


# Scottish Burden of Disease Study, 2015

## Neck and lower back pain technical overview



This resource may also be made available on request in the following formats:



 **0131 314 5300**

 **[nhs.healthscotland-alternativeformats@nhs.net](mailto:nhs.healthscotland-alternativeformats@nhs.net)**

Published by NHS Health Scotland

1 South Gyle Crescent  
Edinburgh EH12 9EB

© NHS Health Scotland 2017 and ISD 2017

# 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 neck and lower back pain (N&LBP) in SBoD.

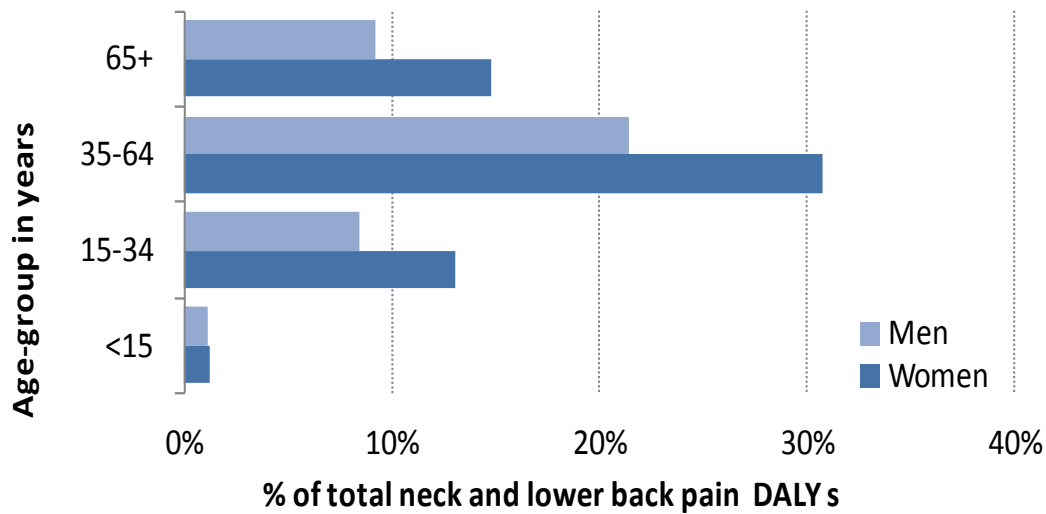
Burden of disease studies aim to estimate the difference between ideal and actual health in a country or region at a specific point in time. Individuals can suffer non-fatal health loss due to suffering disability attributable to a disease, condition or injury, or suffer fatal health loss which is early 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 neck and lower back pain

Neck and lower back pain (N&LBP) was the second leading cause of disease burden in Scotland in 2015, resulting in a total of approximately 90,200 DALYs. Of this total burden, 64% was due to lower back pain (LBP) and 36% to neck pain (NP)

**Figure 1 Percentage of total DALYs by gender and age-group for N&LBP**



Women contributed a higher proportion of the burden (60%) than men (40%). Overall, 52% of the total N&LBP burden was contributed by individuals aged 35 to 64 years, 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 neck and lower back pain

Each single death contributes to the total YLL through calculating the difference between the age at death and the life expectancy at that age. N&LBP is not regarded in itself as a valid clinical cause of death in burden of disease studies. 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 N&LBP [2].

## Years Lived with Disability (YLD) due to neck and lower back pain

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 are as follows:

### **Estimating the number of individuals suffering disability**

To estimate prevalent cases of N&LBP in 2015, the Practice Team Information (PTI) dataset 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 N&LBP, between 1 April 2003 and 31 September 2013, were used to estimate prevalence. Individuals were counted once per year if they attended their GP and consulted for either neck or lower back pain. Neck and lower back pain were treated separately, so the same individual could contribute to both the prevalence estimate of NP and LBP. The burden of suffering both conditions is considered to be smaller than the sum of either single burden and there is a later adjustment to avoid double counting in the DALY estimate.

We used a list of Read codes developed by Keele University to identify N&LBP prevalent cases [5]. We used the average number of individuals consulting for N&LBP per year, for the time period covered by PTI (2003-2013) to estimate the number of prevalent cases in 2014 and 2015.

