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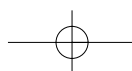


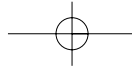
Health
Promotion
Unit

50 Years of Heart Disease in Ireland

*Mortality, Morbidity and
Health Services Implications*

February 2001





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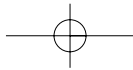
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50 Years of Heart Disease in Ireland

Mortality, Morbidity and Health Services Implications

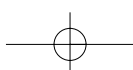
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Summary

In 1999, 12,996 people died from vascular diseases in Ireland. In 1950, 11,887 people died from the same group of diseases. The populations of the respective years differed, of course (approximately 4 million vs 2.9 million), and a higher proportion of those who died in 1950 were less than 65 years old. However, it is relevant to ask what has happened in relation to vascular diseases in Ireland in the last 50 years, and what predictions can be made about the occurrence of these diseases in the future.

Vascular diseases, of which cardiovascular disease is the most common, account for over 40% of all deaths and 37% of deaths under 65 years in Ireland at this time. Within cardiovascular disease, ischaemic heart disease (IHD) is by far the most common. It alone accounts for approximately 25% of all deaths. Three-quarters of those who succumb to ischaemic heart disease die from an acute myocardial infarct (AMI). Thus, cardiovascular disease remains a significant public health problem in our society as we enter the new millennium.

Mortality from ischaemic heart disease in Ireland is high compared with rates in other countries. In particular, when compared with other European Union countries, Ireland has the highest rate in men and the third highest rate in women.

Progress has been made, however. Analysis of mortality from IHD over the 50-year period under review reveals that rates generally increased to the mid-1970's. A high 'plateau' was then maintained for several years until 1985. Since then rates have been declining steadily. Adjusted rates in 1999 are 37% lower in men and 30% lower in women than they were in 1985. This is almost certainly due to the combination of preventive strategies and improved diagnostic and treatment facilities which have been put in place in the intervening years. If, however, this welcome trend is to be sustained, and the targets set down by the 1994 Health Strategy '*Shaping a Healthier Future*' and the Report of the Cardiovascular Health Strategy Group '*Building Healthier Hearts*' in 1999 are to be realised, the implementation of proposed additional preventive and treatment strategies needs to proceed without delay.

Pari passu with the declining mortality from IHD has been the emergence of a significant burden on the health services posed by increasing numbers of patients surviving early episodes of IHD and subsequently requiring cardiac care. This phenomenon, combined with the demographic changes projected for Ireland, i.e. a substantial increase in the elderly population in coming decades, will have a significant impact on the need for appropriate services into the future.

Introduction

Rates of cardiovascular and other vascular diseases have been high in Ireland for several decades. Previous reviews of mortality rates in Ireland have examined the burden of disease, trends in selected age and gender groups and trends in selected time periods (1-5). Reviews of morbidity from cardiovascular disease have been less frequent. The most recent outline was that provided in the Cardiovascular Health Strategy Report, *Building Healthier Hearts* (6).

The purpose of this report is to look at current mortality and morbidity from ischaemic heart disease (IHD) and acute myocardial infarction (AMI) across the entire age range, to examine and interpret changes which occurred in the latter half of the last century, and to assess the potential health services implications of this group of diseases over the coming decades.

Thus, Section I examines current mortality from IHD in Ireland, its contribution to all-cause mortality, differences by gender and the relative position of IHD mortality in Ireland in an international context. Trends in age-adjusted mortality *rates* of IHD in males and females over the 50-year period, 1950 to 1999, are presented and analysed. Specific attention is paid to changes in the *number* of deaths from IHD in males and females over the 50-year period.

Section II presents data on current morbidity from cardiovascular disease in Ireland relative to other disease entities, as well as changes which have taken place over recent decades. This section also provides an overview of current health service implications of ischaemic heart disease, based on hospital discharge data, bed day use, length of stay and peak ages on admission. Presentation of projected demographic changes for Ireland over the coming decades provides the basis for a discussion of potential future requirements for cardiac services.

Section 1

Mortality from Ischaemic Heart Disease in Ireland: Current Status

DATA COLLATION

Mortality data for Ireland are compiled by the Central Statistics Office (CSO) on behalf of the Department of Health and Children. The basis for mortality statistics is death certification, which records immediate and underlying causes of death and information on any other related conditions. Underlying cause of death is coded according to the International Classification of Diseases (ICD) coding system (7). Data are published both quarterly and annually. Mortality data for 1998 were reviewed to ascertain total mortality, mortality from vascular diseases and ischaemic heart disease and mortality from all other causes. Data are presented separately for males and females.

Mortality from ischaemic heart disease in Ireland is known to be high by international standards. IHD mortality data from several countries were extracted from the World Health Statistics Annual 1998 (8). Rates for each country were standardised to a World Standard Population for the purposes of comparison. Data used are the most recent data provided in that report for each country.

RESULTS

There were 31,352 deaths in Ireland in 1998, of which 13,191 (42%) were due to diseases of the vascular system (Table 1). Deaths from cardiovascular disease (n=7,749) comprised more than half of the deaths from vascular diseases and 25% of all deaths. There was little difference between males and females in the proportions of all deaths due to vascular diseases (Table 1 / Fig. 1). However, a slightly lower proportion of deaths in females were due to cardiovascular disease (22.9% vs 26.4%) and a slightly higher proportion were due to cerebrovascular disease (10.1% vs 6.5%).

