Bias and Biology Northern Ireland

The heart attack gender gap

British Heart Foundation Northern Ireland

Contents

3 Foreword

5 Introduction

6 Awareness

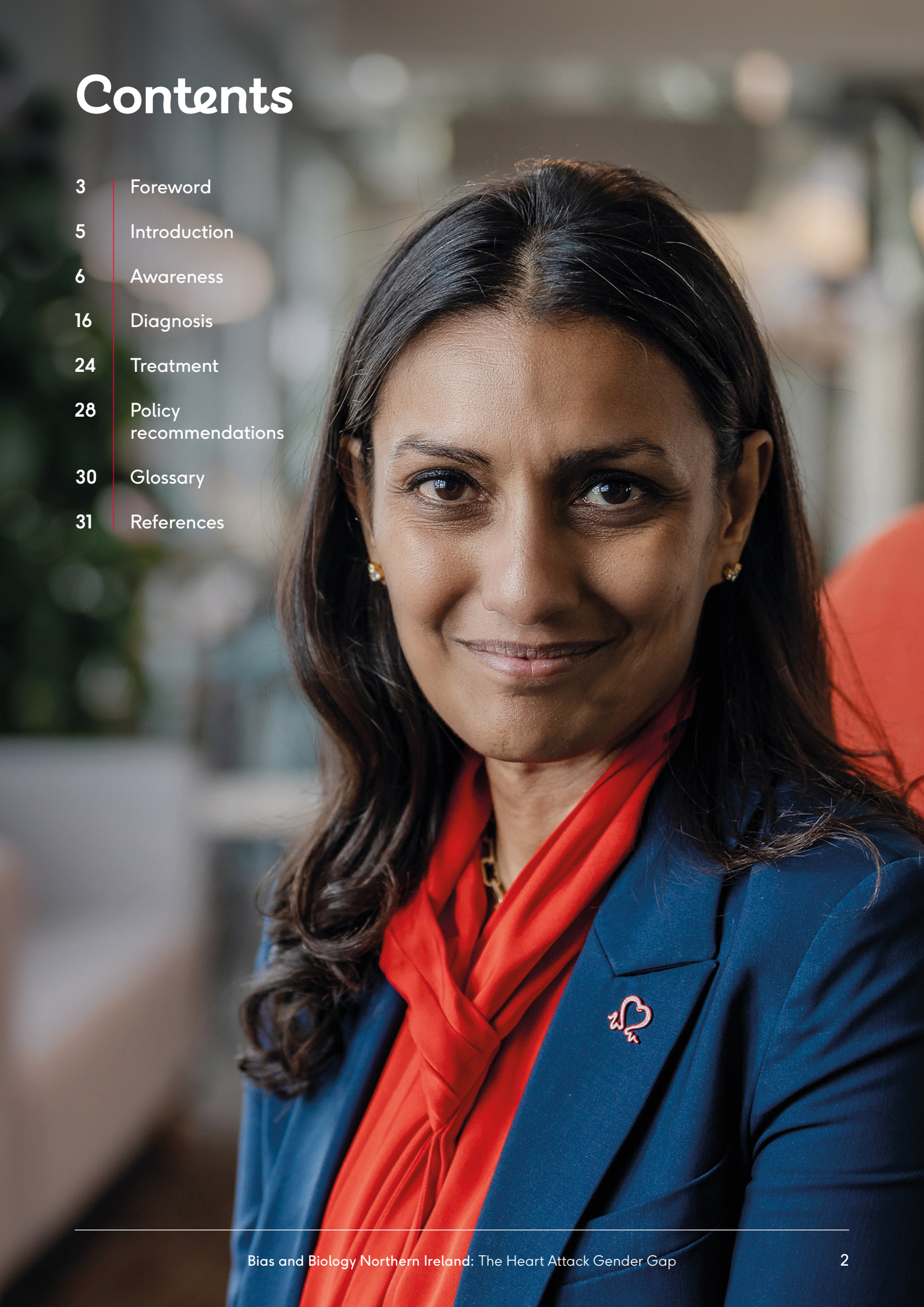
16 Diagnosis

24 Treatment

28 Policy recommendations

30 Glossary

31 References



Foreword

The British Heart Foundation Northern Ireland (BHF NI) has produced this report to highlight the systemic gender inequalities which exist across the cardiac care pathway and to provide policy recommendations to close the heart attack gender gap, improving outcomes and quality of life for women with heart disease in Northern Ireland.

Decades of research has led to dramatic improvements in survival rates from cardiac events such as heart attacks. In the 1960s, more than seven out of ten heart attacks in the UK were fatal. Today, more than seven out of ten people will survive.[1] We better understand how to respond when a patient presents with symptoms suggestive of a heart attack. We are better and quicker at running the appropriate diagnostic tests and we have better techniques available to treat the cause of the heart attack and to prevent another from happening in the future.

Despite this encouraging progress, inequalities persist in the awareness, diagnosis and care for heart disease. Informed by evidence-based data, clinical expertise and local patient experience, this report reveals inequalities faced by women across the heart disease care pathway. The scale of the problem has also been highlighted by the British Cardiovascular Society through the publication of a consensus document which presents the sex-related differences in diagnosis and treatment.[2]

Women are not adequately equipped with clear, accessible information on symptoms; are more likely than men to receive a delayed diagnosis or a misdiagnosis following a heart attack and are less likely than men to receive timely, optimal treatment. Such gender inequalities are further exacerbated by socioeconomic deprivation, driven by the wider social determinants of health. We know that the modifiable risk factors for heart disease are more prevalent in areas of higher deprivation and that those living in these areas are also less likely to be aware of heart disease as the leading cause of death. It amounts to a societal failure that women living in areas of higher deprivation are even less likely than men living in the same areas to be aware of the risk factors for heart disease.

It is important to highlight that this is not the fault of any single organisation or individual. This is an entrenched issue which manifests as a series of biases and which must urgently be addressed by adopting a joined-up, collaborative approach to health and care. This report is not intended to paint a picture of blame; we want to change the public perception of women and heart disease. Our aim is to start a conversation today so that, in the future, more women's lives are saved, and women make a better recovery from heart disease.

BHF NI calls on the Northern Ireland Executive to deliver a Women's Health Action Plan which tackles inequalities across the cardiac care pathway and to close the heart attack gender gap.

Dr. Sonya Babu-Narayan

Clinical Director,
British Heart Foundation

There are currently an estimated

26,000 women

in **Northern Ireland** living with **coronary heart disease**

Introduction

Coronary heart disease (CHD) is one of the leading causes of death for women in Northern Ireland (NI) – killing twice as many women each year as breast cancer.[3] BHF NI estimates that, there are currently 26,000 women in Northern Ireland living with coronary heart disease.[4] However, women with heart disease are disadvantaged at each stage of their patient journey. A growing global body of research over the years has revealed sex inequalities across the cardiac care pathway. Such inequalities are further exacerbated by ethnicity and socio-economic status as well as behavioural, environmental and social factors.

Insufficient awareness in Northern Ireland, of women's risk of heart disease and heart attack, negatively impacts women's prospects of recovery due to delays seeking medical treatment. Such delays are further affected by systemic gender inequalities in the diagnosis and treatment provided to women who have experienced a heart attack. With an aim to improve outcomes and quality of life for women with heart disease in Northern Ireland, this report outlines the findings of international studies, supported by local NI-specific data, presenting policy recommendations and a strong case for action.