We estimated that there were approximately 101,000 individuals with NP and 313,000 individuals with LBP consulting with their GP practice in Scotland in 2015.

## Severity distribution and disability weights

The levels of severity and disability due to N&LBP 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 have been developed by the GBD study through surveys of the general public [7] and take into account the consequences of each disease and injury. The severity distributions and disability weights for N&LBP are shown in Table 1 and Table 2.

**Table 1 Description and allocation to severity levels for lower back pain with corresponding disability weight**

Severity level	Description	% of individuals	Disability weight
Without leg pain			
Mild	Has mild back pain, which causes some difficulty dressing, standing, and lifting things.	38	0.020
Moderate	Has moderate back pain, which causes difficulty dressing, sitting, standing, walking, and lifting things.	36	0.054
Severe	Has severe back pain, which causes difficulty dressing, sitting, standing, walking, and lifting things. The person sleeps poorly and feels worried.	11	0.272
Most severe	Has constant back pain, which causes difficulty dressing, sitting, standing, walking, and lifting things. The person sleeps poorly, is worried, and has lost some enjoyment in life.	15	0.372
With leg pain			
Mild	Same as without leg pain	27	0.020
Moderate	Same as without leg pain	37	0.054
Severe	Has severe back and leg pain, which causes difficulty dressing, sitting, standing, walking, and lifting things. The person sleeps poorly and feels worried.	13	0.325

Severity level	Description	% of individuals	Disability weight
Most severe	Has constant back and leg pain, which causes difficulty dressing, sitting, standing, walking, and lifting things. The person sleeps poorly, is worried, and has lost some enjoyment in life.	23	0.384

**Table 2 Description and allocation to severity levels for neck pain with corresponding disability weight**

Severity level	Description	% of individuals	Disability weight
Mild	Has neck pain, and has difficulty turning the head and lifting things.	69	0.052
Moderate	Has constant neck pain, and has difficulty turning the head, holding arms up, and lifting things.	11	0.112
Severe	Has severe neck pain, and difficulty turning the head and lifting things. The person gets headaches and arm pain, sleeps poorly, and feels tired and worried.	6	0.226
Most Severe	Has constant neck pain and difficulty turning the head, holding and lifting things. The person gets headaches, sleeps poorly, and feels tired and worried.	14	0.300

We made two important assumptions when applying the severity distributions in Table 1 and Table 2 to estimate the burden using our prevalent count:

- 1 We assumed that mild cases of N&LBP are not consulting their GP practice. To consider these cases we uplifted our prevalence count by applying a factor of 1.55 and 3.2 to LBP and NP, respectively<sup>1</sup>. If some mild cases were consulting their GP Practice then we will have over-estimated the burden of N&LBP in Scotland.
- 2 We assumed that the ratio between cases of LBP with and without leg pain is approximately 1:4. This ratio is based on the worldwide prevalence reported by the GBD 2015 study [6] for LBP with and without leg pain. If we have a higher proportion of cases with leg pain then we will have under-estimated the burden on N&LBP in Scotland.

<sup>1</sup> The uplift factor comes from the % of mild cases in:

NP :  $(1-0.69)^{-1} = 3.2$  where .69 is the proportion of mild cases in GBD

LBP:  $(1-(4 \times 0.38/5 + 0.27/5))^{-1} = 1.55$  where .38 and .27 are the proportions of mild cases in GBD

The uplift factors were applied to our prevalence estimates from the PTI dataset to obtain a total prevalence of NP and LBP, including mild cases, of 323,200 and 486,000, respectively. LBP prevalence was then split into cases with and without leg pain using the ratio 1:4. When the severity distributions and disability weights were then applied, we estimated a total of 60,100 YLD due to lower back pain and 34,100 YLD due to neck pain. Finally, these estimates were adjusted to avoid double counting the disability associated with suffering both conditions<sup>2</sup>. Once all these inputs were taken into account, individuals were estimated to be suffering approximately 90,200 YLD in 2015 due to living with N&LBP.

## Data quality

In order to provide a measure of the degree of accuracy<sup>3</sup> and relevance<sup>4</sup> 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 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.

