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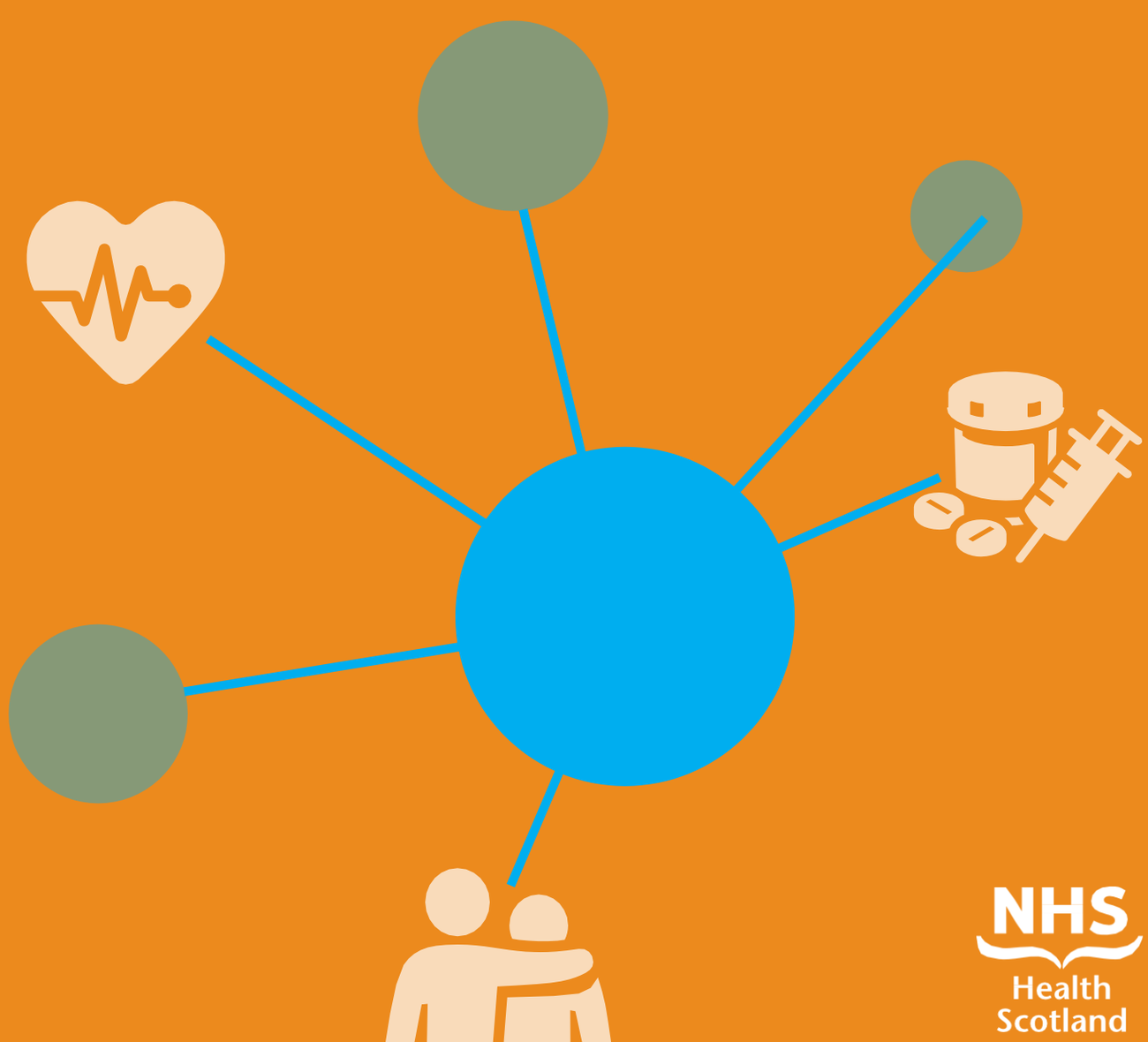
Public Health Information for Scotland

The Scottish Burden of Disease Study, 2016

Skin and subcutaneous diseases 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 skin and subcutaneous diseases in SBoD. When estimating the burden of skin and subcutaneous diseases, we have considered the following conditions/diseases:

- Cellulitis,
- Decubitus ulcer,
- Scabies, acne vulgaris,
- Alopecia areata,
- Dermatitis,
- Fungal skin diseases,
- Pruritus,
- Psoriasis,
- Urticaria,
- Viral skin diseases,
- Pyoderma, and
- Other skin and subcutaneous diseases.

