Distr.
GENERAL

CES/AC.36/1998/9
EUR/ICP/INFO 020603/9

21 July 1998

Original: English

STATISTICAL COMMISSION and ECONOMIC COMMISSION FOR EUROPE

WORLD HEALTH ORGANIZATION REGIONAL OFFICE FOR EUROPE

CONFERENCE OF EUROPEAN STATISTICIANS

Joint ECE-WHO Meeting on Health Statistics
(Rome, Italy, 14-16 October 1998)

SESSION III : Development and use of health output indicators

Invited paper submitted by the Erasmus University, Rotterdam, Netherlands [1]

DALYS IN EUROPE

Summary

Disability-adjusted life-years (DALYs) constitute a member of the family of composite health outcome measures, that further includes measures such as the Healthy Life Expectancy, Disability-Adjusted Life Expectancy and Quality Adjusted Life-years. DALYs are essentially a combination of Years of Life Lost due to mortality (YLL) and Years of Life lost due to Disability (YLD) by a population. YLD are weighted for the severity of specified disabilities using disease-specific disability weights between 0 (no disability) and 1 (extreme disability).

DALYs were developed in the Global Burden of Disease (GBD) study that provided quantitative, internally consistent estimates of the burden of the disease, including non-fatal health outcomes, attributable to 107 causes, per sex, for different age groups, and per region of the world, in 1990. The GBD study has demonstrated the potential value of combining data about length of life and severity of disease in a single comprehensive measure. Descriptions of the population's health with the help of such a measure may serve as a source of information for public health policy and for prioritizing and

[1] Prepared by Marie-Louise Essink-Bot, MD PhD, Department of Public Health.

planning health care and health services re search.

Recently, a coherent set of disability weights for 52 diseases that constitute the major part of ill-health in the Netherlands was derived in the Dutch Disability Weights study, and applied in Dutch burden of disease estimates in the Dutch Public Health Status and Forecast 1997 study.
The present paper provides an introduction on the DALY approach by discussing some of the methods and the results of the Global Burden of Disease study, the Dutch Disability Weights study and the burden of disease estimates in the Dutch Public Health Status and Forecast 1997 study.

I. Introduction

1. This paper intends to provide an introduction on composite health outcome measures in general and on the DALY measure in particular. The DALY (disability adjusted life year) as an indicator of a population's health is but one of a family of measures combining mortality and morbidity. Section 2 below provides a general introduction on composite health outcome measures, including a discussion of the rationale of combining mortality and morbidity into one common metric. The DALY measure was developed in the Global Burden of Disease (GBD) study. The aims, methodology and some results of the GBD are addressed in section 3. The Dutch Disability Weights study, designed to establish a comprehensive series of disability weights for The Netherlands and to investigate the feasibility of some of the methods employed in the Global Burden of Disease study is presented in section 4.1. The resulting Dutch disability weights were combined with epidemiological data into burden of disease estimates for the Netherlands in the Public Health Status and Forecast 1997, see section 4.2. Section 5 provides a brief description of the BIOMED project 'Disability weights for Diseases in Europe' that started in March, 1998.

II. Composite Health Outcome Measures

II.1 Mortality and morbidity

2. A plethora of indicators are currently available by which to represent the state of a population's health. An important and fundamental distinction should be recognized between indicators based on mortality and indica tors based on morbidity. Mortality-based indicators, for example, are the (whether or not disease-specific) mortality figures, and a set of de rived measures such as the po tential years of life lost, and life expectancy at birth. Other indicators are based on morbidity, such as, for example, the figures for new and existing cases of specific diseases and their sequelae in terms of disabilities and handicaps.

3. Morbidity and mortality are complementary aspects of the population's health. Obviously, as the ideal is a long life in good health, a good measure of the population's health should comprise both aspects. The advantage to a mortality-based method of measuring the population's health is the fact that

mortality is more easily measured than morbidity and that (virtually) full-fledged vital registration systems are in place in most European countries. This indicator of measuring the population's health is therefore readily available and reliable.