The Women's Health Action Plan presents an opportunity for the Department of Health to tackle gender inequalities across the cardiac care pathway. Following the example of Scotland, England and Wales, the Department of Health for Northern Ireland must include cardiovascular health as a key component of the Women's Health Action Plan and any strategy which follows.

"I was told that my artery was 70% blocked and that I was on my way to a massive heart attack. That was very hard to hear when I was so young."

Frances Kane

Awareness

Prevalence of heart disease in Northern Ireland

- Coronary heart disease is **one of the leading causes of death for women in Northern Ireland**, killing twice as many women each year as breast cancer.[5]
- BHF NI estimates that there are currently **around 26,000 women living with coronary heart disease**.[6]
- **1,977 women in Northern Ireland died from heart and circulatory diseases in 2022**, with 588 deaths resulting from coronary heart disease and 334 of those directly attributed to myocardial infarction (heart attack).[7]

Under awareness of women's risk of heart disease

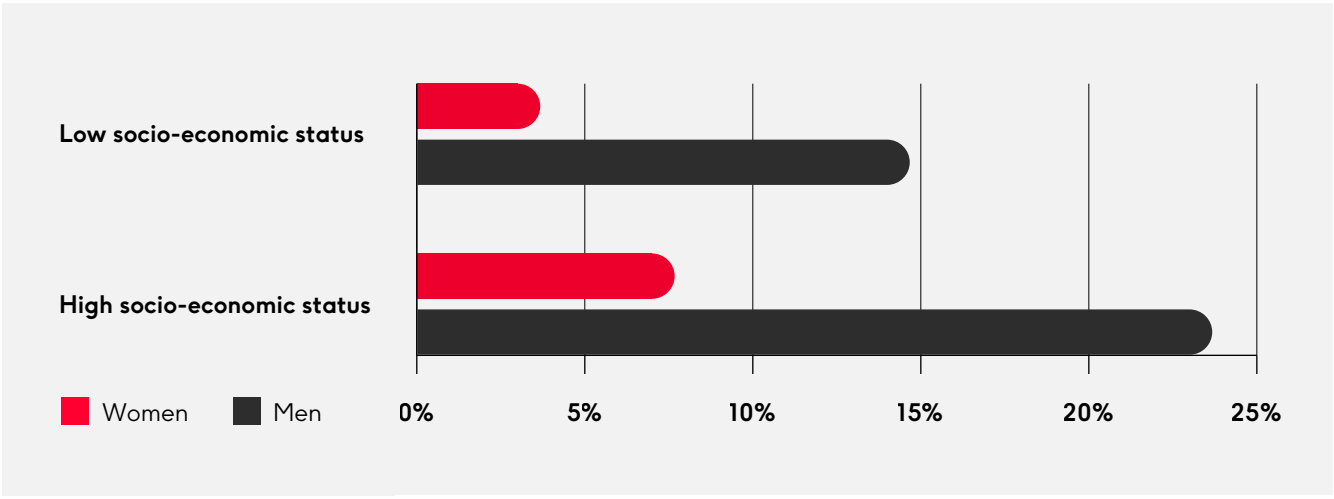
These figures clearly illustrate that heart disease and heart attacks affect women although they have long been perceived as illnesses which exclusively affect men. Insufficient awareness of women's risk of heart disease and heart attack negatively impacts their prospects of recovery due to delays seeking medical care, delays in diagnosis and delayed treatment. Greater awareness among women and healthcare providers of women's risk of heart disease would result in fewer delays across the care pathway and better outcomes for female patients.

A 2024 survey commissioned by BHF NI found that nearly 6 in 10 are not aware that heart disease is one of the leading causes of death for women in Northern Ireland.[8] In a cross-sectional survey of 2,609 individuals from six European countries, women were **five times less likely** than men to consider heart disease as the greatest health issue or leading cause of death amongst women.[9]

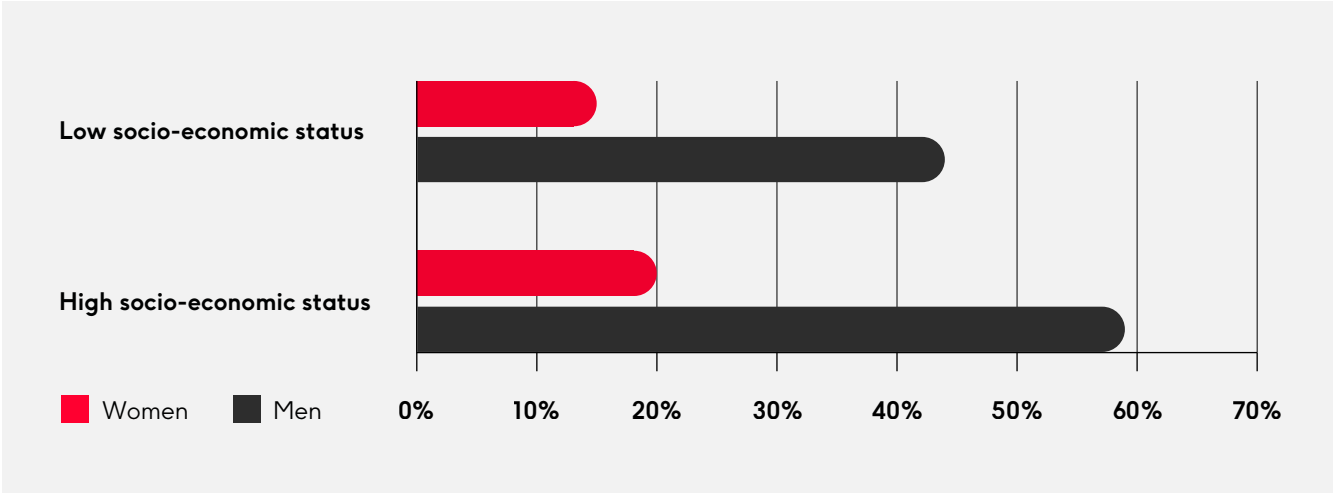
The same European study also identified socio-economic inequalities in awareness among men and women. There was greater awareness of heart disease as a leading cause of death among individuals from a higher socio-economic status compared to those of a lower socio-economic status.

For those with a high socio-economic status, 23% of men and just 7% of women were aware of heart disease as a leading health issue. Meanwhile, 14% of men and just 3% of women with a low socio-economic status were aware of heart disease as a leading health issue. The same trend was observed for awareness of heart disease as a leading cause of death (59% of men vs. 20% of women with a high socio-economic status and 44% of men vs. 15% of females with a low socio-economic status).[10]

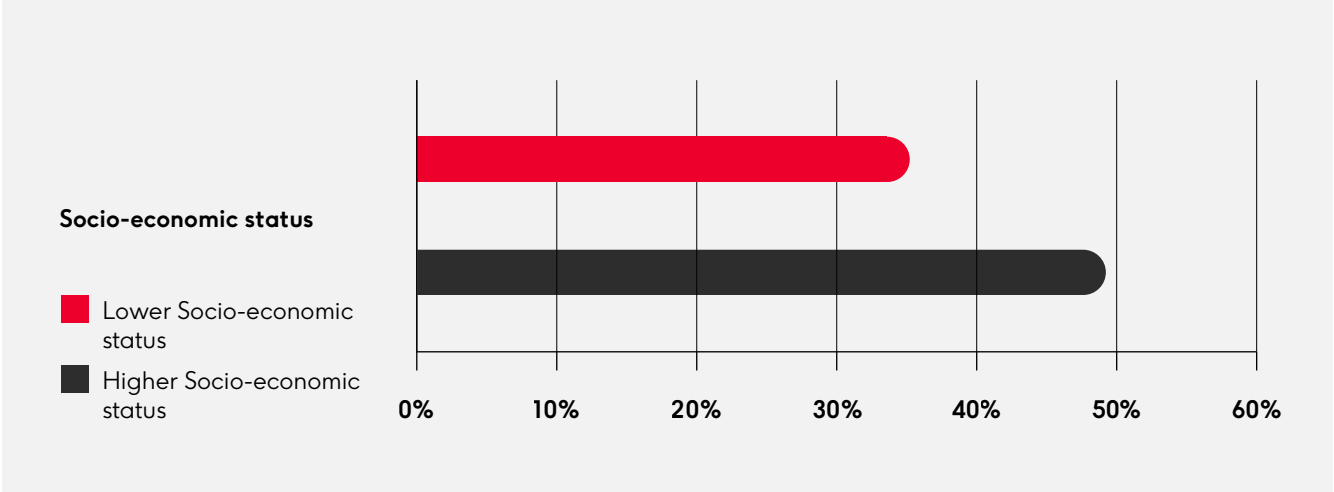
Awareness in Europe of heart disease as a leading health issue by gender and socio-economic status[11]



