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Has the burden of depression been overestimated?

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Objective To investigate whether high estimates of the burden of depression could be attributed to an overestimation of disability weights (reflecting more severe disability).

Methods We derived disability weights that were tailored to prevalence data. Empirical disability data from a Dutch community survey was used to describe three classes of severity of depression and their proportional prevalence. We obtained valuations from experts for each class and calculated the overall disability weight for depression.

Findings Expert valuations were similar to those of previous studies. The overall disability weight for depression was similar to other studies except the 1994 Dutch Burden of Disease Calculation, which it exceeded by 73%. The lower Dutch 1994 disability weight resulted from an overestimation of the proportion of mild cases of depression by experts (60% versus 27% observed in the empirical data used in the present study).

Conclusion This study found no indication that disability associated with depression was overestimated. The Dutch example showed the importance of tailoring disability weights to epidemiological data on prevalence.

Keywords Depressive disorder, Major; Disability evaluation; Disabled persons/statistics; Cost of illness; Comparative study; Netherlands (*source: MeSH, NLM*).

Mots clés Dépression involutive; Evaluation incapacité; Handicapé/statistique; Coût maladie; Etude comparative; Pays-Bas (*source: MeSH, INSERM*).

Palabras clave Depresión involutiva; Evaluación de la incapacidad; Personas incapacitadas/estadística; Costo de la enfermedad; Estudio comparativo; Países Bajos (*fuente: DeCS, BIREME*).

Arabic

Voir page 446 le résumé en français. En la página 447 figura un resumen en español.

Introduction

One of the major findings of the 1990 global burden of disease study was the importance of major depression as a contributor to the worldwide disease burden, with an impact exceeding that of cerebrovascular disease and cancers (*1*). The measure of the burden of disease used in this study, the disability-adjusted life year, combines the number of life-years lost due to premature mortality and the number of years lived with disability using a set of disease-specific disability weights. Years lived with depression were weighted for the severity of the disability associated with the disease using depression-specific disability weights. The prominence of major depression as a contributor to disease burden was replicated in several national burden of disease studies that followed the 1990 study (*2–4*) and in the 2000 study (*5*). This high burden is based on the high prevalence figures for major depression found in community surveys (*6–8*) and the high disability weights derived from expert opinion. Although the effects of major depression on functioning and well-being are reported to be strong (*8–12*), the high disability weights used in burden-of-disease studies may be questioned because much of the empirical information on disability from depression comes from clinical cases. Population surveys, on the other hand, may include milder cases of depression than those found in clinical settings (*13*). Because prevalence estimates are derived from general population surveys, the disability weights may, consequently, be too high. The burden of major depression relies heavily on these estimates, as the mortality component is low (*1–5*).

The aim of our study was to investigate whether the burden of depression has been overestimated because disability weights have been inaccurately tailored to the prevalence data. We used information on disability taken from a community survey as reported by people with depression. Disability was defined as limitations in the physical, psychological and social domains of functioning. Previously, we distinguished three clusters of severity of major depression: mild, moderate to severe, and severe with psychotic features (*14*). We derived empirical disability weights for these three classes of severity and combined them with their empirical prevalence estimates into an overall disability weight for major depression.

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Methods

The study was divided into four parts:

1. a valuation study to derive disability weights for the three classes of severity;
2. a comparison of the results with a previous valuation study;
3. the calculation of an overall disability weight for major depression;
4. comparison of the overall disability weight to previous estimates of disability weights for major depression.

Valuation study

Disease selection, staging and description

We included four other disorders in the valuation study to prevent bias. The disorders we asked experts to value were: major depression, obsessive–compulsive disorder, oesophageal cancer, prostate cancer, and vision disorders. Each disease was subdivided into different stages that were assumed to represent a homogeneous group of people in terms of disability, treatment and prognosis. In total 18 disease-stages were valued: the three severity classes of major depression, three stages for oesophageal cancer, two for obsessive–compulsive disorder, and five for each of the other two disorders.