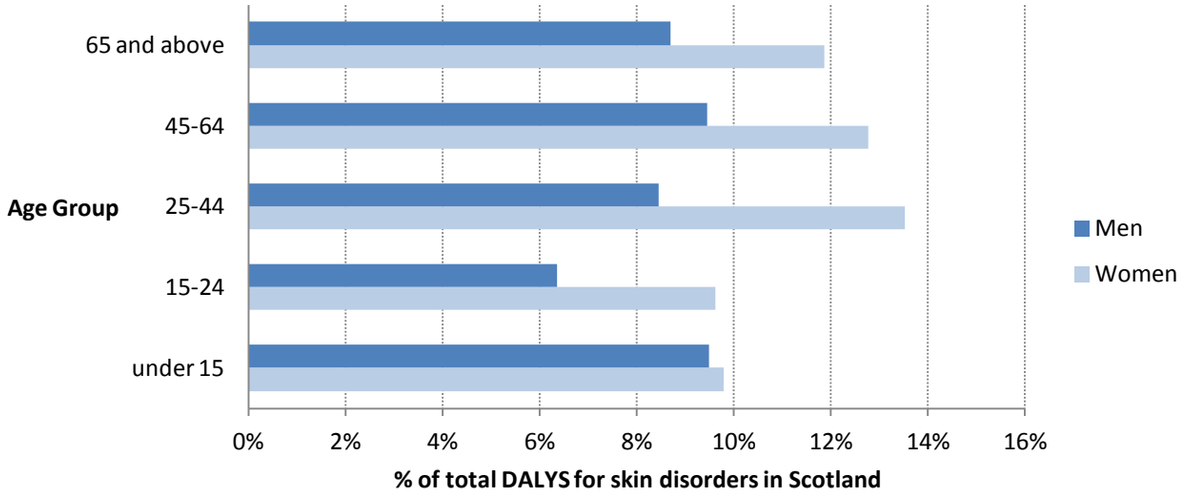
Burden of disease studies aim to estimate the difference between ideal and actual health in a country or region at a specific point in time. Individuals can suffer non-fatal health loss due to suffering disability attributable to a disease or injury, or suffer fatal health loss which is early death due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

Skin and subcutaneous diseases were the 22nd most common cause of disease burden in Scotland in 2016 resulting in around 17,700 DALYs. Of this total burden, 13% was due to premature mortality attributed to skin and subcutaneous diseases and 87% was attributed to health loss suffered due to living with skin and subcutaneous diseases.

Figure 1 Percentage of total DALYs by gender and age-group for skin and subcutaneous diseases