Awareness in Europe of heart disease as a leading cause of death by gender and socio-economic status[12]



Awareness of heart disease as a leading cause of death for women in Northern Ireland by socio-economic status[13]



The intersectionality of sex inequalities and socio-economic inequalities in awareness are cause for concern.

This disparity of awareness is also present in Northern Ireland. Of the respondents to the 2024 survey commissioned by BHF NI, 49% of those of a higher socioeconomic status identified heart disease as the leading cause of death for women, compared to 35% of respondents with a lower socioeconomic status.[14] This presents a strong case for awareness-raising approaches targeted by sex and social deprivation.

Under awareness of heart attack symptoms

Symptoms of heart attack vary from person to person but may include:

- pain or discomfort in the chest
- pain or tightness that radiates to the left or right arm, to the jaw, neck, back or stomach
- feeling nauseous, sweaty or lightheaded
- shortness of breath
- an overwhelming feeling of apprehension, anxiety or panic.

Any of these symptoms can be experienced by anyone experiencing a heart attack. BHF NI engaged with the public and found that there was a common misperception that when women experience a heart attack, they present with 'atypical symptoms' and that pain or discomfort in the chest, jaw pain, shortness of breath, shooting pain in the left arm are more common in men than in women.[15] However, a study at the University of Edinburgh involving 1,941 patients systematically recruited from an emergency department population over a five-year period from 2013–2017 and uniformly assessed, found that symptoms considered to be 'typical' were more common in women (77%) than in men (59%) with heart attack.[16]

The presence of chest, arm or jaw pain, with descriptors of dull, heavy, tight, pressure, ache, squeezing, crushing or gripping were classified as 'typical'. Radiation of pain and the presence of associated symptoms such as nausea, vomiting, sweating, shortness of breath, and palpitations were also considered 'typical'. Epigastric or back pain, or pain that was burning, stabbing, indigestion-like or any other pain descriptor or presentation, were classified as 'atypical'. Chest pain was the most common presenting symptom, with 92% of women and 91% of men reporting chest pain.[17]

The responses to the survey commissioned by BHF NI showed that just 14% of women, compared to 18% of men feel 'very confident' identifying the symptoms of a heart attack.[18] A heart attack is a medical emergency so timely, effective treatment is critical. Delays in hospital presentation increase the risk of permanent damage to the heart.

A global study of 6,022 patients from 41 hospitals across 12 countries found that the overall time from symptom onset to hospital presentation was longer for women than men. The median hospital arrival time for men was 240 minutes following the onset of symptoms while the median arrival time for women was 270 minutes.[19]

Equipping women in Northern Ireland with clear information to empower them to quickly and confidently recognise the onset of heart attack symptoms could mitigate delays in seeking medical attention thus reducing mortality and morbidity.[20]

Mary Evans' story
a case study

Mary from Strabane always led an active, healthy lifestyle but in April 2024, at age 65, Mary experienced a heart attack.

"Up until I had a heart attack, I considered myself a fit and healthy person. It didn't occur to me when I was experiencing chest discomfort that it might be a heart attack."

Mary felt what she has described as "under par" for about two weeks before seeking medical care but attributed this to loss of mobility and fitness after having recently broken her ankle.

"It didn't occur to me to call the GP because I really didn't think it was anything serious. For two weeks I felt sluggish and under the weather, but I didn't know what I would tell the doctor. I didn't know how to describe my symptoms. I put the chest discomfort down to indigestion, feeling lazy or feeling unfit."

On the evening of Tuesday 16th April, Mary felt what she thought was "awful indigestion". The next morning, Mary went to the pharmacy for over-the-counter medication to treat what she thought was indigestion. When Mary went to the till to pay, she remarked to the cashier "I am either having the worst indigestion of my life or I am having a heart attack" but Mary didn't seriously think that she was having a heart attack.

The cashier was concerned and strongly suggested that Mary speak to the pharmacist who asked her to describe her symptoms. When the pharmacist asked Mary "are you breathless on exertion?" she was then advised to contact the GP.

The GP told Mary that the symptoms she was experiencing could be angina, so she was referred to the emergency department.

"Thinking of the symptoms of a heart attack I would have thought of crippling chest pain or shooting pains in the left arm, but I just felt like I had really bad indigestion."

"I was sent to the Cardiac Assessment Unit where the medical team attended to me immediately. I really felt I was wasting their time and kept apologising for being there for what I thought was indigestion."

The medical team did a troponin test which showed that Mary's troponin levels were high. The same test was repeated after four hours and by then Mary's troponin levels had increased further. The doctor told Mary that they would do an echocardiogram and a coronary angiogram.

"I didn't really take in what the doctor was saying to me as he did the angiogram, probably because I didn't want to take it in. I only heard the words 'heart attack'."

Mary expressed that she feels immense responsibility for having a heart attack. "I never thought a healthy woman like me could have a heart attack. I was active, I walk and cycle a lot. I didn't want to call the GP because I know how busy they are, and I didn't want to waste their time."

"I am 65 now and post menopause, but I had polycystic ovary syndrome (PCOS) when I was younger and have just recently learnt that both PCOS and menopause transition can affect heart health."

Risk factors for heart disease and heart attack

Cardiovascular health is impacted by a range of modifiable risk factors. Smoking, overweight and obesity, physical inactivity and alcohol consumption can increase the risk of experiencing a heart attack. However, women and men are affected differently by these factors. Women with a history of diabetes, smoking, and hypertension have a greater relative risk for developing cardiovascular disease compared to men with the same risk factors.[21] High blood pressure, smoking and diabetes are all major risk factors for coronary heart disease, which is the most common cause of heart attacks.

There is higher prevalence of modifiable risk factors in areas of higher deprivation in Northern Ireland. Those living in the most deprived quintile are over three times more likely to smoke than those living in the least deprived quintile.[22] Similar trends can be observed for obesity. Since 2010, obesity levels have consistently been higher in the most deprived quintile of Northern Ireland.[23]

The 2024 BHF NI-commissioned survey also found lower levels of awareness of modifiable risk factors for cardiovascular disease (CVD) in areas of higher deprivation compared to areas of lower deprivation. Of respondents from a higher socio-economic group, 79% identified smoking as a risk factor, compared to 70% from a lower socio-economic group. The same trend can be observed for obesity (86% vs 79%).[24] Higher prevalence of modifiable risk factors for heart disease in areas of higher deprivation, combined with lower levels of awareness of these risk factors among women with a low socio-economic status, reveals varying levels at which women are at a disadvantage in terms of both risk of developing heart disease and risk perception. Ensuring optimal outcomes for female patients and reducing long-term damage to the heart starts with awareness of symptoms and risk factors.