Examination of international data on IHD mortality reveals that among the 32 countries compared, Irish males have the 3rd highest mortality rate from IHD, while the rate in Irish females is the 6th highest (Fig 2). It is of note that Ireland has the highest mortality rate from IHD in males and the 3rd highest rate in females in the European Union. Other developed countries such as the United States, Australia and Canada have rates of ischaemic heart disease which are significantly lower than those which obtain in Ireland.

Table 1: Principal Causes of Death in Ireland, 1998: Distribution by Gender

	Males	%	Females	%	Total	%
Vascular Disease	6,835	41.5	6,356	42.7	13,191	42.1
☐ Cardiovascular Disease	4,350	26.4	3,399	22.9	7,749	24.7
☐ Cerebrovascular Disease	1,073	6.5	1,507	10.1	2,580	8.2
☐ Other Vascular Disease	1,412	8.6	1,450	9.8	2,862	9.1
Malignant Neoplasms	4,022	24.4	3,471	23.3	7,493	23.9
Respiratory Disorders	1,183	7.2	1,419	9.5	2,602	8.3
Injuries / Poisonings	1,101	6.7	439	3.0	1,540	4.9
All Other Causes	3,341	20.3	3,185	21.4	6,526	20.8
TOTAL	16,482	100	14,870	100	31,352	100

Fig. 1: Principal Causes of death in Ireland 1998

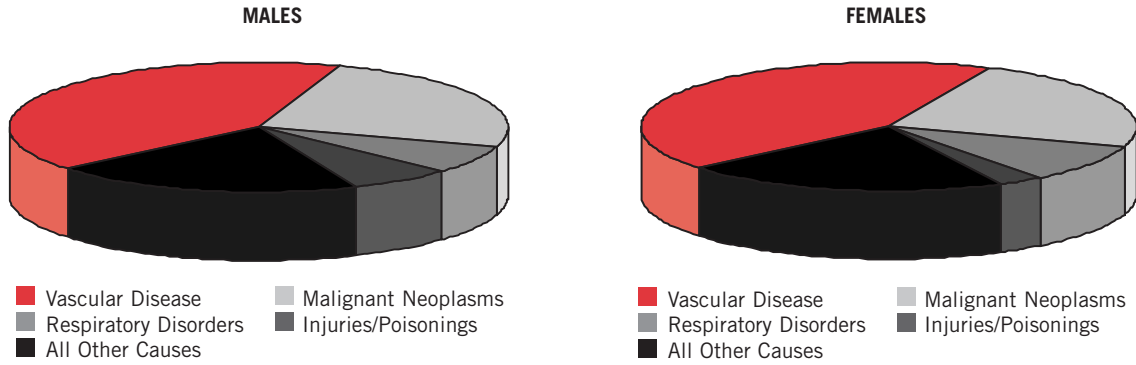
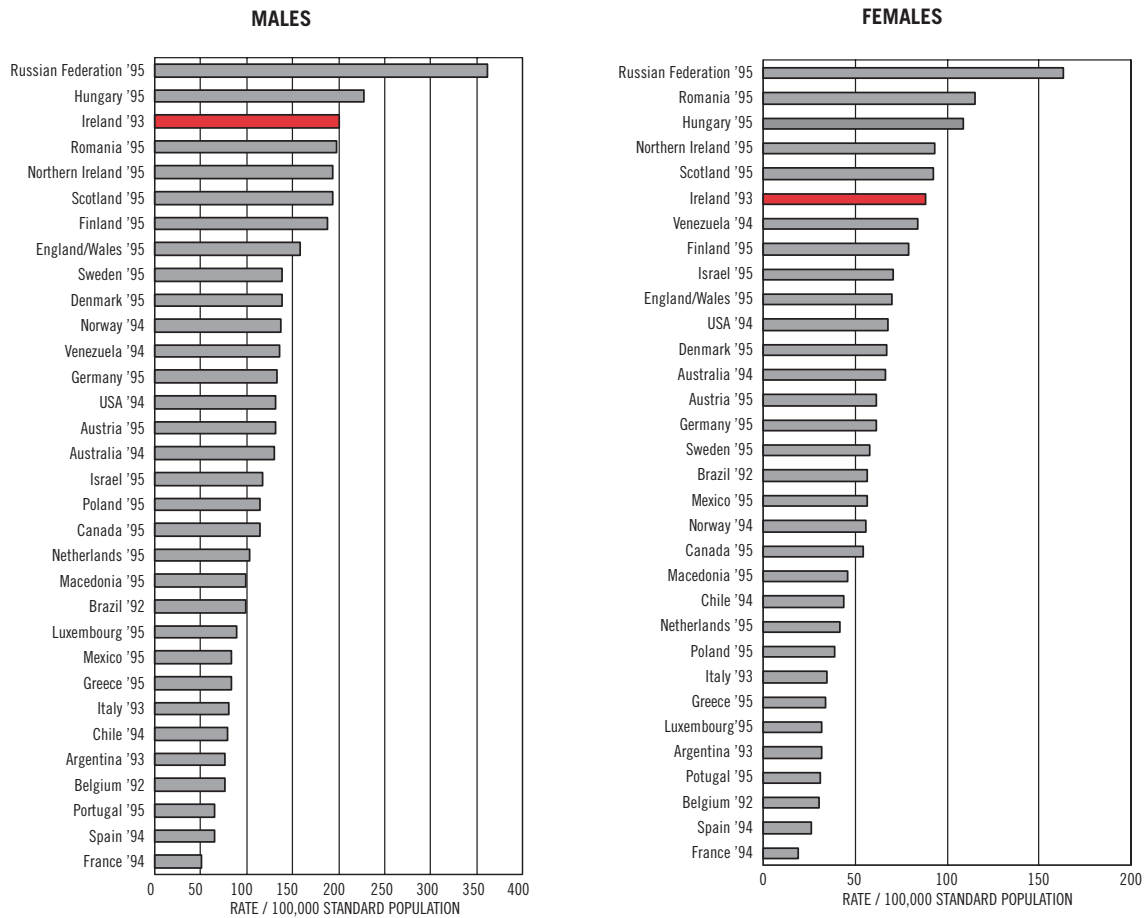


