The Scottish Burden of Disease Study, 2016

Depression 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 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 depression 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 depression

Depression was the third leading cause of disease burden in Scotland in 2016, resulting in a total of approximately 67,100 DALYs. The burden of depression was fully attributed to individuals suffering health loss due to living with depression.

**Figure 1 Percentage of total DALYs by gender and age-group* for depression**
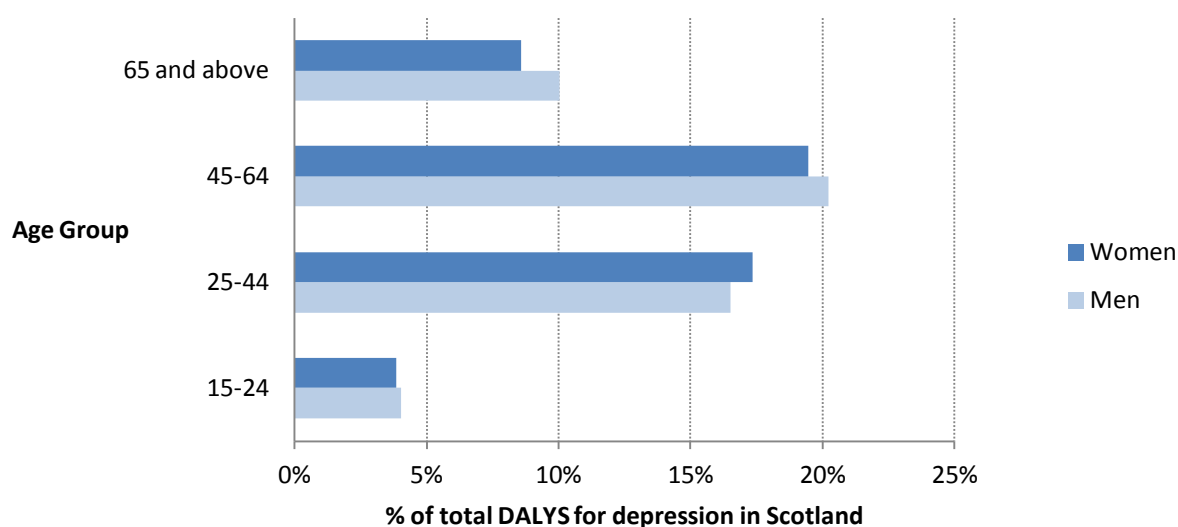
* Please note, we have not estimated the burden of depression in individual's aged under 15 years (see QI section for further explanation).

Women contributed a higher proportion of the burden (51%) than men (49%). Overall, 81% of the total depression burden was contributed by individuals aged 15 to 64 years, as outlined in Figure 1. Women aged 45-64 years accounted for 20% of the total burden for depression and men aged 45-64 years accounted for 19% of the depression burden. Note that the burden which we are describing above is the absolute burden and has not been adjusted for the age/gender case-mix.

The age standardised DALY rates for depression, by deprivation[1] decile, are shown in Figure 2. Individuals in the most deprived decile experienced a burden that was 2.5 times greater than individuals in the least deprived decile.

Figure 2 DALYs (rates per 100,000[2]) of total depression burden by deprivation decile