A lay-accessible version of the text and a standardized functional health status description were provided for each disease stage. An example of the lay text and the standardized functional health status description are shown in Box 1. We used a health classification system adapted from the original EuroQol 5D-3L classification and refer to it as EuroQol 5D+C5L (15, 16). It includes cognition as a sixth dimension of health (5D+C) along with mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. We have adapted the three levels to a five-level scale (5L): in this scheme the first, third and fifth levels are identical to those in EuroQol 5D-3L but we have added two intermediate levels.

For major depression we based the information in the lay text on the criteria for major depression and its severity as defined by the *Diagnostic and statistical manual of mental disorders*, third edition, revised (DSM-III-R). The EuroQol description was based on data from the Netherlands Mental Health Survey and Incidence Study (NEMESIS) (9, 14). The eight scales of the Short Form-36 health survey (17) were used as indicators of disability along with two additional questions. These questions asked about the number of days spent in bed due to psychiatric problems, drug-related problems or alcohol-related problems, and the number of days someone was unable to work due to these problems. We used a formal algorithm (available from the authors on request) to map these disability data onto the EuroQoL 5D+C5L classification.

For comparative purposes, the descriptions of obsessive–compulsive disorder and oesophageal cancer were the same as those used in a previous study, the Dutch disability weights study (18). We re-coded the associated EuroQol 5D+C3L descriptions into the 5D+C5L instrument. Descriptions and resulting values for prostate cancer and vision disorders will be presented elsewhere.

Valuation procedure and respondents

The valuation procedure was largely the same as that used in the Dutch disability weights study (18). In brief, we recruited medical doctors assumed to have sufficient knowledge of the

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Box 1. **Example of disease-stage description for depression**

Depression
Depression is divided into the following stages:
1. mild
2. moderate to severe
3. severe with psychotic features.

We now ask you to value:

Patients with moderate to severe depression
These people experience one or more depressive episodes within a year. During these periods they go through permanent feelings of sadness or emptiness and a permanent loss of interest or pleasure in nearly all activities. They have problems eating and/or sleeping and feel worthless or guilty. They may have thoughts of death.

In a year in which one or more episodes are experienced, their condition is such that they have:

- no problems in walking about
- no problems with self-care
- some problems with performing usual activities (*e.g. work, study, housework, family or leisure activities*)
- moderate pain or discomfort (*feeling tired*)
- moderate anxiety or depression
- some cognitive impairments (*with memory, concentration, disorganization, IQ level*)

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consequences of a broad range of diseases. A convenience sample of 75 doctors was contacted by postal questionnaire; 55 of these doctors had previously participated in similar studies (18, 19).

We replicated the Dutch disability weights study's interpolation procedure in which respondents were asked to place (or interpolate) disease stages on a disability scale. This scale ranged from 0 (worst imaginable health state) to 100 (best imaginable health state) and was formally calibrated in the earlier study with person trade-off derived disability weights for 16 conditions. We replaced the conditions "mild major depression" and "severe vision disorder" on the original scale with disorders that had comparable disability weights (mild to moderate panic disorder and grade 3–4 arthritis).

The duration of a disease stage to be valued was defined as one year for all diseases.

Analyses of the interpolation data

For each disease-stage, we calculated the disability weight as: 1 – mean value/100. We examined the validity and reliability of the valuations by checking compliance with a pre-imposed order of stages of mental disorders (mild, moderate, severe); inspecting the Spearman rank correlation among respondents; and estimating the proportion of total variance that was attributable to the disease stages, using generalizability theory (G-study) (20, 21).

We also studied associations of age, sex, current profession (GP, psychiatrist, researcher, other) and having medical experience (< 1 year versus > 1 year) with the valuations in a regression analysis. All analyses were performed in SAS version 6.12 (22).

Comparison with the Dutch disability weights study

We compared disability weights for stages of major depression from the present study with those from the earlier study (18). In this study mild and severe depression were valued separately.

Because respondents to the two studies were not drawn from independent studies, standard statistical testing was not used. Instead, we compared the 95% confidence intervals. The disability weights for obsessive–compulsive disorder and oesophageal cancer from both studies were compared to estimate test–retest reliability.