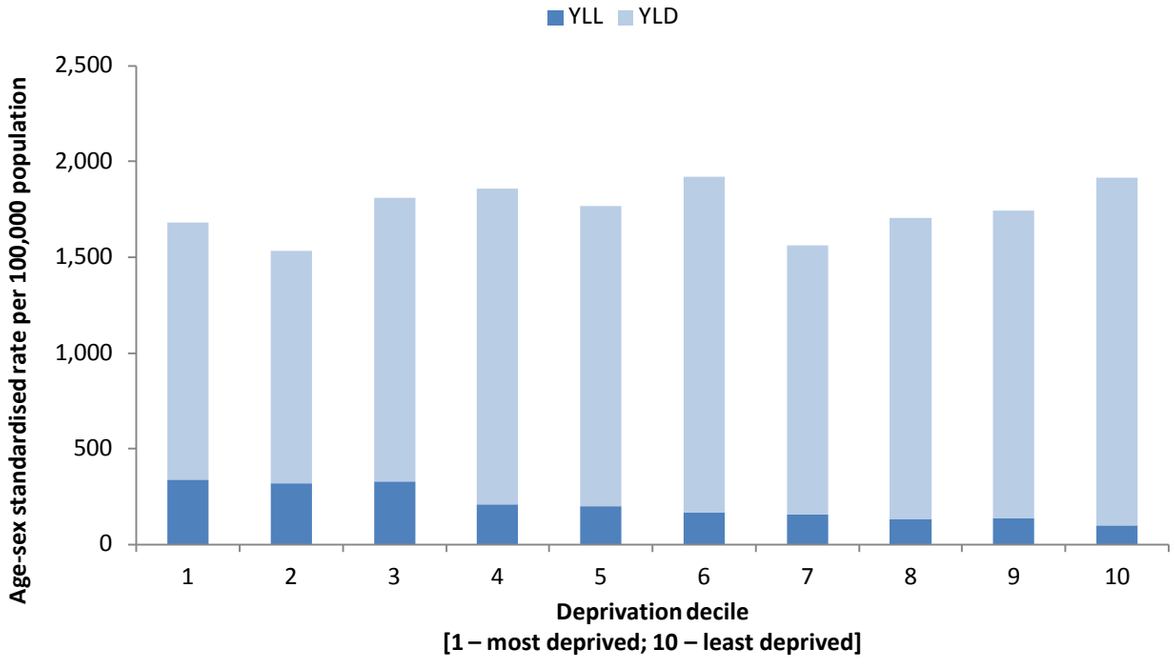


Women contributed a higher proportion of the total skin and subcutaneous disease burden (56%) than men (44%). Overall, 14% of the total skin and subcutaneous disease burden was contributed by women aged 25 to 44 years followed by women aged 45 to 64 years (13%) [Figure 1]. Note that the burden which 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 skin and subcutaneous diseases, by deprivation[1] decile, are shown in Figure 2. There is a slight decrease in YLL with decreasing levels of deprivation. The overall DALYs are similar across the deprivations decile ranging from 1,533 to 1,920 per 100,000.

[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.

Figure 2 DALY (rates per 100,000[2]) of total skin and subcutaneous diseases burden by deprivation decile



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 skin and subcutaneous diseases

YLL measures the years of life lost due to premature deaths i.e. the fatal component of burden of disease. YLLs are calculated by subtracting the age at each skin and subcutaneous disease death from the expected remaining life expectancy for a person at that age.

Estimating the number of deaths

For the period 2014-2016, we estimated an average of 211 deaths per year caused by skin and subcutaneous diseases. These deaths were identified from the underlying cause of death on the National Records of Scotland (NRS) register of deaths [2] and the Global Burden of Disease 2015 (GBD2015) cause list [3], which has been classified using the International Statistical Classification of Diseases and Related Health Problems (ICD) [4]. The NRS register of deaths has a Community Health Index (CHI) number attached to each death, which allows for demographic data such as gender, geographical area of residence and age at death to be established for each individual.

[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.

Included in the total skin and subcutaneous diseases mortality count are deaths that have come from what are termed ill-defined causes of deaths in burden of disease studies. These ill-defined deaths are causes of death that have been coded with ICD10 codes in vital registers but for the purposes of burden of disease studies, are not regarded as sufficiently specific causes of death. In SBoD, these ill-defined deaths are redistributed amongst specific causes of death across the burden of disease cause list based on the secondary causes of death recorded on the death certificate. For a small number of cases, where there was no additional information relating to secondary causes of death, the individual's clinical history was evaluated to inform the target cause for redistribution. For skin and subcutaneous disease, approximately 6% of the mortality count comes from these ill-defined deaths. For this reason, the number of deaths due to skin and subcutaneous disease which have been reported are different from that of officially reported sources. Further explanation of this method is available in the Invited chapter of The Registrar General's Annual Review of Demographic Trends [5].

Years of life lost (YLL) due to skin and subcutaneous diseases

Each single death contributes to the total YLL through calculating the difference between the age at death and the life expectancy at that age. Life expectancy was defined using the 2013 gender-specific National Life Tables for Scotland [6]. Based on mortality records, there were 2,300 years of life lost due to skin and subcutaneous diseases in Scotland in 2016. Dividing the total YLL for skin and subcutaneous diseases by the total number of deaths indicates that, on average, individuals who die from skin and subcutaneous diseases, die 11 years younger than would otherwise be expected on the basis of the life expectancy of the general population.

Years lived with disability (YLD) due to skin and subcutaneous diseases

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

The burden of health loss from skin and subcutaneous diseases in SBoD is based on the Global Burden of Disease Study specifications and is comprised of the following conditions: cellulitis, decubitus ulcer, scabies, acne vulgaris, alopecia areata, dermatitis, fungal skin diseases, pruritus, psoriasis, urticaria, viral skin diseases, abscess, pyoderma, and other skin and subcutaneous diseases [3].

To estimate the number of individuals suffering disability from skin and subcutaneous diseases in 2016, the Practice Team Information dataset (PTI) was used for all the conditions listed above [7]. 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 [8]; see the ScotPHO website for the list of Read codes used for each condition [1]. We differentiated the conditions in four groups depending on the remission period and used a different methodology for each group:

A. We assumed that the following conditions were acute diseases and assigned them the following duration: four weeks for cellulitis, 12 weeks for decubitus ulcer, one week for abscess and other bacterial skin diseases and two weeks for impetigo. The number of individuals that had a Read code specific to these conditions between 1 April 2003 and 31 September 2013 were used to estimate the yearly prevalence. The number of individuals was counted and if they consulted more than once in a given year, then assuming that their consultations were more than the average duration of days apart, additional incidents were recorded.

