
Introduction and Methodology

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Background

This report outlines the burden of respiratory disease on the population of Ireland and its impact on health services. It focuses on data from 2016 but also reflects recent time trends. Ten years ago in 2008, the Irish Thoracic Society published the INHALE report (2nd edition) which focused on 2004 data and time trends at that period¹.

Respiratory disease covers a diverse range of acute and chronic diseases. These include a number of common conditions and a larger number of relatively rare conditions. Respiratory disease is a major cause of morbidity and mortality and is responsible for a large proportion of the overall health burden of illness, both in Ireland and globally².

Two of the most common respiratory diseases in terms of prevalence and mortality are chronic obstructive pulmonary disease (COPD) and lung cancer. A major risk factor for both of these is tobacco smoking. The time lag of 20–30 years between tobacco exposure and the development of disease means that both will remain major challenges for many years to come in Ireland.

Asthma has increased in prevalence in many countries including Ireland in the late 20th century. It is unclear why this has occurred but it may be related to our 'western' lifestyle and increasing urbanisation².

The prevalence of some other respiratory conditions is also increasing. Examples include interstitial lung disease and pulmonary vascular diseases. There is also greater realisation of the extent of the morbidity associated with obstructive sleep apnoea syndromes (OSAS) which in part may be due to better recognition, but also represents a rising prevalence as obesity becomes more common.

An increasingly recognised influence on adult respiratory health is respiratory health and disease in infancy and childhood. An example of this is the increased survival into adulthood of people with cystic fibrosis (CF) with both earlier detection through screening, and improved therapies. Another example is the improved survival rate of premature infants into childhood and adulthood which can bring its own respiratory complications. On the other hand, the increase in childhood asthma will in turn lead to an increase in adults with the disease. More generally, the impact from poor respiratory health in childhood, due to adverse social and environmental factors, on adult respiratory health is increasingly recognised and may be as important a risk factor as smoking².

Vaccination programmes have had beneficial impacts on many acute respiratory infectious diseases but in the absence of adequate uptake of vaccination, a number of diseases such as influenza and pertussis continue to occur. For other diseases such as respiratory syncytial virus (RSV), vaccines and

vaccination programmes are awaited. Pneumonia continues to be a major source of ill health and death in Ireland as well as having a major impact on health services. Tuberculosis declined dramatically in countries like Ireland in the 20th century but with the emergence of drug resistance, it still presents challenges in the 21st century both globally and in Ireland.

As the Irish population ages, the role of co-morbidities in conjunction with respiratory disease in those affected presents an additional challenge for care and treatment.

The mission of the Irish Thoracic Society is to promote respiratory health and alleviate suffering from respiratory disease. Ten years after the publication of the 2nd INHALE report, the Irish Thoracic Society (ITS) considered it timely to adopt a new format, in line with similar reports from a number of other countries¹⁻⁵, using the International Classification of Diseases (ICD) 10th revision, to include not just an over-view of respiratory disease in Ireland but also of eleven individual diseases and two key population groups – children and older people¹⁻⁵.

Who this report is for?

This report provides national data on respiratory disease in the Irish population. The authors hope the report will be an invaluable resource for policy-makers, health care providers and professionals, researchers, patients and their families as well as the wider public. The data and analyses could inform the development of strategies designed to reduce the impact of respiratory disease on Ireland's health, thereby improving respiratory health and wellbeing and reducing the impact on health services.

Data and Data sources

A number of databases were used to compile national data for this overview of respiratory disease in Ireland, major specific respiratory conditions and two age cohorts (children, older people). These included census data from the Central Statistics office (CSO), mortality data both from Vital Statistics of the CSO and Public Health Information System (PHIS). The Computerised Infectious Disease Reporting system (CIDR) was accessed for incidence of respiratory infectious diseases and the National Cancer Registry Ireland (NCRI) for incidence of lung cancer. The Primary Care Reimbursement Scheme (PCRS) was accessed for data on respiratory medication use by those eligible for General Medical Services (GMS) as was the Hospital Inpatient Enquiry (HIPE) system for data from acute publicly funded hospitals. It must be noted that all data sources have limitations.

Secondary data was obtained from relevant reports and other data sources which are referenced as appropriate.

Lack of national primary care data, medication data at disease and total population level, respiratory aids and appliances data including long term oxygen, national diagnostic data and data on other respiratory services means that this report is an underestimate of the burden of respiratory disease in Ireland.