Overall disability weight

We calculated an overall disability weight for major depression by combining the disability weights for each of the three classes of severity with their proportional prevalence. Prevalence data for the three classes were obtained from the NEMESIS study. We distributed proportionally the residual prevalence of cases with "unspecified severity" across the classes, excluding the class severe depression with psychotic features because we assumed psychotic features were unlikely to be missed.

Comparison with previous estimates

We compared the overall disability weight from the present study with overall disability weights from four studies: the Dutch national burden of disease calculation for 1994 (3), the 1990 global burden of disease study (1), the Australian Burden of Disease Study (2), and another Australian study by Andrews et al. (23, 24). Both the Dutch and Australian Burden of Disease studies used the same severity-specific disability weights from the Dutch disability weights study (18) to calculate an overall disability weight, but they used different methods to obtain proportional distributions of the classes of severity.

Results

Description of classes of severity

The lay texts and functional health status descriptions for the three classes of severity of major depression are shown in Table 1 (web version only, available at: http://www.who.int/bulletin).

Respondents

A total of 49 medical doctors participated (24 men, 25 women; 65% response rate). Respondents had a mean age of 46.6 years (standard deviation = 8.8). On average respondents had 12.2 years of medical experience. A total of 53% of respondents were involved directly in patient care (14 general practitioners, 5 psychiatrists and 7 in other types of care); 35% worked in medical research and 12% worked in other health-related professions or were retired.

Analyses

Table 2 and Table 3 show the disability weights with their 95% confidence intervals for the three severity classes of depression. All respondents but one complied with the ranking implied by the severity-specific classes of psychiatric disorders (mild, moderate to severe, severe depression with psychotic features). Respondents largely agreed with each other on the ranking of the 18 disease stages: the mean Spearman correlation coefficient was 0.83.

In the generalizability study, 76% of total variance was explained by the disease stages. Respondents contributed another 6%, while a residual 18% remained unexplained. Regression analyses showed that the variables age, sex, current profession, and not having practical medical experience could not significantly predict the disability weights of the 18 disease stages.

Comparison with the Dutch disability weights study

Table 2 also provides the disability weights for major depression obtained in the earlier Dutch study. Disability weights in the present study fell within the range of the 95% confidence intervals from the earlier study, and for moderate to severe depression they fell between the 95% confidence intervals of the separately valued classes of severity. EuroQol descriptions in the present study were generally less severe.

Table 2 also shows the disability weights for obsessive–compulsive disorder and cancer of the oesophagus. Re-valuation of their stages in the present study resulted in average values that fell within the 95% confidence intervals of the disability weights from the earlier Dutch study, except in the case of severe obsessive–compulsive disorder (present study 0.76, 95% confidence interval (CI) = 0.71–0.82 versus earlier study 0.56, 95% CI = 0.38–0.74).

For depression, the differences between the disability weights in the earlier study and those in this study did not appear to be larger than those for the two identically described conditions. The new disability weights fell within the earlier study's 95% confidence intervals, and the absolute differences in the disability weights between the two studies (0.01 and 0.05) were smaller than for the identically described diseases (between 0.01 to 0.20).

Overall disability weight

Table 3 shows how we combined the disability weights for each stage of major depression with the prevalence distribution of depressive cases across the severity classes to come up with an overall disability weight of 0.46.

Comparison to previous estimates

In Table 4 (web version only, available at: http://www.who.int/bulletin) we compare the overall disability weight for depression to that from other studies. The estimate from the present study is similar to that of the 1990 global burden of disease study (disability weight = 0.47) (1) and close to those from the two Australian studies (approximately 0.41 in both studies) (2, 22–24). However, it is 73% higher than the one used in the 1994 Dutch national burden of disease calculation (disability weight = 0.27) (3). The lower 1994 disability weight results from the use of different proportional prevalences of severity classes to calculate the overall disability weight. For the 1994 calculation these proportional prevalences were based on expert opinion, while in the present study data from NEMESIS were used. Experts estimated that 60% of cases had mild major depression, 30% had moderate disease, 9% had severe disease and 1% had severe disease with psychotic features; in the NEMESIS study only 27% of cases had mild major depression (Table 3). The lower overall disability weight in the 1994 study is not caused by different valuations: the disability weights for the separate severity classes were similar between the two studies.