4. By contrast, morbidity is far more difficult to classify and to measure, while registrations tend to be incomplete, unreliable or simply absent altogether. Simplicity and reliability, therefore, argue in favour of a mortality-based measurement of the population's health. And if the two aspects of the population's health, morbidity and mortality could be summarized into a single mortality-based measure, the choice would be a straightforward one. However, only diseases running an acute course tend to be able to fulfil this condition: the patient falls ill and is either dead or has recovered without any notable consequences within a relatively brief period of time. Examples of such diseases are infectious diseases such as cholera and pneumonia. Other disorders are more chronic in nature (or leave lasting effects, such as poliomyelitis), and are therefore poorly captured solely by measuring mortality. Examples include conditions affecting the musculoskeletal system, various types of cancer, non acutely fatal cardiovascular disease, psychiatric disorders and dementia. Generally speaking, conditions leading to speedy fatality cause little morbidity (but possibly a high rate of mortality), while chronic diseases cause a high rate of morbidity (and possibly also, but not necessarily, high mortality).

5. Hence some sort of rift may be discerned between morbidity and mortality, between conditions which primarily cause morbidity and those primarily resulting in death. Obviously, therefore, an indicator based on morbidity would yield an entirely different view of the health problems within a population than would a mortality-based indicator. Yet this difference is also demonstrated by the developments within a single disease. Since the eighties, for example, the number of deaths due to heart disease in the Netherlands has been falling (improvement) while the number of existing cases of ischemic heart disease has concomitantly increased (deterioration), and in particular, a more severe form has been on the rise (deterioration). This can be explained as follows: improving the survival rate for acute myocardial infarctions has resulted in more heart patients, who subsequently run a considerable risk of developing heart failure. A public health measure based on mortality figures alone will mark the improvement (declining mortality) but not the change for the worse (more and more severe illness) following from this development, and hence presents a distorted view of reality.

6. The solution is, in principle, straightforward: we create a public health indicator encompassing both the aspects of morbidity and mortality. Such an indicator, combining morbidity and mortality is called a Composite Health Outcome Measure. Examples are:

- 'Healthy Life Expectancy' (in different variants, such as Life Expectancy in Perceived Good health and Life Expectancy without Disability)
- 'Disability Adjusted Life Expectancy' (DALE)

- ‘Disability Adjusted Life years’ (DALYs).
- ‘Quality Adjusted Life years’ (QALYs)

II.2 The common denominator: time

7. In a composite health outcome measure, morbidity and mortality must somehow be combined un der a common denominator. Successful indicators based on mortality, such as life expectancy and lost life-years, use ‘time’ as the unit of measurement for the population’s health indicator, and more specifically, the number of years lived (life expectancy) or by contrast, not lived (the lost life-years). In combining morbidity and mortality into a single composite measure, the obvious choice is to express morbidity in terms of time as well: the years lived with disease. By rendering the tim lost due to disease equivalent to the time lost through death it is possible to con struct a composite health outcome measure. This is done by partly equating the time lived with dis ease with the time lost due to death. In the computation of DALYs, part of the time lived with the disease is regarded as not lived, and the remainder is regarded as time lived in good health, with the help of a disability weight that reflects the relative severity of the disease.

8. In determining the disability weights, the severity of the condition is assessed at the level of the physical, mental and social functioning of the patient. On a scale of 1.00 (‘extreme disability’) to 0.00 (‘no disability’), a cold, for example, could be as signed a disability weight of 0.01 and multiple sclerosis of 0.67. Not-lived years are assigned the weight 1.00 (‘dead’). A year lived with a disease assigned a disability weight of 0.40 is equal to 0.40 year not-lived plus 0.60 year in good health. By multiplying the time lived (in years) by the disability weight assigned to the state in which the years were spent, it becomes possible to compare both the functional effects of various dis eases. Moreover, it becomes possible to compare the consequences of morbidity and mortality.

9. Weighting the unhealthy years lived according to the degree of dysfunction in which they are spent has been customary in the economic evaluation (cost effectiveness or better cost utility analysis) of medical interventions. The consequences of morbidity and the changes therein are combined with data on survival in Quality Adjusted Life years (QALYs). QALYs make use of quality weights instead of disability weights. Quality weights generally range from 0 (death or extremely low quality of life) to 1 (optimal quality); disability weights run in the reverse direction from 1 (death or extreme disability) to 0 (no disability). The difference between quality weights and disability weights is partly a semantic discussion, and it may cause a lot of confusion. However, essentially the one is the complement of the other, and conceptually there is no real difference between QALYs and DALYs.