Fig. 2: Age-standardised mortality from IHD (ICD 410-414): International comparison



Source: 1996 World Health Statistics Annual, World Health Organisation, Geneva, 1998. Rates Standardised to World Standard Population

Mortality from Ischaemic Heart Disease in Ireland: Trends in Rates over 50 years

DATA COLLATION

To examine trends in ischaemic heart disease in Ireland over 50 years, Vital Statistics reports for each year from 1950 to 1999 were retrieved.⁽¹⁰⁾ Data pertaining to total deaths, deaths from vascular diseases and deaths from IHD and AMI were extracted. Overall crude and age-specific rates were derived for each year.

The International Classification of Diseases (ICD) coding system is not a static system. Serial revisions have been required at approximately ten-year intervals since its inception in 1900, to accommodate increasing specification of diagnoses over time, as well as new diagnoses and/or procedures which emerge. The period of this review covers 4 revisions of the ICD coding system as outlined in Table 2.

For meaningful comparison of changes in mortality rates over time, age-standardisation of crude rates is essential. Therefore, age and gender-specific rates of IHD and AMI for each year were adjusted to the 1991 population of Ireland as standard, using the direct method of adjustment (9).

RESULTS

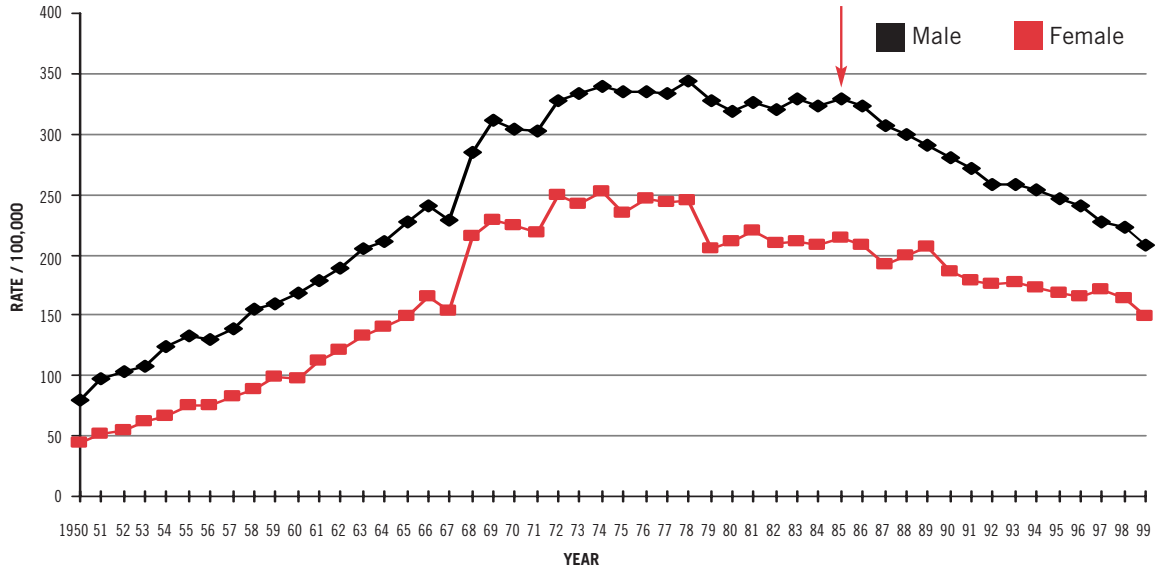
Age-standardised mortality rates for IHD in Ireland from 1950 to 1999 are shown in Fig 3. This graph suggests a steady rise in IHD mortality from 1950 through 1974, followed by a 'plateau' to 1985. The sudden but unsustainable decrease in 1978 was most likely related to the subtle coding change between the 8th and 9th revisions of ICD. Of much greater significance is the steady and sustained decline in mortality rates from IHD since 1985. This decline has occurred in both men and women. **By 1999 mortality from IHD had declined by 37% in men and by 30% in women since the peak year of 1985.**

AMI was assigned a specific ICD code in 1968. Age-standardised mortality rates for AMI from 1968 to 1999 are shown in Fig. 4. The changes in AMI mortality since 1968 are similar to those of IHD mortality. Of interest is that AMI mortality rates do not demonstrate the sudden dip in rate in 1978 as was seen with IHD. This is most likely because there was no change to the specific ICD code for AMI at that time. **By 1999, mortality from AMI had declined by 50% in men and 39% in women since the peak year of 1995.**

