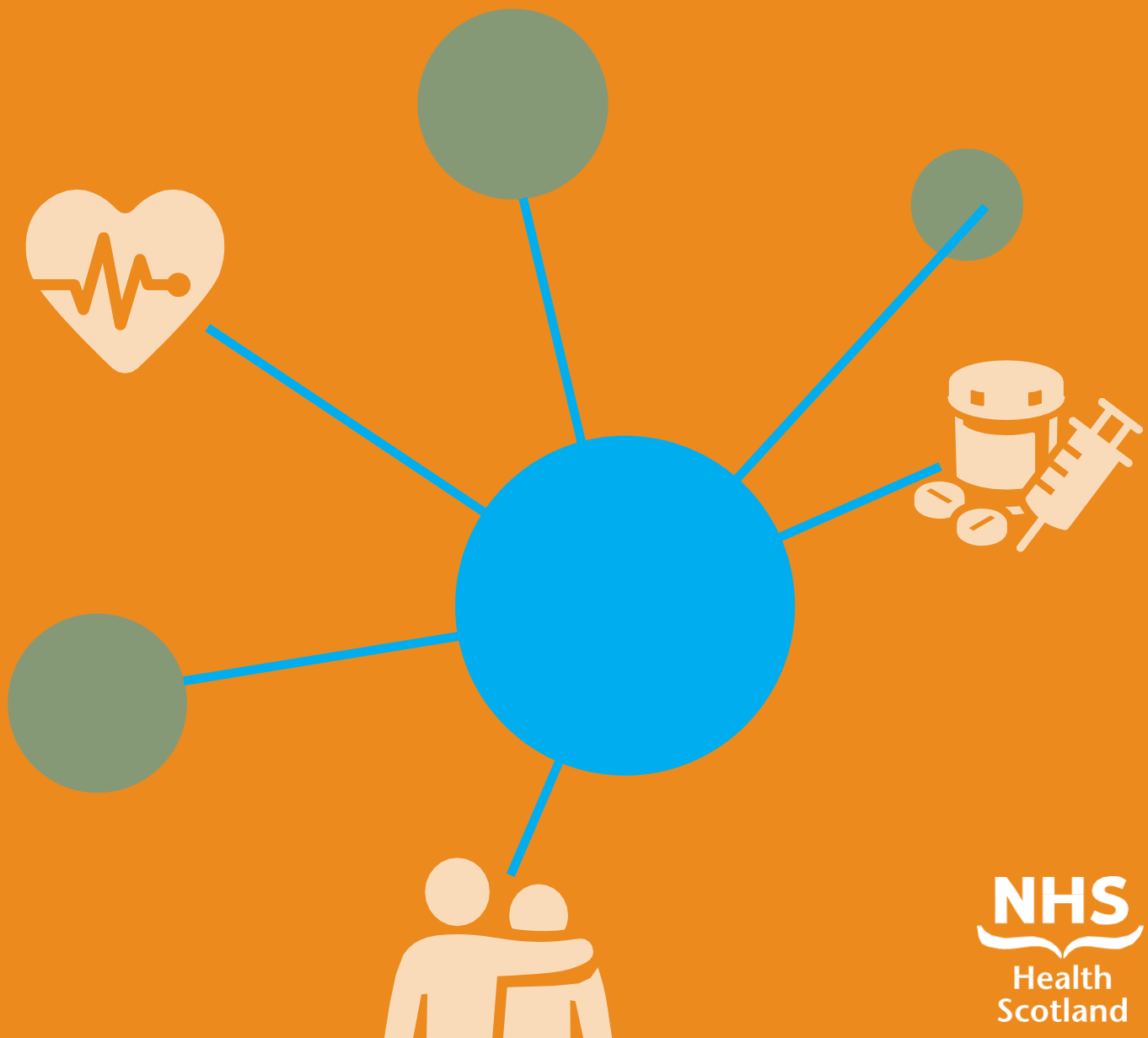# The Scottish Burden of Disease Study, 2016

Migraine technical overview

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

Background

The Scottish Burden of Disease (SBoD) study team have published comprehensive estimates of the burden of disease and injury in Scotland for 2016 [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 migraine 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 or injury, or suffer fatal health loss which is early death due to a disease 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).

In SBoD 2016, all data are presented as three year averages for period 2014-2016. A three year period is used to smooth out most of the effect if the mortality or morbidity of a single year happens to be unusual. 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 migraine

Migraine was the 7th most common cause of disease burden in Scotland in 2016, resulting in approximately 48,000 DALYs. Migraine was the second largest contributor to the overall neurological disorders disease burden.