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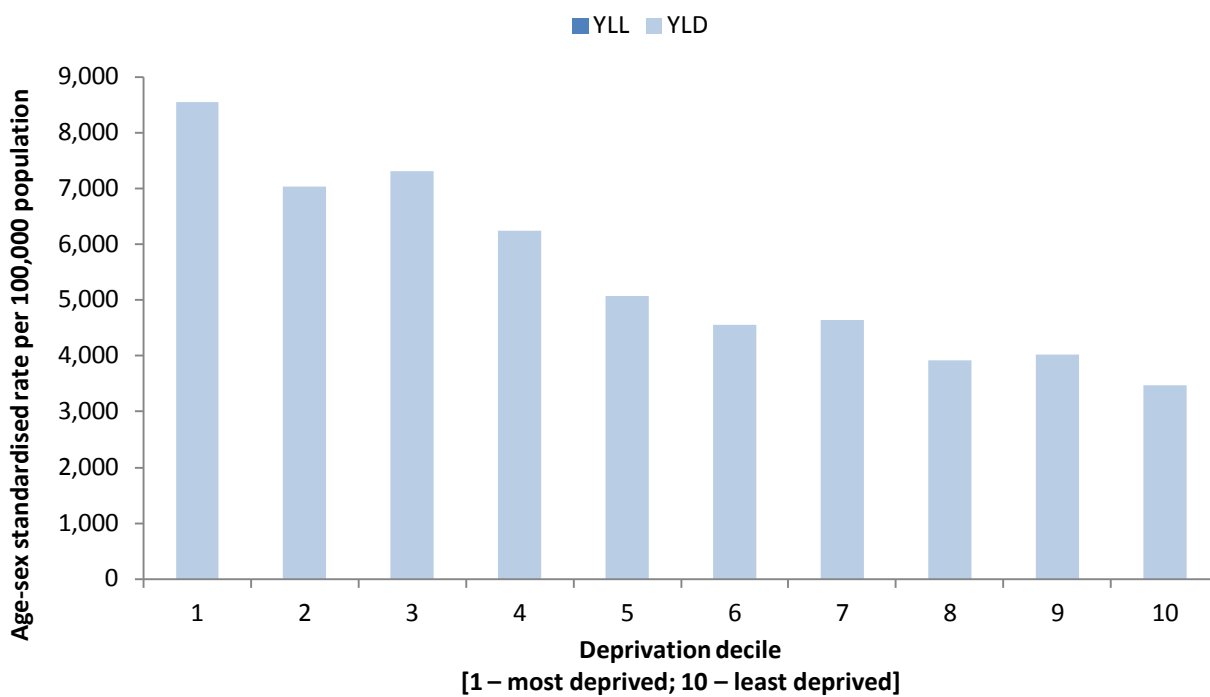
[1] We used the Scottish Index of Multiple Deprivation (SIMD 2016) to analyse patterns of inequality in the burden of disease across Scotland. SIMD2016 is categorised into deciles 1 (most deprived) to 10 (least deprived), SIMD2016 calculates deprived areas, not deprived individuals.
[2] Where the data 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) due to depression

Each single death contributes to the total YLL through calculating the difference between the age at death and the life expectancy at that age. Although depression may lead to loss of life through (for example) suicide, depression 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 depression [2].

Years Lived With Disability (YLD) due to depression

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

We used the Scottish Health Survey to estimate prevalence of depression in Scotland. The Scottish Health Surveys (SHeS) are a series of stratified, cluster-sampled, cross-sectional surveys designed to measure the health of a representative sample of the Scottish population living in private households. This survey series started in 1995 with latest survey carried out in 2017 [3].

In SHeS, details on symptoms of depression and anxiety are collected via a standardised instrument, the Revised Clinical Interview Schedule (CIS-R) [4, 5]. The CIS-R is a well-established tool for measuring the prevalence of mental disorders [6]. The complete CIS-R comprises 14 sections, each covering a type of mental health symptom and asks about presence of symptoms in the week preceding the interview. Prevalence of two of these mental illnesses - depression and anxiety – was first introduced to SHeS in 2008, as part of the nurse interview. Since 2012, the questions have been included in the biological module, with participants, aged 16 years and over, completing the questions themselves on the interviewer laptop (CASI).

The CIS-R scale for depression generates a score between 0 and 4; a score of 2 of more is the threshold for any of the conditions being regarded as 'clinically significant' [7].

We have used the SHeS survey prevalence by gender, of those reporting two or more symptoms on the CIS-R depressions scale, taking an average from 2012-15 (four survey waves) (see table 1 below). The survey prevalence was then multiplied with the NRS population estimate (2016) for males and females separately to obtain expected number of cases of depression by gender. In order to obtain the distribution of these cases by both age (16 years and over), gender and SIMD, the average distribution of prevalence across the years (2014-16) of individuals community-dispensed antidepressant medication was used.