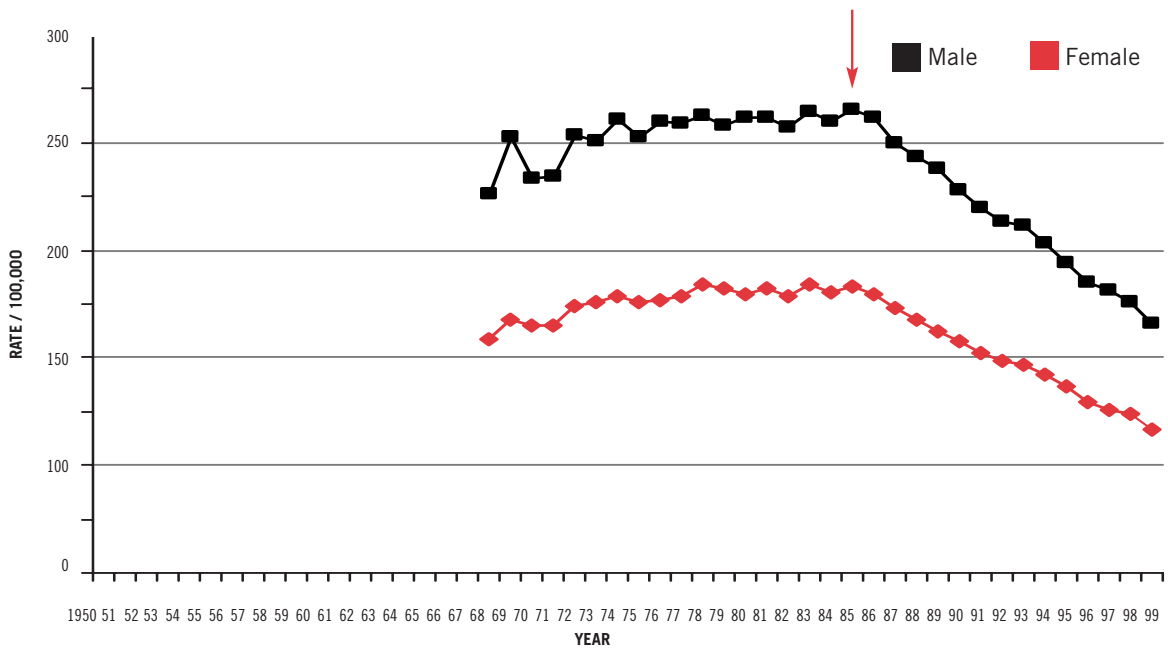
Table 2: Codes for IHD in the International Classification of Diseases 1950-1999

ICD 6th Revision 1949-1957		ICD 7th Revision 1958-1967		ICD 8th Revision 1968 - 1978		ICD 9th Revision 1979 - 1999	
Code	Description	Code	Description	Code	Description	Code	Description
420	Arteriosclerotic heart disease including coronary disease	420	Arteriosclerotic heart disease including coronary disease	410-414	Ischemic heart disease	410-414	Ischemic heart disease
420.0	Arteriosclerotic heart disease so described	420.0	Arteriosclerotic heart disease so described	410.0	Acute myocardial infarction With hypertensive disease	410	Acute myocardial infarction
420.1	Heart disease specified as involving coronary arteries	420.1	Heart disease specified as involving coronary arteries	410.9	Without mention of hypertensive disease	411	Other acute / subacute forms of ischemic heart disease
420.2	Angina pectoris without mention of coronary disease	420.2	Angina pectoris without mention of coronary disease	411.0	Other acute and subacute forms of IHD With hypertensive disease	412	Old myocardial infarction
422	Other myocardial degeneration	422	Other myocardial degeneration	411.9	Without mention of hypertensive disease	413	Angina pectoris
				412.0	Chronic ischemic heart disease With hypertensive disease	414	Other forms of chronic ischemic heart disease
				412.9	Without mention of hypertensive disease		
				413.0	Angina pectoris With hypertensive disease		
				413.9	Without mention of hypertensive disease		
					Asymptomatic IHD		
				414.0	With hypertensive disease		
				414.9	Without mention of hypertensive disease		

**Fig. 3: Mortality from Ischaemic Heart Disease in Ireland 1950 - 1999:
Age-standardised Rates / 100,000 population in Males and Females**



**Fig. 4: Mortality from Acute Myocardial Infarction in Ireland 1968 - 1999:
Age-standardised Rates / 100,000 population in Males and Females**



Mortality from Ischaemic Heart Disease in Ireland: Trends in Numbers and Rates over 50 years

DATA COLLATION

As well as reporting on changes in rates of IHD and AMI over the last 50 years, this review permits us to look at changes in the number of deaths over time. This analysis is subject to the influences of changing population structure, which is eliminated by the process of standardisation. Nonetheless, it is relevant to look at numbers from the point of view of demands on the health services.

Total deaths, deaths from vascular diseases and deaths from IHD were collated for selected years (at 5 year intervals) to assess their relevant contributions to mortality. Data are presented in Table 3.

In order to assess concurrence with rate changes each year from 1950-1999, the number of deaths from IHD, have been graphed with the rates over that period. Data are presented for males and females separately (Figs. 5 and 6). Note the use of the double y-axis in order to represent these two distinct entities on one graph.