The primary source on population size was census data (2011, 2016) from the CSO www.cso.ie/en/census.

The disease coding system used in Ireland currently both for deaths and hospitalisation is the 10th International Classification of Disease (ICD-10) convention of the World Health Organisation (WHO). It has been used for **deaths** in Ireland since 2007. Data on deaths for this report was sourced from Vital Statistics reports from the CSO (up to and including 2015). Data was sourced for the years 2007-2015. Data on deaths was also sourced from PHIS. This provides specific mortality numbers and rates by age and sex for a limited number of causes. These are the 65 causes of death reported across Europe (Eurostat 65 Causes of Death Shortlist) plus nine additional national categories, so 74 causes in total. This database extended to include provisional 2016 mortality data for these 74 causes. Throughout this report, where 2016 mortality data is provided in tables, it is noted that the data is provisional. Data in text is also provisional. The ICD 10 mortality codes available in PHIS relevant to respiratory disease and to this report are listed in the appendix. In addition to mortality data by cause, age and gender PHIS provides age standardised mortality rates, regional variations and years of potential life lost (YPLL) for the specified causes. This latter measure is of greater relevance for diseases associated with death in younger age cohorts. The specific national publications which used PHIS accessed for this report was Health In Ireland, Key Trends, 2017⁹. Otherwise PHIS database was accessed directly.

Age standardisation which takes the ages of people within a population into account helps to ensure that comparisons of the number of people dying with a condition are not unduly influenced if there are a larger number of older people in a particular population at that time.

Data for notifiable **respiratory infectious diseases** was accessed from the national Computerised Infectious Disease Reporting system (CIDR) and relevant annual reports from the Health Protection Surveillance Centre (HPSC). Many specified infectious diseases deemed of public health significance are notifiable by legislation. All medical practitioners including clinical directors of diagnostic laboratories in Ireland must notify the Medical Officer of Health (MOH) of these specified infectious diseases. The majority of these diseases/organisms are entered on a national computerised infectious disease reporting system (CIDR).

As notifications only reflect those with diagnosed infectious disease, the data likely underestimate the true incidence. For example with influenza, many patients may self-manage and do not present to a medical practitioner.

Expenditure on pharmaceuticals used in the management of respiratory disease was obtained from the pharmacy claims dataset (HSE – **Primary Care Reimbursement Scheme (PCRS)**), which includes reimbursement of expenditure on the GMS and the Drugs Payments Scheme (DPS). Omitted from this are the population who do not have GMS eligibility. Hence these estimates of these costs are an underestimation of the expenditure for pharmaceuticals for respiratory disease in the population.

The pharmacy claims dataset (HSE – Primary Care Reimbursement Scheme (PCRS)), was further utilised to estimate the prevalence of respiratory medication use in the means tested GMS scheme in 2016. In that year, approximately 37% of the Irish population (1.7 million people) were covered by the GMS scheme which entitled them to medication free-of-charge with a nominal co-payment. The majority of patients aged over 70 years were also eligible for this scheme. A comparison of those with full GMS coverage for the entirety of 2016 with the 2016 census data, found that 69% of males and 75% of females over 70 years had full GMS eligibility for the entire year. Hence, rates of medication use in these older age groups are largely representative of the wider Irish population.

The age and sex specific prevalence of all respiratory medication use in 2016 were estimated by restricting the cohort to those with full eligibility for 2016, and using total numbers in the GMS population (by age and sex) that had full eligibility for the entire year as the population denominator. Patterns of medication use in this cohort including the number of different drug classes dispensed from were examined. This data is presented in Chapters (Overview, Older People, Paediatrics, COPD).

The disease coding system used in Ireland currently for hospitalisations, as for deaths, is the 10th International Classification of Disease (ICD-10). It has been used for hospitalisations in Ireland since 2006 and for deaths since 2007. Specific publications which used HIPE accessed for this report included National Healthcare Quality Reporting System Annual report (2017)⁶, Activity in Acute Hospitals (2016)⁷ and National Audit of Hospital Mortality⁸. Otherwise the **Hospital Inpatient Enquiry (HIPE)** database was interrogated directly.

Hospitalisations are episodes of hospital inpatient care, classified by ICD coding on discharge. They are a measure of health service utilisation and reflect local medical care practices, data coding and recording patterns as well as the epidemiology of the conditions described.