Table 1 CIS-R scale scores from Scottish Health Survey 2012-2015 combined

Depression symptom score	CISR score	CISR score
	Males (%)	Females (%)
0 symptoms	82.9	80.8
1 symptom	7.9	10.2
2 or more symptoms	9.2	9.0

Using this method of identifying prevalent cases of depression, we estimated that there were approximately 408,300 individuals in the Scottish population suffering disability due to depression in 2016.

Severity distribution and disability weights

The levels of severity and disability due to depression in Scotland were based on the specifications of the GBD 2016 study [8]. 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 [9]. The severity distributions and disability weights for depression are outlined in Table 1.

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

Severity level	Description	% of individuals	Disability weight
Asymptomatic	Experiences no symptoms by virtue of, for instance being on treatment or because of the natural course of the condition.	19	Nil
Mild	Feels persistent sadness and has lost interest in usual activities. The person sometimes sleeps badly, feels tired, or has trouble concentrating but still manages to function in daily life with extra effort.	64	0.145
Moderate	Has constant sadness and has lost interest in usual activities. The person has some difficulty in daily life, sleeps badly, has trouble concentrating, and sometimes thinks about harming himself (or herself).	11	0.396
Severe	Has overwhelming, constant sadness and cannot function in daily life. The person sometimes loses touch with reality and wants to harm or kill himself (or herself).	6	0.658

Once the severity of depression and associated disability were taken into account, individuals were estimated to be suffering approximately 67,100 YLD in 2016 due to living with depression.

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.

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 depression in Scotland are **moderately accurate and relevant.**

Obtaining estimates of the number of individuals suffering from depression is difficult. The stigma associated with mental health conditions means that individuals may not admit to having depression, or opt to pursue non-traditional treatments [10].

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

We have chosen to use the Scottish Health Survey, a nationally representative general population survey to estimate the number of individuals suffering from depression in Scotland. SHeS uses CIS-R, a validated tool, to measure depression and we feel that that SHeS represents a more robust source to estimate prevalence than relying on health care administrative datasets

Our study estimated a depression prevalence of 9.1% (16 years and over) in Scotland in 2016. In comparison, the Global Burden of Disease study (GBD) 2015 estimated a lower depression prevalence of 4.8% in those aged 3 years and over [11]. The 2015/16 Quality and Outcomes Framework (QOF) in Scotland, estimated a prevalence of 6.8% for patients aged 16 and above [12]. Comparisons with GBD, however, are not straightforward. The GBD disease model for depression includes separate estimates of the burden for major depressive disorders and dysthymia. CIS-R cannot be used to ascertain dysthymia specifically [13] however we have assumed that within our estimate from SHeS, using CIS-R, we are capturing some of the population suffering from major depressive disorders and/or dysthymia.

We have likely underestimated the burden of depression as we have not taken into account those aged 16 years and under who suffer from depression. Obtaining estimates of adolescents suffering from depression is difficult. Data on rates of childhood depression using structured depression measures only started to be collected in the 1980s. Since then, many instruments have been developed for clinical and research purposes, but there has been little consensus regarding which instruments are most valuable for different situations [14]. It was recently estimated that approximately 5570 children in Scotland, under 18 years of age, were on anti-depressants [15]. If we applied the severity distributions and disability weights from Table 1 above this would result in approximately and additional 1000 YLD. This would have no effect on the overall ranking of depression in the Scottish Burden of Disease Study.

What next to improve estimates for depression?

Future work on the SBoD study will attempt to refine the estimates of prevalence. The improvement of prevalence estimates will include reviewing the coding and recording of depression in alternative national datasets and exploring local area datasets for information. The development of the Scottish Primary Care Information Resource (SPIRE) will help us to improve our estimates of the burden of disease in Scotland [16]. 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) for enquiries and suggestions on how to improve our estimates.

References

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