III. The Global Burden of Disease Study

III.1 Aims and objectives

10. The Global Burden of Disease (GBD) study was carried out at the request of the Worldbank and the WHO, by Christopher J.L. Murray (Harvard University) and Alan D. Lopez (WHO). The first version of this study appeared as a Worldbank report in 1993, while a series of books on this project started appearing mid 1996. (Worldbank, 1993; Murray, 1996a)

11. The GBD study had three primary goals: to provide information on non-fatal health outcomes for debates on international health policy; to develop unbiased epidemiological assessments for major disorders; and to quantify the burden of disease with a measure that could also be used for cost-effectiveness analysis. There were four specific objectives (Murray, 1997a):

- To develop internally consistent estimates of mortality for 107 causes of death, by age, sex and geographic region
- To develop internally consistent estimates of incidence, prevalence, duration, and case-fatality for 483 disabling sequelae of the 107 causes, and deriving a coherent set of disability weights for these sequelae;
- To estimate the fraction of mortality and morbidity attributable to ten major risk factors;
- To develop various projection scenarios of mortality and disability estimates by cause, age, sex and region.

12. The GBD study is exceptional because of its worldwide scope. By combining epidemiological data and disability weights into Disability Adjusted Life Years or DALYs, it became possible to estimate the total burden of disease at the global level, and to break this down according to the share accounted for by specific diseases.

13. The following section will explore the methods used in the GBD study to arrive at DALYs. Thereafter some salient results of the GBD study will be presented.

III.2 The construction of DALYs

14. The DALY sums years of life lost to premature death (YL L) and years of life lost due to a disability of specified severity and duration (YLD). One DALY is thus one lost year of healthy life.

15. In the GBD study, YLL were defined as the number of years that death occurs before the age to which the dying person could have expected to survive if he/she were a member of a standardized model population with a life expectancy at birth equal to that of the world’s longest surviving population, Japan. Data on cause-specific deaths were obtained from vital registration systems (if available), sample death registrations, and epidemiological assessments by experts. Consistency and validity of the available data and estimates were checked using cause of deaths models.

16. The number of years lost due to a disabling condition (YLD) can be calculated from incidence, average age at onset and the average duration of the disability. Valid community-based epidemiological studies were not available in any region of the world for these epidemiologic parameters for the 107 causes and 483 sequelae included in the GBD. The GBD, however, used data from all possible sources, and supplemented these with informed judgment by a large number of experts familiar with specific disease or injuries.

17. Epidemiological experts were requested to estimate incidence, prevalence, average age of onset, average duration, case-fatality rate, remission rate and death rate for each sequela. This information allowed the GBD investigators to correct the preliminary estimates for internal consistency – that is, to ensure that estimated prevalence was consistent with estimated incidence and vice versa. Consistency of the estimates was validated using a computer model specially developed for the study, named DisMod. The iterative process ending with the final estimates took more than four years.

18. The disability weights for the 483 sequelae were assigned by panels of medical experts in a two-step procedure. The first step involved the calibration of a disability scale. The weights were determined by positioning some 22 so-called indicator conditions on the scale. On the basis of this calibration, the scale was divided into seven more or less homogenous classes. During the second step, the 483 sequelae were assigned to these classes. The relatively unknown valuation method of ‘person trade-off’ was applied to estimate the disability weights for the indicator conditions (Nord, 1995) . In the GBD study, two specially developed variants of PTO were applied, in order to promote explicit deliberation within and among the subjects by framing the same question from two different viewpoints. In the first , PTO1, a respondent is asked to decide for how many N (N > 1000 persons) in health state X he would be willing to trade one year of life extension of 1000 healthy individuals for the extension of life by one year for the group in the health state X. In the second variant (PTO2), the respondent is asked to estimate for how many individuals in health state X he would be prepared to surrender one year of extended li fe for 1000 individuals in perfect health in exchange for the complete recovery followed by one year of perfect health for the group in the given health state.