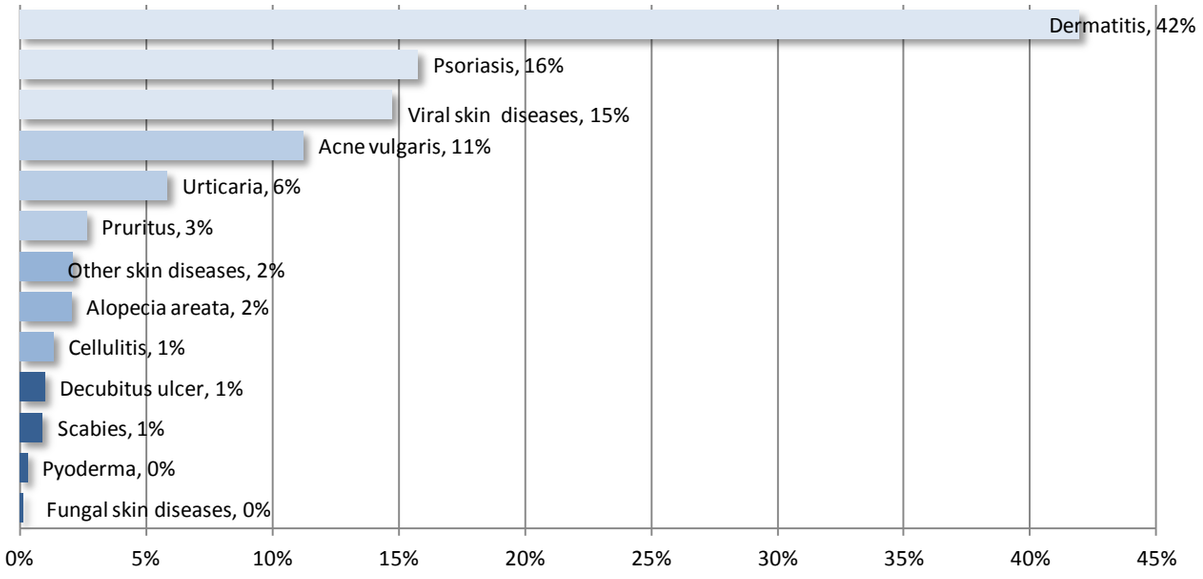
B. For the following conditions we assumed an average duration of around one year and counted one prevalent case per individual if the individual consulted in the year: other skin and subcutaneous diseases, scabies, psoriasis and viral warts.

C. For the following conditions we assumed a duration longer than a year: acne vulgaris, eczema, contact dermatitis, seborrhoeic dermatitis, tinea capitis, any other fungal skin diseases, pruritus and molluscum contagiosum and counted one prevalent case per individual for all the years the individual consulted and the years in between. For instance, if the individual consulted in the year 2011 and 2013, this peson was considered a prevalent case for 2011, 2012 and 2013. If the individual only consulted once, then s/he was only counted in that year.

D. Finally, we treated alopecia areata as a chronic condition. Individuals that attended their GP and consulted for alopecia areata 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 alopecia areata for the period (2003-2013) to 2014, 2015 and 2016. The estimated incidence and mortality data was used to calculate 2016 prevalence. There is no information about the death of individuals in QOF, so adjustments are made to account for deaths were made using average mortality rates for each age, gender and deprivation decile in Scotland.

For conditions in groups A, B and C we used the average prevalent (or events) from 2003 to 2013 as the prevalence estimate for the year 2016. For conditions in group D, the methodology described above already gave us an estimated prevalence for year 2016. Figure 3 below provides a breakdown of the contribution of each of the skin conditions to the overall YLD for skin and subcutaneous diseases.

Figure3 Percentage of total skin and subcutaneous diseases prevalence by individual skin condition



Using this method of identifying prevalent cases, we estimated that there were approximately 834,500 individuals[3] in the Scottish population suffering disability or illness due to skin and subcutaneous diseases in 2016.

Severity distribution and disability weights

The levels of severity and disability for skin and subcutaneous diseases in Scotland are based on the specifications of the Global Burden of Disease (GBD) 2016 study [9]. This allowed us to disaggregate the prevalent cases into levels of severity and the associated disability at each level of severity. The disability weights have been developed by the global burden of disease study through surveys of the general public and take into account the consequences of each disease and injury [10]. The severity distributions and disability weights for each of the skin and subcutaneous diseases are shown Table 1.

The severity distributions and disability weights shown in Table 1 and Table 2 were applied to the estimated number of individuals with skin and subcutaneous diseases, resulting in approximately 15,400 YLD due to skin and subcutaneous diseases in Scotland in 2016.