Figure 1 Percentage of total DALYs by age-group and gender for migraine
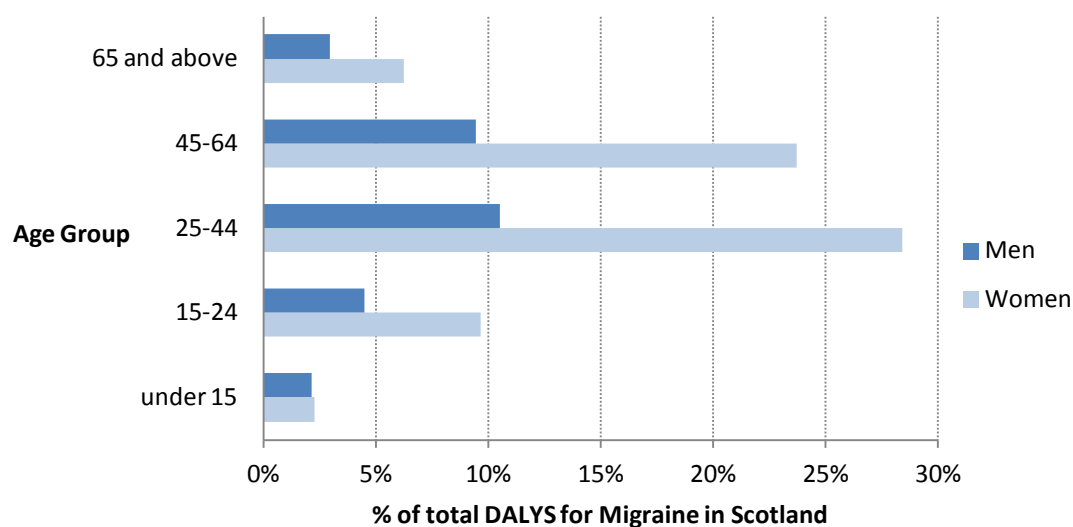
Overall, women accounted for 70% of the total migraine DALY in Scotland in 2016. Women aged between 25-44 years accounted for the largest proportion (28%) of this burden, followed closely by women aged 45-64 years (23%). Across all age groups women experienced a greater proportion of the migraine burden than men. Note that the burden we are describing above is the absolute burden and has not been adjusted for the age/gender case-mix.

The age standardised DALY rates, by deprivation[1] decile, for migraine, are shown in Figure 2. The highest DALY rates were found deciles 5 and 6 (4,965 and 4,795 per 100,000 respectively and the lowest in deciles 1 and 2 (3,699 and 3,602 per 100,000 respectively).

Figure 2 Migraine DALY (rate per 100,000[2]) by deprivation decile
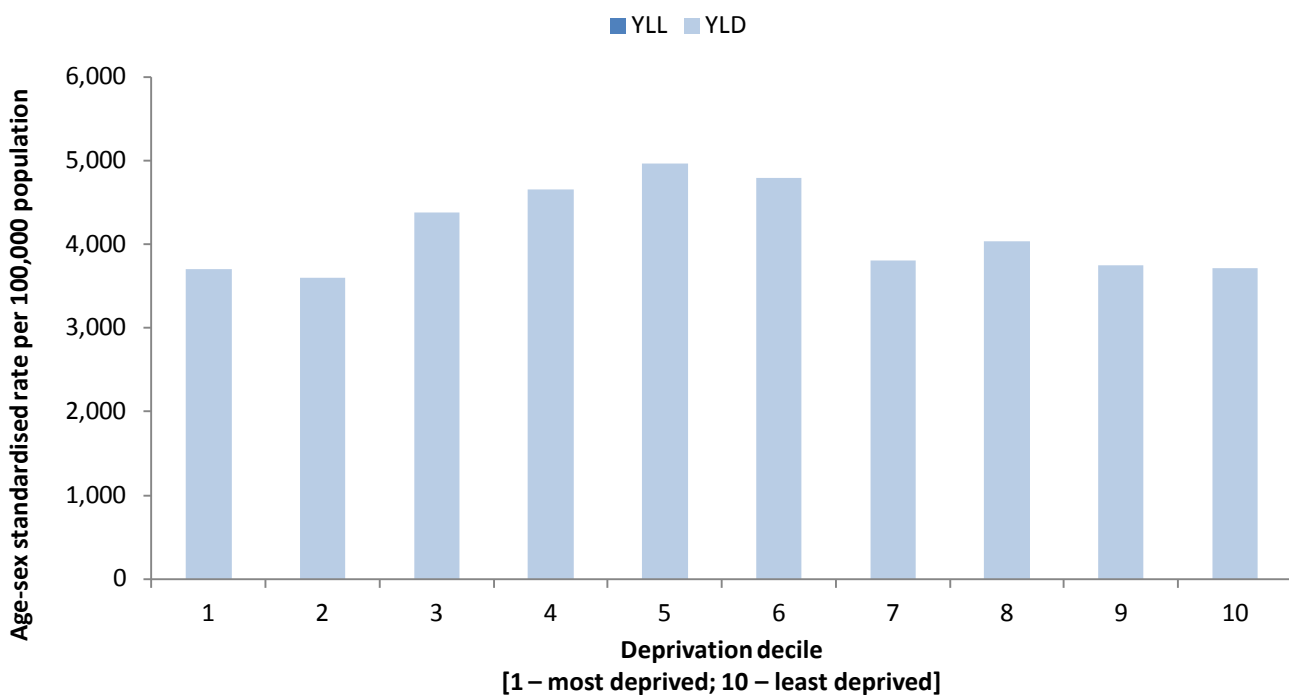
[1] We used the Scottish Index of Multiple Deprivation (SIMD 2016) to analyse patterns of inequality in the burden of disease across Scotland. SIMD2016 is categorised into deciles 1 (most deprived) to 10 (least deprived), SIMD2016 calculates deprived areas, not deprived individuals.
[2] Where the data were age-standardised, this was done directly using the 2013 European Standard Population to account for differences in age structure between SIMD deciles.

