


Scottish Burden of Disease Study, 2015

Osteoarthritis technical overview



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Background

The Scottish Burden of Disease (SBoD) study team have published comprehensive estimates of the burden of disease and injury in Scotland for 2015 [1]. The purpose of this technical overview is to provide background information on the data and methodology used, noting any caveats associated with estimating the burden of osteoarthritis in SBoD.

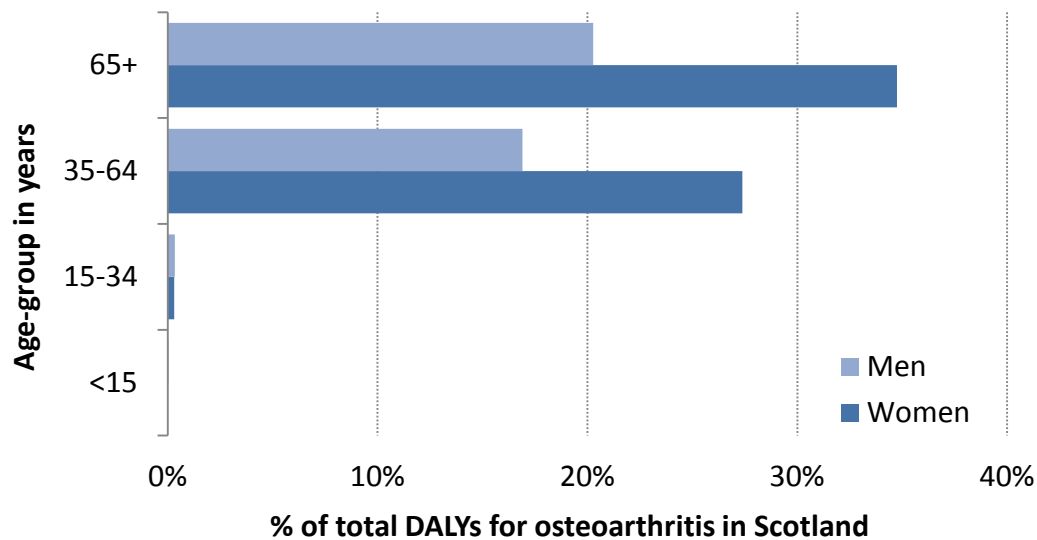
Burden of disease studies aim to estimate the difference between ideal and actual health in a country or region at a specific point in time. Individuals can suffer non-fatal health loss due to suffering disability attributable to a disease, condition or injury, or suffer fatal health loss which is early death due to a disease, condition or injury. To quantify the total burden, non-fatal and fatal health loss are combined to produce a single metric called the Disability-Adjusted Life Year (DALY).

Further information about the SBoD study, including a more thorough explanation of the methodology used, overview reports, detailed results and other specific disease briefings, can be found on the website of the Scottish Public Health Observatory (ScotPHO) [1].

Estimated burden due to osteoarthritis

Osteoarthritis was the 25th most common cause of disease burden in Scotland in 2015, resulting in a total of approximately 16,600 DALYs. The burden of osteoarthritis is fully attributed to individuals suffering health loss due to living with osteoarthritis.

Figure 1 Percentage of total DALYs by gender and age group for osteoarthritis



Women contributed a higher proportion of the burden (62%) than men (38%). Overall, 55% of the total osteoarthritis burden was contributed by individuals aged 65 years and above, as outlined in Figure 1. Note that the burden we are describing is the absolute burden and has not been adjusted for the age/gender case-mix.

How did we produce these estimates?

DALYs attributed to a disease, condition or injury are calculated by combining estimates from two individual metrics: Years of Life Lost (YLL) due to premature mortality and Years Lived with Disability (YLD).

Years of Life Lost (YLL) due to osteoarthritis

Each single death contributes to the total YLL through calculating the difference between the age at death and the life expectancy at that age. Osteoarthritis is not regarded in itself as a valid clinical cause of death in burden of disease studies [2]. There is therefore no YLL component in the DALY for this condition; the entire burden estimated comes from non-fatal consequences of health loss due to osteoarthritis.

Years Lived with Disability (YLD) due to osteoarthritis

Years lived with disability (YLD) are estimated using

- disease and injury prevalence estimates
- levels of severity
- disability weights

Our sources of information for these three components were as follows:

Estimating the number of individuals suffering disability

To estimate prevalent cases of osteoarthritis in 2015, the Practice Team Information dataset (PTI) was used [3]. This dataset was collected by ISD Scotland from April 2003 to September 2013. It includes information from a nationally representative 5% sample of Scottish General Practices regarding face-to-face consultations between individuals and a member of the practice team (GPs, nurses and clinical assistants). The presence of a unique patient-identifier on the dataset allows for the grouping of consultations for each individual. The reason for each consultation was coded using Read codes [4]. The number of individuals that had a Read code specific to osteoarthritis between 1 April 2003 and 31 September 2013 were used to estimate prevalence. We used a list of Read codes developed by Keele University to identify osteoarthritis prevalent cases [5]. We did not distinguish osteoarthritis by knee, hip or any other joint. Individuals that attended their GP and consulted for osteoarthritis for the first time were counted as new (incident) cases, and we assumed that they remained a prevalent case until their point of death. We projected the estimated annual incidence trends of osteoarthritis for the time period (2003-2013) to 2014 and 2015. The estimated incidence and mortality data was used to calculate 2015 prevalence. There is no information about the death of individuals in PTI, so adjustments to account for deaths were made using average age and gender mortality rates in Scotland.

