 100,000 population respectively.

The number of AMI deaths was 1,073 in 2022, an increase of about 26% from 853 in 2012. However, the age-standardised mortality rate (ASMR) declined significantly from 20.0 to 15.5 per 100,000 population during this period. There was little overall change in the 30-day case fatality rate (CFR), at 9.8% in 2012 and 8.5% in 2022.

The proportion of AMI patients experiencing typical symptoms of AMI dropped over the years. Each year, about 60-70% of ST-segment elevation myocardial infarction (STEMI) patients had typical symptoms, while the majority of the non-ST-segment elevation myocardial infarction (NSTEMI) patients had no or non-typical symptoms. Between 2012 and 2022, the two most common presenting symptoms remained consistent for AMI patients: chest pain and breathlessness. Approximately 50-60% of AMI patients experienced chest pain every year in the past 10 years, while about 48-55% experienced breathlessness.

Relating to risk factors for AMI, between 2012 and 2022, hypertension and hyperlipidaemia were consistently the two most common risk factors among AMI patients. Every year from 2012 to 2022, about 75% (3 in 4) of AMI patients had hypertension, while the proportion with hyperlipidaemia rose from 70.1% in 2012 to 74.4% in 2022. Moderate-to-high BMI and diabetes were also prevalent among AMI patients, with more than half of them having these risk factors and upward trends were observed over the years. Smoking was also a common risk factor, observed among about two in five AMI patients during this period.

The median door-to-balloon (DTB) time remained relatively unchanged at 59 minutes in 2012 and 57 minutes in 2022. The proportion of STEMI patients with DTB time of 90 minutes or less improved from 88.6% in 2012 to 95.6% in 2022. The median DTB time was consistently shorter for STEMI patients who arrived by Singapore Civil Defence Force (SCDF) ambulance (51 minutes in 2022) than those who relied on other modes of transport (65 minutes in 2022) across the years. The proportion of STEMI patients with DTB time of 90 minutes or less was consistently higher among those who were conveyed via SCDF ambulance (97.5% in 2022) than those who arrived via other modes of transport (92.4% in 2022) across the years.

Between 2012 and 2022, the average length of hospitalisation for AMI remained largely similar, ranging between 7.6 and 8.1 days every year.

3. INTRODUCTION

Ischaemic heart disease was the third most common cause of death in Singapore in 2022, accounting for 19.7% of all deaths in Singapore¹. AMI, commonly known as heart attack, is a type of ischaemic heart disease.

The most common cause of AMI is atherosclerosis – the narrowing of the arteries due to the build-up of cholesterol deposits in the arterial walls, forming plaques that narrow the arteries and restrict blood flow. Restoring blood flow to the heart through revascularisation of the blocked arteries, coupled with pharmacotherapy, are the recommended treatment for AMI. There are two main types of AMI - STEMI and NSTEMI. STEMI is more severe with a higher 30-day case fatality rate, while NSTEMI is more prevalent, accounting for about 80% of AMI episodes each year.

The common risk factors of AMI are hypertension, hyperlipidaemia, diabetes, obesity, smoking and old age. The proportion of Singapore residents aged 65 years and above rose from about 10% (1 in 10) in 2012 to 16.6% (1 in 6) in 2022². This figure has been projected to rise to about 24.1% (1 in 4) in 2030³. With Singapore's rapidly ageing population, the incidence of AMI is expected to rise. To mitigate the impact of AMI, preventive measures that reduce cardiovascular risk, as well as post-AMI interventions that improve prognosis and reduce recurrence risk, are essential.

¹ Principal Causes of Death. Ministry of Health, Singapore. <u>www.moh.gov.sg/resources-statistics/singapore-health-facts/principal-causes-of-death</u> Accessed on 8 May 2024.

² SingStat Table Builder, Population and Population Structure, Annual Population, Singapore Residents by age group, ethnic group and sex. Department of Statistics, Singapore.

https://tablebuilder.singstat.gov.sg/table/TS/M810011. Accessed on 23 April 2024.

³ Population Trends – Overview. National Population and Talent Division, Prime Minister's Office, Singapore. <u>https://www.population.gov.sg/our-population/population-trends/overview/</u>. Accessed 18 June 2024.

4. METHODOLOGY

The National Registry of Diseases Office (NRDO) collects and analyses epidemiological data to support health policy planning and review as well as programme evaluation.

The Acute Myocardial Infarction Registry was established in 1988 and managed by the Ministry of Health (MOH). It was subsequently transferred to the Singapore Cardiac Databank in 2002. In April 2007, the NRDO, under the purview of Health Promotion Board, took over the management of the Registry, which was re-named to Singapore Myocardial Infarction Registry (SMIR). The SMIR collects epidemiological data on AMI cases diagnosed in all public hospitals, private hospitals and a small number of AMI deaths that occurred at home, which are certified by the general practitioners in Singapore. Legislation mandated notification from all healthcare institutions since September 2012.

Data sources

The SMIR receives AMI case notifications from

- 1. All healthcare institutions via the Hospital In-patient Discharge Summary and the cardiac biomarkers list,
- 2. MOH via the MediClaim list and Casemix and Subvention list, and
- 3. Death Registry of the Ministry of Home Affairs (MHA) via the death list.

The International Classification of Diseases 9th Revision (ICD-9) Clinical Modification code 410 was used to identify AMI cases from the data sources prior to 2012, while the ICD-10 Australian Modification codes I21 and I22 were used for AMI cases diagnosed from 2012 onwards. A master patient list was created by merging data from these sources using the patients' unique National Registration Identification Card (NRIC) number.

The registry coordinators confirmed the diagnosis of AMI by viewing the patients' medical records, before extracting relevant detailed clinical information from there. All cases collected by the SMIR were diagnosed as AMI by a certified doctor, accompanied by symptoms of AMI, raised cardiac biomarkers and/or abnormal electrocardiogram (ECG).

AMIs are broadly classified into STEMI and NSTEMI based on documentation by doctors in the patients' medical records. There is a small group of patients (<10%) without documentation of STEMI or NSTEMI. This group of patients usually died out-of-hospital or soon after arrival at the hospitals, before the doctors could diagnose if the AMI was a STEMI or NSTEMI. From 2011 onwards, besides STEMI and NSTEMI, type 1, 2, 3, 4A, 4B and 5 are also used to classify the cases based on recommendation by the American Heart Association⁴. For type 2 AMI, they were

⁴ American College of Cardiology Foundation. Universal definition of myocardial infarction. Journal of the American College of Cardiology 2007; 50(22): 2173-2195.

eventually combined with NSTEMI in this report as their clinical characteristics are similar⁵.

Cases that were transferred between hospitals were merged to avoid multiple counting of the same AMI episode. As the registry moves towards automated data collection and ceased collection of ECG data from 2019 onwards, recurring AMI within 28 days of a preceding episode is no longer merged with the preceding episode unlike earlier years. Fewer than 2% of the AMI patients had another AMI within 28 days in each year prior to 2019.

The death status of all patients registered in the SMIR were updated till 30 September 2023 by matching the patients' NRIC number with the death information from MHA.

Population estimate

The Singapore population estimates used to calculate the incidence rates and mortality rates in this report were obtained from the Singapore Department of Statistics, which releases mid-year population estimates of Singapore residents (i.e. Singapore citizens and permanent residents) annually⁶. The Segi World population estimates used for age standardisation are available on the World Health Organization website⁷.

Incidence rate

The incidence rate in each year was calculated by taking the number of AMI episodes that occurred in a year among Singapore residents, divided by the number of Singapore residents in the same year. Patients were categorised into 5-year age groups and age standardisation was done using the direct method with the Segi World population as the standardisation weights.

Mortality rate

The mortality rate in each year was calculated by taking the number of deaths with AMI as the primary cause of death occurring in a year among Singapore residents, divided by the number of Singapore residents in the same year. Patients were categorised into 5-year age groups and age standardisation was done using the direct method with the Segi World population as the standardisation weights.

Case fatality rate

The case fatality rate in each year was calculated by taking the number of deaths with AMI as the primary cause of death that occurred within 30 days from onset of AMI, divided by the number of AMI patients in the same year. This indicator reflects the

https://tablebuilder.singstat.gov.sg/table/TS/M810011. Accessed on 23 April 2024.

⁵ Stein YG et al. Type-II myocardial infarction – patient characteristics, management and outcomes. PLoS One 2014; 9(1): e84285.

⁶ SingStat Table Builder, Population and Population Structure, Annual Population, Singapore Residents by age group, ethnic group and sex. Department of Statistics, Singapore.

⁷ Omar BA et al. Age standardization of rates: a new WHO standard. GPE discussion paper series: no. 31. EIP.GPE/EBD World Health Organization 2001.

severity of AMI, the timeliness of healthcare delivery and the effectiveness of AMI treatment.

This report focuses on Singapore residents, aged 15 years and above, diagnosed with AMI in 2012 to 2022 as they stood on 27 March 2024. All findings in this report, except mortality and case fatality, were based on AMI episodes.

5. FINDINGS

5.1 Incidence

The number of AMI episodes increased by about 44% from 9,124 in 2012 to 13,137 in 2022, with the corresponding crude incidence rates (CIR) increasing significantly from 285.9 to 376.3 per 100,000 population (Table 5.1.1 and Figure 5.1.1). However, after accounting for Singapore's ageing population, there was little overall change in ASIR (p=0.544). Notably, there was a drop in the AMI incidence number and rate in 2020, which was likely due to the corollary effect of COVID-19 pandemic, as patients avoided going to the hospitals, especially elderly with NSTEMI⁸. Similarly, declines in hospital admissions for AMI during the peak of the pandemic were also noted in many other countries, such as in China, Italy, Spain, United States, United Kingdom, France, Greece, and Sweden⁹. In 2021 and 2022, however, the ASIR returned to be closer to that observed prior to the COVID-19 pandemic.

Year of onset	Number	CIR	95% CI	ASIR	95% CI
2012	9124	285.9	280.0-291.8	223.3	218.6-227.9
2013	9532	295.2	289.3-301.1	222.8	218.3-227.3
2014	9835	301.4	295.5-307.4	219.3	214.9-223.7
2015	10132	307.0	301.0-313.0	217.2	212.9-221.5
2016	10815	324.1	317.9-330.2	222.5	218.2-226.8
2017	11949	354.4	348.1-360.8	235.0	230.7-239.3
2018	11983	352.1	345.8-358.4	227.5	223.3-231.6
2019	12651	368.3	361.9-374.7	230.9	226.7-235.0
2020	11680	338.0	331.8-344.1	207.9	204.0-211.8
2021	12447	365.1	358.6-371.5	217.9	213.9-221.9
2022	13137	376.3	369.8-382.7	217.9	214.0-221.8
P for trend	-	<0.001**	-	0.544	-

Table 5.1.1: Incidence number and rate of AMI (per 100,000 population)

Figure 5.1.1: Incidence rate of AMI (per 100,000 population)



⁸ Tern P. et al. Impact of COVID-19 on Acute MI and Percutaneous Coronary Intervention Rates and Outcomes in Southeast Asia and the Middle East. Journal of Asia Pacific Society of Cardiology: 2022.

⁹ Toscano et al. Acute Myocardial Infarction During the COVID-19 Pandemic: An Update on Clinical Characteristics and Outcomes. Front. Cardiovasc. Med. 2021; 8.

The median age at onset of AMI increased from 68.5 years in 2012 to 71.4 years in 2022 (p<0.001) (Table 5.1.2). Nearly 80% of AMI patients were aged 60 years and above at onset in 2022, a gradual increase from about 70% in 2012; and about 53% were aged 70 years and above (Figure 5.1.2). In comparison, the American Heart Association (AHA) reported in 2023 that 30-40% of Americans hospitalised for acute coronary syndrome were aged 75 years and above¹⁰.

Voor of opent	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
rear of onset	Median	age	Number	%	Number	%	Number	%
2012	68.5		15	0.2	139	1.5	726	8.0
2013	69.2		13	0.1	139	1.5	765	8.0
2014	68.8		11	0.1	127	1.3	768	7.8
2015	68.8		13	0.1	148	1.5	742	7.3
2016	69.0		16	0.1	155	1.4	727	6.7
2017	70.1		16	0.1	162	1.4	700	5.9
2018	70.0		15	0.1	132	1.1	766	6.4
2019	70.5		22	0.2	179	1.4	785	6.2
2020	69.9		15	0.1	143	1.2	774	6.6
2021	70.3		12	0.1	190	1.5	747	6.0
2022	71.4		10	0.1	158	1.2	733	5.6
Voor of oncot	Age 50-59		Age 60	-69	Age 70-79		Age 8	0+
rear or onset	Number	0/	Number	0/	Number	0/		• (
	подпри	70	Indunia	%	numper	70	Number	%
2012	1818	% 19.9	2107	% 23.1	2213	7 6 24.3	2106	% 23.1
2012 2013	1818 1859	% 19.9 19.5	2107 2146	% 23.1 22.5	2213 2241	7 0 24.3 23.5	Number 2106 2369	% 23.1 24.9
2012 2013 2014	1818 1859 1972	% 19.9 19.5 20.1	2107 2146 2241	% 23.1 22.5 22.8	2213 2241 2297	70 24.3 23.5 23.4	Number 2106 2369 2419	% 23.1 24.9 24.6
2012 2013 2014 2015	Number 1818 1859 1972 1923	% 19.9 19.5 20.1 19.0	2107 2146 2241 2489	% 23.1 22.5 22.8 24.6	Number 2213 2241 2297 2189	70 24.3 23.5 23.4 21.6	Number 2106 2369 2419 2628	% 23.1 24.9 24.6 25.9
2012 2013 2014 2015 2016	Number 1818 1859 1972 1923 2004	% 19.9 19.5 20.1 19.0 18.5	Number 2107 2146 2241 2489 2814	% 23.1 22.5 22.8 24.6 26.0	Number 2213 2241 2297 2189 2285	70 24.3 23.5 23.4 21.6 21.1	Number 2106 2369 2419 2628 2814	% 23.1 24.9 24.6 25.9 26.0
2012 2013 2014 2015 2016 2017	Number 1818 1859 1972 1923 2004 2116	% 19.9 19.5 20.1 19.0 18.5 17.7	Number 2107 2146 2241 2489 2814 2963	% 23.1 22.5 22.8 24.6 26.0 24.8	Number 2213 2241 2297 2189 2285 2768	70 24.3 23.5 23.4 21.6 21.1 23.2	Number 2106 2369 2419 2628 2814 3224	% 23.1 24.9 24.6 25.9 26.0 27.0
2012 2013 2014 2015 2016 2017 2018	Number 1818 1859 1972 1923 2004 2116 2035	% 19.9 19.5 20.1 19.0 18.5 17.7 17.0	Number 2107 2146 2241 2489 2814 2963 3040	% 23.1 22.5 22.8 24.6 26.0 24.8 25.4	Number 2213 2241 2297 2189 2285 2768 2762	70 24.3 23.5 23.4 21.6 21.1 23.2 23.0	Number 2106 2369 2419 2628 2814 3224 3233	% 23.1 24.9 24.6 25.9 26.0 27.0 27.0
2012 2013 2014 2015 2016 2017 2018 2019	Number 1818 1859 1972 1923 2004 2116 2035 2057	76 19.9 19.5 20.1 19.0 18.5 17.7 17.0 16.3	Number 2107 2146 2241 2489 2814 2963 3040 3136	% 23.1 22.5 22.8 24.6 26.0 24.8 25.4 24.8	Number 2213 2241 2297 2189 2285 2768 2762 2978	70 24.3 23.5 23.4 21.6 21.1 23.2 23.0 23.5	Number 2106 2369 2419 2628 2814 3224 3233 3494	% 23.1 24.9 25.9 26.0 27.0 27.6
2012 2013 2014 2015 2016 2017 2018 2019 2020	Number 1818 1859 1972 1923 2004 2116 2035 2057 1960	% 19.9 19.5 20.1 19.0 18.5 17.7 17.0 16.3 16.8	Number 2107 2146 2241 2489 2814 2963 3040 3136 2984	% 23.1 22.5 22.8 24.6 26.0 24.8 25.4 24.8 25.5	Number 2213 2241 2297 2189 2285 2768 2762 2978 2624	76 24.3 23.5 23.4 21.6 21.1 23.2 23.0 23.5 23.5	Number 2106 2369 2419 2628 2814 3224 3233 3494 3180	% 23.1 24.9 25.9 26.0 27.0 27.6 27.2
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Number 1818 1859 1972 1923 2004 2116 2035 2057 1960 1988	76 19.9 19.5 20.1 19.0 18.5 17.7 17.0 16.3 16.8 16.0	Number 2107 2146 2241 2489 2814 2963 3040 3136 2984 3203	% 23.1 22.5 22.8 24.6 26.0 24.8 25.4 24.8 25.5 25.7	Number 2213 2241 2297 2189 2285 2768 2762 2978 2624 2848	70 24.3 23.5 23.4 21.6 21.1 23.2 23.0 23.5 22.5 22.9	Number 2106 2369 2419 2628 2814 3224 3233 3494 3180 3459	% 23.1 24.9 25.9 26.0 27.0 27.6 27.2 27.8

Table 5.1.2: Age distribution at onset of AMI

¹⁰ Damluji et al. Management of Acute Coronary Syndrome in the Older Adult Population: A Scientific Statement From the American Heart Association. Circulation. 2023;147:e32–e62



Figure 5.1.2: Age distribution at onset of AMI

The age-specific incidence rate of AMI increased with age, with the oldest age group (80 years and above) having the highest incidence rate – about 4.5 and 2.5 times that of those aged 60-69 and 70-79 years respectively (Figures 5.1.3a and 5.1.3b). Over the years, only those aged 70-79 years exhibited a significant decline in age-specific incidence of AMI, while the trends in the remaining age groups were not statistically significant (Table 5.1.3).

Figure 5.1.3a: Age-specific incidence rate of AMI (per 100,000 population) across years