Discussion

We derived disability weights for major depression occurring in a community setting by using prevalence and disability data from the Dutch community-based survey known as NEMESIS. The overall disability weight for major depression was similar to or higher than that used in several burden of disease studies (1–3, 23). This indicates that disability weights used in previous calculations of the burden of depression were not too high.

Table 3. **Disability weight for severity classes of major depression and calculation of the average disability weight**

Severity of depression	EuroQol 5D+C5L[a]	% of prevalence[b]	Disability weight	95% CI[d]
Mild	112222	26.7[c]	0.19	0.16–0.22
Moderate to severe	113333	61.9[c]	0.51	0.46–0.55
Severe with psychotic features	214444	11.4	0.84	0.80–0.88
Total		**100**	**0.46**	

[a] The six digits in this column correspond to scores on the six dimensions of the EuroQol 5D+C5L scale. These dimensions are mobility, self-care, usual activities, pain/discomfort, anxiety/depression, and cognition. A score of 1 indicates that a person has no problems functioning in that dimension; a score of 2 indicates that a person has a few problems functioning; a score of 3 indicates that a person has some or moderate problems; a score of 4 indicates there are severe problems; and a score of 5 indicates there are very severe problems or an inability to function.
[b] Prevalence data obtained from the Netherlands Mental Health Study and Incidence Survey (NEMESIS) (7, 14).
[c] Prevalence includes major depression of unspecified severity.
[d] CI = confidence interval.

The disability weights for the separate classes of severity of depression did not deviate greatly from the Dutch disability weights study (18). In that study, descriptions of functional health status (using EuroQol) were based on case definitions and expert opinion and were not tailored to the community setting. On average these descriptions were somewhat more severe than the ones in the present study (which were based on self-reported disability from NEMESIS), and we expected our disability weights for different stages of depression to be lower (i.e. indicating less disability) than in the earlier study. Nevertheless, the differences between the disability weights in the two studies did not appear to be significant. Similar disability weights for different stages of major depression were also found in an Australian study (24). As has been suggested before (25), the health status descriptions in EuroQol may have only a small effect on valuation. Apparently the label provided (disease and severity class) is much more important to evaluators.

The overall disability weight (i.e. the combination of stage-specific disability weights and prevalence) from the present study was similar to that used in the 1990 global burden of disease study and two Australian studies (1, 2, 23). Thus there is no reason to suspect that the disability weights were overestimated previously. Therefore, the high burden of depression estimated by the 1990 study and by several national studies does not appear to have been exaggerated by overestimation of disability weights.

On the contrary, the burden of depression seems to have been underestimated in the 1994 Dutch national burden of disease calculation (3): the disability weight in the present study was 73% higher than the weight used in the 1994 calculation. In the 1994 study experts estimated that a larger proportion of

people had mild depression than was observed in NEMESIS. These prevalence data on the distribution of disability associated with major depression had a major impact on the overall disability weight (and burden). This shows the importance of using quantitative epidemiological information in burden of disease calculations. The calculation of the overall disability weight using the proportional distribution of the classes of severity enabled us to better tailor the disability weight to the community setting. It also pointed out the previous underestimation of the burden of major depression in the Netherlands and the importance of the epidemiological data.

Conclusions

Our study found no indication that previously estimated disability weights were overestimates because they had not been tailored to the community setting. Our tailored disability weights were similar to those found in most other studies, including the global burden of disease study, and do not decrease the estimated burden of depression. These results reinforce the validity of previous high estimates of the burden of depression. This study additionally points out the importance of obtaining sound epidemiological data in burden of disease studies. ■

Résumé

La charge de dépression a-t-elle été surestimée

Objectif Examiner la possibilité d'attribuer la valeur élevée des estimations de la charge de dépression à une surestimation des coefficients de pondération servant au calcul des années d'incapacité (indiquant une degré plus grave d'incapacité).