Using this method of identifying prevalent cases of osteoarthritis, we estimated that there were approximately 461,800 individuals in the Scottish population living with osteoarthritis in 2015.

Severity distribution and disability weights

The levels of severity and disability due to osteoarthritis in Scotland were based on the specifications of the Global Burden of Disease (GBD) 2015 study [6]. This allowed prevalent cases to be disaggregated by levels of severity and the associated disability at each level of severity. The disability weights were developed by the GBD study through surveys of the general public and take into account the consequences of each disease, condition and injury [7]. The severity distributions and disability weights for osteoarthritis are outlined in Table 1.

Once the severity of osteoarthritis and associated disability were taken into account, individuals were estimated to be suffering approximately 16,600 YLDs due to osteoarthritis in Scotland in 2015.

Table 1 Description and allocation to severity levels for osteoarthritis with corresponding disability weight

Severity level	Description	% of individuals	Disability weight
Mild	Has pain in the leg, which causes some difficulty running, walking long distances, and getting up and down.	75	0.023
Moderate	Has moderate pain in the leg, which makes the person limp, and causes some difficulty walking, standing, lifting and carrying heavy things, getting up and down and sleeping.	24	0.079
Severe	Has severe pain in the leg, which makes the person limp and causes a lot of difficulty walking, standing, lifting and carrying heavy things, getting up and down, and sleeping.	1	0.165

Data quality

In order to provide a measure of the degree of accuracy¹ and relevance² of the estimated disease DALYs to users, a measure of data quality has been developed for the SBoD study. This measure assigns a RAG (Red; Amber; Green) status to

¹ How precise, unbiased or certain the estimate is.

² Do we measure the thing we want to measure?

each disease or injury indicative of the accuracy and relevance of the estimates. Interpretation of the RAG status can be defined as follows:

 **Highly accurate and relevant**

Estimates have been derived using relevant and robust data sources with only a small degree of adjustments performed to the input data. These estimates can be considered a highly accurate depiction of the burden incurred from the disease, condition or injury.

 **Moderately accurate and relevant**

Estimates have been derived using reasonably relevant and robust data sources with only a moderate degree of adjustments performed to the input data. These estimates can be considered a moderately accurate depiction of the burden incurred from the disease, condition or injury.

 **Uncertainties over accuracy and relevance**

Estimates have been derived using less comprehensive or relevant data sources with a high degree of adjustments performed to the input data. These estimates contain substantial uncertainties and should be used with some caution.

The data quality has been assessed using three main criteria:

- Relevance and accuracy of the data source used to measuring the population of interest
- Likelihood that the implemented disease model captured the overall burden of disease or injury
- The relative contribution of ill-defined deaths to YLL, and YLL to DALY.

These criteria are subjectively assessed and each criterion is scored on a scale of 1 to 5. Further details on these data quality measures are available on the ScotPHO website [1].

Based on these criteria, the estimates of burden of osteoarthritis in Scotland are

 **moderately accurate and relevant.**

There are no national registries available for osteoarthritis; hence we used primary care data. However, while GPs are likely to be the first point of contact for osteoarthritis problems, their recording and diagnosis in PTI may not be accurate. Additionally, PTI is a sample of the population in contact with primary care services. We assumed that osteoarthritis is a chronic disease, so once somebody is diagnosed s/he will be a prevalent case until the point of death. However because PTI does not include information about when a person dies we have estimated when that happens based on national averages, adding another layer of uncertainty to our prevalence estimates. Finally we have not removed individuals who have a knee or hip replacement from our prevalent population.

We estimate a prevalence of 461,800 individuals with osteoarthritis in Scotland. The Global Burden of Disease (GBD) 2015 study estimated a prevalence of 378,500 individuals in the same time period [8]. Arthritis Research UK estimates a prevalence of 420,000 individuals only for osteoarthritis of the knee³. This estimate is obtained by modelling the osteoarthritis cases⁴ in the English Longitudinal Study of Ageing using socio-demographic, lifestyle and other factors [9] and extrapolating the results to the Scottish population.

The absences of death information in primary care data, lack of adjustment for hip and knee replacements, and the difficulty in diagnosing osteoarthritis in primary care settings are reasons to be moderately cautious about our estimates.

What next to improve estimates for osteoarthritis?

Future work on the SBoD study will attempt to refine the estimates of prevalence. This work will include reviewing the coding and recording of osteoarthritis in alternative national datasets and exploring local area datasets for information. The development of the Scottish Primary Care Information Resource (SPIRE) will help us

³ Personal communication

⁴ Prevalent cases in the English Longitudinal Study of Ageing are those reporting that the doctor has diagnosed them as having osteoarthritis

to improve our estimates of the burden of disease in Scotland [10]. Further to this, work will be carried out to attempt to derive estimates of severity levels that are dependent on age and that are specific to the Scottish population. Additionally, we will consider changes in the burden of osteoarthritis after taking into account the improvement in health experienced by those undergoing hip and knee replacements.

These improvements are partly dependant on exploring other data sources and reviewing evidence from high quality research that it is relevant to Scotland. Please contact the SBoD project team (nhs.healthscotland-sbod-team@nhs.net) for enquiries and suggestions on how to improve our estimates.

References

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