Voor of opport	C	Overall	Ag	e 15-29	Ag	e 30-39	Ag	e 40-49
rear of onset	CIR	95% CI	CIR	95% CI	CIR	95% CI	CIR	95% CI
2012	285.9	280.0-291.8	1.9	1.0-2.9	22.8	19.0-26.6	115.3	106.9-123.7
2013	295.2	289.3-301.1	1.7	0.8-2.6	23.1	19.2-26.9	121.7	113.0-130.3
2014	301.4	295.5-307.4	1.4	0.6-2.3	21.4	17.7-25.1	123.0	114.3-131.7
2015	307.0	301.0-313.0	1.7	0.8-2.6	25.0	21.0-29.0	119.6	111.0-128.3
2016	324.1	317.9-330.2	2.0	1.0-3.1	26.4	22.2-30.5	118.3	109.7-126.9
2017	354.4	348.1-360.8	2.0	1.0-3.0	27.9	23.6-32.2	113.8	105.4-122.3
2018	352.1	345.8-358.4	1.9	1.0-2.9	22.6	18.7-26.4	125.3	116.4-134.1
2019	368.3	361.9-374.7	2.9	1.7-4.1	30.1	25.7-34.5	128.2	119.2-137.1
2020	338.0	331.8-344.1	2.0	1.0-3.0	23.9	20.0-27.9	126.7	117.7-135.6
2021	365.1	358.6-371.5	1.7	0.7-2.6	32.2	27.6-36.8	126.0	117.0-135.0
2022	376.3	369.8-382.7	1.4	0.5-2.2	26.0	21.9-30.0	121.3	112.5-130.1
P for trend	<0.001**	-	0.805	-	0.052	-	0.096	-
Voar of opent	Ag	je 50-59	Ag	e 60-69	Ag	e 70-79	A	ge 80+
Year of onset	Ag CIR	e 50-59 95% Cl	Ag CIR	e 60-69 95% Cl	Ag CIR	e 70-79 95% CI	A CIR	ge 80+ 95% Cl
Year of onset 2012	Aç CIR 312.3	e 50-59 95% CI 297.9-326.6	Ag CIR 614.6	e 60-69 95% Cl 588.4-640.9	Ag CIR 1286.6	e 70-79 95% Cl 1233.0-1340.2	A CIR 2713.9	ge 80+ 95% Cl 2598.0-2829.8
Year of onset 2012 2013	Ac CIR 312.3 313.0	e 50-59 95% Cl 297.9-326.6 298.8-327.2	Ag CIR 614.6 583.0	e 60-69 95% Cl 588.4-640.9 558.3-607.7	Ag CIR 1286.6 1272.6	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3	A CIR 2713.9 2885.5	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7
Year of onset 2012 2013 2014	Ag CIR 312.3 313.0 326.5	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0	Ag CIR 614.6 583.0 570.7	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3	Ag CIR 1286.6 1272.6 1254.4	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7	A CIR 2713.9 2885.5 2771.1	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5
Year of onset 2012 2013 2014 2015	Ac CIR 312.3 313.0 326.5 315.2	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3	Ag CIR 614.6 583.0 570.7 588.5	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7	Ag CIR 1286.6 1272.6 1254.4 1190.7	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6	A CIR 2713.9 2885.5 2771.1 2812.3	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8
Year of onset 2012 2013 2014 2015 2016	Ag CIR 312.3 313.0 326.5 315.2 325.8	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3 311.5-340.0	Ag CIR 614.6 583.0 570.7 588.5 625.5	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7 602.4-648.6	Ag CIR 1286.6 1272.6 1254.4 1190.7 1191.6	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6 1142.8-1240.5	A CIR 2713.9 2885.5 2771.1 2812.3 2877.3	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8 2771.0-2983.6
Year of onset 2012 2013 2014 2015 2016 2017	Ac CIR 312.3 313.0 326.5 315.2 325.8 344.3	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3 311.5-340.0 329.7-359.0	Ag CIR 614.6 583.0 570.7 588.5 625.5 635.0	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7 602.4-648.6 612.1-657.9	Ag CIR 1286.6 1272.6 1254.4 1190.7 1191.6 1309.1	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6 1142.8-1240.5 1260.3-1357.8	A CIR 2713.9 2885.5 2771.1 2812.3 2877.3 3183.4	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8 2771.0-2983.6 3073.5-3293.3
Year of onset 2012 2013 2014 2015 2016 2017 2018	Ag CIR 312.3 313.0 326.5 315.2 325.8 344.3 331.8	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3 311.5-340.0 329.7-359.0 317.4-346.2	Ag CIR 614.6 583.0 570.7 588.5 625.5 635.0 628.4	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7 602.4-648.6 612.1-657.9 606.0-650.7	Ag CIR 1286.6 1272.6 1254.4 1190.7 1191.6 1309.1 1206.8	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6 1142.8-1240.5 1260.3-1357.8 1161.8-1251.8	A CIR 2713.9 2885.5 2771.1 2812.3 2877.3 3183.4 3024.9	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8 2771.0-2983.6 3073.5-3293.3 2920.6-3129.2
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019	Ag CIR 312.3 313.0 326.5 315.2 325.8 344.3 331.8 338.1	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3 311.5-340.0 329.7-359.0 317.4-346.2 323.5-352.7	Ag CIR 614.6 583.0 570.7 588.5 625.5 635.0 628.4 627.0	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7 602.4-648.6 612.1-657.9 606.0-650.7 605.1-649.0	Ag CIR 1286.6 1272.6 1254.4 1190.7 1191.6 1309.1 1206.8 1216.9	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6 1142.8-1240.5 1260.3-1357.8 1161.8-1251.8 1173.2-1260.6	A CIR 2713.9 2885.5 2771.1 2812.3 2877.3 3183.4 3024.9 3021.0	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8 2771.0-2983.6 3073.5-3293.3 2920.6-3129.2 2920.8-3121.2
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020	Ag CIR 312.3 313.0 326.5 315.2 325.8 344.3 331.8 338.1 325.6	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3 311.5-340.0 329.7-359.0 317.4-346.2 323.5-352.7 311.2-340.1	Ag CIR 614.6 583.0 570.7 588.5 625.5 635.0 628.4 627.0 580.5	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7 602.4-648.6 612.1-657.9 606.0-650.7 605.1-649.0 559.7-601.3	Ag CIR 1286.6 1272.6 1254.4 1190.7 1191.6 1309.1 1206.8 1216.9 1005.4	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6 1142.8-1240.5 1260.3-1357.8 1161.8-1251.8 1173.2-1260.6 966.9-1043.8	A CIR 2713.9 2885.5 2771.1 2812.3 2877.3 3183.4 3024.9 3021.0 2565.1	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8 2771.0-2983.6 3073.5-3293.3 2920.6-3129.2 2920.8-3121.2 2475.9-2654.2
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Ag CIR 312.3 313.0 326.5 315.2 325.8 344.3 331.8 338.1 325.6 340.3	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3 311.5-340.0 329.7-359.0 317.4-346.2 323.5-352.7 311.2-340.1 325.3-355.3	Ag CIR 614.6 583.0 570.7 588.5 625.5 635.0 628.4 627.0 580.5 618.3	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7 602.4-648.6 612.1-657.9 606.0-650.7 605.1-649.0 559.7-601.3 596.9-639.8	Ag CIR 1286.6 1272.6 1254.4 1190.7 1191.6 1309.1 1206.8 1216.9 1005.4 1045.9	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6 1142.8-1240.5 1260.3-1357.8 1161.8-1251.8 1173.2-1260.6 966.9-1043.8 1007.5-1084.3	A CIR 2713.9 2885.5 2771.1 2812.3 2877.3 3183.4 3024.9 3021.0 2565.1 2634.2	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8 2771.0-2983.6 3073.5-3293.3 2920.6-3129.2 2920.8-3121.2 2475.9-2654.2 2546.4-2721.9
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022	Ag CIR 312.3 313.0 326.5 315.2 325.8 344.3 331.8 338.1 325.6 340.3 318.6	e 50-59 95% Cl 297.9-326.6 298.8-327.2 312.1-341.0 301.1-329.3 311.5-340.0 329.7-359.0 317.4-346.2 323.5-352.7 311.2-340.1 325.3-355.3 304.3-333.0	Ag CIR 614.6 583.0 570.7 588.5 625.5 635.0 628.4 627.0 580.5 618.3 622.3	e 60-69 95% Cl 588.4-640.9 558.3-607.7 547.0-594.3 565.4-611.7 602.4-648.6 612.1-657.9 606.0-650.7 605.1-649.0 559.7-601.3 596.9-639.8 601.2-643.4	Ag CIR 1286.6 1272.6 1254.4 1190.7 1191.6 1309.1 1206.8 1216.9 1005.4 1045.9 1078.9	e 70-79 95% Cl 1233.0-1340.2 1219.9-1325.3 1203.1-1305.7 1140.8-1240.6 1142.8-1240.5 1260.3-1357.8 1161.8-1251.8 1173.2-1260.6 966.9-1043.8 1007.5-1084.3 1041.4-1116.4	A CIR 2713.9 2885.5 2771.1 2812.3 2877.3 3183.4 3024.9 3021.0 2565.1 2634.2 2824.2	ge 80+ 95% Cl 2598.0-2829.8 2769.3-3001.7 2660.7-2881.5 2704.7-2919.8 2771.0-2983.6 3073.5-3293.3 2920.6-3129.2 2920.8-3121.2 2475.9-2654.2 2546.4-2721.9 2734.8-2913.6

 Table 5.1.3: Age-specific incidence rate of AMI (per 100,000 population)

Although the sex distribution was almost equal in the general population, there were about twice as many males getting an AMI every year (Table 5.1.4). The ASIRs for males were consistently higher than females (Figure 5.1.4). In 2022, males had an ASIR of 326.7 per 100,000 population, while females had an ASIR of 118.2 per 100,000 population. While the CIRs had increased significantly for both sexes, after accounting for population ageing, the change in ASIR of AMI among males was not significant (p=0.274), while that for females had decreased significantly (p=0.004).

Males were known to have a higher risk of AMI than females. The underlying causes were multifactorial and related to the pathophysiological sex differences in AMI¹¹. Furthermore, the prevalence of hypertension, hyperlipidaemia, diabetes, high body mass index (BMI) and smoking, which are common risk factors of AMI, were higher among males than females in the general population based on the National Population Health Survey (NPHS) 2022¹².

Male										
Year of onset	Number	%	CIR	95% CI	ASIR	95% CI				
2012	5977	65.5	383.1	373.4-392.8	320.8	312.6-329.0				
2013	6106	64.1	387.2	377.5-396.9	314.9	307.0-322.8				
2014	6391	65.0	401.4	391.5-411.2	315.4	307.7-323.2				
2015	6581	65.0	408.9	399.0-418.8	312.7	305.1-320.3				
2016	7105	65.7	437.0	426.8-447.2	324.3	316.7-331.9				
2017	7890	66.0	480.9	470.3-491.5	346.6	338.9-354.3				
2018	7991	66.7	483.1	472.5-493.6	339.3	331.8-346.8				
2019	8271	65.4	495.9	485.2-506.5	338.3	330.9-345.7				
2020	7812	66.9	465.7	455.4-476.0	312.0	305.0-319.1				
2021	8355	67.1	503.9	493.1-514.7	328.7	321.5-336.0				
2022	8695	66.2	513.6	502.8-524.4	326.7	319.6-333.7				
P for trend	-	-	<0.001**	-	0.274	-				
		-	Female							
Year of onset	Number	%	CIR	95% CI	ASIR	95% CI				
2012	3147	34.5	192.9	186.2-199.7	133.6	128.8-138.5				
2013	3426	35.9	207.4	200.4-214.3	136.2	131.5-140.9				
2014	3444	35.0	206.2	199.3-213.1	130.1	125.6-134.6				
2015	3551	35.0	210.0	203.1-216.9	127.7	123.3-132.1				
2016	3710	34.3	216.8	209.8-223.7	128.7	124.3-133.0				
2017	4059	34.0	234.5	227.3-241.7	133.3	129.0-137.5				
2018	3992	33.3	228.3	221.2-235.3	125.4	121.4-129.5				
2019	4380	34.6	247.9	240.5-255.2	132.2	128.0-136.3				
2020	3868	33.1	217.5	210.6-224.3	112.5	108.8-116.3				
2021	4092	32.9	233.6	226.4-240.8	116.1	112.3-119.9				
2022	4442	33.8	247.0	239.7-254.3	118.2	114.5-121.9				
P for trend	-	-	0.001**	-	0.004**	-				

Table 5.1.4: Incidence number and rate of AMI (per 100,000 population) by sex

¹¹ Mehta LS et al. Acute myocardial infarction in women. Circulation 2016; 133.

¹² National Population Health Survey 2022 (Household Interview and Health Examination). Ministry of Health, Singapore. <u>https://www.moh.gov.sg/resources-statistics/reports/national-population-health-survey-2022</u>. Accessed 18 June 2024.



Figure 5.1.4: Incidence rate of AMI (per 100,000 population) by sex

The median age at onset of AMI among males increased from 64.3 years in 2012 to 67.9 years in 2022 (p<0.001) (Table 5.1.5a). The highest proportion of male AMI patients in 2022 was among those aged 60-69 years (29.3%); this was the case throughout the years from 2012 onwards (Figure 5.1.5a).

Voor of opent	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49	
rear of onset	Median	age	Number	%	Number	%	Number	%	
2012	64.3		11	0.2	120	2.0	633	10.6	
2013	64.4		10	0.2	121	2.0	661	10.8	
2014	64.7		10	0.2	111	1.7	664	10.4	
2015	65.1		8	0.1	126	1.9	637	9.7	
2016	65.6		11	0.2	133	1.9	613	8.6	
2017	66.6		14	0.2	134	1.7	607	7.7	
2018	66.7		12	0.2	112	1.4	661	8.3	
2019	66.9		16	0.2	144	1.7	660	8.0	
2020	66.5		14	0.2	118	1.5	646	8.3	
2021	67.1		11	0.1	154	1.8	637	7.6	
2022	67.9		4	0.0	137	1.6	622	7.2	
Voar of onsot	Age 50-59		Age 60	Age 60-69		Age 70-79		Age 80+	
	Number	%	Number	%	Number	%	Number	%	
2012	Number 1491	% 24.9	Number 1500	% 25.1	Number 1286	% 21.5	Number 936	% 15.7	
2012 2013	Number 1491 1534	% 24.9 25.1	Number 1500 1547	% 25.1 25.3	Number 1286 1277	% 21.5 20.9	Number 936 956	% 15.7 15.7	
2012 2013 2014	Number 1491 1534 1599	% 24.9 25.1 25.0	Number 1500 1547 1632	% 25.1 25.3 25.5	Number 1286 1277 1342	% 21.5 20.9 21.0	Number 936 956 1033	% 15.7 15.7 16.2	
2012 2013 2014 2015	Number 1491 1534 1599 1576	% 24.9 25.1 25.0 23.9	Number 1500 1547 1632 1834	% 25.1 25.3 25.5 27.9	Number 1286 1277 1342 1298	% 21.5 20.9 21.0 19.7	Number 936 956 1033 1102	% 15.7 15.7 16.2 16.7	
2012 2013 2014 2015 2016	Number14911534159915761675	% 24.9 25.1 25.0 23.9 23.6	Number15001547163218342036	% 25.1 25.3 25.5 27.9 28.7	Number 1286 1277 1342 1298 1366	% 21.5 20.9 21.0 19.7 19.2	Number 936 956 1033 1102 1271	% 15.7 15.7 16.2 16.7 17.9	
2012 2013 2014 2015 2016 2017	Number149115341599157616751740	%24.925.125.023.923.622.1	Number150015471632183420362181	%25.125.325.527.928.727.6	Number 1286 1277 1342 1298 1366 1716	% 21.5 20.9 21.0 19.7 19.2 21.7	Number 936 956 1033 1102 1271 1498	% 15.7 16.2 16.7 17.9 19.0	
2012 2013 2014 2015 2016 2017 2018	Number 1491 1534 1599 1576 1675 1675 1740 1683	%24.925.125.023.923.622.121.1	Number1500154716321834203621812270	%25.125.325.527.928.727.628.4	Number 1286 1277 1342 1298 1366 1716 1725	%21.520.921.019.719.221.721.6	Number 936 956 1033 1102 1271 1498 1528	% 15.7 16.2 16.7 17.9 19.0 19.1	
2012 2013 2014 2015 2016 2017 2018 2019	Number 1491 1534 1599 1576 1675 1740 1683 1679	%24.925.125.023.622.121.120.3	Number 1500 1547 1632 1834 2036 2181 2270 2301	% 25.1 25.3 25.5 27.9 28.7 27.6 28.4 27.8	Number 1286 1277 1342 1298 1366 1716 1725 1856	% 21.5 20.9 21.0 19.7 19.2 21.7 21.6 22.4	Number 936 956 1033 1102 1271 1498 1528 1615	% 15.7 16.2 16.7 19.0 19.1 19.5	
2012 2013 2014 2015 2016 2017 2018 2019 2020	Number 1491 1534 1599 1576 1675 1675 1683 1679 1610	% 24.9 25.1 25.0 23.9 23.6 22.1 21.1 20.3 20.6	Number 1500 1547 1632 1834 2036 2181 2270 2301 2254	% 25.1 25.3 27.9 28.7 27.6 28.4 27.8 28.9	Number 1286 1277 1342 1298 1366 1716 1725 1856 1656	% 21.5 20.9 21.0 19.7 19.2 21.7 21.6 22.4 21.2	Number 936 956 1033 1102 1271 1498 1528 1615 1514	% 15.7 16.2 16.7 19.0 19.1 19.5 19.4	
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Number1491153415761576167516751683167916101644	% 24.9 25.1 25.0 23.6 22.1 21.1 20.3 20.6 19.7	Number 1500 1547 1632 1834 2036 2181 2270 2301 2254 2413	%25.125.527.928.727.628.427.828.928.9	Number 1286 1277 1342 1298 1366 1716 1725 1856 1656 1823	% 21.5 20.9 21.0 19.7 19.2 21.7 21.6 22.4 21.2 21.8	Number 936 956 1033 1102 1271 1498 1528 1615 1514 1673	% 15.7 16.2 16.7 19.0 19.1 19.5 19.4 20.0	

Table 5.1.5a: Age distribution at onset of AMI among males

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Figure 5.1.5a: Age distribution at onset of AMI among males

The median age at onset of AMI among females increased from 75.9 years in 2012 to 78.4 years in 2022 (p=0.008) (Table 5.1.5b), about 10 years older than the median age at onset among males (Table 5.1.5a). In contrast to males, amongst whom those aged 60-69 years formed the biggest age group (29.3%), those aged 80 years and above formed the largest proportion of female AMI patients every year (45.7%) in 2022 (Figure 5.1.5b).

Worldwide, the pattern of females having AMI onset 9-10 years later than males persists across all regions, primarily because younger males had higher prevalence of risk factors than females of the same age, especially lipid abnormalities and smoking^{13,14}. The same risk profile had been observed in Singapore in the NPHS 2022¹⁵, whereby the prevalence of hyperlipidaemia and smoking were substantially higher among males aged 30-59 years compared to females of the same age.

Veer of erect	Overall	Age 15-29		Age 30-39		Age 40-49	
rear of onset	Median age	Number	%	Number	%	Number	%
2012	75.9	4	0.1	19	0.6	93	3.0
2013	77.4	3	0.1	18	0.5	104	3.0
2014	76.9	1	0.0	16	0.5	104	3.0
2015	77.4	5	0.1	22	0.6	105	3.0
2016	77.3	5	0.1	22	0.6	114	3.1
2017	77.8	2	0.0	28	0.7	93	2.3
2018	78.0	3	0.1	20	0.5	105	2.6
2019	78.0	6	0.1	35	0.8	125	2.9
2020	77.6	1	0.0	25	0.6	128	3.3
2021	77.4	1	0.0	36	0.9	110	2.7

Table 5.1.5b: Age	e distribution at	onset of AMI	among females
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¹³ Yusof, S et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364:937-952.

¹⁴ Campbell, D. J. Why do men and women differ in their risk of myocardial infarction? European Heart Journal. 2008;29:835-835.

¹⁵ National Population Health Survey 2022 (Household Interview and Health Examination). Ministry of Health, Singapore. <u>https://www.moh.gov.sg/resources-statistics/reports/national-population-health-survey-2022</u>. Accessed 18 June 2024.

2022	78.4		6	0.1	21	0.5	111	2.5	
Veer of eneot	Age 50	-59	Age 60	Age 60-69		Age 70-79		Age 80+	
rear of onset	Number	%	Number	%	Number	%	Number	%	
2012	327	10.4	607	19.3	927	29.5	1170	37.2	
2013	325	9.5	599	17.5	964	28.1	1413	41.2	
2014	373	10.8	609	17.7	955	27.7	1386	40.2	
2015	347	9.8	655	18.4	891	25.1	1526	43.0	
2016	329	8.9	778	21.0	919	24.8	1543	41.6	
2017	376	9.3	782	19.3	1052	25.9	1726	42.5	
2018	352	8.8	770	19.3	1037	26.0	1705	42.7	
2019	378	8.6	835	19.1	1122	25.6	1879	42.9	
2020	350	9.0	730	18.9	968	25.0	1666	43.1	
2021	344	8.4	790	19.3	1025	25.0	1786	43.6	
2022	339	7.6	785	17.7	1150	25.9	2030	45.7	





Comparing the ethnic distribution of the AMI population with the general population, the proportion of Chinese was lower among the AMI population (Table 5.1.6). Chinese also consistently had the lowest ASIR across the years – consistently less than half that of the Malays and Indians (Figure 5.1.6). In 2022, the ASIR of AMI in the Chinese, Malays and Indians were 172.9, 421.3 and 418.3 per 100,000 population respectively. The changes in ASIR over the years were not significant for all the three ethnic groups.

A possible reason for the comparatively higher incidence of AMI in the Malays and Indians could be that diabetes and high BMI, which are common risk factors of AMI, were more prevalent among Malays and Indians than Chinese in the general population based on the NPHS 2022¹⁶. Smoking, another significant risk factor of AMI, is also more prevalent among Malays than the other ethnic groups¹⁶. Furthermore, Indians have ethnic-specific risk for coronary artery disease¹⁷.

¹⁶ National Population Health Survey 2022 (Household Interview and Health Examination). Ministry of Health, Singapore. <u>https://www.moh.gov.sg/resources-statistics/reports/national-population-health-survey-2022</u>. Accessed 18 June 2024.

¹⁷ Zheng H et al. Ethnic differences and trends in ST-segment elevation myocardial infarction incidence and mortality in a multi-ethnic population. Annuals Academy of Medicine Singapore. 2019; 48: 75-85.