Sex-specific risk factors for heart attack

There are certain factors which can heighten a woman's risk of developing heart disease which is further impacted by disparities in universal heart disease risk factors. Early management of these factors can decrease morbidity and mortality while improving the overall quality of women's health.[25]

According to the World Health Organization (WHO), a life course approach involves taking action early in the life course; appropriately during life's transition periods; and together as a whole society to create healthy environments.[26] Adopting a life course approach means identifying opportunities for minimising risk factors and enhancing factors to protect good health early in the life course and during life's transition periods. Sex-specific risk factors which can heighten a woman's risk of developing cardiovascular disease across the lifespan underpin the importance of adopting a life course approach to management and care of CVD.

Menopause

The transition to menopause presents an opportunity for healthcare providers to discuss the effect of menopause on cardiovascular health with their patients and to provide support, information and resources for risk-factor management during this life stage.

Oestrogen has a protective effect on the heart; helping to control cholesterol levels and reduce the risk of fat build-up in the arteries. During and after menopause, the body produces less oestrogen, losing the cardioprotective effect of the hormone, which is why women, on average, develop heart disease later in life than men.[27]

The lack of awareness of the link between menopause and cardiovascular health was evident in the results of the survey commissioned by BHF NI. Just 9% of 1,049 respondents identified menopause and perimenopause as having the effect of increasing the risk of developing heart disease.[28]

Women who experience premature menopause (before the age of 40) and early menopause (before the age of 45) have a 50% higher risk of developing heart disease than those whose menopause occurs later.[29] However, just 14% of 35–44-year-olds and 13% of 45–54-year-olds in Northern Ireland are aware that the transition to menopause and perimenopause increases the risk of developing cardiovascular disease.[30]

"I am 65 now and post menopause, but I had polycystic ovary syndrome (PCOS) when I was younger and have just recently learnt that both PCOS and menopause transition can affect heart health."

Mary Evans

Hypertensive disorders in pregnancy

Pre-eclampsia is a condition that can affect pregnant women during the second term of their pregnancy (from 20 weeks on) or following the birth of their baby. Pre-eclampsia is diagnosed when there is a combination of raised blood pressure and protein in the urine. Women who experience pre-eclampsia have a higher risk of developing cardiovascular disease and chronic high blood pressure (hypertension) later in life.[31] High blood pressure is a major risk factor for heart attack and over half of heart attacks in Northern Ireland are associated with high blood pressure.[32]

Current NICE guidelines indicate that women who have had a hypertensive disorder of pregnancy should be advised that this is associated with an increased risk of hypertension and cardiovascular disease later in life. GPs and healthcare providers should discuss with all patients, ways to reduce this risk such as avoiding smoking, maintaining a healthy lifestyle and a healthy weight.[33]

Gestational diabetes

Gestational diabetes mellitus is high blood sugar that develops during pregnancy and usually resolves after giving birth. It occurs when the body cannot produce enough insulin to control blood sugar levels during pregnancy.[34] There is an association between gestational diabetes and future cardiovascular events with growing evidence to suggest that women with a history of gestational diabetes are at an increased risk of experiencing a heart attack during the first ten years post-partum.[35, 36, 37]

A systematic review and pooled analysis of nine studies over a sixty-eight-year period (January 1950–August 2018) with data from 5,390,591 women found that women with gestational diabetes had a twofold higher risk of experiencing future cardiovascular events including a heart attack, postpartum compared with their peers. The results found that the differential risk between women who had gestational diabetes mellitus and those who did not, was highest during the first decade following the pregnancy. The risk was also found not to be dependent on preexisting type 2 diabetes.[38]

This highlights the importance of offering regular follow-ups for women who experienced gestational diabetes to manage their risk of subsequently experiencing cardiovascular events such as a heart attack.

Adopting a life-course approach to women's cardiovascular health which aims to improve awareness among women and healthcare providers of women's risk of heart disease and heart attack would mitigate delays across the heart disease care pathway, subsequently improving outcomes and quality of life for female patients.

Recommendations

1. The Department of Health must include cardiovascular health as a key component of the Women's Health Action Plan.

2. As part of the Women's Health Action Plan, the Public Health Agency must take a proactive role to improve public awareness of heart disease and heart attack for women with clear messaging on risk factors and symptoms.

3. To address systemic inequalities, the Department of Health must ensure that a life course approach is the cornerstone of all policy related to women's cardiovascular health.

Diagnosis

A woman's risk of developing heart disease can be affected by a range of sex-specific factors. Age at the beginning of menstruation, age at menopause, polycystic ovary syndrome, a history of gestational diabetes, hypertensive disorders during pregnancy such as pre-eclampsia, as well as adverse pregnancy outcomes, stillbirth and miscarriages can enhance a woman's cardiovascular risk across the lifespan.[39]

These sex-specific conditions and pregnancy-related factors must be incorporated into cardiovascular risk assessment of patients by medical professionals to ensure timely identification and management of risk factors to prevent acute cardiac events such as a heart attack. This is particularly important among women who are also living with modifiable risk factors such as smoking, overweight and obesity and diabetes who are at an increased risk of developing cardiovascular disease and experiencing a heart attack. A comprehensive assessment which identifies all risk factors, including non-modifiable risk factors such as family history, could ensure timely diagnosis and treatment, thus improving outcomes for female patients.

Timely diagnosis following a heart attack is critical to reduce treatment delays and increase potential for recovery. After a heart attack, an incorrect initial diagnosis increases the risk of death after 30 days by 70%.[40]

A coronary angiogram is a key diagnostic test which involves the insertion of a catheter into a blood vessel in the groin, or in the arm. The tip of the catheter is then passed up to the heart and coronary arteries, a dye is injected through the catheter and X-ray images (angiograms) are taken. This identifies whether there is a blockage or narrowing of the arteries.[41] This is a critical step in the diagnosis of both a STEMI (ST segment elevation myocardial infarction) heart attack, where there is total blockage of the coronary artery and an NSTEMI (non-ST segment elevation myocardial infarction), which is a type of heart attack caused by the partial blockage of a coronary artery. A coronary angiogram enables doctors to initiate timely treatment where necessary to unblock a coronary artery and restore blood flow to the heart.

Research indicates that women in the UK are 50% more likely than men to be misdiagnosed or receive a delayed diagnosis following a heart attack.[42] Under the current NICE guidelines, a coronary angiogram should be performed within 72 hours of first admission for NSTEMI.[43] The European Society of Cardiology recommends an even shorter time frame of 24 hours within hospital admission for a coronary angiogram.[44,45] Women in England and Wales who have an NSTEMI heart attack are 12.5% less likely than men to receive a coronary angiogram within 72 hours of hospital admission.[46]

The 2024 Myocardial Ischaemia National Audit Project (MINAP) report shows similar trends for Northern Ireland. Fewer women than men with lower risk NSTEMI heart attacks receive a coronary angiogram within 72 hours of presentation to hospital.[47]

This evidence suggests the presence of bias in clinical decision-making and indicates that when women experience a heart attack, they are disadvantaged from the onset of symptoms and the point of diagnosis, negatively impacting the trajectory of their treatment and potential for recovery.

Frances Kane's story
a case study

Frances from North Belfast was just 27 years old when she was diagnosed with coronary heart disease. At the time, Frances was studying for her PhD and when she went to the GP, she was told that the chest and arm pains she was experiencing were likely due to stress or allergies.