---

<sup>2</sup> In fact, we adjust for the disability associated with multiple diseases. We refer to this method as comorbidity adjustment and explained in our technical paper [1]

<sup>3</sup> How precise, unbiased or certain the estimate is.

<sup>4</sup> Do we measure the thing we want to measure?



## **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 N&LBP are deemed to have

## **uncertainties over the accuracy and relevance.**

While GPs are likely to be the first point of contact for N&LBP problems, their recording and diagnosis in the PTI database may not be complete or fully accurate. Additionally, the PTI dataset is a five per cent sample of GP practices, where data collection terminated in 2013. We assumed duration of one year for N&LBP, and considered that individuals suffer the burden of N&LBP only for the year they consult their GP. However, we don't have any evidence that this duration is adequate for the different severity levels associated with N&LBP.

We estimated a prevalence rate of 9% of the Scottish population for LBP and 6% for NP in 2015. The Global Burden of Disease study (GBD) 2015 estimated a prevalence of 12% for LBP and 8% for NP in Scotland in 2015 [8]. Comparisons with other recent studies in Scotland and other areas of the UK are problematic as many of these report prevalence of LBP and NP for specific age groups [9] and these studies also tended to report higher prevalence estimates.

Despite SBoD estimating a lower prevalence count than other studies, N&LBP still appears as the second highest cause of disease burden in Scotland. Burden could be over-reported even with under-reported prevalence. This is because the results are very reliant on the global severity distributions we have applied to Scotland (see Table 1 and Table 2), and on our three important assumptions: that mild cases do not consult their GP (if they do, we are over-estimating prevalence and burden), that a fifth of LBP sufferers have leg pain (if the proportion is lower we are over-estimating burden) and that all individuals suffer disability for a full year (if the duration is less for even a subset of patients, then we are over-estimating burden).

## **What next to improve estimates for N&LBP**

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

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](mailto:nhs.healthscotland-sbod-team@nhs.net)) for enquiries and suggestions on how to improve our estimates.

## References

- [1] Scottish Burden of Disease study. Scottish Public Health Observatory, Available from: URL: <http://www.scotpho.org.uk/comparative-health/burden-of-disease/overview> (Accessed 03 July 2017)
- [2] GBD 2015 Mortality and Causes of Death Collaborators. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The Lancet* 2016 Oct 8;388(10053):1459-544.
- [3] ISD Scotland. Practice Team Information. NHS National Services Scotland, Available from: URL: <http://www.isdscotland.org/Health-Topics/General-Practice/PTI-Support/> (Accessed 03 July 2017)
- [4] NHS Digital. Read Codes. NHS Digital, Available from: URL: <https://digital.nhs.uk/article/1104/Read-Codes> (Accessed 03 July 2017)
- [5] The copyright of the Morbidity Definitions/Code Lists (©2014) used in this 'disease briefing' is owned by Keele University, the development of which was supported by the Primary Care Research Consortium. The SBoD team would like to acknowledge Keele University's Prognosis and Consultation Epidemiology Research Group who have given us permission to utilise the Morbidity Definitions/Code Lists (©2014)
- [6] Vos T, Allen C, Arora M, Barber RM, Bhutta ZA, Brown A, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *The Lancet* 2016;388(10053):1545-602.
- [7] Salomon JA, Haagsma JA, Davis A, de Noordhout CM, Polinder S, Havelaar AH, et al. Disability weights for the Global Burden of Disease 2013 study. *The Lancet Global Health* 2015 Nov;3(11):e712-e723.

- [8] Institute for Health Metrics and Evaluation (IHME). GBD Results Tool. Seattle, WA: IHME, University of Washington. Available from: URL: <http://ghdx.healthdata.org/gbd-results-tool> (Accessed 03 July 2017)
- [9] Macfarlane GJ, Beasley M, Jones EA, Prescott GJ, Docking R, Keeley P, et al. The prevalence and management of low back pain across adulthood: Results from a population-based cross-sectional study (the MUSICIAN study). *PAIN* 2012;153(1):27-32.
- [10] Scottish Primary Care Information Resource (SPIRE). NHS National Services Scotland, Available from: URL: <http://spire.scot/> (Accessed 03 July 2017)