19. The GBD study incorporated age-weights into the DALY that assign a greater value to a year lived by a young or middle-aged adult as compared to a year of life lived by young children or the elderly. This was done to represent a credible aproach to capturing the dependence of the young and older generations on adults. Furthermore, the GBD included a discount rate of 3%. However, neither age weights nor discount rates are essential elements of the DALY approach (see, for a discussion, Barendregt 1996, and Murray 1996b).

III.3 Some results of the GBD-study

20. Examples of the results of the GBD study are presented in Tables 1 (a global ranking of causes of years of life lost), 2 (global ranking of causes

of years of life lost due to disability) and 3 (global ranking of causes of combined burden of disease in DALYs). Infectious diseases were the dominant cause of years of life lost (YLLs) in the world (Table 1). Cardiovascular disease caused 8.6% of YLL. One of the surprising findings of the GBD was that adults under the age of 70 in Sub-Saharan Africa today face a higher risk of death from noncommunicable diseases (e.g., cardiovascular) than adults from the same age in the Established Market Economies. It was also shown that in part of the developing world (China, Other Asia and Islands, Latin America and the Caribbean and the Middle Eastern Crescent) more people die from non-communicable diseases than from communicable, maternal, perinatal and nutritional disorders. Overall, the GBD showed the epidemiological transition to be much further advanced in developing countries than was generally appreciated.

21. Psychiatric diseases were dominant causes of years of life lost due to disability (YLDs; Table 2). In the developed regions, alcohol use ranks first in the causes of YLDs in males (13.7%).

22. Table 3 shows the combined burden of mortality and morbidity in DALYs for the world in 1990. Some infectious diseases retained their leading positions. Unipolar major depression, a condition that hardly causes any mortality, ranks fourth. While psychiatric conditions are responsible for little more than 1% of deaths, they account for almost 11% of disease burden worldwide, thus underscoring the importance of including non-fatal health-outcomes in public health measures.

Table 1: Ten leading causes of years of life lost (YLLs), world, 1990 (Murray, 1996a)

Rank	Cause	YLLs (thousands)	Per cent of total
	All causes	906 501	100.0
1	Lower respiratory infections	108 601	12.0
2	Diarrhoeal diseases	94 434	10.4
3	Conditions arising during the perinatal period	82 681	9.1
4	Ischaemic heart disease	41 595	5.0
5	Measles	36 450	4.0
6	Tuberculosis	34 304	3.8
7	Cerebrovascualr disease	32 115	3.6
8	Malaria	28 038	3.0
9	Road traffic accidents	26 162	2.9
10	Congenital anomalies	19 414	2.2

Table 2 Ten leading causes of years of life lost due to disability (YLD), world, 1990 (Murray, 1996a)

Rank	Cause	YLDs (thousands)	Per cent of total
	All causes	472 736	100.0
1	Unipolar major depression	50 810	10.7
2	Iron deficiency anemia	21 987	4.7
3	Falls	21 949	4.6
4	Alcohol use	15 770	3.3
5	Chronic obstructive pulmonary disease	14 692	3.1
6	Bipolar disorder	14 141	3.0
7	Congenital anomalies	13 507	2.9
8	Osteoarthritis	13 275	2.8
9	Schizophrenia	12 183	2.6
10	Obsessive-compulsive disorders	10 213	2.2

Table 3 Ten leading causes of disease burden (DALYs), world, 1990 (Murray, 1996a)

Rank	Cause	DALYs (thousands)	Per cent of total
	All causes	1 379 238	100.0
1	Lower respiratory infections	112 898	8.2
2	Diarrhoeal diseases	99 633	7.2
3	Conditions arising during the perinatal period	92 313	6.7
4	Unipolar major depression	50 810	3.7
5	Ischaemic heart disease	46 699	3.4
6	Cerebrovascular disease	38 532	2.8
7	Tuberculosis	38 426	2.8
8	Measles	36 520	2.7
9	Road traffic accidents	34 317	2.5
10	Congenital anomalies	32 921	2.4

23. The GBD study has demonstrated the potential value of combining data about length of life and severity of disease in a single comprehensive measure. Descriptions of the population’s health with the help of such a measure may serve as a source of information for public health policy and for prioritizing and planning health care and health services re search. However, the GBD also pointed out that the utility of any index of the population’s health is limited by the accuracy of the underlying epidemiological data. There are still massive lacunae in basic epidemiological data. Descriptive epidemiological data on disabling sequelae of diseases and injuries are especially scarce. This holds for developed countries as well. Murray and Lopez put great effort in providing estimates that were at least plausible and internally consistent, guided by the ‘ethos of applied demography’,

namely that it is better to provide the best possible estimates based on, at times, poor data, than providing no estimates at all.