Frances's dad had a heart attack when he was in his early forties, but Frances exercised regularly, ate well, maintained a healthy weight and never smoked.

"To me, heart attacks were something that happened to older people. Because my dad was male, it didn't seem rare to me that he had a heart attack, but I was never anticipating that I would be at risk."

Frances's symptoms included breathlessness, chest and arm pain which came on gradually and increased on exertion.

"I initially talked it away as niggles, or something muscular."

When Frances could no longer walk up the stairs without having to stop, she decided it was time to see her GP. Frances told her GP she was worried it was cardiac related, but the GP told her there was nothing wrong with her heart and that the chest and arm pain were likely caused by allergies, so she was sent home with antihistamines.

On a repeat visit to the GP, Frances was told once more that she was too young to have anything wrong with her heart and instead received a lung function test, the results of which were normal. Frances knew her symptoms were related to something more serious, so a few months later, she went to the emergency department.

"I went up and down the stairs in the hospital as many times as I could; to bring on the pain so I could show the doctors and nurses what I meant."

After being reviewed at the emergency department, Frances was referred to a cardiologist and sent for a treadmill ECG test. The test showed a minor abnormality so Frances was told she would be sent for a coronary angiogram.

"I was told that I would receive a coronary angiogram to rule out coronary heart disease and a heart attack but that was unlikely as I was a young woman."

"I then felt that I was wasting their time. I was only referred to the cardiologist because I presented myself to the emergency department, not because my GP referred me."

"I then began to doubt myself, so I kept telling myself 'it's just stress, it's just stress'. I was in the second year of my PhD and convinced it was the pressure of my studies manifesting itself."

The coronary angiogram showed a blockage in Frances' artery. "I was told that my artery was 70% blocked and that I was on my way to a massive heart attack. That was very hard to hear when I was so young."

"I felt shocked. I then felt very sorry for myself. I went home and cried on the sofa and asked myself: why did this happen to me? The doctors always referred to my age and gender as a young woman to dismiss my concerns that my problem was heart related. My persistence when I knew myself that something wasn't right, probably saved my life."

Mary Delaney's story
a case study

When Mary's sister Frances was diagnosed with coronary artery disease, Mary was offered a stress echocardiogram. Although the results of the echo showed no abnormalities at the time, three years after her sister's diagnosis, at the age of 26 Mary was also diagnosed with coronary artery disease.

Mary was told by the doctor that she was a "ticking time bomb".

Mary had been treated for high blood pressure since she was 22 years old, but she was generally in good health. "I was active, as an A&E nurse I was always on my feet."

"I had symptoms for three weeks before I received a diagnosis. I had shortness of breath, chest pain on exertion but I dismissed the symptoms until I felt really unwell. Had it been a male patient in his 60s or 70s telling me of these symptoms, I would have known right away not to ignore it."

Mary was at work in the emergency department when she told her colleagues how unwell she felt so she was referred to the consultant cardiologist.

"When the consultant saw that a young female had been referred, they challenged the referral; the cardiologist queried why a 26-year-old female was being referred for review by cardiology. I wasn't taken seriously."

"Because of my sister Frances' diagnosis, the cardiologist agreed to see me."

Mary was sent for a treadmill test which showed ECG changes on exertion. She then proceeded to have an angiogram which showed 90% stenosis in her coronary artery, similar to her sister Frances. Mary had a stent fitted from the point of diagnosis.

If it hadn't been for her sister Frances' diagnosis and working in the hospital herself, Mary might not have been seen by the cardiologist and treated right away.

"It was described as a ticking time bomb. If I hadn't had the quick escalation due to Frances' diagnosis, I would have been on my way to a massive heart attack."

"It was described as a ticking time bomb. If I hadn't had the quick escalation due to Frances' diagnosis, I would have been on my way to a massive heart attack."

Mary Delaney

The diagnosis came as a shock to Mary. "I was in my 20s, relatively healthy and carefree. I do worry it could affect my career as I am on my feet all day and I need to be relatively fit and active to do my job."

Given the young age at which they were both diagnosed with heart disease, Mary and her sister Frances subsequently underwent testing for Familial Hypercholesterolemia (FH) but the results showed no presence of FH.

Mary was diagnosed with Polycystic Ovary Syndrome (PCOS) when she was a teenager, but there was no mention of the effect this could have on Mary's cardiovascular health.

"I was never told that this could have a negative impact on my cardiovascular health later in life; that it could potentially further increase my risk of developing heart disease. I just know this now because of my background in healthcare."

Image. Frances (left) sitting with her sister Mary (right)

Recommendations

4. The Women's Health Action Plan must ensure the provision of continued professional development, education and training for healthcare professionals at primary and secondary care on comprehensive risk factor assessment for cardiovascular disease in women which incorporates sex-specific risk factors. Training must address bias in clinical decision-making to ensure long-term cultural changes.

5. The Department of Health and the Health and Social Care Trusts in Northern Ireland must ensure that all patients presenting to emergency departments and cardiology units, with heart attack symptoms receive appropriate diagnostic tests and treatments within the guideline-indicated timeframes.

Treatment

Sex inequities in the provision of optimal care

A heart attack is a medical emergency so timely, effective treatment is critical. Current national guidelines recommend that after initial treatment, all heart attack patients should be considered for important secondary prevention drugs that have been shown to improve outcomes. However, BHF-funded researchers at the University of Leeds found that women in England and Wales were less likely to receive guideline-indicated care and had higher mortality rates than men following a heart attack.[48]

This cohort study comprised 691,290 hospitalisations for myocardial infarction over a ten-year period from 2003–2013. The researchers mapped quality indicators recommended by the European Society of Cardiology against the data held by the Myocardial Infarction National Audit Programme (MINAP) and found that women less frequently received 13 out of the 16 recommended quality indicators following a heart attack, including:

- Timely reperfusion therapy (restoration of blood flow, using procedures such as drugs or stents) for STEMI (a type of heart attack where the coronary heart artery is completely blocked).
- Coronary revascularisation – widening of blocked or narrowed coronary arteries (15% less likely than men).
- Secondary prevention therapies:
  - Women are 7% less likely than men to receive dual antiplatelet therapies which consist of a combination of aspirin and a second oral medication which prevents the formation of harmful blood clots.
  - Women were 2.7% less likely than men to be prescribed statins – medication which can help lower the level of low-density lipoprotein (LDL) cholesterol in the blood, the build-up of which can lead to the hardening and narrowing of the arteries.
  - Women were 7.4% less likely than men to be prescribed beta-blockers which slow the heart rate and reduce the force at which blood is pumped around the body and are thus a lifesaving therapy following a heart attack.

The same study found that over the course of a decade, the deaths of 8,243 women in England and Wales who died from a heart attack, could potentially have been prevented if they had received the same standard of care as men.[49]

Although heart disease in women generally manifests later in life than in men, the case studies in this report are evidence that younger women can also be affected by heart disease and must be taken seriously. Similarly, men may be more likely than women to experience a heart attack, but heart attacks are still common in women, particularly after menopause.[50] Underrepresentation of women in clinical research, low risk perception of women's risk of heart disease by both patient and health care provider, sex differences in health-seeking behaviour and interpretation of heart attack symptoms may partially explain delays in hospital presentation and diagnosis of heart attack in women but the findings of the study outlined above presents a worrying picture that sex inequalities persist throughout the cardiac care pathway and women continue to be disadvantaged at treatment stage.