RESULTS

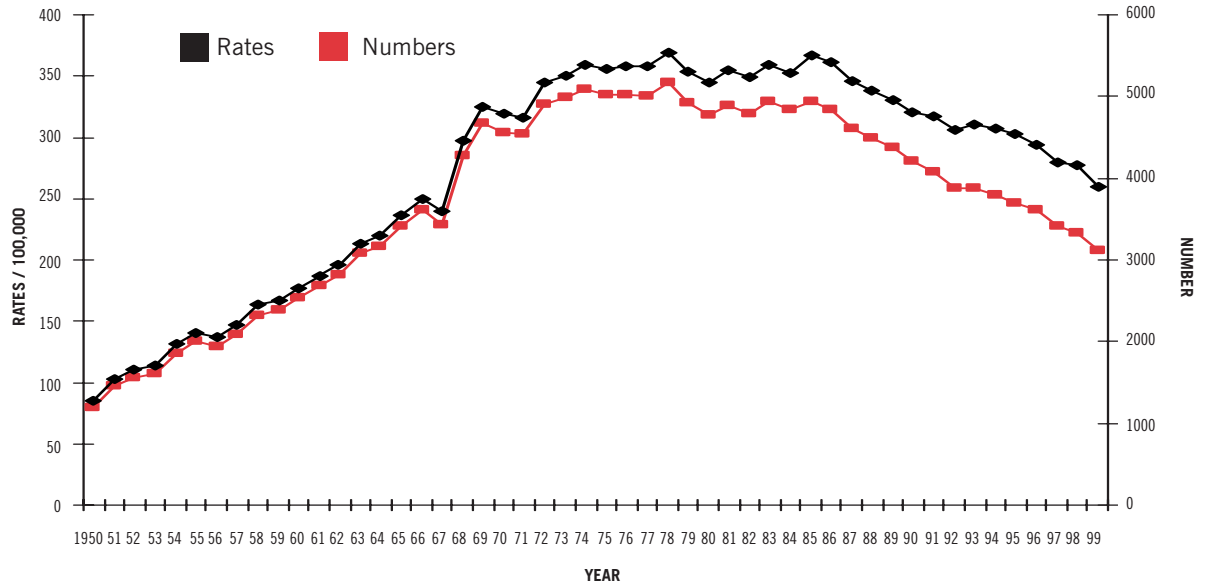
The contribution of vascular diseases to overall mortality shows some variation from 31% in 1950 to 51% in the 1970's to 41% now (Table 3). What is even more striking, however, is the change in the apparent contribution of IHD to vascular mortality. This ranges from a low of 16% in 1950 to a high of 57% in 1990. This almost certainly reflects the lack of specification of diagnoses during the early years covered by this review and the coding of a large proportion of IHD to non-specific codes in the ICD system such as 422 (Myocardial Degeneration).

Figs. 5 and 6 show the distribution over time of IHD rates and numbers for males and females separately. For most of the period the changes in numbers dying from IHD reflect closely the changes in rates. This is an indication that the age structure of the population did not vary much during these years. In recent years, however, there has been a divergence between rates and numbers, such that numbers are not declining as rapidly as rates. This is more pronounced in women than in men. This is one manifestation of the demographic changes now occurring whereby the proportion of those aged 65+ is growing rapidly. Furthermore, this increase in longevity is more pronounced for women than for men. This points to a growing burden on the health services to cater for elderly patients, a significant proportion of whom will have cardiovascular disease.

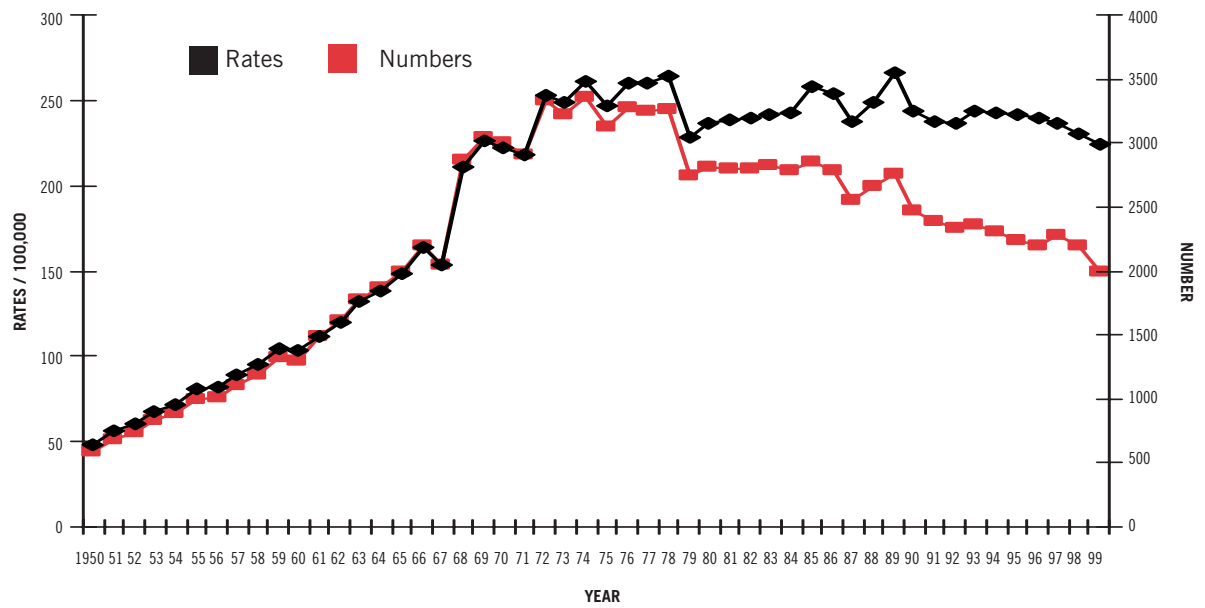
Table 3: Total Deaths, Deaths from Vascular Diseases and Deaths from IHD for selected years 1950-1999