IV. The Dutch Disability Weights study and the Dutch Public Health Status and Forecast 1997

IV.1 The Dutch Disability Weights study

24. In the Dutch project on 'Disability Weights for Diseases', that was carried out in 1996, a coherent set of disability weights was derived for 52 diseases covering 70% of deaths, 65% of disease-attributable health-care costs and 50% of GP-contacts in The Netherlands in 1994. The GBD disability weights were derived for use at the global scale, which means that relatively much attention was spent on conditions with little relevance to the Dutch population's health, such as tropical dis eases and malnutrition. Furthermore, the GBD study was the first of its kind, and therefore a need was felt to investigate to what extent the methods introduced by the GBD study for determining disability weights yield reliable, valid and - for the Netherlands - usable results.

25. The design of the Dutch Disability Weights (DDW) study corresponded to the GBD protocol, with some amendments. It is described into detail elsewhere (Stouthard 1997, 1998). The DDW protocol was extensively tested in several pilot studies. The 52 diseases were broken down into 175 disease stages that were homogenous regarding health status, treatment and prognosis. The most important amendment of the GBD valuation protocol was the addition of a standardized description of the health status associated with each disease stage to be valued. To this end an extended version of the EuroQol classification system for health status was used. The six dimensions of this extended EuroQol were labelled 'Mobility', 'Self care', 'Usual Activities', 'Pain/discomfort', 'Mood' and 'Cognitive functioning' (added). Each dimension comprised three levels: 1 = 'no problems', 2 = 'some problems', 3 = 'severe problems'. The aim of adding a standardized health status description was to harmonize the mental image of the state to be valued across the subjects who conducted the valuation task.

26. The first step of the valuation protocol included the assignment of values to 16 key health states to anchor and calibrate the disability scale. The values were assigned using the PTO method by 38 medical experts randomly assigned to 1 out of 3 panels. In the second step, the experts interpolated each of the remaining disease stages on the disability scale in a written procedure.

27. The weights derived from the disease stages in the DDW study were compared to the disability weights assigned to the indicator conditions in the GBD study, to the extent that similar health states were concerned (table 4). The GBD provided disability weights for 22 indicator conditions, divided into 7 (arbitrarily defined) 'disability classes'. The Dutch disability weights were therefore also divided into similar classes for the sake of comparison. Of the 22 indicator conditions in the GBD study, 12 had a compa-

rable counterpart in the Dutch study .The results of the comparison showed that the weights derived in both studies corre sponded rather well. Five disease stages proved to have been classified into the same class in both studies, two other disease stages were situ ated virtually on the border between two disability classes. The other five disease stages ended up either one class higher or lower. These dif ferences are partially explainable by the difference in the context of the valuations (global versus The Netherlands). Infertility and mental retar dation probably have less far-reaching consequences in the Dutch situa tion than in developing countries. ‘Angina’ and ‘depression’ were submitted as indicator conditions for weighting in the GBD study as single disease stages. In the Dutch weights study, various disease stages were included for these diagnostic groups and the complete disease model was shown. Hence, ‘severe depression’ may have been more heavily weighted in the DDW study because of the fact that ‘moderate’ and ‘mild’ depression were also included. Analogous to this is the fact that ‘mild stable angina’ may also have possi bly been weighted more lightly due to the inclusion of ‘severe stable angina’ in the DDW study. All in all, these results support the validity of the disability weights.