Each year, (MINAP) collates information from Northern Ireland and across the UK about the care provided to patients who are admitted to hospital with a heart attack. The latest report summarising data from 2022–2023 shows that over a ten-year period from 2013–2023, a higher percentage of women than men with a higher-risk STEMI heart attack were not receiving reperfusion treatment. This is most apparent for women over the age of 75 years, but this sex inequality is also present among the 55–64-year-old age group.[51]

Data from the SWEDEHEART registry shows that improved concordance with guideline-indicated care has the potential to reduce the sex-mortality gap for heart attack.[52]

Sex differences in cardiovascular management at primary care

A systematic review and meta-analysis of studies published over a 19-year period from the year 2000 to 2019, involving over 2 million patients worldwide, including Northern Ireland, found that female patients at high risk or with established cardiovascular disease were less likely than men to be prescribed the necessary medication in primary care.[53] This study reviewed the sex differences in cardiovascular medication prescription at primary care and found that women were less likely to be prescribed aspirin, statins and other life-saving medication such as beta-blockers, and ACE inhibitors.

Lower prescription rates for cardiovascular management may be explained by a combination of the following:

1. The lower incidence of CVD among women of middle age compared to men of middle age and the later occurrence of CVD in a woman's life course may have led to the misperception that CVD is less common in women and thus, there is less need for prevention at primary care.[54]

2. Women may have a lower awareness of the severity of their cardiovascular condition and may receive less support from healthcare providers, compared with men which results in lower health consciousness and less frequent use of healthcare services.[55]

It is concerning that studies which included Northern Ireland, show that women have unequal outcomes in receiving appropriate treatment and medication at primary care.

Clinician gender and patient outcomes

There is growing evidence to suggest that physician gender affects patient outcomes. A systematic review of studies published between 2009 and 2019 identified differences in outcomes for patients treated by female physicians compared to male physicians.[56] Through an examination of the gender match between attending physicians and patients admitted to emergency departments in Florida with a heart attack between 1991 and 2010, it was observed that mortality was highest among female patients treated by male physicians, whereas mortality rates were similar between men and women if the treating physician was female.[57] The same study also found that male physicians with more exposure to female patients, and when they work with more female physicians, are more effective at treating female heart attack patients.[58] This highlights the importance of diverse clinical teams for optimal outcomes for patients.

In the UK and Ireland, cardiology is a male-dominated field. Females only represent 28% of cardiology trainees in the UK and a mere 18% of cardiology consultants.[59] In Northern Ireland, just 21% of cardiology consultants are female and a similar trend is observed in the Republic of Ireland, where just 20% of consultant cardiologists are female.[60,61] Addressing this gender imbalance through a meaningful effort to encourage greater diversity of clinical teams, at all levels, could improve outcomes for patients with cardiovascular health issues.

Recommendations

6. The Department of Health should review the adherence to current NICE guidelines on cardiovascular disease and heart attack to identify and address sex-specific disparities in timely and appropriate treatment.

7. The Department of Health must address the lack of comprehensive data on patient journeys and outcomes, broken down by sex, age, ethnicity and level of deprivation. This could provide insight into specific issues related to treatment which must be addressed to improve outcomes and quality of life for women who have experienced a heart attack.

8. As part of ongoing efforts to increase the recruitment and retention of cardiologists across each of the Health and Social Care Trusts, there must be a meaningful effort to encourage a greater diversity of cardiologists, including an increased representation of female cardiologists at all levels of seniority.

Policy recommendations

Awareness

1. The Department of Health in Northern Ireland must include cardiovascular health as a key component of the Women's Health Action Plan.

2. As part of the Women's Health Action Plan, the Public Health Agency must take a proactive role to improve public awareness of heart disease and heart attack for women with clear messaging on risk factors and symptoms.

3. The Department of Health must ensure that a life course approach is the cornerstone of all policy related to women's cardiovascular health.

Diagnosis

4. The Women's Health Action Plan must ensure the provision of continued professional development, education and training for healthcare professionals at primary and secondary care on comprehensive risk factor assessment for cardiovascular disease in women which incorporates sex-specific risk factors. Training must address bias in clinical decision-making to ensure long-term cultural changes.

5. The Department of Health and the Health and Social Care Trusts in Northern Ireland must ensure that all patients presenting to emergency departments and cardiology units, with heart attack symptoms receive appropriate diagnostic tests and treatments within the guideline-indicated timeframes.

Treatment

6. The Department of Health should review the adherence to current NICE guidelines on cardiovascular disease and heart attack to identify and address sex-specific disparities in timely and appropriate treatment.

7. The Department of Health must address the lack of comprehensive data on patient journeys and outcomes, broken down by sex, age, ethnicity and level of deprivation. This could provide insight into specific issues related to treatment which must be addressed to improve outcomes and quality of life for women who have experienced a heart attack.

8. As part of ongoing efforts to increase the recruitment and retention of cardiologists across each of the Health and Social Care Trusts, there must be a meaningful effort to encourage a greater diversity of cardiologists, including an increased representation of female cardiologists at all levels of seniority.

Glossary

Heart and circulatory diseases /cardiovascular disease

An umbrella term for all diseases of the heart and circulation. It includes everything from conditions that are inherited or that a person is born with, to those that develop later.

Coronary heart disease

Sometimes called ischaemic heart disease or coronary artery disease. CHD is when the coronary arteries become narrowed by fatty material within their walls. These arteries supply your heart with blood containing high levels of oxygen.

Myocardial infarction (MI)/heart attack

A heart attack happens when the heart suddenly stops receiving a supply of oxygen-rich blood – usually due to a clot blocking the flow in one of the arteries which supply blood to the muscles of the heart.

NSTEMI heart attack (non-ST segment elevation myocardial infarction)

A partial blockage of one or more coronary arteries, which can result in serious damage to the heart muscle.

STEMI heart attack (ST-segment elevation myocardial infarction)

A total blockage of a coronary artery, which can result in serious damage to the heart muscle.

Hypertension

The medical term for high blood pressure, meaning the heart is working harder to pump blood around the body.

Pre-eclampsia

When less blood flows between mother and baby. This means the placenta (an organ that provides oxygen and nutrients to your baby through the umbilical cord) does not get enough blood.

Gestational diabetes

Diabetes which can develop during pregnancy which usually disappears after giving birth.

Coronary angiogram

A heart test that looks at the blood supply of your heart. A special dye is injected into an artery in your arm or leg, which travels to your coronary arteries. When it gets there, an x-ray photograph is taken of the artery to look for any narrowing of the coronary arteries.

Reperfusion therapy

A medical treatment to restore blood flow to the heart, typically after a heart attack.

Coronary revascularisation

Refers to a group of treatments or procedures that restore blood flow to areas of the heart that aren't getting enough blood to meet their needs.

Cardiac rehabilitation

A programme of exercise, lifestyle advice, stress management and health education for patients with cardiovascular disease.