[3] Individuals are counted more than once if they suffered more than one of the skin and subcutaneous diseases

Table 1 Severity levels for each of the skin diseases with corresponding severity distribution

Disease	Severity level	% of individuals
Cellulitis	Mild, with itch/pain	36
	Moderate with itch/pain	33
	Severe with itch/pain	30
Psoriasis	Mild, with itch/pain	79
	Moderate with itch/pain	12
	Severe with itch/pain	9
Dermatitis: atopic	Asymptomatic	42
	Mild, with itch/pain	50
	Moderate with itch/pain	6
	Severe with itch/pain	2
Dermatitis: contact.	Asymptomatic	43
	Mild, with itch/pain	49
	Moderate with itch/pain	8
Dermatitis: seborrhoeic	Asymptomatic	47
	Mild, with itch/pain	5853
Viral skin diseases: molluscum contagiosum	Acute mild episode of infectious disease	58
	Moderate	42
Viral skin diseases:Viral warts	Acute mild episode of infectious disease	58
	Moderate	42
Alopecia areata	Mild	59
	Severe	41
Urticaria.	Mild, with itch/pain	78
	Severe	22
Decubitus ulcer	Mild	56
	Moderate	24
	Severe	20
Fungal skin diseases and Pyoderma	Acute mild episode of infectious disease	100
Scabies	Mild, with itch/pain	100
Acne vulgaris	Mild	86
	Moderate	12
	Severe	2
Pruritus	Mild	100
Other skin and subcutaneous diseases	Asymptomatic	48
	Mild	52

Table 2 Description of severity levels for skin disease with corresponding disability weight given by the GBD 2016 [3]

Severity level	Description	Disability weight
Asymptomatic	Has disease or infection but experiences no symptoms by virtue of, for instance being on treatment or because of the natural course of the condition.	Nil
Mild, with itch/pain	Has a slight, visible physical deformity that is sometimes sore or itchy. Others notice the deformity, which causes some worry and discomfort.	0.027
Moderate, with itch/pain	Has a visible physical deformity that is sore and itchy. Other people stare and comment, which causes the person to worry. The person has trouble sleeping and concentrating.	0.188
Severe, with itch/pain	Has an obvious physical deformity that is very painful and itchy. The physical deformity makes others uncomfortable, which causes the person to avoid social contact, feel worried, sleep poorly, and think about suicide.	0.576
Acute mild episode of infectious disease	Has a low fever and mild discomfort, but no difficulty with daily activities.	0.006
Mild	Has a slight, visible physical deformity that others notice, which causes some worry and discomfort.	0.011
Moderate	Has a visible physical deformity that causes others to stare and comment. As a result, the person is worried and has trouble sleeping and concentrating.	0.067
Severe	Has an obvious physical deformity that makes others uncomfortable, which causes the person to avoid social contact, feel worried, sleep poorly, and think about suicide.	0.405

Data quality

In order to provide a measure of the degree of accuracy[4] and relevance[5] 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 above criteria, the estimates of burden of **skin and subcutaneous diseases** in Scotland should be considered as moderately accurate and relevant  .

YLD accounted for approximately 90% of the overall burden for skin diseases in Scotland in 2015. Using primary care data we estimated that approximately 834,000 individuals were suffering disability or illness from skin diseases in 2016, which is approximately 20% of the Scottish population.

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

It is difficult, however to accurately compare our estimates of the number of individuals with skin and subcutaneous diseases, due to the heterogeneity of the skin diseases grouping used in SBoD (and GBD) and the limited availability of population based studies considering the overall burden of skin conditions and diseases. Previous studies in the UK, on unselected populations, mostly self-reported, suggest that around 23-33% have a skin problem that could benefit from medical care at any one time [11]. In one of the few UK studies to estimate the prevalence of skin diseases in the general population using some form of physical examination, carried out in 1976, 23% of the sampled population had a skin disease considered worthy of medical care [12].

It is possible that we may have underestimated the YLD burden for skin diseases in Scotland. YLDs for the skin disease burden in SBoD are derived from primary care records, based on a direct mapping of ICD codes, from the GBD 2015 disease classification, to Read codes used in primary care. In addition to issues relating to the capture of accurate diagnostic information for skin diseases [11], our mapping may also not have been sensitive enough to capture the overall burden of skin diseases in primary care.

What next to improve estimates for skin and subcutaneous diseases?

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 skin and subcutaneous diseases in alternative national datasets and explore local area datasets for information. The development of SPIRE [13] will help us to improve our estimates of the burden of disease in Scotland. 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.

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