How did we produce these estimates?

DALYs attributed to a disease 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) to migraine

Each single death contributes to the total YLL through calculating the difference between the age at death and the life expectancy at that age. Migraine is not regarded, in itself, as a valid 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 migraine.

Years lived with disability (YLD) due to migraine

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 prevalence

To estimate prevalent cases of migraine in Scotland in 2016, we have used estimates from the Global Burden of Disease 2016 study. In GBD, prevalence estimates for migraine were based on systematic reviews of published papers, GBD used 123 prevalence data points and 4 incidence data points covering 16 of GBD world regions. Data from these studies were modelled using DisMod-MR 2.1, a statistical method that synthesises sparse and heterogeneous epidemiological data for non-fatal outcomes [3]. GBD estimate prevalence at five levels global, super-region, region, country, and subnational locations, with results from a higher level providing guidance for the analysis at a lower geographical level.

Using this method, GBD estimated a total prevalence of approximately 1,100, 800 individuals suffering from migraine in Scotland in 2016 [4]. The total prevalent estimate was later redistributed to different age groups, gender and deprivation deciles based on the proportions we obtained from the Practice Team Information dataset (PTI) [5]. 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. The number of individuals that had a Read code specific to migraine between 1 April 2003 and 31 September 2013 were used to estimate the age groups and gender proportions. The list of Read codes we used to identify migraine consultations can be found on the ScotPHO website [1].

Severity distribution and disability weights

The levels of severity and disability due to migraine in Scotland are based on the specifications of the Global Burden of Disease (GBD) 2016 study [3]. 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 through surveys of the general public and take into account the consequences of each disease and injury [6]. The severity distributions and disability weights for migraine are shown in Table 1. Only 13% of people who suffer from migraine and/or MOH as a result of migraine (i.e. the total number of prevalent cases) had symptoms at any one time, reflecting the episodic nature of the condition. The remaining 87% of people do not therefore have an associated disability weight and do not count towards the overall DALY total.

These severity distributions and disability weights were applied to the estimated number of people suffering from migraine (n= 1,100,800), resulting in around 48,000 YLD due to migraine in Scotland in 2016.

Table 1 Migraine severity levels and disability weights

Severity level	Description	% of individuals	Disability weight
Asymptomatic migraine and MOH due to migraine	experiences no symptoms by virtue of, for instance being on treatment or because of the natural course of the condition.	87%	0.000
Symptomatic migraine	has severe, throbbing head pain and nausea that cause great difficulty in daily activities and sometimes confine the person to bed. Moving around, light, and noise make it worse.	8%	0.441
Symptomatic medication overuse headache due to migraine	has daily headaches, felt as dull pain and often lasting all day, with poor sleep, nausea and fatigue. The person takes medicine for the headaches, which provides little relief but is needed to avoid having worse symptoms.	5%	0.223

Data quality

In order to provide a measure of the degree of accuracy[3] and relevance[4] 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.