Year	Total Deaths	Deaths from Vascular Diseases		Deaths from IHD	
	Number	Number	% of Total	Number	% of Vascular
1950	37,741	11,887	31	1,906	16
1955	36,761	13,523	37	3,190	24
1960	33,754	12,508	37	4,023	32
1965	33,179	12,645	38	5,531	44
1970	33,319	17,009	51	7,765	46
1975	33,616	17,293	51	8,624	50
1980	32,953	16,642	51	8,324	50
1985	32,526	16,076	49	8,938	56
1990	31,203	14,165	45	8,048	57
1995	30,948	14,018	45	7,770	55
1999	31,683	12,996	41	6,876	53

**Fig. 5: Mortality from Ischaemic Heart Disease in Ireland 1950 - 1999:
Age-standardised Rates / 100,000 Population & Numbers in MALES**



**Fig. 6: Mortality from Ischaemic Heart Disease in Ireland 1950 - 1999:
Age-standardisation Rates / 100,000 Population & Numbers in FEMALES**



Section 2

Morbidity from Ischaemic Heart Disease in Ireland: Current Status and Health Services Implications

DATA COLLATION

By contrast to mortality data which are available for the population as a whole, data on morbidity from IHD are incomplete. There are no population registers of IHD, nor are there comprehensive data on primary care consultations for IHD. Data on hospitalisation for IHD and related illnesses are available, but with some limitations. There are no data on the extent to which diseases of the vascular system contribute to the need for long term care of elderly persons. Thus, the only data upon which estimates of morbidity due to diseases of the vascular system can be based are those contained in the Hospital In-Patient Enquiry (HIPE) database.

The HIPE database was set up in 1970 to record episodes of care in acute publicly funded hospitals in Ireland. Items recorded in the database include patient identifiers, dates of admission and discharge, principal and other diagnoses and principal and other procedures. Limitations of the data include the following: episodes of care rather than patients are recorded, data apply to public hospital only and the completeness and accuracy of data provided by hospitals has been questioned. However, with the introduction of case mix budgeting, with a portion of funding to hospitals linked to HIPE returns, the quality of data reported has improved significantly.

HIPE data for 1999 have been analysed to ascertain the relative contribution of vascular disease to admissions to acute hospitals in terms of patient numbers and bed days used. The HIPE data have also been used to derive age-specific hospitalisation rates for males and females separately.

RESULTS

Fig. 7 outlines the number of discharges from acute publicly funded hospitals in Ireland in 1999 by Major Diagnostic Category (MDC). Patients with vascular diseases comprised the 3rd highest *number* of discharges. Of particular note, however, is that patients with vascular diseases required more *bed days* than patients in any other diagnostic category (Fig. 8). Thus average length of stay was longer. This is almost certainly an indicator of severity of disease in cardiac patients.

Fig. 9 shows the age-specific distribution of hospitalizations for IHD and/or AMI as the principal diagnosis. The rates for males are roughly double those for females throughout the age range. The peak age range for hospitalization in males was 60 to 74 years; peak age range for females was 65 to 79 years.

Fig 7: Number of Acute Hospital Discharges by Major Diagnostic Category, 1999 HIPE data.

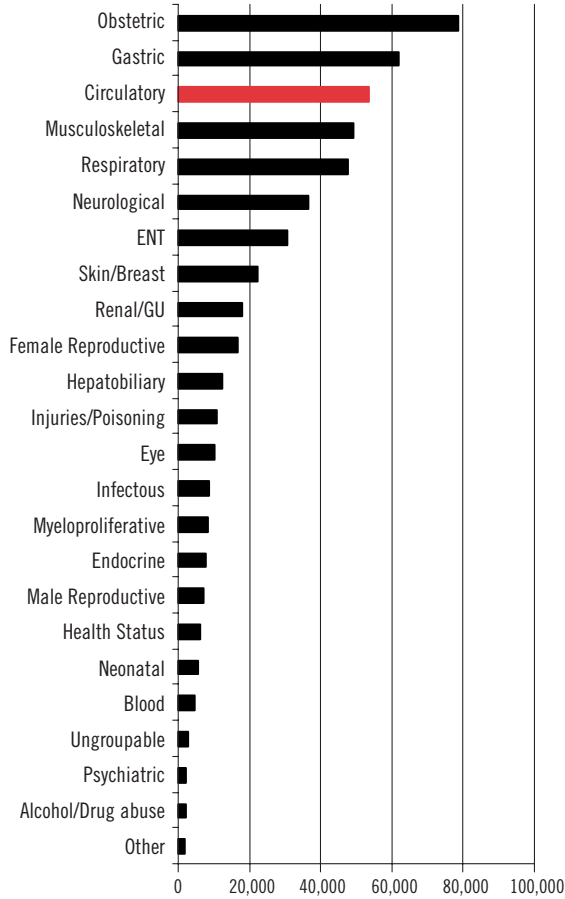


Fig 8: Acute Hospital Bed Days used by Major Diagnostic Category, 1999 HIPE data.