References

1. Asaria, P. et al. (2022). Contributions of event rates, pre-hospital deaths, and deaths following hospitalisation to variations in myocardial infarction mortality in 326 districts in England: a spatial analysis of linked hospitalisation and mortality data. *The Lancet Public Health*. https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(22)00108-6/fulltext

2. Tayal U, Pompei G, Wilkinson I, et al. Advancing the access to cardiovascular diagnosis and treatment among women with cardiovascular disease: a joint British Cardiovascular Societies' consensus document. *Heart 110* (22). https://heart.bmj.com/content/110/22/e4

3. Northern Ireland, Statistics and Research Agency (NISRA). (2023). Deaths by sex, age and cause 2022. https://www.nisra.gov.uk/statistics/births-deaths-and-marriages/registrar-general-annual-report

4. BHF estimate based on The Health Intelligence Network (THIN) prevalence data and latest Quality & Outcomes Framework 2023/24 prevalence data from Northern Ireland Department of Health (2024). https://www.health-ni.gov.uk/publications/202324-raw-disease-prevalence-trend-data-northern-ireland

5. Northern Ireland, Statistics and Research Agency (NISRA). (2023). Deaths by sex, age and cause 2022. https://www.nisra.gov.uk/statistics/births-deaths-and-marriages/registrar-general-annual-report

6. BHF estimate based on The Health Intelligence Network (THIN) prevalence data and latest Quality & Outcomes Framework 2023/24 prevalence data from Northern Ireland Department of Health (2024). https://www.health-ni.gov.uk/publications/202324-raw-disease-prevalence-trend-data-northern-ireland

7. Northern Ireland, Statistics and Research Agency (NISRA). (2023). Deaths by sex, age and cause 2022. https://www.nisra.gov.uk/statistics/births-deaths-and-marriages/registrar-general-annual-report

8. Lucid Talk Northern Ireland (NI)-Wide NIVIEW 'Winter' 2024 'Tracker' Poll-Project – Winter 2024.

9. Daponte-Codina, A., Knox, E. C., Mateo-Rodriguez, I., Seims, A., Regitz-Zagrosek, V., Maas, A. H. E. M., White, A., Barnhoorn, F., & Rosell-Ortiz, F. (2022). Gender and Social Inequalities in Awareness of Coronary Artery Disease in European Countries. *International journal of environmental research and public health*, *19*(3), 1388. https://www.mdpi.com/1660-4601/19/3/1388

10. Ibid.

11. Daponte-Codina, A., Knox, E. C., Mateo-Rodriguez, I., Seims, A., Regitz-Zagrosek, V., Maas, A. H. E. M., White, A., Barnhoorn, F., & Rosell-Ortiz, F. (2022). Gender and Social Inequalities in Awareness of Coronary Artery Disease in European Countries. *International journal of environmental research and public health*, *19*(3), 1388. https://www.mdpi.com/1660-4601/19/3/1388

12. Ibid.

13. Lucid Talk Northern Ireland (NI)-Wide NIVIEW 'Winter' 2024 'Tracker' Poll-Project – Winter 2024.

14. Ibid.

15. Lucid Talk Northern Ireland (NI)-Wide NIVIEW 'Winter' 2024 'Tracker' Poll-Project – Winter 2024.

16. Ferry, A.V., Anand, A., Strachan, F.E., Mooney, L., Stewart, S.D., Marshall, L., Chapman, A.R., Lee, K.K., Jones, S., Orme, K., Shah, A.S.V., Mills, N.L. (2019). Presenting Symptoms in Men and Women Diagnosed with Myocardial Infarction Using Sex-Specific Criteria. *Journal of the American Heart Association 8*(17). https://www.ahajournals.org/doi/full/10.1161/JAHA.119.012307?rfr_dat=cr_pub++0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org

17. Ibid.

18. Lucid Talk Northern Ireland (NI)-Wide NIVIEW 'Winter' 2024 'Tracker' Poll-Project – Winter 2024.

19. Bugiardini, R., Ricci, B., Cenko, E., Vasiljevic, Z., Kedev, S., Davidovic, G., Zdravkovic, M., Miličić, D., Dilic, M., Manfrini, O., Koller, A., & Badimon, L. (2017). Delayed Care and Mortality Among Women and Men with myocardial infarction. *Journal of the American Heart Association*, *6*(8), e005968. https://www.ahajournals.org/doi/full/10.1161/JAHA.117.005968?rfr_dat=cr_pub++0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org

20. Daponte-Codina, A., Knox, E. C., Mateo-Rodriguez, I., Seims, A., Regitz-Zagrosek, V., Maas, A. H. E. M., White, A., Barnhoorn, F., & Rosell-Ortiz, F. (2022). Gender and Social Inequalities in Awareness of Coronary Artery Disease in European Countries. *International journal of environmental research and public health*, *19*(3), 1388. https://www.mdpi.com/1660-4601/19/3/1388

21. Rajendran, A., Minhas, A.S., Kazzi, B., Varma, B., Choi, E., Thakkar, A., Michos E.D. (2023). Sex-specific differences in cardiovascular risk factors and implications for cardiovascular disease prevention in women. *Atherosclerosis 384* (117269). https://doi.org/10.1016/j.atherosclerosis.2023.117269

22. Health Survey Northern Ireland: first results 2022/2023. https://www.health-ni.gov.uk/sites/default/files/publications/health/hsni-first-results-22-23.pdf

23. Ibid.

24. Lucid Talk Northern Ireland (NI)-Wide NIVIEW 'Winter' 2024 'Tracker' Poll-Project – Winter 2024.

25. Rajendran, A., Minhas, A.S., Kazzi, B., Varma, B., Choi, E., Thakkar, A., Michos E.D. (2023). Sex-specific differences in cardiovascular risk factors and implications for cardiovascular disease prevention in women. *Atherosclerosis 384* (117269). https://doi.org/10.1016/j.atherosclerosis.2023.117269

26. The Minsk Declaration. The Life-course Approach in the Context of Health 2020. Copenhagen: WHO Regional Office for Europe; 2016. https://iris.who.int/bitstream/handle/10665/349095/WHO-EURO-2015-4177-43936-61918-eng.pdf?isAllowed=y&sequence=1#:~:text=1.1%20We%2C%20the%20Member%20States,implementation%20of%20Health%202020%20and

27. Ryczkowska, K., Adach, W., Janikowski, K., Banach, M., & Bielecka-Dabrowa, A. (2022). Menopause and women's cardiovascular health: is it really an obvious relationship? *Archives of medical science: AMS*, *19*(2), 458–466. https://www.archivesofmedicalscience.com/Menopause-and-women-s-cardiovascular-health-is-it-really-an-obvious-relationship,157308,0,2.html

28. Lucid Talk Northern Ireland (NI)-Wide NIVIEW 'Winter' 2024 'Tracker' Poll-Project – Winter 2024.

29. Mayor, S. (2016). Early menopause is linked to higher risk of cardiovascular disease and death. *British Medical Journal*, *354*(5004). https://www.bmj.com/content/354/bmj.i5004

30. Lucid Talk Northern Ireland (NI)-Wide NIVIEW 'Winter' 2024 'Tracker' Poll-Project – Winter 2024.

31. Leon, L. J., McCarthy, F. P., Direk, K., Gonzalez-Izquierdo, A., Prieto-Merino, D., Casas, J. P., & Chappell, L. (2019). Preeclampsia and Cardiovascular Disease in a Large UK Pregnancy Cohort of Linked Electronic Health Records: *A CALIBER Study. Circulation*, *140*(13), 1050–1060. https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.118.038080?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

32. Global Health Metrics (2020). Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet* (396), 1223–49. https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2930752-2

33. National Institute for Health and Care Excellence (NICE) Guideline (2019). Hypertension and pregnancy: diagnosis and management. https://www.nice.org.uk/guidance/ng133/resources/hypertension-in-pregnancy-diagnosis-and-management-pdf-66141717671365

34. NHS (2022). Gestational diabetes overview. https://www.nhs.uk/conditions/gestational-diabetes/

35. Xie, W., Wang, Y., Xiao, S., Qiu, L., Yu, Y., & Zhang, Z. (2022). Association of gestational diabetes mellitus with overall and type specific cardiovascular and cerebrovascular diseases: systematic review and meta-analysis. *BMJ (Clinical research ed.)*, *378*, e070244. https://doi.org/10.1136/bmj-2022-070244