			Chines	е		
Year of onset	Number	%	CIR	95% CI	ASIR	95% CI
2012	5981	65.6	248.0	241.8-254.3	176.9	172.3-181.5
2013	6309	66.2	258.6	252.2-265.0	177.5	173.1-182.0
2014	6521	66.3	264.7	258.2-271.1	175.0	170.7-179.4
2015	6801	67.1	272.8	266.3-279.3	175.0	170.8-179.3
2016	7119	65.8	282.4	275.9-289.0	175.7	171.5-179.9
2017	8035	67.2	315.6	308.7-322.5	188.5	184.3-192.8
2018	8046	67.1	313.2	306.3-320.0	182.0	177.9-186.1
2019	8410	66.5	324.3	317.4-331.3	181.9	177.9-186.0
2020	7756	66.4	297.4	290.7-304.0	163.6	159.8-167.4
2021	8230	66.1	320.1	313.2-327.0	169.1	165.2-173.0
2022	8809	67.1	335.3	328.3-342.3	172.9	169.0-176.7
P for trend	-	-	<0.001**	-	0.343	-
			Malay			
Year of onset	Number	%	CIR	95% CI	ASIR	95% CI
2012	1854	20.3	460.0	439.1-481.0	458.8	437.4-480.3
2013	1892	19.8	462.8	442.0-483.7	450.0	429.3-470.7
2014	1873	19.0	451.8	431.4-472.3	421.7	402.2-441.2
2015	1965	19.4	467.7	447.1-488.4	426.6	407.3-445.9
2016	2154	19.9	505.8	484.5-527.2	449.6	430.2-469.0
2017	2263	18.9	525.2	503.6-546.9	458.1	438.9-477.2
2018	2270	18.9	521.5	500.0-542.9	442.7	424.3-461.2
2019	2454	19.4	558.9	536.8-581.0	462.4	443.9-480.9
2020	2236	19.1	505.6	484.6-526.5	405.2	388.1-422.2
2021	2419	19.4	549.2	527.3-571.1	432.8	415.3-450.3
2022	2480	18.9	554.0	532.2-575.8	421.3	404.5-438.1
P for trend	-	-	<0.001**	-	0.235	-
			Indian	1		
Year of onset	Number	%	CIR	95% CI	ASIR	95% CI
2012	1166	12.8	418.1	394.1-442.1	433.1	407.6-458.6
2013	1184	12.4	421.1	397.1-445.0	420.7	396.3-445.2
2014	1261	12.8	444.3	419.8-468.9	426.7	402.8-450.7
2015	1237	12.2	432.4	408.3-456.5	399.0	376.4-421.6
2016	1399	12.9	485.0	459.6-510.4	436.4	413.2-459.6
2017	1500	12.6	514.9	488.9-541.0	450.4	427.4-473.3
2018	1538	12.8	523.0	496.8-549.1	440.6	418.6-462.7
2019	1620	12.8	544.6	518.1-571.1	447.8	426.0-469.6
2020	1548	13.3	517.8	492.0-543.6	413.1	392.6-433.7
2021	1633	13.1	556.3	529.3-583.3	434.5	413.4-455.5
2022	1680	12.8	549.7	523.4-576.0	418.3	398.3-438.3
P for trend	-	-	<0.001**	-	0.811	-

 Table 5.1.6: Incidence number and rate (per 100,000 population) of AMI by

 ethnicity



Figure 5.1.6: Incidence rate of AMI (per 100,000 population) by ethnicity

The Chinese had the oldest median age at onset of AMI, which increased from 71.7 years in 2012 to 74.1 years in 2022 (p=0.002) (Table 5.1.7a). Since 2012, those aged 80 years and above accounted for the largest proportion of AMI cases among the Chinese, ranging from 28.0%-35.1% (Figure 5.1.7a).

Veer of erect	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
tear of onset	Median	age	Number	%	Number	%	Number	%
2012	71.7		10	0.2	66	1.1	392	6.6
2013	72.6		8	0.1	75	1.2	381	6.0
2014	72.5		6	0.1	60	0.9	389	6.0
2015	72.3		9	0.1	66	1.0	353	5.2
2016	72.0		4	0.1	81	1.1	344	4.8
2017	73.3		6	0.1	80	1.0	372	4.6
2018	72.7		6	0.1	61	0.8	394	4.9
2019	73.2		10	0.1	87	1.0	392	4.7
2020	72.8		7	0.1	56	0.7	404	5.2
2021	73.3		7	0.1	82	1.0	369	4.5
2022	74.1		5	0.1	78	0.9	391	4.4
Voor of opent	Age 50	-59	Age 60	Age 60-69		-79	Age 8	0+
rear or onset	Age 50-59					~ ~		
	Number	%	Number	%	Number	%	Number	%
2012	Number 960	% 16.1	Number 1308	% 21.9	Number 1568	% 26.2	Number 1677	% 28.0
2012 2013	Number 960 1002	% 16.1 15.9	Number 1308 1335	% 21.9 21.2	Number 1568 1610	% 26.2 25.5	Number 1677 1898	% 28.0 30.1
2012 2013 2014	Number 960 1002 1072	% 16.1 15.9 16.4	Number 1308 1335 1398	% 21.9 21.2 21.4	Number 1568 1610 1674	% 26.2 25.5 25.7	Number 1677 1898 1922	% 28.0 30.1 29.5
2012 2013 2014 2015	Number 960 1002 1072 1067	% 16.1 15.9 16.4 15.7	Number 1308 1335 1398 1590	% 21.9 21.2 21.4 23.4	Number 1568 1610 1674 1619	% 26.2 25.5 25.7 23.8	Number 1677 1898 1922 2097	% 28.0 30.1 29.5 30.8
2012 2013 2014 2015 2016	Number 960 1002 1072 1067 1079	% 16.1 15.9 16.4 15.7 15.2	Number 1308 1335 1398 1590 1750	% 21.9 21.2 21.4 23.4 24.6	Number 1568 1610 1674 1619 1662	26.2 25.5 25.7 23.8 23.3	Number 1677 1898 1922 2097 2199	% 28.0 30.1 29.5 30.8 30.9
2012 2013 2014 2015 2016 2017	Number 960 1002 1072 1067 1079 1110	% 16.1 15.9 16.4 15.7 15.2 13.8	Number 1308 1335 1398 1590 1750 1835	% 21.9 21.2 21.4 23.4 24.6 22.8	Number 1568 1610 1674 1619 1662 2010	% 26.2 25.5 25.7 23.8 23.3 25.0	Number 1677 1898 1922 2097 2199 2622	% 28.0 30.1 29.5 30.8 30.9 32.6
2012 2013 2014 2015 2016 2017 2018	Number 960 1002 1072 1067 1079 1110 1079	% 16.1 15.9 16.4 15.7 15.2 13.8 13.4	Number 1308 1335 1398 1590 1750 1835 1895	% 21.9 21.2 21.4 23.4 24.6 22.8 23.6	Number 1568 1610 1674 1619 1662 2010 2045	% 26.2 25.5 25.7 23.8 23.3 25.0 25.4	Number 1677 1898 1922 2097 2199 2622 2566	% 28.0 30.1 29.5 30.8 30.9 32.6 31.9
2012 2013 2014 2015 2016 2017 2018 2019	Number 960 1002 1072 1067 1079 1110 1079 10096	% 16.1 15.9 16.4 15.7 15.2 13.8 13.4 13.0	Number 1308 1335 1398 1590 1750 1835 1895 1898	% 21.9 21.2 21.4 23.4 24.6 22.8 23.6 22.6	Number15681610167416191662201020452137	% 26.2 25.5 25.7 23.8 23.3 25.0 25.4 25.4	Number 1677 1898 1922 2097 2199 2622 2566 2790	% 28.0 30.1 29.5 30.8 30.9 32.6 31.9 33.2
2012 2013 2014 2015 2016 2017 2018 2019 2020	Number 960 1002 1072 1067 1079 1110 1079 960	% 16.1 15.9 16.4 15.7 15.2 13.8 13.4 13.0 12.9	Number 1308 1335 1398 1590 1750 1835 1895 1895 1898 1829	% 21.9 21.2 21.4 23.4 24.6 22.8 23.6 22.6 23.6	Number15681610167416622010204521371925	% 26.2 25.5 25.7 23.8 23.3 25.0 25.4 25.4 24.8	Number167718981922209721992622256627902536	% 28.0 30.1 29.5 30.8 30.9 32.6 31.9 33.2 32.7
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Number 960 1002 1072 1067 1079 1110 1079 1096 999 1018	% 16.1 15.9 16.4 15.7 13.8 13.4 13.0 12.9 12.4	Number 1308 1335 1398 1590 1750 1835 1895 1898 1829 1829 1899	% 21.9 21.2 21.4 23.4 24.6 22.8 23.6 22.6 23.6 23.6 23.1	Number 1568 1610 1674 1662 2010 2045 2137 1925 2050	% 26.2 25.5 25.7 23.8 23.3 25.0 25.4 25.4 24.8 24.9	Number 1677 1898 1922 2097 2199 2622 2566 2790 2536 2805	% 28.0 30.1 29.5 30.8 30.9 32.6 31.9 33.2 32.7 34.1

Table 5.1.7a: Age distribution at onset of AMI among Chinese

Figure 5.1.7a: Age distribution at onset of AMI among Chinese

The median age at onset of AMI among the Malays was earlier than that among the Chinese, increasing from 63.6 years in 2012 to 66.0 years in 2022 (p=0.014) (Table 5.1.7b). Across all years, those aged 60-69 years made up the largest proportion of Malay AMI patients (33.3% in 2022) (Figure 5.1.7b).

Veer of exect	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
tear of onset	Median	age	Number	%	Number	%	Number	%
2012	63.6		3	0.2	32	1.7	187	10.1
2013	64.0		3	0.2	32	1.7	214	11.3
2014	63.7		3	0.2	28	1.5	208	11.1
2015	63.4		4	0.2	48	2.4	209	10.6
2016	64.0		7	0.3	37	1.7	215	10.0
2017	64.5		7	0.3	46	2.0	172	7.6
2018	64.7		6	0.3	45	2.0	191	8.4
2019	65.0		7	0.3	54	2.2	195	7.9
2020	64.1		5	0.2	48	2.1	187	8.4
2021	64.1		3	0.1	66	2.7	196	8.1
2022	66.0		3	0.1	49	2.0	159	6.4
	Age 50-59							
Voar of oncot	Age 50	-59	Age 60	-69	Age 70	-79	Age 8	0+
Year of onset	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 8 Number	0+ %
Year of onset 2012	Age 50 Number 499	-59 % 26.9	Age 60 Number 490	-69 % 26.4	Age 70 Number 409	-79 % 22.1	Age 8 Number 234	0+ <u>%</u> 12.6
Year of onset 2012 2013	Age 50 Number 499 504	-59 % 26.9 26.6	Age 60 Number 490 493	-69 % 26.4 26.1	Age 70 Number 409 388	- 79 % 22.1 20.5	Age 8 Number 234 258	0+ 12.6 13.6
Year of onset 2012 2013 2014	Age 50 Number 499 504 521	- 59 26.9 26.6 27.8	Age 60 Number 490 493 489	- 69 26.4 26.1 26.1	Age 70 Number 409 388 366	- 79 22.1 20.5 19.5	Age 8 Number 234 258 258	0+ 12.6 13.6 13.8
Year of onset 2012 2013 2014 2015	Age 50 Number 499 504 521 505	- 59 26.9 26.6 27.8 25.7	Age 60 Number 490 493 489 524	-69 % 26.4 26.1 26.1 26.7	Age 70 Number 409 388 366 361	-79 22.1 20.5 19.5 18.4	Age 8 Number 234 258 258 314	0+ 12.6 13.6 13.8 16.0
Year of onset 2012 2013 2014 2015 2016	Age 50 Number 499 504 521 505 552	- 59 26.9 26.6 27.8 25.7 25.6	Age 60 Number 490 493 489 524 624	-69 % 26.4 26.1 26.1 26.7 29.0	Age 70 Number 409 388 366 361 371	-79 % 22.1 20.5 19.5 18.4 17.2	Age 8 Number 234 258 258 314 348	0+ % 12.6 13.6 13.8 16.0 16.2
Year of onset 2012 2013 2014 2015 2016 2017	Age 50 Number 499 504 521 505 552 598	-59 % 26.9 26.6 27.8 25.7 25.6 26.4	Age 60 Number 490 493 489 524 624 657	-69 % 26.4 26.1 26.1 26.7 29.0 29.0	Age 70 Number 409 388 366 361 371 452	-79 % 22.1 20.5 19.5 18.4 17.2 20.0	Age 8 Number 234 258 258 314 348 331	0+ 12.6 13.6 13.8 16.0 16.2 14.6
Year of onset 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 499 504 521 505 552 598 598	-59 26.9 26.6 27.8 25.7 25.6 26.4 24.8	Age 60 Number 490 493 489 524 624 657 659	-69 % 26.4 26.1 26.7 29.0 29.0 29.0	Age 70 Number 409 388 366 361 371 452 449	-79 % 22.1 20.5 19.5 18.4 17.2 20.0 19.8	Age 8 Number 234 258 258 314 348 331 356	0+ 12.6 13.6 13.8 16.0 16.2 14.6 15.7
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 499 504 521 505 552 598 564 574	-59 26.9 26.6 27.8 25.7 25.6 26.4 24.8 23.4	Age 60 Number 490 493 489 524 624 657 659 714	-69 % 26.4 26.1 26.7 29.0 29.0 29.0 29.1	Age 70 Number 409 388 366 361 371 452 449 515	-79 % 22.1 20.5 19.5 18.4 17.2 20.0 19.8 21.0	Age 8 Number 234 258 258 314 348 331 356 395	0+ % 12.6 13.6 13.8 16.0 16.2 14.6 15.7 16.1
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 499 504 521 505 552 598 564 574 581	-59 26.9 26.6 27.8 25.7 25.6 26.4 24.8 23.4 26.0	Age 60 Number 490 493 524 624 657 659 714 662	-69 % 26.4 26.1 26.7 29.0 29.0 29.0 29.0 29.1 29.1	Age 70 Number 409 388 366 361 371 452 449 515 400	-79 % 22.1 20.5 19.5 18.4 17.2 20.0 19.8 21.0 17.9	Age 8 Number 234 258 258 314 348 331 356 395 353	0+ 12.6 13.6 13.8 16.0 16.2 14.6 15.7 16.1 15.8
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 499 504 521 505 552 598 564 574 581 601	-59 26.9 26.6 27.8 25.7 25.6 26.4 24.8 23.4 26.0 24.8	Age 60 Number 490 493 489 524 624 657 659 714 662 777	-69 % 26.4 26.1 26.7 29.0 29.0 29.0 29.0 29.1 29.6 32.1	Age 70 Number 409 388 366 361 371 452 449 515 400 440	-79 % 22.1 20.5 19.5 18.4 17.2 20.0 19.8 21.0 17.9 18.2	Age 8 Number 234 258 258 314 348 331 356 395 353 353 336	0+ % 12.6 13.6 13.8 16.0 16.2 14.6 15.7 16.1 15.8 13.9

Table 5.1.7b: Age distribution at onset of AMI among Malays

Figure 5.1.7b: Age distribution at onset of AMI among Malays

The median age at onset of AMI among the Indians increased from 62.4 years in 2012 to 65.6 years in 2022 (p<0.001) (Table 5.1.7c). From 2015 onwards, those aged 60-69 years made up the largest proportion of Indian AMI patients (28.9% in 2022) (Figure 5.1.7c).

Veer of erect	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
tear of onset	Median	age	Number	%	Number	%	Number	%
2012	62.4		2	0.2	38	3.3	137	11.7
2013	62.2		2	0.2	29	2.4	156	13.2
2014	62.4		2	0.2	36	2.9	154	12.2
2015	62.5		0	0.0	32	2.6	164	13.3
2016	63.9		5	0.4	33	2.4	155	11.1
2017	64.3		2	0.1	32	2.1	144	9.6
2018	64.5		3	0.2	22	1.4	165	10.7
2019	64.3		2	0.1	31	1.9	182	11.2
2020	64.2		2	0.1	35	2.3	171	11.0
2021	64.7		2	0.1	37	2.3	168	10.3
2022	65.6		2	0.1	28	1.7	160	9.5
	65.6		Age 60-69					
Voor of opent	Age 50-59		Age 60	-69	Age 70	-79	Age 8	0+
Year of onset	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 8 Number	0+ %
Year of onset 2012	Age 50 Number 321	-59 % 27.5	Age 60 Number 286	-69 % 24.5	Age 70 Number 216	-79 % 18.5	Age 8 Number 166	0+ <u>%</u> 14.2
Year of onset 2012 2013	Age 50 Number 321 318	-59 % 27.5 26.9	Age 60 Number 286 287	-69 % 24.5 24.2	Age 70 Number 216 211	- 79 % 18.5 17.8	Age 80 Number 166 181	0+ 14.2 15.3
Year of onset 2012 2013 2014	Age 50 Number 321 318 342	-59 27.5 26.9 27.1	Age 60 Number 286 287 322	-69 24.5 24.2 25.5	Age 70 Number 216 211 219	-79 % 18.5 17.8 17.4	Age 80 Number 166 181 186	0+ 14.2 15.3 14.8
Year of onset 2012 2013 2014 2015	Age 50 Number 321 318 342 320	-59 % 27.5 26.9 27.1 25.9	Age 60 Number 286 287 322 349	-69 % 24.5 24.2 25.5 28.2	Age 70 Number 216 211 219 192	-79 % 18.5 17.8 17.4 15.5	Age 80 Number 166 181 186 180	0+ % 14.2 15.3 14.8 14.6
Year of onset 2012 2013 2014 2015 2016	Age 50 Number 321 318 342 320 344	-59 % 27.5 26.9 27.1 25.9 24.6	Age 60 Number 286 287 322 349 416	-69 % 24.5 24.2 25.5 28.2 29.7	Age 70 Number 216 211 219 192 227	-79 % 18.5 17.8 17.4 15.5 16.2	Age 80 Number 166 181 186 180 219	0+ 14.2 15.3 14.8 14.6 15.7
Year of onset 2012 2013 2014 2015 2016 2017	Age 50 Number 321 318 342 320 344 369	-59 % 27.5 26.9 27.1 25.9 24.6 24.6	Age 60 Number 286 287 322 349 416 439	-69 24.5 24.2 25.5 28.2 29.7 29.3	Age 70 Number 216 211 219 192 227 278	-79 % 18.5 17.8 17.4 15.5 16.2 18.5	Age 80 Number 166 181 186 180 219 236	0+ 14.2 15.3 14.8 14.6 15.7 15.7
Year of onset 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 321 318 342 320 344 369 362	-59 27.5 26.9 27.1 25.9 24.6 24.6 23.5	Age 60 Number 286 287 322 349 416 439 448	-69 24.5 24.2 25.5 28.2 29.7 29.3 29.1	Age 70 Number 216 211 219 192 227 278 253	-79 % 18.5 17.8 17.4 15.5 16.2 18.5 16.4	Age 80 Number 166 181 186 180 219 236 285	0+ 14.2 15.3 14.8 14.6 15.7 15.7 18.5
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 321 318 342 320 344 369 362 361	-59 27.5 26.9 27.1 25.9 24.6 24.6 23.5 22.3	Age 60 Number 286 287 322 349 416 439 448 484	-69 24.5 24.2 25.5 28.2 29.7 29.3 29.1 29.9	Age 70 Number 216 211 219 192 227 278 253 290	-79 % 18.5 17.8 17.4 15.5 16.2 18.5 16.4 17.9	Age 80 Number 166 181 186 180 219 236 285 270	0+ 14.2 15.3 14.8 14.6 15.7 15.7 18.5 16.7
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 321 318 342 320 344 369 362 361 355	-59 % 27.5 26.9 27.1 25.9 24.6 24.6 23.5 22.3 22.9	Age 60 Number 286 287 322 349 416 439 448 484 484	-69 24.5 24.2 25.5 28.2 29.7 29.3 29.1 29.9 29.3	Age 70 Number 216 211 219 192 227 278 253 290 277	-79 % 18.5 17.8 17.4 15.5 16.2 18.5 16.4 17.9 17.9	Age 8 Number 166 181 186 180 219 236 285 285 270 254	0+ 14.2 15.3 14.8 14.6 15.7 15.7 15.7 15.7 16.7 16.4
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 321 318 342 320 344 369 362 361 355 347	-59 % 27.5 26.9 27.1 25.9 24.6 24.6 23.5 22.3 22.9 21.2	Age 60 Number 286 287 322 349 416 439 448 484 484 454 481	-69 24.5 24.2 25.5 28.2 29.7 29.3 29.1 29.9 29.3 29.5	Age 70 Number 216 211 219 192 227 278 253 290 277 328	-79 % 18.5 17.8 17.4 15.5 16.2 18.5 16.4 17.9 17.9 20.1	Age 80 Number 166 181 186 180 219 236 285 270 254 270	0+ 14.2 15.3 14.8 14.6 15.7 15.7 18.5 16.7 16.4 16.5

Table 5.1.7c: Age distribution at onset of AMI among Indians

Figure 5.1.7c: Age distribution at onset of AMI among Indians

NSTEMI occurred more frequently than STEMI (Table 5.1.8), and the ASIRs for NSTEMI were consistently higher than STEMI across the years (Figure 5.1.8). NSTEMI was more prevalent as it could occur on its own or as a complication in very sick patients. Critically ill patients had increased risk for NSTEMI as myocardial demand was higher in these patients¹⁸.

A dip was observed in overall AMI incidence in 2020, possibly attributable to the COVID-19 pandemic. A STEMI is more severe with a higher likelihood of fatality if intervention is not provided promptly. Thus, the number of STEMIs continued to rise in 2020 and the ASIR remained unaffected, as these patients were less likely to avoid hospital visits due to the ongoing COVID-19 pandemic. However, the number of NSTEMIs dropped in 2020, as these patients, especially the elderly, could have avoided going to hospitals due to COVID-19 concerns. The ASIR for STEMI generally remained stable at between 52.8 and 57.3 per 100,000 population over the past decade (p=0.708), as was that for NSTEMI (range: 143.4 to 172.4 per 100,000 population, p=0.739).

As the percentages in Table 5.1.8 are among all AMI and patients without documentation of STEMI or NSTEMI are not shown, the sum of the percentages for STEMI and NSTEMI are less than 100% for each year. Figures for overall CIR and ASIR include cases of unknown etiology.

¹⁸Jeremy B. Richards, Renee D. Stapleton. Non-pulmonary complications of critical care. A clinical guide. Respiratory Medicine.