Respiratory conditions were categorised as per the British Lung Foundation's recent publication³. The appendix shows details of ICD 10 codes used. Analyses were conducted on all hospitals reporting to HIPE between 2009 and 2016 (including children and maternity hospitals).

The report presents data on all hospitalisation activity (inpatient and day case activity) and inpatient activity only. Inpatient care includes both elective and emergency admissions to hospital - and encompasses all activity in the Acute Medical Assessment Units (AMAU) including those admitted to the Unit and discharged home the same day. It also includes those small numbers of admissions from the Emergency Department (ED) admitted and discharged on the same day. To facilitate comparison with other published reports, including that of the Department of Health⁶, the Health Service Executive⁷ and the British Lung Foundation³, analyses were conducted and reported upon in as similar manner as was possible. The following measures from HIPE were used throughout:

Discharges/total discharges: The total-discharges denominator includes all discharges from the included hospitals during the time period under examination. As the majority of analyses presented here are for inpatient activity, the denominator most commonly used is the total number of inpatient discharges during that year including maternity discharges as well as those discharges that were admitted and discharged the same day (but which were not day cases). This measure provides a comprehensive measure of the proportion of total inpatient activity attributable to respiratory disease.

Age: In addition to the impact across all ages, data is also presented for those aged 65 years and over, those aged 16 to 64 years and those aged 0-15 years. Among the latter group those aged 0 to 4 years were also analysed in terms of inpatient hospitalisations for respiratory disease.

Bed days used: This count is calculated by subtracting the date of discharge from the admission date to give the number of hospital days for each episode of care, which is then summed to give a total count of bed days used in any time period (usually per year), to facilitate comparison with other conditions. The measure gives an overall estimate of the burden of a condition on hospitals. For those admitted and discharged the same day, a bed day used of one is applied throughout.

These hospitalisation statistics relate to the main reason for admission to hospital. As with mortality data, the true impact of comorbid lung diseases may be underestimated. They only include data from HIPE reporting public hospitals and the numbers reflect episodes of care and not individual patients.

The data does not include ED presentations discharged home from hospital without admission. It does not cover Outpatient Department activity or other hospital activities not requiring hospital stay.

In the interests of clarity where appropriate the specific ICD 10 code is included, for example chronic lower respiratory disease (ICD 10: J40-47), chronic obstructive pulmonary disease (COPD) (ICD 10: J40-44, 47), and pneumonia (ICD 10: J12-18), pneumonia organism unspecified (ICD 10: J18), acute lower respiratory infection (unspecified) (ICD 10: J22).

Report Structure

The structure of this report was influenced both by that of the British Lung Foundation report *Battle for Breath* and the White Book of the European Respiratory Society^{2,3}. In addition to an overview chapter, there is a chapter on children's respiratory health and another on older people's respiratory health. There are also 11 disease specific chapters. The structure within most chapters reflects the headings used in the UK document³. These are:

- Disease incidence, which is a measure of the number or rate of new cases of disease occurring in the population over a specified period such as 12 months. Incidence data for respiratory infectious diseases (notifiable) and a limited number of chronic diseases such as lung cancer and cystic fibrosis are available. Incidence data for other diseases and conditions are sparse. The absence of primary care data is a particular challenge here.
- Disease prevalence is a measure of the number of cases of existing disease in the population at a given time, or over a period such as the past 12 months. In the absence of national population registries such as the National Cancer Registry, the voluntary Cystic Fibrosis Registry, the prevalence of a disease can be difficult to measure.
- Respiratory mortality is the number of people who died from the respiratory disease in the specified time period. Where available from PHIS, rates standardised for the population structure are given to facilitate comparisons.
- Impact on health service: in the absence of data for all but public hospitalisation data, the focus in these sections is on this data. For a few chapters, data on medication was extracted.
- Gender is reflected in the above as available.
- Age is reflected in the above as available.

- International comparison was not undertaken as the focus of this report is on Irish data. However, key sources were the World Health Organisation (WHO) European Region, which extends from the Atlantic coast to Central Asia, and its data on mortality and hospital admissions which was accessed via the European Respiratory Society White Book, the British Lung Foundation document previously mentioned and other more disease specific sources referenced in relevant chapters^{2,3}.

Overall, the data provided here is the most accurate picture available on the respiratory health of Ireland at a national level.

References

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