Méthodes Des coefficients de pondération destinés au calcul des années d'incapacité et adaptés aux données de prévalence ont été établis. Les données d'incapacité empiriques provenant d'une enquête néerlandaise en communauté ont servi à décrire trois classes de gravité de la dépression et leurs taux de prévalence.

Des évaluations des coefficients de pondération pour chacune des classes ont été obtenu auprès d'experts, ce qui a permis de déterminer le coefficient de pondération global pour le calcul des années d'incapacité associées à la dépression.

Résultats Les évaluations établies par les experts étaient similaires à celles fournies par les études antérieures. Dans le cas de la dépression, le coefficient de pondération global pour le calcul des années d'incapacité présentait une valeur analogue à celle obtenue dans les autres études, à l'exception du Calcul de

la charge de morbidité au Pays-Bas de 1994, qui aboutissait à un chiffre inférieur de 73 %. Le coefficient de pondération plus faible de l'étude néerlandaise résultait d'une surestimation par les experts de la proportion de cas de dépression sans gravité (60 % contre 27 % d'après les données empiriques utilisées dans la présente étude).

Conclusion Cette étude n'a mis en évidence aucun élément indiquant une surestimation de l'incapacité liée à la dépression. L'exemple néerlandais montre l'importance d'une adaptation des coefficients pondéraux servant au calcul des années d'incapacité aux données épidémiologiques de prévalence.

Resumen

¿Se ha sobrestimado la carga de depresión?

Objetivo Investigar si las altas estimaciones de la carga de depresión podrían atribuirse a una sobrestimación de las ponderaciones de la discapacidad (que reflejarían una mayor gravedad de ésta).

Métodos Desarrollamos ponderaciones de la discapacidad ajustadas a los datos de prevalencia. Se usaron los datos empíricos de discapacidad de una encuesta llevada a cabo en una comunidad holandesa para describir tres clases de gravedad de la depresión y su prevalencia proporcional. Obtuvimos valoraciones de los expertos para cada clase y calculamos el peso global de la discapacidad por depresión.

Resultados Las valoraciones de los expertos fueron similares a las de estudios anteriores. El peso global de la discapacidad correspondiente a la depresión fue similar al de otros estudios, exceptuando el del Cálculo de la Carga de Morbilidad de los Países Bajos de 1994, que superó en un 73%. El menor peso de la discapacidad obtenido en el estudio holandés de 1994 se debió a que los expertos sobrestimaron la proporción de casos leves de depresión (60%, frente al 27% observado en los datos empíricos usados en el presente trabajo).

Conclusión Este estudio no ha detectado ningún indicio de que se haya sobrestimado la discapacidad asociada a la depresión. El ejemplo holandés muestra la importancia de ajustar las ponderaciones de la discapacidad a los datos epidemiológicos sobre la prevalencia.

Arabic

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Table 1. **Three severity classes (stages) of major depression used in this study**

Severity	Lay description[a]	EuroQol 5D+C5L dimension[b]					
		Mobility	Self-care	Usual activities	Pain/ discomfort	Anxiety/ depression	Cognition
Mild	These people experience one or more depressive episodes within a year. During these periods they have permanent feelings of sadness or emptiness or a permanent loss of interest or pleasure in nearly all activities. They may have problems eating or sleeping and can feel worthless or guilty. They may have thoughts of death.	1	1	2	2	2	2
Moderate to severe	These people experience one or more depressive episodes within a year. During these periods they have permanent feelings of sadness or emptiness and a permanent loss of interest or pleasure in nearly all activities. They have problems eating and/or sleeping and feel worthless or guilty. They may have thoughts of death.	1	1	3	3	3	3
Severe with psychotic features	These people experience one or more depressive episodes within a year. During these periods they have permanent feelings of sadness or emptiness and a permanent loss of interest or pleasure in nearly all activities. Furthermore, they experience delusions and hallucinations. They have problems eating and sleeping and feel worthless or guilty. They have thoughts of death.	2	1	4	4	4	4

[a] Descriptions are translated from Dutch. Lay descriptions were based on DSM-III-R criteria for major depression and severity.