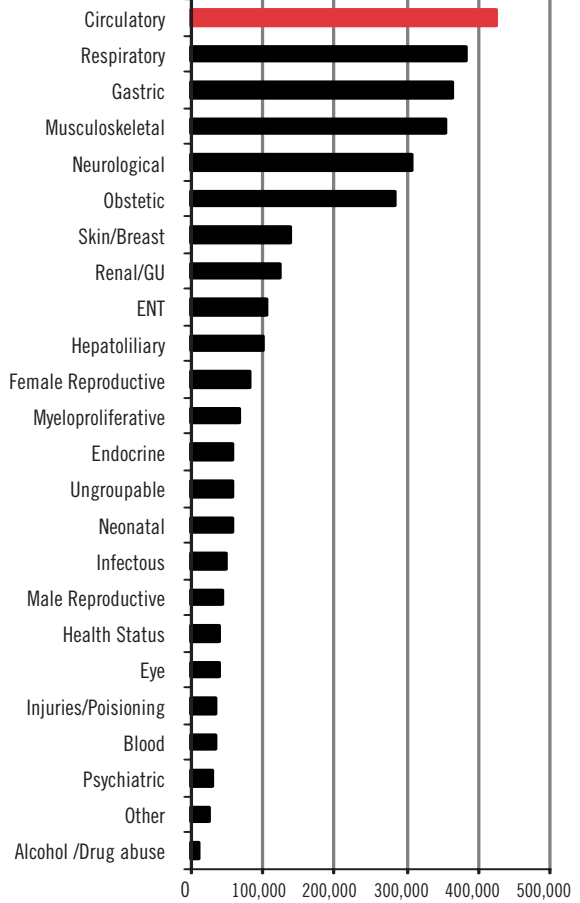
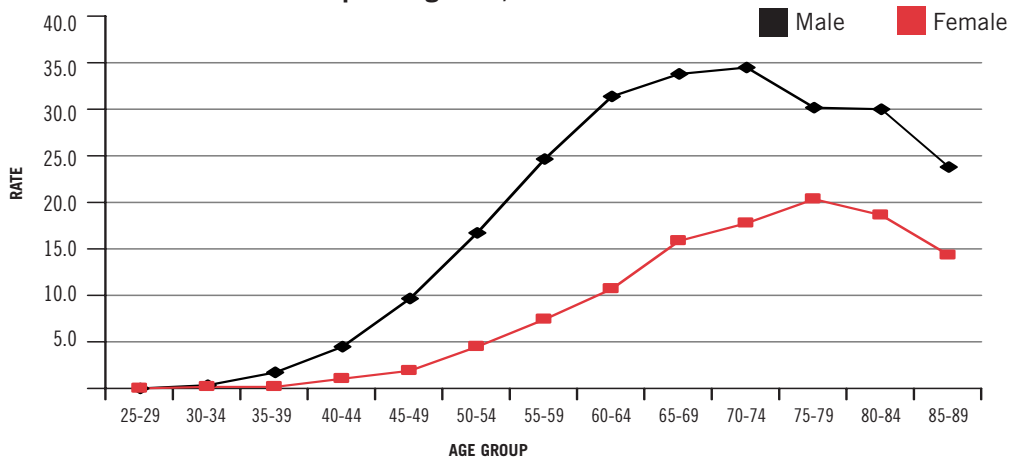


Fig 9: Age-specific distribution of hospitalization for IHD / AMI as Principal Diagnosis, 1999 HIPE data



Morbidity from Ischaemic Heart Disease in Ireland: Trends in hospital discharges and bed days used over time

DATA COLLATION

Summary HIPE data are published by the Planning Unit of the Department of Health and Children in Health Statistics Annuals.

(11) HIPE data for selected years since its inception were reviewed from these reports to assess changes over time in hospital discharges and use of hospital bed days by patients with vascular diseases. The proportions of total discharges and of total bed days used which were ascribed to patients with vascular diseases were calculated. The position of vascular disease relative to other categories of disease was ascertained. Up to 1990 diseases were grouped into 16 categories in the Health Statistics Annual. Thereafter, 26 categories were used based on Major Diagnostic Categories.

RESULTS

Data are provided in Table 4. The proportion of total discharges accounted for by patients with cardiovascular and other vascular disease has remained quite constant over the period at approximately 10%. This places vascular diseases high in the rank order of the conditions with which people are hospitalised (3rd out of 26). However, patients with vascular diseases have required more bed days than patients with any other group of diseases. While the proportion of total bed days used by patients with vascular disease has varied a little from 13.3% to 16.8%, the position at the top of the rank has been consistent throughout the period reviewed.

Table 4: Morbidity from IHD in Ireland over 50 years: Relative position of Diseases of the Vascular System with respect to patient numbers and resource consumption

Year	Total Discharges	Vascular Diseases					
		Discharges	% of Total Discharges	Position*	Bed Days Used	% of Total Bed Days	Position*
1978	292,968	25,345	8.6	6th/16	395,382	13.5	1st/16
1980	370,716	33,390	9.0	5th/16	570,969	15.0	1st/16
1985	401,265	40,109	10.0	4th/16	537,460	15.9	1st/16
1990	312,957	32,884	10.0	4th/16	361,724	16.8	1st/16
1993	503,062	51,270	10.2	3rd/26	415,800	13.3	2nd/26
1997	468,475	54,288	11.6	2nd/26	445,162	14.3	1st/26
1999	505,414	53,535	10.6	3rd/26	422,624	13.3	1st/26

* refers to the position of Diseases of the Vascular System in relation to diseases of other systems.