			STEMI			
Year of onset	Number	%	CIR	95% CI	ASIR	95% CI
2012	2275	24.9	71.3	68.4-74.2	57.3	54.9-59.7
2013	2362	24.8	73.1	70.2-76.1	57.2	54.9-59.6
2014	2345	23.8	71.9	69.0-74.8	55.1	52.9-57.4
2015	2308	22.8	69.9	67.1-72.8	52.8	50.6-55.0
2016	2406	22.2	72.1	69.2-75.0	53.9	51.7-56.1
2017	2540	21.3	75.3	72.4-78.3	54.4	52.3-56.6
2018	2609	21.8	76.7	73.7-79.6	54.8	52.7-57.0
2019	2736	21.6	79.6	76.7-82.6	55.9	53.7-58.0
2020	2815	24.1	81.5	78.4-84.5	56.0	53.9-58.1
2021	2773	22.3	81.3	78.3-84.4	55.6	53.5-57.8
2022	2891	22.0	82.8	79.8-85.8	55.4	53.3-57.5
P for trend	-	-	<0.001**	-	0.708	-
			NSTEM	l		
Year of onset	Number	%	CIR	95% CI	ASIR	95% CI
2012	6379	69.9	199.9	195.0-204.8	154.6	150.8-158.5
2013	6731	70.6	208.4	203.5-213.4	155.6	151.8-159.4
2014	7109	72.3	217.9	212.8-222.9	156.0	152.3-159.7
2015	7481	73.8	226.7	221.5-231.8	157.3	153.6-160.9
2016	7953	73.5	238.3	233.1-243.5	159.8	156.2-163.4
2017	8959	75.0	265.7	260.2-271.2	172.4	168.7-176.0
2018	8941	74.6	262.7	257.3-268.2	164.8	161.3-168.3
2019	9396	74.3	273.5	268.0-279.1	166.0	162.6-169.5
2020	8364	71.6	242.0	236.8-247.2	143.4	140.3-146.6
2021	9158	73.6	268.6	263.1-274.1	153.8	150.5-157.1
2022					452.0	
	9697	73.8	277.7	272.2-283.3	153.9	150.7-157.1

Table 5.1.8: Incidence number and rate of AMI (per 100,000 population) by subtype

Figure 5.1.8: Incidence rate of AMI (per 100,000 population) by subtype

The median age at onset of STEMI increased from 60.7 years in 2012 to 63.5 years in 2022 (p<0.001) (Table 5.1.9a). Every year, more than half of STEMI patients were aged 50-69 years at onset (55.2% in 2022) (Figure 5.1.9a); the percentage of STEMI patients aged 60 years and above had also increased from about 52% in 2012 to 62% in 2022.

Voar of onsot	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
Teal of onset	Median	age	Number	%	Number	%	Number	%
2012	60.7		5	0.2	67	2.9	326	14.3
2013	60.6		5	0.2	76	3.2	329	13.9
2014	60.1		8	0.3	63	2.7	338	14.4
2015	60.2		3	0.1	74	3.2	340	14.7
2016	60.7		9	0.4	71	3.0	312	13.0
2017	62.0		7	0.3	52	2.0	299	11.8
2018	62.1		5	0.2	52	2.0	329	12.6
2019	62.4		9	0.3	67	2.4	351	12.8
2020	62.7		9	0.3	67	2.4	323	11.5
2021	62.7		5	0.2	84	3.0	312	11.3
2022	63.5		3	0.1	64	2.2	333	11.5
	03.5		Age 60-69					
Voar of onsot	Age 50-59		Age 60	-69	Age 70	-79	Age 8	0+
Year of onset	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 8 Number	0+ %
Year of onset 2012	Age 50 Number 689	-59 % 30.3	Age 60 Number 559	-69 % 24.6	Age 70 Number 365	-79 % 16.0	Age 8 Number 264	0+ % 11.6
Year of onset 2012 2013	Age 50 Number 689 735	-59 % 30.3 31.1	Age 60 Number 559 554	-69 % 24.6 23.5	Age 70 Number 365 391	-79 % 16.0 16.6	Age 8 Number 264 272	0+ 11.6 11.5
Year of onset 2012 2013 2014	Age 50 Number 689 735 760	-59 % 30.3 31.1 32.4	Age 60 Number 559 554 553	-69 24.6 23.5 23.6	Age 70 Number 365 391 372	-79 % 16.0 16.6 15.9	Age 8 Number 264 272 251	0+ 11.6 11.5 10.7
Year of onset 2012 2013 2014 2015	Age 50 Number 689 735 760 710	-59 % 30.3 31.1 32.4 30.8	Age 60 Number 559 554 553 606	-69 % 24.6 23.5 23.6 26.3	Age 70 Number 365 391 372 321	-79 % 16.0 16.6 15.9 13.9	Age 8 Number 264 272 251 254	0+ % 11.6 11.5 10.7 11.0
Year of onset 2012 2013 2014 2015 2016	Age 50 Number 689 735 760 710 756	-59 % 30.3 31.1 32.4 30.8 31.4	Age 60 Number 559 554 553 606 714	-69 % 24.6 23.5 23.6 26.3 29.7	Age 70 Number 365 391 372 321 299	-79 % 16.0 16.6 15.9 13.9 12.4	Age 8 Number 264 272 251 254 245	0+ % 11.6 11.5 10.7 11.0 10.2
Year of onset 2012 2013 2014 2015 2016 2017	Age 50 Number 689 735 760 710 756 754	-59 % 30.3 31.1 32.4 30.8 31.4 29.7	Age 60 Number 559 554 553 606 714 702	-69 24.6 23.5 23.6 26.3 29.7 27.6	Age 70 Number 365 391 372 321 299 417	-79 % 16.0 16.6 15.9 13.9 12.4 16.4	Age 80 Number 264 272 251 254 245 309	0+ % 11.6 11.5 10.7 11.0 10.2 12.2
Year of onset 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 689 735 760 710 756 754 754	-59 30.3 31.1 32.4 30.8 31.4 29.7 28.5	Age 60 Number 559 554 553 606 714 702 797	-69 24.6 23.5 23.6 26.3 29.7 27.6 30.5	Age 70 Number 365 391 372 321 299 417 415	-79 % 16.0 15.9 13.9 12.4 16.4 15.9	Age 8 Number 264 272 251 254 245 309 268	0+ % 11.6 11.5 10.7 11.0 10.2 12.2 10.3
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 689 735 760 710 756 754 754 743 718	-59 30.3 31.1 32.4 30.8 31.4 29.7 28.5 26.2	Age 60 Number 559 554 553 606 714 702 797 789	-69 24.6 23.5 23.6 26.3 29.7 27.6 30.5 28.8	Age 70 Number 365 391 372 321 299 417 415 477	-79 % 16.0 15.9 13.9 12.4 16.4 15.9 17.4	Age 8 Number 264 272 251 254 245 309 268 325	0+ % 11.6 11.5 10.7 11.0 10.2 12.2 10.3 11.9
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 689 735 760 710 756 754 743 743 718 745	-59 30.3 31.1 32.4 30.8 31.4 29.7 28.5 26.2 26.2	Age 60 Number 559 554 553 606 714 702 797 789 882	-69 24.6 23.5 23.6 26.3 29.7 27.6 30.5 28.8 31.3	Age 70 Number 365 391 372 321 299 417 415 415 477 427	-79 % 16.0 15.9 13.9 12.4 16.4 15.9 17.4 15.2	Age 8 Number 264 272 251 254 245 309 268 325 362	0+ % 11.6 11.5 10.7 11.0 10.2 12.2 10.3 11.9 12.9
Year of onset 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 689 735 760 710 756 754 754 743 718 745 727	-59 30.3 31.1 32.4 30.8 31.4 29.7 28.5 26.2 26.5 26.2	Age 60 Number 559 554 553 606 714 702 797 789 882 882 862	-69 24.6 23.5 23.6 26.3 29.7 27.6 30.5 28.8 31.3 31.1	Age 70 Number 365 391 372 321 299 417 415 477 427 427	-79 % 16.0 15.9 13.9 12.4 16.4 15.9 17.4 15.2 16.8	Age 8 Number 264 272 251 254 245 309 268 325 362 318	0+ % 11.6 11.5 10.7 11.0 10.2 12.2 10.3 11.9 12.9 11.5

 Table 5.1.9a: Age distribution at onset of STEMI

The median age at onset of NSTEMI increased from 71.7 years in 2012 to 73.5 years in 2022 (p=0.004) (Table 5.1.9b), about 10 years older than the median age at onset of STEMI (Table 5.1.9a). Unlike STEMI, the highest proportion of NSTEMI patients in 2022 was among those aged 80 years and above (33.4%) (Figure 5.1.9b). Data from the Global Registry of Acute Coronary Events (GRACE) and UK Myocardial Ischemia National Audit Project had also similarly demonstrated that older adults were more likely to present with NSTEMI than STEMI¹⁹. This trend of NSTEMI patients being older is generally consistent internationally²⁰.

Veer of erect	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
tear of onset	Median	age	Number	%	Number	%	Number	%
2012	71.7		9	0.1	62	1.0	373	5.8
2013	72.3		8	0.1	60	0.9	407	6.0
2014	72.1		3	0.0	59	0.8	411	5.8
2015	72.1		10	0.1	67	0.9	381	5.1
2016	72.0		7	0.1	79	1.0	393	4.9
2017	72.2		9	0.1	104	1.2	382	4.3
2018	72.4		10	0.1	73	0.8	418	4.7
2019	72.5		11	0.1	106	1.1	409	4.4
2020	72.4		6	0.1	70	0.8	424	5.1
2021	72.5		6	0.1	102	1.1	412	4.5
2022	73.5		6	0.1	84	0.9	375	3.9
Vear of onset	Age 50	-59	Age 60-69		Age 70	-79	Age 8	0+
Teal of offset	Number	%	Number	%	Number	%	Number	%
2012	1060	16.6	1431	22.4	1749	27.4	1695	26.6
2013	1061	15.8	1503	22.3	1738	25.8	1954	29.0
2014	1141	16.1	1621	22.8	1834	25.8	2040	28.7
2015	1148	15.3	1820	24.3	1790	23.9	2265	30.3
2016	1186	14.9	1996	25.1	1891	23.8	2401	30.2
2017	1312	14.6	2175	24.3	2252	25.1	2725	30.4
2018	1248	14.0	2140	23.9	2247	25.1	2805	31.4
2019	1273	13.5	2245	23.9	2388	25.4	2964	31.5
2020	1146	13.7	1995	23.9	2088	25.0	2635	31.5
2021	1207	13.2	2231	24.4	2248	24.5	2952	32.2
2022	1147	11.8	2315	23.9	2534	26.1	3236	33.4

Table 5.1.9b: Age distribution at onset of NSTEMI

¹⁹ Dai X et al. Acute coronary syndrome in older adults. Journal of Geriatric Cardiology; 2016:13. 101-108.

²⁰ McManus D. V. et al. Recent Trends in the Incidence, Treatment, and Outcomes of Patients with ST and Non-ST-Segment Acute Myocardial Infarction. Am J Med 2011; 124(1): 40-47.

Figure 5.1.9b: Age distribution at onset of NSTEMI

5.2 Mortality

The number of AMI deaths increased by about 25% from 853 in 2012 to 1,073 in 2022 (Table 5.2.1), a comparatively less drastic rise than the number of AMI episodes from 9,124 to 13,137 during the same period (Table 5.1.1). Overall, the crude mortality rate (CMR) increased from 26.7 to 30.7 per 100,000 population in the past decade (Figure 5.2.1). However, the increase in CMR is due in part to population ageing, as there was a significant drop in ASMR from 20.0 per 100,000 population in 2012 to 15.5 per 100,000 population in 2022 (p<0.001). This decreasing trend in ASMR was likely due to the higher rates of revascularisation and pharmacotherapy over the years^{21,22,23,24}.

	•			•	• •
Year of death	Number	CMR	95% CI	ASMR	95% CI
2012	853	26.7	24.9-28.5	20.0	18.6-21.4
2013	816	25.3	23.5-27.0	18.2	16.9-19.4
2014	870	26.7	24.9-28.4	18.5	17.2-19.7
2015	881	26.7	24.9-28.5	17.6	16.4-18.8
2016	886	26.5	24.8-28.3	17.0	15.9-18.2
2017	1018	30.2	28.3-32.1	18.5	17.3-19.7
2018	915	26.9	25.1-28.6	16.0	14.9-17.0
2019	986	28.7	26.9-30.5	16.2	15.2-17.3
2020	1036	30.0	28.2-31.8	16.3	15.3-17.3
2021	1002	29.4	27.6-31.2	15.3	14.3-16.3
2022	1073	30.7	28.9-32.6	15.5	14.5-16.4
P for trend	-	0.002**	-	<0.001**	-

Table 5.2.1: Mortality number and rate of AMI (per 100,000 population)

²¹ Aronow, H.D and Bavashi, C. Mechanical Complications in Acute Myocardial Infarction. JACC Cardiovascular Interventions; 2019:12(18).

²² Takeji Y. et al. Differences in mortality and causes of death between STEMI and NSTEMI in the early and late phases after acute myocardial infarction. PLoS ONE 2021; 16(11).

²³ McManus D. V. et al. Recent Trends in the Incidence, Treatment, and Outcomes of Patients with ST and Non-ST-Segment Acute Myocardial Infarction. Am J Med 2011; 124(1): 40-47.

²⁴ Laforgia PL et al. The Reduction of Mortality in Acute Myocardial Infarction: From Bed Rest to Future Directions. International Journal of Preventive Medicine 2022.

The median age at death increased from 76.9 years in 2012 to 79.2 years in 2022 (p<0.001) (Table 5.2.2). The proportion of those in the oldest age group amongst AMI deaths had increased over the years – almost half of the patients who died of AMI in 2022 were aged 80 years and above (47.7%), compared to 40.1% in 2012 (Figure 5.2.2). As older persons are less likely to survive an AMI compared to those who are younger²⁵, individuals aged 80 years and above comprised a substantially larger proportion of AMI deaths vis-à-vis AMI incidence (about 23%-29%) (Table 5.1.2). Other possible reasons for poorer outcomes among older AMI patients include delayed treatment seeking due to atypical presenting symptoms, and preclusion from coronary reperfusion therapy due to a greater prevalence of comorbidities related to advanced age^{26,27}.

Voor of dooth	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
Teal of dealin	Median	age	Number	%	Number	%	Number	%
2012	76.9		1	0.1	5	0.6	34	4.0
2013	77.5		0	0.0	5	0.6	27	3.3
2014	76.2		1	0.1	6	0.7	33	3.8
2015	76.7		0	0.0	5	0.6	35	4.0
2016	77.4		2	0.2	7	0.8	26	2.9
2017	77.6		1	0.1	7	0.7	21	2.1
2018	78.1		0	0.0	5	0.5	25	2.7
2019	78.2		0	0.0	4	0.4	25	2.5
2020	79.0		0	0.0	3	0.3	28	2.7
2021	79.0		0	0.0	6	0.6	26	2.6
2022	79.2		1	0.1	4	0.4	21	2.0
Voar of doath	Age 50	-59	Age 60-69		Age 70-79		Age 8	0+
Teal of dealin	Number	%	Number	%	Number	%	Number	%
2012	101	11.8	157	18.4	213	25.0	342	40.1
2013	91	11.2	144	17.6	225	27.6	324	39.7
2014	116	13.3	157	18.0	215	24.7	342	39.3
2015	104	11.8	159	18.0	216	24.5	362	41.1
2016	90	10.2	189	21.3	207	23.4	365	41.2
2017	96	9.4	193	19.0	266	26.1	434	42.6
2018	89	9.7	186	20.3	209	22.8	401	43.8
2019	97	9.8	177	18.0	245	24.8	438	44.4
2020	93	9.0	184	17.8	243	23.5	485	46.8
2021	73	7.3	189	18.9	234	23.4	474	47.3
2022	65	6.1	188	17.5	282	26.3	512	47.7

Table 5.2.2: Age distribution at death of AMI

²⁵ Mangion K et al. Survival in the elderly after acute myocardial infarction: room for more improvement. Age and Ageing 2014; 43: 739–740.

²⁶ Ibid.

²⁷ Carro A, Kaski JC. Myocardial Infarction in the Elderly. Aging and Disease. 2011;2(1): 116-137

Figure 5.2.2: Age distribution at death of AMI

The age-specific mortality rate of AMI increased with age, with the oldest age group consistently having the highest mortality rate each year (Figures 5.2.3a and 5.2.3b). Significant drops in mortality rates were seen in those aged 50-79 years (Table 5.2.3).

Figure 5.2.3a: Age-specific mortality rate of AMI (per 100,000 population) across years

Figure 5.2.3b: Age-specific mortality rate of AMI (per 100,000 population) across age groups

Voar of doath	C	Overall	A	ge 15-29	A	vge 30-39	4	Age 40-49
Teal of dealin	CMR	95% CI	CMR	95% CI	CMR	95% CI	CMR	95% CI
2012	26.7	24.9-28.5	0.1	0.1-0.4	0.8	0.1-1.5	5.4	3.6-7.2
2013	25.3	23.5-27.0	0.0	0.0-0.0	0.8	0.1-1.6	4.3	2.7-5.9
2014	26.7	24.9-28.4	0.1	0.1-0.4	1.0	0.2-1.8	5.3	3.5-7.1
2015	26.7	24.9-28.5	0.0	0.0-0.0	0.8	0.1-1.6	5.6	3.8-7.5
2016	26.5	24.8-28.3	0.3	0.1-0.6	1.2	0.3-2.1	4.2	2.6-5.9
2017	30.2	28.3-32.1	0.1	0.1-0.4	1.2	0.3-2.1	3.4	2.0-4.9
2018	26.9	25.1-28.6	0.0	0.0-0.0	0.9	0.1-1.6	4.1	2.5-5.7
2019	28.7	26.9-30.5	0.0	0.0-0.0	0.7	0.0-1.3	4.1	2.5-5.7
2020	30.0	28.2-31.8	0.0	0.0-0.0	0.5	0.1-1.1	4.6	2.9-6.3
2021	29.4	27.6-31.2	0.0	0.0-0.0	1.0	0.2-1.8	4.4	2.7-6.1
2022	30.7	28.9-32.6	0.1	0.1-0.4	0.7	0.0-1.3	3.5	2.0-5.0
P for trend	0.002**	-	0.962	-	0.400	-	0.062	-
Voor of dooth	Ag	je 50-59	A	ge 60-69	A	vge 70-79		Age 80+
real of dealin	CMR	95% CI	CMR	95% CI	CMR	95% CI	CMR	95% CI
2012	17.3	14.0-20.7	45.8	38.6-53.0	123.8	107.2-140.5	440.7	394.0-487.4
2013	15.3	12.2-18.5	39.1	32.7-45.5	127.8	111.1-144.5	394.6	351.7-437.6
2014	19.2	15.7-22.7	40.0	33.7-46.2	117.4	101.7-133.1	391.8	350.3-433.3
2015	17.0	13.8-20.3	37.6	31.8-43.4	117.5	101.8-133.2	387.4	347.5-427.3
2016	14.6	11.6-17.7	42.0	36.0-48.0	108.0	93.2-122.7	373.2	334.9-411.5
2017	15.6	12.5-18.7	41.4	35.5-47.2	125.8	110.7-140.9	428.5	388.2-468.8
2018	14.5	11.5-17.5	38.4	32.9-44.0	91.3	78.9-103.7	375.2	338.5-411.9
2019	15.9	12.8-19.1	35.4	30.2-40.6	100.1	87.6-112.6	378.7	343.2-414.2
2020	15.5	12.3-18.6	35.8	30.6-41.0	93.1	81.4-104.8	391.2	356.4-426.0
2021	12.5	9.6-15.4	36.5	31.3-41.7	85.9	74.9-96.9	361.0	328.5-393.5
2022	11.0	8.3-13.6	35.1	30.1-40.1	95.8	84.6-107.0	376.9	344.3-409.6
P for trend	0.007**	-	0.004**	-	0.001**	-	0.052	-

 Table 5.2.3: Age-specific mortality rate of AMI (per 100,000 population)

As with incidence trends (Table 5.1.4), males also accounted for a greater proportion of AMI deaths than females – about 60% each year (Table 5.2.4). The ASMRs of AMI were also consistently higher among males. In 2022, the ASMR of AMI in males was 21.4 per 100,000 population, while females had an ASMR of 10.3 per 100,000 population. The ASMR had dropped significantly over the years for both males and females (p<0.001, p=0.001) (Figure 5.2.4).