[b] The six digits in this column correspond to scores on the six dimensions of the EuroQol 5D+C scale. On the EuroQol 5D+C5L scale a score of 1 indicates that a person has no problems functioning; a score of 2 indicates that a person has a few problems functioning; a score of 3 indicates that a person has some or moderate problems; a score of 4 indicates there are severe problems; and a score of 5 indicates there are very severe problems or an inability to function. EuroQol scores were based on disability indicators from Dutch population surveys (*7, 14*).

Table 2. **Disability weights obtained in the present study compared with those obtained in the Dutch disability weights study (*18*)**

Disease and stage	Current study			Dutch disability weights study		
	EuroQol score[a, b]	Disability weight	95% CI[c]	EuroQol score[a]	Disability weight	95% CI
Major depression						
Mild	112222	0.19	0.16–0.22	113131	0.14	0.09–0.19
Moderate to severe	113333	0.51	0.46–0.55			
Moderate				133133	0.35	0.27–0.42
Severe				335353	0.76	0.56–0.97
Severe with psychotic features	214444	0.84	0.80–0.88	335355	0.83	0.75–0.92
Cancer of the oesophagus						
Diagnosis and primary therapy	112441	0.52	0.48–0.57	112441[d]	0.53	0.36–0.70
After intentionally curative primary therapy	113331	0.42	0.37–0.46	113331	0.38	0.25–0.51
Irradically removed/disseminated carcinoma	114451	0.82	0.79–0.84	114451[d]	0.73	0.61–0.86
Obsessive–compulsive disorder						
Mild to moderate	113133	0.30	0.26–0.33	113133	0.24	0.17–0.32
Severe	133155	0.76	0.71–0.82	133155	0.56	0.38–0.74

[a] The six digits in this column correspond to scores on the six dimensions of the EuroQol 5D+C5L scale. These dimensions are mobility, self-care, usual activities, pain/discomfort, anxiety/depression, and cognition. A score of 1 indicates that a person has no problems functioning in that dimension; a score of 2 indicates that a person has a few problems functioning; a score of 3 indicates that a person has some or moderate problems; a score of 4 indicates there are severe problems; and a score of 5 indicates there are very severe problems or an inability to function.

[b] These EuroQol scores were based on disability indicators from Dutch population surveys (*7, 14*).

[c] CI = confidence interval.

[d] For these stages the Dutch disability weights study gave two EuroQol 5D+C3L descriptions, each having a 50% possibility of occurring. We re-coded these into EuroQol 5D+C5L levels by averaging the two descriptions, thereby using the two additional levels (level 2 and 4) of this system.

Table 4. **Comparison of overall disability weights for depression from different studies**

Study[a]	Method of deriving disability weight	Severity classes	Distribution across classes	Overall disability weight
Present study (the Netherlands)	Interpolation on a person trade-off calibrated disability scale	Mild; moderate to severe; severe with psychotic features	Dutch survey data[b]	0.459
1990 global burden of disease study (1) (established market economies)	Person trade-off	Treated versus Untreated	Expert estimation	0.469
Dutch national burden of disease calculation (3) (the Netherlands)	Dutch disability weights study: person trade-off and interpolation on a person trade-off calibrated disability scale	Mild; moderate; severe; severe with psychotic features	Expert estimation	0.266
Australian Burden of Disease Study (2) (Australia)	Dutch disability weights study: person trade-off and interpolation	Mild; moderate; severe	Short Form-12 health survey cut-off scores in Australian survey[c]	0.41 (m) 0.37 (f)
Andrews et al. (23, 24) (Australia)	Person trade-off	Mild episode; moderate episode; severe episode	Short Form-12 cut-off scores in Australian survey[c]	0.417

[a] Information in parentheses indicates where study took place.
[b] Data were derived from the Netherlands Mental Health Study and Incidence Survey (NEMESIS) (7, 14).
[c] Data collected during the Australian National Mental Health and Wellbeing Survey (8).