Ⓡ 🟡 Ⓖ **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.

🔴 Ⓐ Ⓖ **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.

---

[3] How precise, unbiased or certain the estimate is.
[4] Do we measure the thing we want to measure?

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 above criteria, the estimated of the burden of migraine in Scotland should be regarded as having **uncertainties over accuracy and relevance** ®Ⓐ Ⓖ.

GBD have estimated a migraine prevalence of approximately 22% (around 1.1million current sufferers of migraine) in Scotland in 2016 [4]. Data from a cross sectional survey (Eurolight) conducted across ten countries (including the United Kingdom) in Europe reported a prevalence of migraine across Europe of 35%. Allowance for an interest-bias-related overestimation margin of 14% reduced the estimate to 30.4%, which was still considered too high [7]. As diagnostic accuracy was not directly assessed in EUROLIGHT there is some uncertainty around the validity of the study's prevalence estimate. EUROLIGHT however was never intended or designed to be a primary source of prevalence [7]. In one of the few UK based migraine studies of over 4,000 individuals in England using similar diagnostic criteria to GBD, Steiner et al (2003) reported a UK prevalence of 15% in adults aged 16-64 years. The authors observed that due to the modified diagnostic criteria used in their study they have likely underestimated the prevalence of migraine, although only to a small extent [8].

We have used estimates from GBD2016 to describe the burden of migraine in Scotland. Our uncertainties over the accuracy and relevance of the migraine burden in Scotland, are not an assessment of the GBD method for estimating the migraine burden itself but an assessment based on: 1) the lack of Scottish/UK data available and included in the modelling estimates and 2) the heterogeneity in study methods and case definitions which complicates the nonfatal estimation of the migraine burden [9]. Although GBD attempt to adjust for such methodological differences, this has relied on generalising adjustment factors from a few studies [10]. However, despite these limitations, it has been observed that GBD have collected and assimilated better migraine data into their estimates as new population-based studies have slowly filled the large knowledge gaps. With better knowledge, empirical data have replaced many of the assumptions underlying the earlier GBD estimates, and their estimates have gained in reliability [11]. Further high quality population-based study, adhering to published methodological guidelines, are still needed to improve estimates of prevalence and ultimately, if studies contributing to GBD are standardized, future migraine prevalence estimates will continue to increase in reliability.

What next to improve estimates for migraine?

Future work on the SBoD study will attempt to refine the estimates of migraine prevalence. This work will include reviewing the coding and recording of migraine in national datasets and exploring local area datasets for information. The development of the Scottish Primary Care Information Resource (SPIRE) may help us to improve our estimates of the burden of disease in Scotland [12].

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

[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 30 July 2018).

[2]   GBD 2016 Causes of Death Collaborators. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet 2017; 390: 1151–210.

[3]   GBD 2016 Disease and Injury Incidence and Prevalence Collaborators Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet, 2017 390, 1211-1259.

[4]   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 30 July 2018).

[5]   ISD Scotland. Practice Team Information. NHS National Services Scotland, Available from: URL: http://www.isdscotland.org/Health-Topics/General-Practice/PTI-Support/ (Accessed 30 July 2018).

[6]   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.

[7]   . Steiner TJ, Stovner LJ, Katsarava Z, Lainez JM, Lampl C, Lantéri-Minet M, Rastenyte D, Ruiz de la Torre E, Tassorelli C, Barré J, Andrée C. The impact of headache in Europe: principal results of the Eurolight project. J Headache Pain. 2014 May 21;15:

[8]   Steiner TJ, Scher AI, Stewart WF, Kolodner K, Liberman J, Lipton RB (2003) The prevalence and disability burden of adult migraine in England and their relationships to age, gender and ethnicity. Cephalalgia 23(7):519–527.

[9]   Steiner TJ, Stovner LJ et al [2013]. Improving quality in population surveys of headache prevalence, burden, and cost: key methodological considerations. J Headache Pain, 14: 87).

[10] GBD 2015 Neurological Disorders Collaborator Group. Global, regional, and national burden of neurological disorders during 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015 Lancet Neurol. 2017 Nov;16(11):877-897.

[11] Steiner TJ, Stovner LJ, Vos T, Jensen R, Katsarava Z. Migraine is first cause of disability in under 50s: will health politicians now take notice? The Journal of Headache and Pain. 2018;19(1):17.

[12] Scottish Primary Care Information Resource (SPIRE). NHS National Services Scotland, Available from: URL: http://spire.scot/ (Accessed 03 July 2018.

www.scotpho.org.uk
www.healthscotland.scot