			Male			
Year of death	Number	%	CMR	95% CI	ASMR	95% CI
2012	483	56.6	31.0	28.2-33.7	26.5	24.1-28.9
2013	490	60.0	31.1	28.3-33.8	25.4	23.1-27.7
2014	513	59.0	32.2	29.4-35.0	25.3	23.1-27.5
2015	500	56.8	31.1	28.3-33.8	23.2	21.1-25.2
2016	518	58.5	31.9	29.1-34.6	23.2	21.1-25.2
2017	577	56.7	35.2	32.3-38.0	24.7	22.6-26.7
2018	538	58.8	32.5	29.8-35.3	22.1	20.2-24.0
2019	552	56.0	33.1	30.3-35.9	21.5	19.7-23.3
2020	622	60.0	37.1	34.2-40.0	23.2	21.3-25.0
2021	586	58.5	35.3	32.5-38.2	21.4	19.6-23.1
2022	622	58.0	36.7	33.9-39.6	21.4	19.7-23.2
P for trend	-	-	0.001**	-	<0.001**	-
			Female			
Year of death	Number	%	CMR	95% CI	ASMR	95% CI
2012	370	43.4	22.7	20.4-25.0	14.4	12.8-15.9
2013	326	40.0	19.7	17.6-21.9	11.9	10.6-13.3
2014	357	41.0	21.4	19.2-23.6	12.5	11.1-13.8
2015	381	43.2	22.5	20.3-24.8	12.6	11.2-13.9
2016	368	41.5	21.5	19.3-23.7	11.6	10.3-12.8
2017	441	43.3	25.5	23.1-27.9	13.1	11.8-14.3
2018	377	41.2	21.6	19.4-23.7	10.5	9.4-11.6
2019	434	44.0	24.6	22.2-26.9	11.5	10.4-12.6
2020	414	40.0	23.3	21.0-25.5	10.4	9.3-11.4
2021	416	41.5	23.7	21.5-26.0	9.8	8.8-10.8
2022	451	42.0	25.1	22.8-27.4	10.3	9.3-11.3
P for trend	-	-	0.032*	-	0.001**	-

Table 5.2.4: Mortality number and rate of AMI (per 100,000 population) by sex

Figure 5.2.4: Mortality rate of AMI (per 100,000 population) by sex

There was an overall increase in the median age at AMI death among males from 72.4 years in 2012 to 75.2 years in 2022 (p=0.03) (Table 5.2.5a). In 2022, those aged 80 years and above accounted for the highest percentage of male AMI deaths at 37.1% (or nearly 2 in 5), compared to 30.6% in 2012 (Figure 5.2.5a).

Veer of death	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
rear of death	Median	age	Number	%	Number	%	Number	%
2012	72.4		1	0.2	4	0.8	28	5.8
2013	72.9		0	0.0	5	1.0	22	4.5
2014	72.0		1	0.2	5	1.0	26	5.1
2015	72.5		0	0.0	2	0.4	29	5.8
2016	71.0		1	0.2	6	1.2	20	3.9
2017	74.1		1	0.2	7	1.2	18	3.1
2018	72.1		0	0.0	3	0.6	22	4.1
2019	72.7		0	0.0	4	0.7	21	3.8
2020	73.7		0	0.0	3	0.5	21	3.4
2021	74.3		0	0.0	4	0.7	23	3.9
2022	75.2		1	0.2	4	0.6	16	2.6
	Δαρ 50-59			Age 60-69				
Voar of doath	Age 50	-59	Age 60	-69	Age 70	-79	Age 8	0+
Year of death	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 8 Number	0+ %
Year of death 2012	Age 50 Number 72	-59 % 14.9	Age 60 Number 112	-69 % 23.2	Age 70 Number 118	-79 % 24.4	Age 8 Number 148	0+ % 30.6
Year of death 2012 2013	Age 50 Number 72 79	-59 % 14.9 16.1	Age 60 Number 112 104	-69 % 23.2 21.2	Age 70 Number 118 135	-79 % 24.4 27.6	Age 80 Number 148 145	0+ 30.6 29.6
Year of death 2012 2013 2014	Age 50 Number 72 79 94	- 59 14.9 16.1 18.3	Age 60 Number 112 104 109	-69 % 23.2 21.2 21.2	Age 70 Number 118 135 133	- 79 % 24.4 27.6 25.9	Age 80 Number 148 145 145	0+ 30.6 29.6 28.3
Year of death 2012 2013 2014 2015	Age 50 Number 72 79 94 80	-59 % 14.9 16.1 18.3 16.0	Age 60 Number 112 104 109 115	-69 % 23.2 21.2 21.2 23.0	Age 70 Number 118 135 133 130	-79 % 24.4 27.6 25.9 26.0	Age 80 Number 148 145 145 144	0+ 30.6 29.6 28.3 28.8
Year of death 2012 2013 2014 2015 2016	Age 50 Number 72 79 94 80 74	-59 % 14.9 16.1 18.3 16.0 14.3	Age 60 Number 112 104 109 115 142	-69 % 23.2 21.2 21.2 23.0 27.4	Age 70 Number 118 135 133 130 115	-79 % 24.4 27.6 25.9 26.0 22.2	Age 80 Number 148 145 145 144 160	0+ 30.6 29.6 28.3 28.8 30.9
Year of death 2012 2013 2014 2015 2016 2017	Age 50 Number 72 79 94 80 74 78	-59 % 14.9 16.1 18.3 16.0 14.3 13.5	Age 60 Number 112 104 109 115 142 136	-69 % 23.2 21.2 21.2 23.0 27.4 23.6	Age 70 Number 118 135 133 130 115 150	-79 % 24.4 27.6 25.9 26.0 22.2 26.0	Age 80 Number 148 145 145 144 160 187	0+ 30.6 29.6 28.3 28.8 30.9 32.4
Year of death 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 72 79 94 80 74 78 78 74	-59 % 14.9 16.1 18.3 16.0 14.3 13.5 13.8	Age 60 Number 112 104 109 115 142 136 138	-69 % 23.2 21.2 21.2 23.0 27.4 23.6 25.7	Age 70 Number 118 135 133 130 115 150 135	-79 % 24.4 27.6 25.9 26.0 22.2 26.0 25.1	Age 80 Number 148 145 145 144 160 187 166	0+ 30.6 29.6 28.3 28.8 30.9 32.4 30.9
Year of death 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 72 79 94 80 74 78 78 74 78	-59 % 14.9 16.1 18.3 16.0 14.3 13.5 13.8 12.7	Age 60 Number 112 104 109 115 142 136 138 128	-69 % 23.2 21.2 23.0 27.4 23.6 25.7 23.2	Age 70 Number 118 135 133 130 115 150 135 145	-79 % 24.4 27.6 25.9 26.0 22.2 26.0 25.1 26.3	Age 80 Number 148 145 145 144 160 187 166 184	0+ 30.6 29.6 28.3 28.8 30.9 32.4 30.9 33.3
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 72 79 94 80 74 78 78 74 70 70	-59 % 14.9 16.1 18.3 16.0 14.3 13.5 13.8 12.7 11.9	Age 60 Number 112 104 109 115 142 136 138 128 135	-69 % 23.2 21.2 23.0 27.4 23.6 25.7 23.2 21.7	Age 70 Number 118 135 133 130 115 150 135 145 145	-79 % 24.4 27.6 25.9 26.0 22.2 26.0 25.1 26.3 27.2	Age 80 Number 148 145 145 144 160 187 166 184 220	0+ % 30.6 29.6 28.3 28.8 30.9 32.4 30.9 33.3 35.4
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 72 79 94 80 74 78 78 74 78 74 70 74 61	-59 % 14.9 16.1 18.3 16.0 14.3 13.5 13.8 12.7 11.9 10.4	Age 60 Number 112 104 109 115 142 136 138 138 128 135 147	-69 % 23.2 21.2 23.0 27.4 23.6 25.7 23.2 21.7 25.1	Age 70 Number 118 135 133 130 115 150 135 145 169 149	-79 24.4 27.6 25.9 26.0 22.2 26.0 25.1 26.3 25.1 26.3 27.2 25.4	Age 80 Number 148 145 145 144 160 187 166 184 220 202	0+ 30.6 29.6 28.3 28.8 30.9 32.4 30.9 33.3 35.4 34.5

Table 5.2.5a: Age distribution at death of AMI among males

Figure 5.2.5a: Age distribution at death of AMI among males

Like the median age at onset of AMI (Tables 5.1.5a and 5.1.5b), females had an older median age at death than males, increasing from 80.6 years in 2012 to 83.9 years in 2022 (p<0.001) (Table 5.2.5b). As with males, those aged 80 years and above comprised the largest proportion of female AMI deaths (62.3%), and the corresponding proportion each year was nearly twice that among males in the oldest age band (Figure 5.2.5b).

Voor of dooth	Overall		Age 15	-29	Age 30	-39	Age 40	-49
Teal of uealli	Median a	age	Number	%	Number	%	Number	%
2012	80.6		0	0.0	1	0.3	6	1.6
2013	81.5		0	0.0	0	0.0	5	1.5
2014	81.3		0	0.0	1	0.3	7	2.0
2015	82.2		0	0.0	3	0.8	6	1.6
2016	81.6		1	0.3	1	0.3	6	1.6
2017	82.1		0	0.0	0	0.0	3	0.7
2018	84.2		0	0.0	2	0.5	3	0.8
2019	83.1		0	0.0	0	0.0	4	0.9
2020	83.1		0	0.0	0	0.0	7	1.7
2021	84.0		0	0.0	2	0.5	3	0.7
2022	83.9		0	0.0	0	0.0	5	1.1
	Age 50-59		Age 60-69					
Voor of dooth	Age 50-	-59	Age 60	-69	Age 70	-79	Age 8	0+
Year of death	Age 50- Number	• 59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 8 Number	0+ %
Year of death 2012	Age 50- Number 29	• 59 % 7.8	Age 60 Number 45	-69 % 12.2	Age 70 Number 95	-79 % 25.7	Age 80 Number 194	0+ % 52.4
Year of death 2012 2013	Age 50- Number 29 12	• 59 7.8 3.7	Age 60 Number 45 40	-69 % 12.2 12.3	Age 70 Number 95 90	-79 25.7 27.6	Age 80 Number 194 179	0+ 52.4 54.9
Year of death 2012 2013 2014	Age 50- Number 29 12 22	59 7.8 3.7 6.2	Age 60 Number 45 40 48	-69 % 12.2 12.3 13.4	Age 70 Number 95 90 82	-79 % 25.7 27.6 23.0	Age 80 Number 194 179 197	0+ 52.4 54.9 55.2
Year of death 2012 2013 2014 2015	Age 50- Number 29 12 22 24	• 59 7.8 3.7 6.2 6.3	Age 60 Number 45 40 48 48 44	-69 % 12.2 12.3 13.4 11.5	Age 70 Number 95 90 82 86	-79 % 25.7 27.6 23.0 22.6	Age 80 Number 194 179 197 218	0+ 52.4 54.9 55.2 57.2
Year of death 2012 2013 2014 2015 2016	Age 50- Number 29 12 22 24 16	59 7.8 3.7 6.2 6.3 4.3	Age 60 Number 45 40 48 48 44 47	-69 % 12.2 12.3 13.4 11.5 12.8	Age 70 Number 95 90 82 86 92	-79 % 25.7 27.6 23.0 22.6 25.0	Age 80 Number 194 179 197 218 205	0+ 52.4 54.9 55.2 57.2 55.7
Year of death 2012 2013 2014 2015 2016 2017	Age 50- Number 29 12 22 24 16 18	59 7.8 3.7 6.2 6.3 4.3 4.1	Age 60 Number 45 40 48 44 44 47 57	-69 % 12.2 12.3 13.4 11.5 12.8 12.9	Age 70 Number 95 90 82 86 92 116	-79 25.7 27.6 23.0 22.6 25.0 26.3	Age 80 Number 194 179 197 218 205 247	0+ 52.4 54.9 55.2 57.2 55.7 56.0
Year of death 2012 2013 2014 2015 2016 2017 2018	Age 50- Number 29 12 22 24 16 18 15	59 7.8 3.7 6.2 6.3 4.3 4.1 4.0	Age 60 Number 45 40 48 44 47 57 48	-69 % 12.2 12.3 13.4 11.5 12.8 12.9 12.7	Age 70 Number 95 90 82 86 92 116 74	-79 % 25.7 27.6 23.0 22.6 25.0 26.3 19.6	Age 80 Number 194 179 197 218 205 247 235	0+ 52.4 54.9 55.2 57.2 55.7 56.0 62.3
Year of death 2012 2013 2014 2015 2016 2017 2018 2019	Age 50- Number 29 12 22 24 16 18 18 15 27	59 7.8 3.7 6.2 6.3 4.3 4.1 4.0 6.2	Age 60 Number 45 40 48 44 47 57 57 48 49	-69 % 12.2 12.3 13.4 11.5 12.8 12.9 12.7 11.3	Age 70 Number 95 90 82 86 92 116 74 100	-79 25.7 27.6 23.0 22.6 25.0 26.3 19.6 23.0	Age 80 Number 194 179 197 218 205 247 235 254	0+ 52.4 54.9 55.2 57.2 55.7 56.0 62.3 58.5
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50- Number 29 12 22 24 16 18 15 27 19	59 7.8 3.7 6.2 6.3 4.3 4.1 4.0 6.2 4.6	Age 60 Number 45 40 48 44 44 47 57 57 48 48 49 49	-69 % 12.2 12.3 13.4 11.5 12.8 12.9 12.7 11.3 11.8	Age 70 Number 95 90 82 86 92 116 74 100 74	-79 25.7 27.6 23.0 22.6 25.0 26.3 19.6 23.0 17.9	Age 80 Number 194 179 197 218 205 247 235 254 254 265	0+ 52.4 54.9 55.2 57.2 55.7 56.0 62.3 58.5 64.0
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50- Number 29 12 22 24 16 18 15 27 19 12	59 7.8 3.7 6.2 6.3 4.3 4.1 4.0 6.2 4.6 2.9	Age 60 Number 45 40 48 44 47 57 48 49 49 49 42	-69 % 12.2 12.3 13.4 11.5 12.8 12.9 12.7 11.3 11.8 10.1	Age 70 Number 95 90 82 86 92 116 74 100 74 85	-79 25.7 27.6 23.0 22.6 25.0 26.3 19.6 23.0 17.9 20.4	Age 80 Number 194 179 197 218 205 247 235 254 265 272	0+ 52.4 54.9 55.2 57.2 55.7 56.0 62.3 58.5 64.0 65.4

Table 5.2.5b: Age distribution at death of AMI among females

Figure 5.2.5b: Age distribution at death of AMI among females

The Chinese consistently had the lowest ASIR of AMI among the different ethnic groups across the years (Table 5.1.6); likewise, they consistently had the lowest ASMR (Table 5.2.6). The ASMR among the Chinese (12.9 per 100,000 population) was lower than the ASMR among Malays (28.4 per 100,000 population) and Indians (26.8 per 100,000 population) in 2022. The ASMR showed a significant downward trend over the years for Chinese (p<0.001) and Malays (p<0.001) but not for Indians (p=0.558) (Figure 5.2.6).

Chinese										
Year of death	Number	%	CMR	95% CI	ASMR	95% CI				
2012	608	71.3	25.2	23.2-27.2	16.9	15.5-18.3				
2013	591	72.4	24.2	22.3-26.2	15.6	14.3-16.8				
2014	606	69.7	24.6	22.6-26.6	15.2	14.0-16.4				
2015	627	71.2	25.2	23.2-27.1	14.8	13.6-16.0				
2016	623	70.3	24.7	22.8-26.7	14.1	13.0-15.3				
2017	707	69.4	27.8	25.7-29.8	15.0	13.9-16.2				
2018	637	69.6	24.8	22.9-26.7	13.0	11.9-14.0				
2019	687	69.7	26.5	24.5-28.5	13.1	12.0-14.1				
2020	752	72.6	28.8	26.8-30.9	13.8	12.7-14.8				
2021	705	70.4	27.4	25.4-29.4	12.2	11.3-13.2				
2022	773	72.0	29.4	27.3-31.5	12.9	12.0-13.9				
P for trend	-	-	0.003**	-	<0.001**	-				

Table 5.2.6: Mortality number and rate of AMI (per 100,000 population) by ethnicity

			Malay			
Year of death	Number	%	CMR	95% CI	ASMR	95% CI
2012	147	17.2	36.5	30.6-42.4	37.2	31.0-43.5
2013	149	18.3	36.4	30.6-42.3	36.3	30.3-42.3
2014	164	18.9	39.6	33.5-45.6	37.5	31.6-43.4
2015	151	17.1	35.9	30.2-41.7	32.7	27.3-38.0
2016	160	18.1	37.6	31.8-43.4	32.5	27.3-37.7
2017	177	17.4	41.1	35.0-47.1	36.1	30.7-41.5
2018	172	18.8	39.5	33.6-45.4	33.1	28.1-38.1
2019	165	16.7	37.6	31.8-43.3	30.1	25.4-34.8
2020	161	15.5	36.4	30.8-42.0	27.7	23.3-32.0
2021	168	16.8	38.1	32.4-43.9	29.2	24.7-33.7
2022	173	16.1	38.6	32.9-44.4	28.4	24.1-32.7
P for trend	-	-	0.463	-	<0.001**	-
			Indian			
Year of death	Number	%	CMR	95% CI	ASMR	95% CI
2012	88	10.3	31.6	25.0-38.1	33.2	26.1-40.3
2013	60	7.4	21.3	15.9-26.7	21.8	16.1-27.5
2014	81	9.3	28.5	22.3-34.8	27.4	21.3-33.6
2015	91	10.3	31.8	25.3-38.3	29.9	23.6-36.2
2016	93	10.5	32.2	25.7-38.8	29.5	23.4-35.6
2017	125	12.3	42.9	35.4-50.4	36.7	30.2-43.2
2018	98	10.7	33.3	26.7-39.9	27.4	21.9-32.9
2019	124	12.6	41.7	34.3-49.0	34.5	28.3-40.6
2020	120	11.6	40.1	33.0-47.3	31.2	25.5-36.8
2021	120	12.0	40.9	33.6-48.2	31.0	25.4-36.6
2022	110	10.3	36.0	29.3-42.7	26.8	21.8-31.8
P for trond	-	-	0.014*	-	0.558	-

Figure 5.2.6: Mortality rate of AMI (per 100,000 population) by ethnicity

Similar to the median age at onset of AMI (Tables 5.1.7a to 5.1.7c), the Chinese had the oldest median age at death, which increased from 79.2 years in 2012 to 81.7 years in 2022 (p<0.001) (Table 5.2.7a). Those aged 80 years and above made up the highest proportion of AMI deaths among the Chinese, increasing from 47.2% in 2012 to 54.1% in 2022 (Figure 5.2.7a).