36. Appelman, Y., van Rijn, B. B., Ten Haaf, M. E, Boersma, E., Peters, S. A. (2015). Sex differences in cardiovascular risk factors and disease prevention. *Atherosclerosis 241(1)*, 211–218. https://www.atherosclerosis-journal.com/article/S0021-9150(15)00061-1/fulltext

37. Kramer, C. K., Campbell, S., & Retnakaran, R. (2019). Gestational diabetes and the risk of cardiovascular disease in women: a systematic review and meta-analysis. *Diabetologia*, *62*(6), 905–914. https://doi.org/10.1007/s00125-019-4840-2

38. Ibid.

39. Rajendran, A., Minhas, A.S., Kazzi, B., Varma, B., Choi, E., Thakkar, A., Michos E.D. (2023) Sex-specific differences in cardiovascular risk factors and implications for cardiovascular disease prevention in women. *Atherosclerosis 384*(117269). https://www.atherosclerosis-journal.com/article/S0021-9150(23)05190-0/fulltext

40. Wu, J., Gale, C. P., Hall, M., Dondo, T. B., Metcalfe, E., Oliver, G., Batin, P. D., Hemingway, H., Timmis, A., & West, R. M. (2018). Editor's Choice – Impact of initial hospital diagnosis on mortality for acute myocardial infarction: A national cohort study. *European heart journal. Acute cardiovascular care*, *7*(2), 139–148. https://doi.org/10.1177/2048872616661693

41. NHS UK. (2022). Overview. Cardiac catheterisation and coronary angiography. https://www.nhs.uk/conditions/coronary-angiography/

42. Wu, J., Gale, C. P., Hall, M., Dondo, T. B., Metcalfe, E., Oliver, G., Batin, P. D., Hemingway, H., Timmis, A., & West, R. M. (2018). Editor's Choice – Impact of initial hospital diagnosis on mortality for acute myocardial infarction: A national cohort study. *European heart journal. Acute cardiovascular care*, *7*(2), 139–148. https://doi.org/10.1177/2048872616661693

43. NICE Guideline (NG185) (2020). Acute Coronary Syndromes. (p16). https://www.nice.org.uk/guidance/ng185/resources/acute-coronary-syndromes-pdf-66142023361477

44. Byrne, R.A., et al., (2023). ESC Scientific Document Group. 2023 ESC Guidelines for the management of acute coronary syndromes: Developed by the task force on the management of acute coronary syndromes of the European Society of Cardiology (ESC). *European Heart Journal*, *44*(38), 3720–3826. https://academic.oup.com/eurheartj/article/44/38/3720/7243210

45. Eggers, K. M., James, S. K., Jernberg, T., & Lindahl, B. (2022). Timing of coronary angiography in patients with non-ST-elevation acute coronary syndrome: long-term clinical outcomes from the nationwide SWEDEHEART registry. *EuroIntervention: journal of EuroPCR in collaboration with the Working Group on Interventional Cardiology of the European Society of Cardiology*, *18*(7), 582–589. https://eurointervention.pcronline.com/article/timing-of-coronary-angiography-in-patients-with-non-st-elevation-acute-coronary-syndrome-long-term-clinical-outcomes-from-the-nationwide-swedeheart-registry

46. Wilkinson, C., Bebb, O., Dondo, T. B., et al. (2018). Sex differences in quality indicator attainment for myocardial infarction; a nationwide cohort study. *Heart (105)*, 516–523. https://heart.bmj.com/content/105/7/516.long

47. Myocardial Ischaemia National Audit Programme (MINAP) (Heart Attack). 2024 Report (2022/2023 data). https://www.nicor.org.uk/interactive-reports/myocardial-ischaemia-national-audit-project-minap-heart-attack

48. Wilkinson, C., Bebb, O., Dondo, T. B., et al. (2018). Sex differences in quality indicator attainment for myocardial infarction; a nationwide cohort study. *Heart (105)*, 516–523. https://heart.bmj.com/content/105/7/516.long

49. Ibid.

50. Vogel et al. (2021). The Lancet women and cardiovascular disease Commission: reducing the global burden by 2030. *The Lancet (397)*, 2385–2438. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00684-X/abstract

51. Myocardial Ischaemia National Audit Programme Final Report 2022–2023 data (2024). MINAP. NICOR. (excluding Scotland). https://www.nicor.org.uk/publications/ncap/heart-attack/2024-2/minap-final-report-2022-23?layout=default

52. Alabas, O. A., Gale, C. P., Hall, M., Rutherford, M. J., Szummer, K., Lawesson, S. S., Alfredsson, J., Lindahl, B., & Jernberg, T. (2017). Sex Differences in Treatments, Relative Survival, and Excess Mortality Following Acute Myocardial Infarction: National Cohort Study Using the SWEDEHEART Registry. *Journal of the American Heart Association*, *6*(12). https://www.ahajournals.org/doi/full/10.1161/JAHA.117.007123?rfr_dat=cr_pub++0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org

53. Zhao, M., Woodward, M., Vaartjes, I., Millett, E. R. C., Klipstein-Grobusch, K., Hyun, K., Carcel, C., & Peters, S. A. E. (2020). Sex Differences in Cardiovascular Medication Prescription in Primary Care: A Systematic Review and Meta-Analysis. *Journal of the American Heart Association*, *9*(11), e014742. https://www.ahajournals.org/doi/full/10.1161/JAHA.119.014742?rfr_dat=cr_pub++0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org

54. Zhao, M., Woodward, M., Vaartjes, I., Millett, E. R. C., Klipstein-Grobusch, K., Hyun, K., Carcel, C., & Peters, S. A. E. (2020). Sex Differences in Cardiovascular Medication Prescription in Primary Care: A Systematic Review and Meta-Analysis. *Journal of the American Heart Association*, *9*(11), e014742. https://www.ahajournals.org/doi/full/10.1161/JAHA.119.014742?rfr_dat=cr_pub++0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org

55. Ibid.

56. Lau, E. S., Hayes, S. N., Volgman, A. S., Lindley, K., Pepine, C. J., Wood, M. J., & American College of Cardiology Cardiovascular Disease in Women Section (2021). Does Patient-Physician Gender Concordance Influence Patient Perceptions or Outcomes? *Journal of the American College of Cardiology*, *77*(8), 1135–1138. https://doi.org/10.1016/j.jacc.2020.12.031

57. Greenwood, B. N., Carnahan, S., & Huang, L. (2018). Patient-physician gender concordance and increased mortality among female heart attack patients. *Proceedings of the National Academy of Sciences of the United States of America*, *115*(34), 8569–8574. https://doi.org/10.1073/pnas.1800097115

58. Ibid.

59. Royal College of Physicians. UK 2022 Census of Consultants. Census full data base of substantive consultants. | PMQ data from GMC register. https://www.rcp.ac.uk/improving-care/resources/the-uk-2022-census-of-consultant-physicians/

60. Ibid.

61. HSE National Doctors Training & Planning HSE Medical Workforce Analysis Report 2023–2024. https://www.hse.ie/eng/staff/leadership-education-development/met/plan/medical-workforce-report-23-24-digital.pdf

bhf.org.uk

British Heart Foundation Northern Ireland

Contact

Sarah Mullally
Policy and Public Affairs Officer
British Heart Foundation Northern Ireland
07811 762 630
mullallys@bhf.org.uk

Liam Duggan
Policy and Public Affairs Manager
British Heart Foundation Northern Ireland
07974 901 087
dugganl@bhf.org.uk

November 2024