Discussion

Vascular Diseases account for over 40% of all deaths in Ireland at this time. Ischaemic heart disease is the single most common cause and alone accounts for 25% of all deaths. There is no marked difference between males and females in the proportion of all deaths accounted for by vascular diseases in general and by IHD in particular. However, the difference lies in the fact for males less than 65 years, IHD is the most common cause of death. For females less than 65 years deaths from cancer exceed those from IHD.

The burden of mortality from cardiovascular disease in Europe has been examined by a Task Force of the European Society of Cardiology (12). Ireland is known to have high mortality from IHD when compared with other countries. The European Task Force publication places cardiovascular disease mortality in Irish men and women at the interface between the very high rates in Eastern European countries and the lower rates which pertain to countries of mainland Europe. This has been confirmed in the international comparisons carried out for this report. Northern Ireland, Scotland and, to a lesser extent England and Wales, continue to have high mortality from IHD along with Ireland.

Examining trends in mortality from IHD and AMI in Ireland over time has identified some interesting findings. The low rates of IHD mortality in the 1950's and 1960's is almost certainly a reflection of difficulties encountered in accurately diagnosing cardiac conditions at that time. Thus, many IHD deaths may have been coded to the 'catch all' category of 'Other Myocardial Degeneration' (ICD 422). One way or another, the data from the 1950's and 1960's point to an ongoing epidemic of heart disease in Ireland for at least half a century. This is evidenced by the fact that in 1950, 31% of all deaths were due to vascular diseases.

That proportion has continued to be high. It must be noted in this context, however, that there has been a significant decline in all-cause mortality in the 50 years, not least because of the declining rates of IHD mortality.

Of particular note in the review of mortality trends over time is the encouraging reduction in the adjusted mortality rates for IHD and AMI since 1985. The extent of those reductions and the change in number of IHD and AMI deaths since 1985 are summarised in Table 5.

Table 5: Summary of changes in IHD and AMI mortality in Ireland 1985-1999

	Males	Females
IHD Rate	39%	30%
IHD Numbers:	29%	13%
AMI Rate	50%	37%
AMI Numbers:	44%	29%

To what can the decline in mortality from IHD and AMI be ascribed? This has been the subject of significant investigation in countries which have experienced declining mortality from IHD for longer than we have in Ireland. IHD mortality began to decline in the 1960's in the United States. Several investigators now concur that the decline is the consequence of a multifaceted approach to the problem. Specifically it has been suggested that a proportion of the decline, ranging from 25% to 50%, may be due to primary prevention. A proportion of the decline (40% to 50%) may be related to early intervention and treatment of acute cardiovascular events and a proportion is due to secondary prevention among those with

established disease (13-16). Data from the WHO MONICA project in 37 countries further suggested that a proportion of the decline in mortality may be related to economic success (17).

Also of note from Table 5 is that, while there is reason for optimism about the declining *rates* of IHD and AMI mortality, there is need for attention to the fact that the *number* of deaths from cardiac disease is declining more slowly particularly in women. This is related to changes which have already taken place in the demographic structure of the population, with an increasing proportion of the population in the older age groups. This trend is set to continue through the coming decades as outlined in Table 6 which is based on population projections conducted by the Central Statistics Office.

**Table 6: Population trends in Ireland 1986 – 2026
% distribution by age category for selected years**

Year	<25	25-64	65+
1986	46.5	42.7	10.8
1996	41.9	47.4	10.7
2006	35.7	52.0	12.3
2016	32.6	52.8	14.6
2026	30.7	51.5	17.8

One consequence of the declining mortality from IHD is an increase in the prevalence of cardiovascular disease in the population. Thus, effective intervention and treatment results in a cohort of patients who survive with the disease and are likely to require further treatment. This has

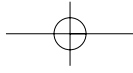
significant implications for the organisation and delivery of health services for this growing body of patients. When taken in conjunction with the projected demographic changes, this points to a significant burden on the health services to cater for an increasingly ageing population, many of whom will have cardiac disease.

Current data on *morbidity* from cardiovascular disease in Ireland are limited, both by their lack of coverage of key areas such as general practice, and by the quantity, quality and accessibility of the data recorded. Now is the time to address this issue. The content of this report indicates the versatility and value of population-based data on *mortality*, which is provided for by the systematic collation of population vital statistics. Similar use could be made of population-based morbidity data if it were available. The HIPE database, despite its limitations, is a valuable repository of morbidity data. Similar systems are required to fill the information gaps in primary care and care of the elderly. Without these data, planning for the required services will be impeded.

In summary, this report provides a synopsis of mortality and morbidity from heart disease in Ireland at the end of the 20th century, with a review of the preceding 50 years. The burden of cardiovascular disease in Ireland is high, both in terms of mortality and morbidity, and in both men and women. Mortality from ischaemic heart disease and acute myocardial infarction has declined steadily since 1985. However, due to improved survival from acute disease and unprecedented changes to the demographic structure, cardiovascular disease continues to pose a significant burden on the health services and on society, a burden which is set to increase further in the coming decades.

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Notes