Veer of death	Overa	all	Age 15	-29	Age 30	-39	Age 40	Age 40-49	
fear of death	Median	age	Number	%	Number	%	Number	%	
2012	79.2		1	0.2	3	0.5	16	2.6	
2013	79.0		0	0.0	4	0.7	12	2.0	
2014	78.3		1	0.2	1	0.2	12	2.0	
2015	78.8		0	0.0	4	0.6	21	3.3	
2016	78.9		0	0.0	4	0.6	11	1.8	
2017	79.6		1	0.1	3	0.4	9	1.3	
2018	80.5		0	0.0	1	0.2	12	1.9	
2019	80.7		0	0.0	3	0.4	13	1.9	
2020	80.4		0	0.0	1	0.1	18	2.4	
2021	81.4		0	0.0	2	0.3	10	1.4	
2022	81.7		1	0.1	0	0.0	13	1.7	
	Age 50-59		Age 60-69						
Voar of doath	Age 50	-59	Age 60	-69	Age 70	-79	Age 8	0+	
Year of death	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 8 Number	0+ %	
Year of death 2012	Age 50 Number 55	-59 % 9.0	Age 60 Number 97	-69 % 16.0	Age 70 Number 149	-79 % 24.5	Age 8 Number 287	0+ <u>%</u> 47.2	
Year of death 2012 2013	Age 50 Number 55 53	- 59 9.0 9.0	Age 60 Number 97 83	-69 % 16.0 14.0	Age 70 Number 149 172	-79 % 24.5 29.1	Age 80 Number 287 267	0+ 47.2 45.2	
Year of death 2012 2013 2014	Age 50 Number 55 53 63	-59 9.0 9.0 10.4	Age 60 Number 97 83 96	-69 % 16.0 14.0 15.8	Age 70 Number 149 172 161	-79 % 24.5 29.1 26.6	Age 80 Number 287 267 272	0+ 47.2 45.2 44.9	
Year of death 2012 2013 2014 2015	Age 50 Number 55 53 63 52	-59 % 9.0 9.0 10.4 8.3	Age 60 Number 97 83 96 95	-69 % 16.0 14.0 15.8 15.2	Age 70 Number 149 172 161 159	-79 % 24.5 29.1 26.6 25.4	Age 80 Number 287 267 272 296	0+ 47.2 45.2 44.9 47.2	
Year of death 2012 2013 2014 2015 2016	Age 50 Number 55 53 63 52 46	-59 % 9.0 9.0 10.4 8.3 7.4	Age 60 Number 97 83 96 95 126	-69 % 16.0 14.0 15.8 15.2 20.2	Age 70 Number 149 172 161 159 149	-79 % 24.5 29.1 26.6 25.4 23.9	Age 80 Number 287 267 272 296 287	0+ 47.2 45.2 44.9 47.2 46.1	
Year of death 2012 2013 2014 2015 2016 2017	Age 50 Number 55 53 63 52 46 48	-59 9.0 9.0 10.4 8.3 7.4 6.8	Age 60 Number 97 83 96 95 126 114	-69 % 16.0 14.0 15.8 15.2 20.2 16.1	Age 70 Number 149 172 161 159 149 183	-79 24.5 29.1 26.6 25.4 23.9 25.9	Age 80 Number 287 267 272 296 287 349	0+ 47.2 45.2 44.9 47.2 46.1 49.4	
Year of death 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 55 53 63 52 46 48 39	-59 9.0 9.0 10.4 8.3 7.4 6.8 6.1	Age 60 Number 97 83 96 95 126 114 111	-69 % 16.0 14.0 15.8 15.2 20.2 16.1 17.4	Age 70 Number 149 172 161 159 149 183 148	-79 24.5 29.1 26.6 25.4 23.9 25.9 23.2	Age 80 Number 287 267 272 296 287 349 326	0+ 47.2 45.2 44.9 47.2 46.1 49.4 51.2	
Year of death 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 55 53 63 63 52 46 48 48 39 44	-59 9.0 9.0 10.4 8.3 7.4 6.8 6.1 6.4	Age 60 Number 97 83 96 95 126 114 111 95	-69 % 16.0 15.8 15.2 20.2 16.1 17.4 13.8	Age 70 Number 149 172 161 159 149 183 148 173	-79 24.5 29.1 26.6 25.4 23.9 25.9 23.2 25.2	Age 80 Number 287 267 272 296 287 349 326 359	0+ 47.2 45.2 44.9 47.2 46.1 49.4 51.2 52.3	
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 55 53 63 52 46 48 39 44 44	-59 9.0 9.0 10.4 8.3 7.4 6.8 6.1 6.4 5.9	Age 60 Number 97 83 96 95 126 114 111 95 108	-69 % 16.0 15.8 15.2 20.2 16.1 17.4 13.8 14.4	Age 70 Number 149 172 161 159 149 183 148 173 188	-79 24.5 29.1 26.6 25.4 23.9 25.9 23.2 25.2 25.2	Age 80 Number 287 267 272 296 287 349 326 359 393	0+ 47.2 45.2 44.9 47.2 46.1 49.4 51.2 52.3 52.3	
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 55 53 63 52 46 48 39 44 44 44 33	-59 9.0 9.0 10.4 8.3 7.4 6.8 6.1 6.4 5.9 4.7	Age 60 Number 97 83 96 95 126 114 111 95 108 106	-69 % 16.0 15.8 15.2 20.2 16.1 17.4 13.8 14.4 15.0	Age 70 Number 149 172 161 159 149 183 148 173 188 166	-79 24.5 29.1 26.6 25.4 23.9 25.9 23.2 25.2 25.0 23.5	Age 80 Number 287 267 272 296 287 349 326 359 393 393 388	0+ 47.2 45.2 44.9 47.2 46.1 49.4 51.2 52.3 52.3 55.0	

 Table 5.2.7a: Age distribution at death of AMI among Chinese

The median age at death among Malay AMI patients was about 10 years younger than that for the Chinese, increasing from 68.2 years to 72.1 years over the past decade (p=0.004) (Table 5.2.7b). The highest proportion of Malays who died of AMI in 2022 was among those aged 60-69 years (31.8%) (Figure 5.2.7b).

Veer of death	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
fear of death	Median	age	Number	%	Number	%	Number	%
2012	68.2		0	0.0	0	0.0	11	7.5
2013	67.0		0	0.0	1	0.7	10	6.7
2014	66.5		0	0.0	3	1.8	15	9.1
2015	68.8		0	0.0	1	0.7	10	6.6
2016	71.7		1	0.6	1	0.6	9	5.6
2017	70.9		0	0.0	2	1.1	7	4.0
2018	69.8		0	0.0	3	1.7	6	3.5
2019	70.6		0	0.0	1	0.6	5	3.0
2020	72.0		0	0.0	1	0.6	3	1.9
2021	70.3		0	0.0	4	2.4	7	4.2
2022	72.1		0	0.0	2	1.2	4	2.3
Voar of doath	Age 50	-59	Age 60	-69	Age 70	-79	Age 8	0+
Year of death	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 80 Number	0+ %
Year of death 2012	Age 50 Number 30	-59 % 20.4	Age 60 Number 38	-69 % 25.9	Age 70 Number 39	-79 % 26.5	Age 8 Number 29	0+ % 19.7
Year of death 2012 2013	Age 50 Number 30 28	-59 % 20.4 18.8	Age 60 Number 38 42	-69 % 25.9 28.2	Age 70 Number 39 36	-79 <u>%</u> 26.5 24.2	Age 8 Number 29 32	0+ 19.7 21.5
Year of death 2012 2013 2014	Age 50 Number 30 28 36	-59 % 20.4 18.8 22.0	Age 60 Number 38 42 44	-69 % 25.9 28.2 26.8	Age 70 Number 39 36 27	- 79 26.5 24.2 16.5	Age 80 Number 29 32 39	0+ 19.7 21.5 23.8
Year of death 2012 2013 2014 2015	Age 50 Number 30 28 36 35	-59 % 20.4 18.8 22.0 23.2	Age 60 Number 38 42 44 32	-69 % 25.9 28.2 26.8 21.2	Age 70 Number 39 36 27 35	-79 26.5 24.2 16.5 23.2	Age 80 Number 29 32 39 38	0+ % 19.7 21.5 23.8 25.2
Year of death 2012 2013 2014 2015 2016	Age 50 Number 30 28 36 35 28	-59 % 20.4 18.8 22.0 23.2 17.5	Age 60 Number 38 42 44 32 38	- 69 25.9 28.2 26.8 21.2 23.8	Age 70 Number 39 36 27 35 37	-79 26.5 24.2 16.5 23.2 23.1	Age 80 Number 29 32 39 38 46	0+ % 19.7 21.5 23.8 25.2 28.8
Year of death 2012 2013 2014 2015 2016 2017	Age 50 Number 30 28 36 35 28 28 23	-59 % 20.4 18.8 22.0 23.2 17.5 13.0	Age 60 Number 38 42 44 32 38 46	-69 % 25.9 28.2 26.8 21.2 23.8 26.0	Age 70 Number 39 36 27 35 37 55	-79 26.5 24.2 16.5 23.2 23.1 31.1	Age 80 Number 29 32 39 38 46 44	0+ 19.7 21.5 23.8 25.2 28.8 24.9
Year of death 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 30 28 36 35 28 28 23 34	-59 % 20.4 18.8 22.0 23.2 17.5 13.0 19.8	Age 60 Number 38 42 44 32 38 46 46 44	-69 % 25.9 28.2 26.8 21.2 23.8 26.0 25.6	Age 70 Number 39 36 27 35 37 55 48	-79 % 26.5 24.2 16.5 23.2 23.1 31.1 27.9	Age 80 Number 29 32 39 38 46 44 37	0+ 19.7 21.5 23.8 25.2 28.8 24.9 21.5
Year of death 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 30 28 36 35 28 28 23 34 34 31	-59 % 20.4 18.8 22.0 23.2 17.5 13.0 19.8 18.8	Age 60 Number 38 42 44 32 38 46 46 44 41	-69 % 25.9 28.2 26.8 21.2 23.8 26.0 25.6 24.8	Age 70 Number 39 36 27 35 37 55 48 40	-79 26.5 24.2 16.5 23.2 23.1 31.1 27.9 24.2	Age 80 Number 29 32 39 38 46 44 37 47	0+ 19.7 21.5 23.8 25.2 28.8 24.9 21.5 28.5
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 30 28 36 35 28 23 23 34 31 28	-59 % 20.4 18.8 22.0 23.2 17.5 13.0 19.8 18.8 18.8 17.4	Age 60 Number 38 42 44 32 38 46 44 40	-69 % 25.9 28.2 26.8 21.2 23.8 26.0 25.6 24.8 24.8	Age 70 Number 39 36 27 35 37 55 48 40 35	- 79 26.5 24.2 16.5 23.2 23.1 31.1 27.9 24.2 21.7	Age 80 Number 29 32 39 38 46 44 37 47 54	0+ 19.7 21.5 23.8 25.2 28.8 24.9 21.5 28.5 33.5
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 30 28 36 35 28 23 34 31 28 31 28 21	-59 % 20.4 18.8 22.0 23.2 17.5 13.0 19.8 18.8 17.4 12.5	Age 60 Number 38 42 44 32 38 46 44 41 41 40 51	-69 % 25.9 28.2 26.8 21.2 23.8 26.0 25.6 24.8 24.8 30.4	Age 70 Number 39 36 27 35 37 55 48 40 35 40	-79 % 26.5 24.2 16.5 23.2 23.1 31.1 27.9 24.2 21.7 23.8	Age 80 Number 29 32 39 38 46 44 37 47 54 47	0+ 19.7 21.5 23.8 25.2 28.8 24.9 21.5 28.5 33.5 26.8

 Table 5.2.7b: Age distribution at death of AMI among Malays

The median age at death among Indian AMI patients ranged between 68.2 and 75.8 years in the past decade (p=0.737) (Table 5.2.7c). Those aged 80 years and above comprised the largest group of AMI deaths among Indians in 2022 (32.7%) (Figure 5.2.7c).

Veer of death	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
tear of death	Median	age	Number	%	Number	%	Number	%
2012	71.5		0	0.0	2	2.3	7	8.0
2013	74.2		0	0.0	0	0.0	4	6.7
2014	73.8		0	0.0	2	2.5	5	6.2
2015	68.9		0	0.0	0	0.0	2	2.2
2016	70.3		1	1.1	1	1.1	6	6.5
2017	72.1		0	0.0	2	1.6	4	3.2
2018	69.1		0	0.0	1	1.0	7	7.1
2019	69.7		0	0.0	0	0.0	5	4.0
2020	68.2		0	0.0	1	0.8	7	5.8
2021	70.6		0	0.0	0	0.0	9	7.5
2022	75.8		0	0.0	2	1.8	3	2.7
Voar of doath	Age 50	-59	Age 60	-69	Age 70	-79	Age 8	0+
Year of death	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 80 Number	0+ %
Year of death 2012	Age 50 Number 14	-59 % 15.9	Age 60 Number 19	- 69 % 21.6	Age 70 Number 25	-79 % 28.4	Age 8 Number 21	0+ % 23.9
Year of death 2012 2013	Age 50 Number 14 6	-59 % 15.9 10.0	Age 60 Number 19 16	-69 % 21.6 26.7	Age 70 Number 25 13	-79 % 28.4 21.7	Age 80 Number 21 21	0+ 23.9 35.0
Year of death 2012 2013 2014	Age 50 Number 14 6 12	- 59 % 15.9 10.0 14.8	Age 60 Number 19 16 14	-69 % 21.6 26.7 17.3	Age 70 Number 25 13 22	-79 % 28.4 21.7 27.2	Age 80 Number 21 21 26	0+ 23.9 35.0 32.1
Year of death 2012 2013 2014 2015	Age 50 Number 14 6 12 16	-59 % 15.9 10.0 14.8 17.6	Age 60 Number 19 16 14 29	-69 % 21.6 26.7 17.3 31.9	Age 70 Number 25 13 22 22	-79 28.4 21.7 27.2 24.2	Age 80 Number 21 21 26 22	0+ 23.9 35.0 32.1 24.2
Year of death 2012 2013 2014 2015 2016	Age 50 Number 14 6 12 16 13	-59 % 15.9 10.0 14.8 17.6 14.0	Age 60 Number 19 16 14 29 25	-69 % 21.6 26.7 17.3 31.9 26.9	Age 70 Number 25 13 22 22 22 19	- 79 28.4 21.7 27.2 24.2 20.4	Age 80 Number 21 21 26 22 28	0+ 23.9 35.0 32.1 24.2 30.1
Year of death 2012 2013 2014 2015 2016 2017	Age 50 Number 14 6 12 16 13 23	- 59 15.9 10.0 14.8 17.6 14.0 18.4	Age 60 Number 19 16 14 29 25 33	-69 21.6 26.7 17.3 31.9 26.9 26.4	Age 70 Number 25 13 22 22 19 27	-79 % 28.4 21.7 27.2 24.2 20.4 21.6	Age 80 Number 21 21 26 22 28 36	0+ 23.9 35.0 32.1 24.2 30.1 28.8
Year of death 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 14 6 12 16 13 23 14	-59 % 15.9 10.0 14.8 17.6 14.0 18.4 14.3	Age 60 Number 19 16 14 29 25 33 30	-69 21.6 26.7 17.3 31.9 26.9 26.4 30.6	Age 70 Number 25 13 22 22 19 27 12	-79 % 28.4 21.7 27.2 24.2 20.4 21.6 12.2	Age 80 Number 21 21 26 22 28 36 34	0+ 23.9 35.0 32.1 24.2 30.1 28.8 34.7
Year of death 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 14 6 12 16 13 23 23 14 22	-59 % 15.9 10.0 14.8 17.6 14.0 18.4 14.3 17.7	Age 60 Number 19 16 14 29 25 33 30 30 39	-69 21.6 26.7 17.3 31.9 26.9 26.4 30.6 31.5	Age 70 Number 25 13 22 22 22 19 27 12 30	-79 28.4 21.7 27.2 24.2 20.4 21.6 12.2 24.2	Age 80 Number 21 21 26 22 28 36 34 28	0+ 23.9 35.0 32.1 24.2 30.1 28.8 34.7 22.6
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 14 6 12 16 13 23 14 22 21	-59 % 15.9 10.0 14.8 17.6 14.0 18.4 14.3 17.7 17.5	Age 60 Number 19 16 14 29 25 33 30 30 39 35	-69 21.6 26.7 17.3 31.9 26.9 26.4 30.6 31.5 29.2	Age 70 Number 25 13 22 22 19 27 12 30 18	-79 % 28.4 21.7 27.2 24.2 20.4 21.6 12.2 24.2 24.2 15.0	Age 80 Number 21 21 26 22 28 36 34 28 38	0+ 23.9 35.0 32.1 24.2 30.1 28.8 34.7 22.6 31.7
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 14 6 12 16 13 23 14 22 21 21 19	-59 % 15.9 10.0 14.8 17.6 14.0 18.4 14.3 17.7 17.5 15.8	Age 60 Number 19 16 14 29 25 33 30 30 39 35 30	-69 21.6 26.7 17.3 31.9 26.9 26.4 30.6 31.5 29.2 25.0	Age 70 Number 25 13 22 22 19 27 12 30 18 28	-79 % 28.4 21.7 27.2 24.2 20.4 21.6 12.2 24.2 15.0 23.3	Age 80 Number 21 21 26 22 28 36 34 28 38 38 38 34	0+ 23.9 35.0 32.1 24.2 30.1 28.8 34.7 22.6 31.7 28.3

 Table 5.2.7c: Age distribution at death of AMI among Indians

The incidence numbers and ASIRs of NSTEMI were consistently higher than those of STEMI across the years (Table 5.1.8); likewise, the mortality numbers and ASMRs of NSTEMI were consistently higher (Table 5.2.8). The ASMR of NSTEMI dropped significantly from 7.3 in 2012 to 5.5 per 100,000 population in 2022 (p=0.004), while

the ASMR for STEMI remained relatively unchanged at 4.9 per 100,000 population in 2012 and 4.6 per 100,000 population in 2022 (p=0.223). The older age of NSTEMI patients was likely a contributing factor as advanced age has been shown to be a strong predictor for poorer health outcomes (including mortality) following AMI, compounded by a greater prevalence of comorbidities²⁸.

As the percentages in Table 5.2.8 are among all AMI and patients without documentation of STEMI or NSTEMI are not shown, the sum of the percentages for STEMI and NSTEMI are less than 100% for each year. Figures for overall CMR and ASMR include cases of unknown etiology.

			STEMI					
Year of death	Number	%	CMR	95% CI	ASMR	95% CI		
2012	210	24.6	6.6	5.7-7.5	4.9	4.2-5.6		
2013	218	26.7	6.8	5.9-7.6	4.9	4.3-5.6		
2014	237	27.2	7.3	6.3-8.2	5.2	4.5-5.9		
2015	257	29.2	7.8	6.8-8.7	5.3	4.6-5.9		
2016	221	24.9	6.6	5.7-7.5	4.5	3.9-5.1		
2017	291	28.6	8.6	7.6-9.6	5.6	5.0-6.3		
2018	226	24.7	6.6	5.8-7.5	4.2	3.6-4.7		
2019	277	28.1	8.1	7.1-9.0	4.8	4.2-5.4		
2020	296	28.6	8.6	7.6-9.5	4.8	4.3-5.4		
2021	282	28.1	8.3	7.3-9.2	4.6	4.1-5.2		
2022	301	28.1	8.6	7.6-9.6	4.6	4.1-5.2		
P for trend	-	-	0.015*	-	0.223	-		
NSTEMI								
	-	I	ISTEMI					
Year of death	Number	ا %	NSTEMI CMR	95% CI	ASMR	95% CI		
Year of death 2012	Number 322	% 37.7	ISTEMI CMR 10.1	95% Cl 9.0-11.2	ASMR 7.3	95% Cl 6.5-8.1		
Year of death 2012 2013	Number 322 300	% 37.7 36.8	CMR 10.1 9.3	95% Cl 9.0-11.2 8.2-10.3	ASMR 7.3 6.4	95% Cl 6.5-8.1 5.7-7.2		
Year of death 2012 2013 2014	Number 322 300 367	% 37.7 36.8 42.2	STEMI CMR 10.1 9.3 11.2	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4	ASMR 7.3 6.4 7.5	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3		
Year of death 2012 2013 2014 2015	Number 322 300 367 390	% 37.7 36.8 42.2 44.3	STEMI CMR 10.1 9.3 11.2 11.8	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0	ASMR 7.3 6.4 7.5 7.5	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3		
Year of death 2012 2013 2014 2015 2016	Number 322 300 367 390 350	% 37.7 36.8 42.2 44.3 39.5	NSTEMI CMR 10.1 9.3 11.2 11.8 10.5	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0 9.4-11.6	ASMR 7.3 6.4 7.5 7.5 6.4	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3 5.7-7.1		
Year of death 2012 2013 2014 2015 2016 2017	Number 322 300 367 390 350 414	% 37.7 36.8 42.2 44.3 39.5 40.7	NSTEMI CMR 10.1 9.3 11.2 11.8 10.5 12.3	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0 9.4-11.6 11.1-13.5	ASMR 7.3 6.4 7.5 7.5 6.4 7.2	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3 5.7-7.1 6.5-7.9		
Year of death 2012 2013 2014 2015 2016 2017 2018	Number 322 300 367 390 350 414 378	% 37.7 36.8 42.2 44.3 39.5 40.7 41.3	NSTEMI CMR 10.1 9.3 11.2 11.8 10.5 12.3 11.1	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0 9.4-11.6 11.1-13.5 10.0-12.2	ASMR 7.3 6.4 7.5 7.5 6.4 7.2 6.3	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3 5.7-7.1 6.5-7.9 5.6-6.9		
Year of death 2012 2013 2014 2015 2016 2017 2018 2019	Number 322 300 367 390 350 414 378 326	% 37.7 36.8 42.2 44.3 39.5 40.7 41.3 33.1	NSTEMI CMR 10.1 9.3 11.2 11.8 10.5 12.3 11.1 9.5	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0 9.4-11.6 11.1-13.5 10.0-12.2 8.5-10.5	ASMR 7.3 6.4 7.5 7.5 6.4 7.2 6.3 5.0	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3 5.7-7.1 6.5-7.9 5.6-6.9 4.4-5.5		
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020	Number 322 300 367 390 350 414 378 326 398	% 37.7 36.8 42.2 44.3 39.5 40.7 41.3 33.1 38.4	NSTEMI CMR 10.1 9.3 11.2 11.8 10.5 12.3 11.1 9.5 11.5	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0 9.4-11.6 11.1-13.5 10.0-12.2 8.5-10.5 10.4-12.6	ASMR 7.3 6.4 7.5 7.5 6.4 7.2 6.3 5.0 5.8	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3 5.7-7.1 6.5-7.9 5.6-6.9 4.4-5.5 5.2-6.4		
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Number 322 300 367 390 350 414 378 326 398 369	% 37.7 36.8 42.2 44.3 39.5 40.7 41.3 33.1 38.4 36.8	NSTEMI CMR 10.1 9.3 11.2 11.8 10.5 12.3 11.1 9.5 11.5 10.8	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0 9.4-11.6 11.1-13.5 10.0-12.2 8.5-10.5 10.4-12.6 9.7-11.9	ASMR 7.3 6.4 7.5 7.5 6.4 7.2 6.3 5.0 5.8 5.2	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3 5.7-7.1 6.5-7.9 5.6-6.9 4.4-5.5 5.2-6.4 4.6-5.7		
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022	Number 322 300 367 390 350 414 378 326 398 369 411	% 37.7 36.8 42.2 44.3 39.5 40.7 41.3 33.1 38.4 36.8 38.3	NSTEMI CMR 10.1 9.3 11.2 11.8 10.5 12.3 11.1 9.5 11.5 10.8 11.8	95% Cl 9.0-11.2 8.2-10.3 10.1-12.4 10.6-13.0 9.4-11.6 11.1-13.5 10.0-12.2 8.5-10.5 10.4-12.6 9.7-11.9 10.6-12.9	ASMR 7.3 6.4 7.5 7.5 6.4 7.2 6.3 5.0 5.8 5.2 5.5	95% Cl 6.5-8.1 5.7-7.2 6.8-8.3 6.8-8.3 5.7-7.1 6.5-7.9 5.6-6.9 4.4-5.5 5.2-6.4 4.6-5.7 5.0-6.1		

Table 5.2.8: Mortality number and rate of AMI (per 100,000 population) by subtype

²⁸ Dai X et al. Acute coronary syndrome in older adults. Journal of Geriatric Cardiology; 2016:13. 101-108.

Figure 5.2.8: Mortality rate of AMI (per 100,000 population) by subtype

The median age at death among STEMI patients ranged between 70.9 and 76.0 years in the past decade (p=0.345) (Table 5.2.9a). The highest proportion of STEMI patients who died of AMI in 2022 was among those aged 80 years and above (38.5%) – this pattern had been consistent since 2012 (Figure 5.2.9a).

Veer of death	Overa	all	Age 15	-29	Age 30	-39	Age 40	-49
tear of death	Median	age	Number	%	Number	%	Number	%
2012	76.0		1	0.5	0	0.0	7	3.3
2013	75.0		0	0.0	2	0.9	7	3.2
2014	73.3		1	0.4	2	0.8	14	5.9
2015	74.6		0	0.0	0	0.0	16	6.2
2016	73.6		2	0.9	3	1.4	6	2.7
2017	73.3		1	0.3	2	0.7	11	3.8
2018	70.9		0	0.0	0	0.0	7	3.1
2019	73.2		0	0.0	1	0.4	7	2.5
2020	74.6		0	0.0	1	0.3	8	2.7
2021	73.4		0	0.0	3	1.1	10	3.5
2022	74.8		0	0.0	0	0.0	9	3.0
-							-	
Voor of dooth	Age 50	-59	Age 60	-69	Age 70	-79	Age 8	0+
Year of death	Age 50 Number	-59 %	Age 60 Number	-69 %	Age 70 Number	-79 %	Age 80 Number	0+ %
Year of death 2012	Age 50 Number 32	-59 % 15.2	Age 60 Number 35	-69 % 16.7	Age 70 Number 57	-79 % 27.1	Age 8 Number 78	0+ <u>%</u> 37.1
Year of death 2012 2013	Age 50 Number 32 32	-59 % 15.2 14.7	Age 60 Number 35 52	-69 % 16.7 23.9	Age 70 Number 57 46	-79 % 27.1 21.1	Age 8 Number 78 79	0+ 37.1 36.2
Year of death 2012 2013 2014	Age 50 Number 32 32 37	-59 % 15.2 14.7 15.6	Age 60 Number 35 52 43	-69 % 16.7 23.9 18.1	Age 70 Number 57 46 63	-79 % 27.1 21.1 26.6	Age 80 Number 78 79 77	0+ 37.1 36.2 32.5
Year of death 2012 2013 2014 2015	Age 50 Number 32 32 37 42	-59 % 15.2 14.7 15.6 16.3	Age 60 Number 35 52 43 46	-69 % 16.7 23.9 18.1 17.9	Age 70 Number 57 46 63 64	-79 % 27.1 21.1 26.6 24.9	Age 80 Number 78 79 77 89	0+ 37.1 36.2 32.5 34.6
Year of death 2012 2013 2014 2015 2016	Age 50 Number 32 32 37 42 36	-59 % 15.2 14.7 15.6 16.3 16.3	Age 60 Number 35 52 43 46 50	-69 % 16.7 23.9 18.1 17.9 22.6	Age 70 Number 57 46 63 64 56	-79 27.1 21.1 26.6 24.9 25.3	Age 80 Number 78 79 77 89 68	0+ 37.1 36.2 32.5 34.6 30.8
Year of death 2012 2013 2014 2015 2016 2017	Age 50 Number 32 32 32 37 42 36 44	-59 % 15.2 14.7 15.6 16.3 16.3 15.1	Age 60 Number 35 52 43 46 50 65	-69 % 16.7 23.9 18.1 17.9 22.6 22.3	Age 70 Number 57 46 63 64 56 78	-79 27.1 21.1 26.6 24.9 25.3 26.8	Age 80 Number 78 79 77 89 68 90	0+ 37.1 36.2 32.5 34.6 30.8 30.9
Year of death 2012 2013 2014 2015 2016 2017 2018	Age 50 Number 32 32 37 42 36 44 44	-59 % 15.2 14.7 15.6 16.3 16.3 15.1 18.1	Age 60 Number 35 52 43 46 50 65 61	-69 % 16.7 23.9 18.1 17.9 22.6 22.3 27.0	Age 70 Number 57 46 63 64 56 78 52	- 79 27.1 21.1 26.6 24.9 25.3 26.8 23.0	Age 80 Number 78 79 77 89 68 90 65	0+ 37.1 36.2 32.5 34.6 30.8 30.9 28.8
Year of death 2012 2013 2014 2015 2016 2017 2018 2019	Age 50 Number 32 32 37 42 36 44 44 41 36	-59 % 15.2 14.7 15.6 16.3 16.3 15.1 18.1 13.0	Age 60 Number 35 52 43 46 50 65 65 61 62	-69 % 16.7 23.9 18.1 17.9 22.6 22.3 27.0 22.4	Age 70 Number 57 46 63 64 56 78 52 75	- 79 27.1 21.1 26.6 24.9 25.3 26.8 23.0 27.1	Age 80 Number 78 79 77 89 68 90 65 90 65 96	0+ 37.1 36.2 32.5 34.6 30.8 30.9 28.8 34.7
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020	Age 50 Number 32 32 37 42 36 44 41 36 35	-59 % 15.2 14.7 15.6 16.3 16.3 15.1 18.1 13.0 11.8	Age 60 Number 35 52 43 46 50 65 61 62 64	-69 % 16.7 23.9 18.1 17.9 22.6 22.3 27.0 22.4 21.6	Age 70 Number 57 46 63 64 56 78 52 75 70	- 79 27.1 21.1 26.6 24.9 25.3 26.8 23.0 27.1 23.6	Age 80 Number 78 79 77 89 68 90 65 96 596 118	0+ 37.1 36.2 32.5 34.6 30.8 30.9 28.8 34.7 39.9
Year of death 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	Age 50 Number 32 32 37 42 36 44 41 36 44 41 36 35 35 34	-59 % 15.2 14.7 15.6 16.3 16.3 15.1 18.1 13.0 11.8 12.1	Age 60 Number 35 52 43 46 50 65 61 62 62 64 74	-69 % 16.7 23.9 18.1 17.9 22.6 22.3 27.0 22.4 21.6 26.2	Age 70 Number 57 46 63 64 56 78 52 75 75 70 57	- 79 27.1 21.1 26.6 24.9 25.3 26.8 23.0 27.1 23.6 20.2	Age 80 Number 78 79 77 89 68 90 65 90 65 96 118 104	0+ 37.1 36.2 32.5 34.6 30.8 30.9 28.8 34.7 39.9 36.9

Table 5.2.9a: Age distribution at death of STEMI

Figure 5.2.9a: Age distribution at death of STEMI

Like the median age at onset (Tables 5.1.9a and 5.1.9b), NSTEMI patients had an older median age at death than STEMI patients, increasing from 80.3 years to 82.5 years in the past decade (Table 5.2.9b). Those aged 80 years and above made up the largest proportion of NSTEMI deaths in 2022 (57.7%) (Figure 5.2.9b).

Veer of death	Overall		Age 15-29		Age 30	-39	Age 40-49	
rear of death	Median a	age	Number	%	Number	%	Number	%
2012	80.3		0	0.0	0	0.0	5	1.6
2013	79.8		0	0.0	0	0.0	3	1.0
2014	79.7		0	0.0	0	0.0	4	1.1
2015	80.0		0	0.0	1	0.3	6	1.5
2016	79.9		0	0.0	1	0.3	2	0.6
2017	79.8		0	0.0	1	0.2	0	0.0
2018	82.1		0	0.0	1	0.3	6	1.6
2019	81.6		0	0.0	0	0.0	0	0.0
2020	81.9		0	0.0	0	0.0	3	0.8
2021	82.9		0	0.0	2	0.5	3	0.8
2022	82.5		0	0.0	0	0.0	4	1.0
Voar of doath	Age 50-	59	Age 60-69		Age 70	-79	Age 8)+
Teal of Geath	Number	%	Number	%	Number	%	Number	%
0040								
2012	17	5.3	46	14.3	88	27.3	166	51.6
2012	17 18	5.3 6.0	46 34	14.3 11.3	88 98	27.3 32.7	166 147	51.6 49.0
2012 2013 2014	17 18 29	5.3 6.0 7.9	46 34 67	14.3 11.3 18.3	88 98 90	27.3 32.7 24.5	166 147 177	51.6 49.0 48.2
2012 2013 2014 2015	17 18 29 24	5.3 6.0 7.9 6.2	46 34 67 65	14.3 11.3 18.3 16.7	88 98 90 98	27.3 32.7 24.5 25.1	166 147 177 196	51.6 49.0 48.2 50.3
2012 2013 2014 2015 2016	17 18 29 24 18	5.3 6.0 7.9 6.2 5.1	46 34 67 65 67	14.3 11.3 18.3 16.7 19.1	88 98 90 98 88	27.3 32.7 24.5 25.1 25.1	166 147 177 196 174	51.6 49.0 48.2 50.3 49.7
2012 2013 2014 2015 2016 2017	17 18 29 24 18 18	5.3 6.0 7.9 6.2 5.1 4.3	46 34 67 65 67 72	14.3 11.3 18.3 16.7 19.1 17.4	88 98 90 98 88 117	27.3 32.7 24.5 25.1 25.1 28.3	166 147 177 196 174 206	51.6 49.0 48.2 50.3 49.7 49.8
2012 2013 2014 2015 2016 2017 2018	17 18 29 24 18 18 18	5.3 6.0 7.9 6.2 5.1 4.3 4.8	46 34 67 65 67 72 54	14.3 11.3 18.3 16.7 19.1 17.4 14.3	88 98 90 98 88 117 94	27.3 32.7 24.5 25.1 25.1 28.3 24.9	166 147 177 196 174 206 205	51.6 49.0 48.2 50.3 49.7 49.8 54.2
2012 2013 2014 2015 2016 2017 2018 2019	17 18 29 24 18 18 18 18 18	5.3 6.0 7.9 6.2 5.1 4.3 4.8 5.5	46 34 67 65 67 72 54 38	14.3 11.3 18.3 16.7 19.1 17.4 14.3 11.7	88 98 90 98 88 117 94 89	27.3 32.7 24.5 25.1 25.1 28.3 24.9 27.3	166 147 177 196 174 206 205 181	51.6 49.0 48.2 50.3 49.7 49.8 54.2 55.5
2012 2013 2014 2015 2016 2017 2018 2019 2020	17 18 29 24 18 18 18 18 18 18 14	5.3 6.0 7.9 6.2 5.1 4.3 4.8 5.5 3.5	46 34 67 65 67 72 54 38 55	14.3 11.3 18.3 16.7 19.1 17.4 14.3 11.7 13.8	88 98 90 98 88 117 94 89 94	27.3 32.7 24.5 25.1 25.1 28.3 24.9 27.3 23.6	166 147 177 196 174 206 205 181 232	51.6 49.0 48.2 50.3 49.7 49.8 54.2 55.5 58.3
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021	17 18 29 24 18 18 18 18 18 18 18 14 16	5.3 6.0 7.9 6.2 5.1 4.3 4.8 5.5 3.5 4.3	46 34 67 65 67 72 54 38 55 43	14.3 11.3 18.3 16.7 19.1 17.4 14.3 11.7 13.8 11.7	88 98 90 98 88 117 94 89 94 89 94 84	27.3 32.7 24.5 25.1 25.1 28.3 24.9 27.3 23.6 22.8	166 147 177 196 174 206 205 181 232 221	51.6 49.0 48.2 50.3 49.7 49.8 54.2 55.5 58.3 59.9

Table 5.2.9b: Age distribution at death of NSTEMI

Figure 5.2.9b: Age distribution at death of NSTEMI

5.3 30-day Case Fatality

The number of AMI deaths within 30 days (Table 5.3.1) did not increase as much as the number of AMI episodes over the years (Table 5.1.1). The CFR remained similar over the years, at 9.8% in 2012 and 8.5% in 2022 (p=0.179) (Figure 5.3.1).

Year of onset	Number	CFR	95% CI
2012	826	9.8	9.1-10.4
2013	788	8.9	8.3-9.6
2014	785	8.6	8.0-9.2
2015	821	8.7	8.1-9.3
2016	837	8.3	7.7-8.8
2017	923	8.3	7.7-8.8
2018	849	7.6	7.1-8.1
2019	971	8.4	7.8-8.9
2020	998	9.2	8.6-9.8
2021	963	8.3	7.8-8.9
2022	1029	8.5	8.0-9.0
P for trend	-	0.179	-

Table 5.3.1: 30-day case fatality number and rate of AMI (%)

Figure 5.3.1: 30-day case fatality rate of AMI (%)

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Although the ASMRs of AMI for males were consistently higher than females across the years (Table 5.2.4), the 30-day CFRs for males were consistently lower than females (Table 5.3.2). In 2022, the CFR was 7.3% for males, and about 1.5 times higher at 10.8% for females. As females tended to have AMI at an older age than males (Tables 5.1.5a and 5.1.5b), they were likely to have more co-morbidities at AMI onset, making them more susceptible to the contraindications of revascularisation or decline of revascularisation. Lower rate of revascularisation of the blocked arteries could have led to the higher CFR among females²⁹. Other possible reasons include delayed treatment seeking in females due to more atypical presentation of symptoms³⁰. The decline in CFR was not significant for both males and females over the years (p=0.137, p=0.551) (Figure 5.3.2).

	Mai	e						
Year of onset	Number	%	CFR	95% CI				
2012	469	56.8	8.4	7.6-9.2				
2013	474	60.2	8.3	7.5-9.0				
2014	455	58.0	7.6	6.9-8.3				
2015	465	56.6	7.5	6.8-8.2				
2016	488	58.3	7.3	6.7-8.0				
2017	521	56.4	7.1	6.4-7.7				
2018	495	58.3	6.6	6.0-7.2				
2019	548	56.4	7.2	6.6-7.8				
2020	599	60.0	8.2	7.6-8.9				
2021	568	59.0	7.3	6.7-7.9				
2022	593	57.6	7.3	6.7-7.9				
P for trend	-	-	0.137	-				
	Female							
Year of onset	Number	%	CFR	95% CI				
2012	357	43.2	12.4	11.1-13.6				
2013	314	39.8	10.2	9.0-11.3				
2014	330	42.0	10.4	9.3-11.6				
2015	356	43.4	10.8	9.7-12.0				
2016	349	41.7	10.2	9.1-11.2				
2017	402	43.6	10.6	9.6-11.7				
2018	354	41.7	9.6	8.6-10.6				
2019	422	43.6	10.7	9.7-11.7				
	423	+3.0						
2020	423 399	40.0	11.2	10.1-12.3				
2020 2021	399 395	40.0	11.2 10.5	10.1-12.3 9.4-11.5				
2020 2021 2022	423 399 395 436	40.0 41.0 42.4	11.2 10.5 10.8	10.1-12.3 9.4-11.5 9.8-11.8				

Table 5.3.2: 30-day case fatality number and rate of AMI (%) by sex

 ²⁹ Berger JS et al. Sex differences in mortality following acute coronary syndromes. JAMA 2009; 302(8): 874-882.
 ³⁰ Stehli et al. Sex differences in Time to Presentation, Revascularization, and Mortality in Myocardial Infarction Treated with Percutaneous Coronary Intervention. JAHA. 2019;8

Figure 5.3.2: 30-day case fatality rate of AMI (%) by sex

Although Chinese generally had the lowest ASMR (Table 5.2.6), they had the highest 30-day CFR across the years (Table 5.3.3). The CFRs were 9.0%, 7.4% and 6.8% for Chinese, Malays, and Indians respectively in 2022. This was likely due to Chinese being oldest at the onset of AMI (Tables 5.1.7a to 5.1.7c). The CFR fell significantly over the years for Malays (p=0.003), but not the Chinese (p=0.187) and Indians (p=0.118) (Figure 5.3.3).

Chinese										
Year of onset	Number	%	CFR	95% CI						
2012	593	71.8	10.6	9.8-11.5						
2013	580	73.6	9.9	9.1-10.8						
2014	550	70.1	9.0	8.3-9.8						
2015	594	72.4	9.3	8.6-10.1						
2016	589	70.4	8.8	8.1-9.6						
2017	651	70.5	8.6	8.0-9.3						
2018	602	70.9	8.0	7.4-8.6						
2019	678	69.8	8.8	8.1-9.4						
2020	725	72.6	10.1	9.3-10.8						
2021	675	70.1	8.8	8.1-9.5						
2022	740	71.9	9.0	8.4-9.7						
P for trend	-	-	0.187	-						

Table 5.3.3: 30-day case fatality number and rate of AMI (%) by ethnicity

Malay										
Year of onset	Number	%	CFR	95% CI						
2012	141	17.1	8.3	7.0-9.7						
2013	140	17.8	8.1	6.8-9.4						
2014	143	18.2	8.1	6.8-9.5						
2015	140	17.1	7.6	6.3-8.8						
2016	152	18.2	7.6	6.4-8.8						
2017	150	16.3	7.2	6.0-8.3						
2018	149	17.6	7.0	5.9-8.2						
2019	161	16.6	7.3	6.2-8.4						
2020	155	15.5	7.4	6.3-8.6						
2021	162	16.8	7.2	6.1-8.4						
2022	169	16.4	7.4	6.3-8.6						
P for trend	-	-	0.003**	-						
	Ind	lian								
Year of onset	Number	%	CFR	95% CI						
2012	81	9.8	7.5	5.8-9.1						
2013	54	6.9	4.9	3.6-6.2						
2014	73	9.3	6.2	4.8-7.6						
2015	77	9.4	6.7	5.2-8.2						
2016	88	10.5	6.8	5.4-8.2						
2017	113	12.2	8.1	6.6-9.6						
2018	90	10.6	6.4	5.0-7.7						
2019	123	12.7	8.3	6.9-9.8						
2020	116	11.6	8.1	6.6-9.5						
2021	117	12.1	7.9	6.4-9.3						
2022	104	10.1	6.8	5.5-8.1						

Figure 5.3.3: 30-day case fatality rate of AMI (%) by ethnicity

Although STEMI patients had lower ASMRs than NSTEMI patients across the years (Table 5.2.8), the 30-day CFRs among STEMI patients were consistently higher than NSTEMI patients (Table 5.3.4). The CFRs were 10.5% and 4.2% for STEMI and NSTEMI patients respectively in 2022. A plausible reason was that STEMI was more severe with a higher likelihood of fatality if intervention was not provided promptly. Complications associated with high short-term fatality rates also tend to be more frequently described among STEMI compared to NSTEMI cases³¹. While the CFR for STEMI patients fluctuated over the years (p=0.308), it fell significantly for NSTEMI patients (p=0.041) (Figure 5.3.4).

As the percentages in Table 5.3.4 are among all AMI and patients without documentation of STEMI or NSTEMI are not shown, the sum of the percentages for STEMI and NSTEMI are less than 100% for each year. Figures for overall CFR include cases of unknown etiology.

STEIVII										
Year of onset	Number	%	CFR	95% CI						
2012	201	24.3	9.1	7.9-10.4						
2013	214	27.2	9.4	8.1-10.6						
2014	220	28.0	9.7	8.4-11.0						
2015	249	30.3	11.0	9.7-12.4						
2016	208	24.9	8.9	7.7-10.1						
2017	274	29.7	11.1	9.8-12.4						
2018	207	24.4	8.1	7.0-9.2						
2019	272	28.0	10.3	9.0-11.5						
2020	294	29.5	10.7	9.5-12.0						
2021	276	28.7	10.2	9.0-11.4						
2022	295	28.7	10.5	9.3-11.7						
P for trend	-	-	0.308	-						
	NSTE	MI								
Year of onset	Number	%	CFR	95% CI						
2012	307	37.2	5.3	4.7-5.9						
2013	275	34.9	4.5	4.0-5.0						
2014	303	38.6	4.6	4.1-5.2						
2015	338	41.2	4.9	4.4-5.4						
2016	319	38.1	4.4	3.9-4.8						
2017	335	36.3	4.1	3.6-4.5						
2018	335	39.5	4.1	3.6-4.5						
2019	315	32.4	3.7	3.3-4.1						
2020	363	36.4	4.8	4.3-5.3						
2021	336	34.9	4.0	3.6-4.5						
2022	370	36.0	4.2	3.8-4.6						
P for trend	-	-	0.041*	-						

Table 5.3.4: 30-day case fatality number and rate of AMI (%) by subtype

³¹ Bouisset F. et al. Comparison of Short- and Long-Term Prognosis between ST-Elevation and Non-ST Elevation Myocardial Infarction. J. Clin. Med. 2023; 10(180)

Figure 5.3.4: 30-day case fatality rate of AMI (%) by subtype

5.4 Symptoms

Clinical presentation has consequences on patient recognition of symptoms, triage categorisation, prescription of diagnostic tests, and disease management³². Symptoms of AMI were defined as typical when there was continuous chest pain of at least 20 minutes. Symptoms would be deemed as atypical if the chest pain was of short duration and/or intermittent with each bout lasting less than 20 minutes, or if pain was experienced at unusual sites such as upper abdomen, arm, jaw, and neck. For well-described symptoms that did not satisfy the criteria for typical or atypical, they were classified as others. These included symptoms due to a definite non-cardiac cause. а definite non-atherosclerotic cardiac cause. or cases of collapse/unresponsiveness. Data were deemed to be insufficient when symptoms were not stated in the medical records or lacked details on the description and duration of symptoms.

The proportion of AMI patients experiencing typical symptoms of AMI were higher in earlier years, declining over time from 42.5% in 2012 to 27.5% in 2022 (Figure 5.4.1). Conversely, the proportion of patients experiencing symptoms that were non-typical increased by about 40% over the years, from 19.0% in 2012 to 26.3% in 2022. Similarly, those with no symptom increased from 4.0% to 13.5% in the same period. The proportion of patients with symptoms that were neither typical nor atypical remained largely similar in the past decade, ranging from 32.7% to 39.6%.

50 40 30 20 % 10			>	<	_						
Year of onset 0	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
— Typical	42.5	40.4	39.4	36.3	37.1	33.5	34.8	34.5	32.5	31.0	27.5
Atypical	19.0	19.6	19.7	19.5	18.9	20.1	21.2	20.4	23.5	23.7	26.3
Others	34.3	34.9	35.8	38.9	37.8	39.6	36.0	36.3	34.7	34.0	32.7
None	4.0	4.8	5.1	5.3	6.1	6.8	8.0	8.8	9.4	11.3	13.5
Insufficient data	0.3	0.3	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0

Figure 5.4.1: Type of symptoms (%)

Among STEMI patients, about 60% experienced typical symptoms in 2022 (Figure 5.4.2a). Unlike STEMI patients, less than a fifth (18.5%) of NSTEMI patients experienced typical symptoms in 2022 (Figure 5.4.2b). This observation could be attributed to the smaller infarct size from NSTEMI, and the infarct did not involve the full thickness of the myocardium and epicardium³³. Additionally, as NSTEMI patients tended to be older, diminished chest pain sensation and cognitive impairment could

³² Kim Soo-Joong. Global Awareness of Myocardial Infarction Symptoms in General Population. Korean Circulation Journal 2021;51(12): 997-1000.

³³ Brieger D et al. Acute coronary syndromes without chest pain, an underdiagnosed and undertreated high-risk group: insights from the global registry of acute coronary events. Chest 2004; 126: 461-469.

also affect symptom perception, leading to a greater likelihood of presenting with atypical symptoms³⁴. The proportion of both STEMI and NSTEMI patients with typical symptoms dropped and that for atypical symptoms rose over the years. STEMI patients were consistently more likely to experience typical symptoms of AMI. Up till 2019, NSTEMI patients were more likely to experience typical AMI symptoms, but the proportion of NSTEMI patients experiencing atypical symptoms exceeded that of patients with typical symptoms from 2020 onwards.

80 70 60 50 40 30 20 10											
Year of onset 0	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
— Typical	70.5	69.3	70.9	68.2	70.7	65.7	65.7	66.7	62.8	65.3	59.9
— Atypical	12.9	14.2	13.9	15.8	14.1	17.9	20.3	16.3	20.0	18.3	22.4
Others	15.4	14.8	13.6	14.8	13.9	15.0	12.8	14.9	14.7	14.0	15.8
None	1.1	1.7	1.6	1.1	1.3	1.5	1.2	2.1	2.5	2.4	1.8
Insufficient data	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 5.4.2a: Type of symptoms (%) among STEMI

Figure 5.4.2b: Type of symptoms (%) among NSTEMI

Consistently across the years, the two most common presenting symptoms of AMI were chest pain and breathlessness, with about half of the patients having these symptoms (chest pain: 51.1%, breathlessness: 48.2%) in 2022 (Figure 5.4.3). About a fifth (19.7%) of the patients had diaphoresis (abnormal sweating) in 2022, while other symptoms like epigastric pain, back pain, shoulder pain, jaw pain and syncope (loss of consciousness) were less common, with fewer than 5% of the patients experiencing

³⁴ Carro A, Kaski JC. Myocardial Infarction in the Elderly. Aging and Disease. 2011;2(1): 116-137

them. Clear downward trends were observed for chest pain, breathlessness, and diaphoresis over the past decade.

As a patient could have multiple symptoms, the percentages in Figures 5.4.3, 5.4.4a and 5.4.4b will not add up to 100% for each year.

s 70 60 50 de 40 50 30 % 20 10											
Year of onset ()	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chest pain	58.3	56.4	55.2	52.5	53.0	50.2	52.6	52.2	53.0	51.8	51.1
Breathlessness	55.7	54.7	53.1	50.1	51.0	50.3	50.9	49.4	49.3	48.4	48.2
Diaphoresis	31.4	29.6	28.3	26.2	26.7	23.2	22.9	23.6	23.0	21.4	19.7
Epigastric pain	4.8	5.1	5.2	4.5	4.4	3.9	4.4	3.8	4.4	3.9	3.8
Back pain	5.2	5.3	5.7	5.1	4.9	5.0	4.9	4.8	5.3	4.7	4.3
	4.7	3.9	4.2	4.3	4.2	3.9	4.4	4.1	4.0	4.1	3.6
— Jaw pain	3.0	2.7	3.4	3.3	3.2	3.2	3.2	3.2	3.2	3.3	2.9
Syncope	1.9	1.8	1.8	1.6	1.3	1.3	1.3	1.0	1.1	1.5	1.3

Figure 5.4.3: Presenting symptoms (%)

Chest pain was the most common presenting symptom of STEMI, with about 4 in 5 STEMI patients having this symptom every year (Figure 5.4.4a). Unlike STEMI, breathlessness was the most common presenting symptom of NSTEMI, with about half of the patients having this symptom in 2022 (Figure 5.4.4b). While the proportion of STEMI patients with chest pain remained stable over the years, the proportion of NSTEMI patients with chest pain dropped from 52.7% in 2012 to 43.8% in 2022. The proportion who experienced breathlessness dropped for both STEMI and NSTEMI patients over the years. This might indicate a rise in silent AMI among NSTEMI patients, whereby mild and brief symptoms are experienced by individuals, leading to delays in seeking medical attention³⁵.

³⁵ The danger of "silent" heart attacks. Harvard Health Publishing, Harvard Medical School. <u>https://www.health.harvard.edu/heart-health/the-danger-of-silent-heart-attacks</u> Accessed on 5 May 2023.

Figure 5.4.4a: Presenting symptoms (%) among STEMI

Figure 5.4.4b: Presenting symptoms (%) among NSTEMI

70 60 50 40 50 30 20 10											
Year of onset 0	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chest pain	52.7	49.9	47.9	44.7	45.9	43.3	45.4	45.5	45.8	44.4	43.8
Breathlessness	57.3	55.8	54.0	50.9	51.3	50.9	50.9	49.3	49.9	48.2	48.2
Diaphoresis	24.2	21.5	19.9	19.1	18.9	16.3	15.9	16.7	15.9	14.4	12.8
Epigastric pain	4.9	4.7	4.9	4.4	4.3	3.5	4.0	3.6	4.3	3.8	3.8
Back pain	4.6	5.0	5.3	4.3	4.3	4.0	4.0	4.1	4.7	4.1	3.5
Shoulder pain	4.7	3.5	3.8	3.8	3.8	3.4	3.9	3.6	3.3	3.6	3.2
——Jaw pain	2.8	2.2	2.9	2.8	2.9	2.7	2.6	2.7	2.5	2.5	2.2
Syncope	1.6	1.4	1.5	1.4	1.0	1.1	1.0	0.8	0.9	1.2	1.0

5.5 Risk Factors

Hypertension, hyperlipidaemia, Type 2 diabetes, obesity, and smoking have been identified as the five main modifiable risk factors of cardiovascular diseases (CVD), including AMI. The increasing prevalence of hypertension, high blood cholesterol, and high BMI could partly explain the rise in crude incidence of AMI³⁶. In 2019, CVD accounted for about 80% of the total societal costs (in the form of healthcare costs and productivity losses) attributed to the trio of metabolic risk factors (high blood pressure, high blood glucose, high cholesterol)³⁷. It has also been found that the risk factors for CVD tend to cluster – for example, high blood pressure often co-exists with high cholesterol, resulting in a synergistic effect and presenting a greater likelihood of developing disease (including CVD) compared to an individual risk factor alone³⁸.

In this report, hypertension, hyperlipidaemia and diabetes were considered to be present if there was history of the condition or if it was newly diagnosed during the index admission. Moderate-to-high BMI refers to BMI 23 kg/m² and above, whereby the risk for cardiovascular disease and diabetes is increased among Asian populations³⁹. Smoking includes former or current smokers. As a patient could have multiple risk factors, the percentages in all Figures of this section will not add up to 100% for each year.

Hypertension and hyperlipidaemia were consistently the two most common risk factors among AMI patients across the years (Figure 5.5.1). In 2022, 74.6% of AMI patients had hypertension, while 74.4% had hyperlipidaemia. Moderate-to-high BMI and diabetes were also prevalent among AMI patients, with more than half of them having these risk factors (moderate-to-high BMI: 59.0%, diabetes: 52.1%) in 2022. While the proportions of AMI patients with hypertension and a history of AMI/revascularisation were fairly consistent at approximately 3 in 4 and 1 in 3 respectively every year, slight upward trends were observed for hyperlipidaemia, moderate-to-high BMI, and diabetes. However, there was a drop in the percentage of AMI patients who were current or former smokers.

³⁶ Tan J. et al. Strategies to prevent cardiovascular disease in Singapore: A call to action from Singapore Heart Foundation, Singapore Cardiac Society, and Chapter of Cardiologists of the Academy of Medicine, Singapore. Ann Acad Med Singap 2024;53: 23-33

³⁷ Tan V., Lim J., Katika A., Chow WL., Ma S., Chen C. The societal cost of modifiable risk factors in Singapore. BMC Public Health 2023; 23:1285

³⁸ Ibid.

³⁹ WHO expert consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet 2004; 363: 157-163.

Figure 5.5.1: Risk factors (%)

More than half of the STEMI patients had hypertension, hyperlipidaemia, moderateto-high BMI or smoked (Figure 5.5.2a). Compared to STEMI patients, the proportions of NSTEMI patients with hypertension, hyperlipidaemia, diabetes, and history of AMI / revascularisation were higher (Figure 5.5.2b) as they tended to be older (Tables 5.1.9a and 5.1.9b), which is associated with an increased burden of cardiovascular risk factors⁴⁰. However, NSTEMI patients were also less likely to have moderate-to-high BMI or smoke.

Figure 5.5.2a: Risk factors (%) among STEMI

⁴⁰ Zuhdi A et al. Acute coronary syndrome in the elderly: the Malaysian National Cardiovascular Disease Database-Acute Coronary Syndrome registry. Singapore Med J 2016; 57(4): 191-197.

Figure 5.5.2b: Risk factors (%) among NSTEMI

5.6 Time Factors

Door-to-balloon (DTB) time: DTB time refers to the time from first medical contact to start of primary PCI (first device time). The timeliness of hospitals in treating STEMI through primary PCI is indicated by the DTB time. Imprecise recording of the time of first medical contact and start of primary PCI by the hospitals will affect the accuracy of DTB time. The targeted DTB time recommended by the American Heart Association is within 90 minutes⁴¹.

Studies have shown that direct ambulance admission to the catheterisation laboratory significantly reduces DTB time⁴². The Singapore Civil Defence Force (SCDF) is the main provider of emergency ambulance services in Singapore. Non-SCDF transport include non-SCDF private ambulance, public transport, personal private transport and walk-in.

The utilisation of SCDF ambulance among STEMI patients ranged from about 50%-60% from 2012 to 2022 (Figure 5.6.1). In 2022, 3 in 5 cases of STEMI arrived by SCDF ambulance.

Figure 5.6.1: Mode of arrival (%) among STEMI patients

 ⁴¹ Antman EM et al. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to revise the 1999 guidelines for the management of patients with acute myocardial infarction). Journal of American College of Cardiology 2004; 94: 722-774.
 ⁴² Dorsch MF et al. Direct ambulance admission to the cardiac catheterization laboratory significantly reduces

⁴² Dorsch MF et al. Direct ambulance admission to the cardiac catheterization laboratory significantly reduces door-to-balloon times in primary percutaneous coronary intervention. American Heart Journal 2008; 155(6): 1054-1058.

Patients who were admitted for a non-AMI condition but developed AMI during hospitalisation, patients who were transferred from another hospital, and patients who experienced non-system delays⁴³, were excluded from the calculation of DTB time. These exclusion criteria were applied as the DTB time would be abnormally short or long under such scenarios.

The median DTB time remained relatively unchanged at 59 (IQR 48-75) minutes in 2012 and 57 (IQR 45-71) minutes in 2022 among STEMI patients (Figure 5.6.2). The proportion of STEMI patients with DTB time of 90 minutes or less improved from 88.6% in 2012 to 95.6% in 2022. This improvement was driven by the efficiency in the healthcare delivery system comprising the early response teams and hospitals.

The median DTB time was consistently shorter for STEMI patients who arrived by SCDF ambulance (51 minutes in 2022) compared to those who relied on other modes of transport (65 minutes in 2022) across the years. SCDF paramedics are trained to recognise STEMI changes in the ECG. Individuals assessed by SCDF paramedics to be in need of immediate intervention can bypass triage upon arrival at the receiving hospital's emergency department (ED), resulting in shorter times to initiation of primary PCI.⁴⁴ A comparable difference was found by a single-centre retrospective cohort study in Singapore, where arrival via emergency ambulance was similarly associated with DTB times approximately 15 minutes shorter than arrival via other modes of transport⁴⁵. This difference was largely attributable to decreased door-to-ECG and door-to-catheterisation laboratory times.

Similarly, the proportion of STEMI patients with DTB time within 90 minutes was consistently higher among those who arrived at the hospital via SCDF ambulance than those who arrived via other modes of transport (97.5% versus 92.4% respectively in 2022) across the years. When a STEMI diagnosis is determined in the pre-hospital setting through the SCDF Emergency Medical Services and the patient is triaged for a primary PCI, he/she will be conveyed to a PCI centre. The receiving hospital's ED is notified by the SCDF in advance to be put on standby, and the patient's ECG is transmitted to the ED before the ambulance's arrival⁴⁶. This allows the hospital to confirm the diagnosis, prepare the resuscitation bay and controlled drugs if necessary, pre-order procedures and activate the catheterisation laboratory, thereby shortening DTB time, which translates to reduction in mortality^{47,48}. Worldwide, interventions such

⁴³ The SMIR only started collecting this variable from 2012 onwards.

Non-system delay refers to delay in primary PCI due to patient's condition. It includes: unfit for primary PCI at the point of hospital arrival (indicated by cardiopulmonary resuscitation, direct current shock, cardiogenic shock, deterioration before or during primary PCI), requirement for other procedure or test prior to primary PCI, equivocal ECG, evolved AMI, delayed consent.

System delay refers to delay in primary PCI due to hospital's system. It includes: delayed process leading to the start of primary PCI, catheterisation laboratory being occupied, procedure difficulty, uptriaged, missed diagnosis, unknown reason.

⁴⁴ CNA Insider. On Call With Singapore's Emergency Medical Services: When Minutes Can Mean Life Or Death. <u>https://www.youtube.com/watch?v=9PjWLStxWCc</u> Accessed on 8 May 2024.

⁴⁵ Liu et al. Improved door-to-balloon time for primary percutaneous coronary intervention for patients conveyed via emergency ambulance service. Ann Acad Med Singapore 2021;50:671-678.

⁴⁶ Chia YW and Chia M. Reducing the total ischaemic time in ST-segment elevation myocardial infarction: Every step matters. Ann Acad Med Singapore 2021;50:662-665.

⁴⁷ Nallamothu BK et al. Relation between door-to-balloon times and mortality after primary percutaneous coronary intervention over time: a retrospective study. Lancet 2015; 385(9973): 1114-1122.

⁴⁸ CNA Insider. On Call With Singapore's Emergency Medical Services: When Minutes Can Mean Life Or Death. <u>https://www.youtube.com/watch?v=9PjWLStxWCc</u> Accessed on 8 May 2024.

as pre-hospital ECG transmission and activation of catheterisation laboratories have been shown to reduce DTB times, and these are only available to patients conveyed via emergency ambulance services⁴⁹.

In August 2021, a platform jointly developed by the SCDF and Ministry of Health (MOH) called Operational Medical Networks Informatics Integrator (OMNII) was launched, allowing stakeholders in pre-hospital emergency care (such as the SCDF) and hospitals to view, document and share patient data (including vital signs) with each other, resulting in speedier patient management and improving chances of survival^{50,51}. With OMNII, SCDF paramedics could also pre-register the patient prior to their arrival at the ED, potentially further improving the DTB time for STEMI patients who arrive by SCDF ambulance.

⁴⁹ Liu et al. Improved door-to-balloon time for primary percutaneous coronary intervention for patients conveyed via emergency ambulance service. Ann Acad Med Singapore 2021;50:671-678.

⁵⁰ New digital platform for paramedics and hospitals to share patient data in real time. Yeoh G. <u>https://www.channelnewsasia.com/singapore/digital-platform-scdf-moh-hospitals-patients-omnii-2132121</u> Accessed on 10 May 2023.

⁵¹ Home Team Science and Technology Agency (HTX). Embracing innovation and technology to save lives with OMNII. <u>https://www.htx.gov.sg/news/featured-news-embracing-innovation-and-technology-to-save-lives-with-omnii</u> Accessed 8 May 2024.

Figure 5.6.2: DTB time by mode of arrival among STEMI patients

5.7 Length of Hospitalisation

Patients who died during hospitalisation, patients who were discharged against medical advice, patients who were transferred from another hospital, and patients who were admitted for a non-AMI condition but developed AMI during hospitalisation, were excluded from the calculation of length of hospital stay (LOS). These exclusion criteria were applied as the LOS would be abnormally short or long under such scenarios.

The average LOS ranged between 7.6 and 8.1 days from 2012 to 2022 (Figure 5.7.1). The average LOS was consistently longer among NSTEMI than STEMI patients by about 2 to 3 days. This could be due to their older age at onset and therefore higher prevalence of co-morbidities; and coupled with their greater tendency for complications, necessitating more extensive monitoring^{52,53}.

Figure 5.7.1: Length of hospitalisation (days)

⁵² Bhat A. G. et al. Hospitalisation Duration of Acute Myocardial Infarction: A Temporal Analysis of 18-Year United States Data. Medicina 2022; 58:

⁵³ Dai X et al. Acute coronary syndrome in older adults. Journal of Geriatric Cardiology; 2016:13. 101-108.

6. CONCLUSION

Driven partly by population ageing, the crude incidence of AMI had risen over the past decade. In 2021, cardiovascular diseases were the third highest contributor to the combined burden of early death and disability in Singapore, accounting for 13.3% of all disability-adjusted life years (DALYs)⁵⁴. It is important for individuals with high risk of AMI to take preventive action. Hypertension, hyperlipidaemia, smoking, diabetes, obesity, unhealthy diet, and a lack of regular physical activity are all significantly associated with increased risk of AMI onset regardless of sex and age, and this is observed across all regions of the world. Collectively, these account for a vast majority of the attributable risk of AMI and are all modifiable through lifestyle interventions such as dietary changes and regular exercise^{55,56}.

One can reduce his/her chances of developing AMI by adopting a healthy lifestyle, such as eating all food in moderation and opting for healthier food options, exercising and maintaining a healthy weight, avoiding smoking, going for health screening and follow-ups, and controlling blood pressure, cholesterol and glucose levels well⁵⁷. Individual awareness of the typical and atypical symptoms of AMI can shorten the time from onset to treatment, thereby improving outcomes, reducing overall mortality and the chances of reinfarction⁵⁸. For individuals with symptoms of AMI, seeking medical help promptly plays a crucial role in prognosis. For individuals who survived an AMI, adherence to medication and healthy lifestyle can reduce the risk of subsequent cardiovascular event and death.

⁵⁴ Global Burden of Disease study 2021 (GBD 2021). Accessed on 10 October 2024.

⁵⁵ Yusof, S et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364:937-952.

⁵⁶ Tan J. et al. Strategies to prevent cardiovascular disease in Singapore: A call to action from Singapore Heart Foundation, Singapore Cardiac Society, and Chapter of Cardiologists of the Academy of Medicine, Singapore. Ann Acad Med Singap 2024;53: 23-33

⁵⁷ Ibid.

⁵⁸ Kim Soo-Joong. Global Awareness of Myocardial Infarction Symptoms in General Population. Korean Circulation Journal 2021;51(12): 997-1000.