Table 4. Comparison GBD – Dutch disability weights

Global Burden of Disease study			Dutch Disability Weights study		
Indicator condition	Disabi-lity class	Disabi-lity weight	Disease stage	Disabi-lity class	Disabi-lity weight
Infertility	3	0.12-0.24	Late complications after STD infection	2	0.11
Angina	3	0.12-0.24	Mild stable angina	2	0.08
Rheumatoid arthritis	3	0.12-0.24	Mild rheumatoid arthritis	3	0.21
Deafness	4	0.24-0.36	Severe hearing disorder in the elderly	5	0.37
Blindness	6	0.50-0.70	Severe vision disorder	5	0.43
Mild mental retardation	5	0.36-0.50	Mild mental handicap	4	0.29
Down's syndrome	5	0.36-0.50	Down's syndrome without comorbidity	6	0.51
Paraplegia	6	0.50-0.70	Paraplegia	6	0.57
Unipolar major depression	6	0.50-0.70	Severe depression	7	0.76
Active psychosis	7	0.70-1.00	Severe schizophrenia	7	0.98
Dementia	7	0.70-1.00	Severe dementia	7	0.94
Quadriplegia	7	0.70-1.00	Tetraplegia	7	0.86

28. The Dutch Disability Weights Study resulted in a coherent set of reliably elicited disability weights for a large number of diseases. The weights are suitable for application in composite public health measures, such as DALYs and DALEs and in economic evaluations in health care interventions. Application of this set of weights in economic evaluation studies and in public health research will foster the integration of information from both these areas. The usability of the weights in public health research will primarily depend on the availability of consistent and comprehensive epidemiological data.

IV.2 DALYs in the Dutch Public Health Status and Forecast Study 1997

29. For a start the disability weights were applied within the scope of the Public Health Status and Forecast 1997 study (VTV-97) in making a tentative estimation of the burden of disease in the Netherlands for a number of important diseases (Ruwaard, 1997). In this study, cause-specific years of life lost (YLL) were computed from cause-specific mortality figures in the Netherlands in 1994 and the life-expectancy following the lifetable for the Dutch population in 1994. This differs from the GBD study, that used a standard life table.

30. In order to compute the number of years of life lost due to disability (YLD) per disease, the disability weight derived for each disease stage should be multiplied with either the prevalence of that disease stage, or with the product of incidence and duration of that stage. However, prevalence and incidence figures were mostly available for a disease as a whole, but were very seldom known for the separate stages. Therefore, the disability weights for the disease stages associated with a specified disease had to be combined into one disability weight for the disease by calculating a weighted average of the disability weights of the various stages, according to the distribution of the disease prevalence over the stages as obtained from expert opinions. This led to a combined disability weight for each of the 52 disease categories.

31. Disease-specific YLD were then calculated by multiplying the epidemiological numbers (in most cases the point prevalence) with this combined disability weight. A special approach was used for diseases generally presenting as a short episode followed by complete recovery, e.g., influenza. The PTO valuation procedures as used in the DDW imply the judgment of a state with a one year duration. However, influenza does not last for a year. Therefore diseases of this type were valued as a ‘annual profile’, e.g. ‘a healthy year including a 2 week episode of influenza’. A disability weight derived for an annual profile was multiplied by the yearly incidence of the disease to obtain YLDs.

32. YLLs and YLDs were then combined into DALYs, without age-weighting and without discounting. Table 5 provides some numerical examples of the calculations. It must be noted that internal consistency and validity checks of epidemiological data did not take place in the Dutch Public Health Status and Forecast 1997. Figure 1 is a graphical representation of YLLs, YLDs and DALYs for seven broad diagnostic categories as percentages of the total numbers that were calculated for the diseases included in the Public Health Status and Forecast study. It is clear that the years of life lost were especially attributed to neoplasms and cardiovascular disease, whereas psychiatric diseases and ‘other physical conditions’ (that include musculoskeletal diseases) were major causes of YLD. By combining YLLs and YLDs into DALYs, the four largest categories had approximately equal magnitudes. The total number of YLDs in the Netherlands equalled 1.5 times the number of YLDs.

Table 5. Examples of DALY calculations in the Netherlands (population approx. 15 million) (source: Ruwaard, 1997)

	Prevalence (1994)	Disability weight	YLD	YLL	DALY
Lung cancer	18 500	0.42	7 770	115 300	123 070
Stroke	97 200	0.61	59 292	110 400	169 692
Rheumatoid arthritis	80 700	0.53	42 771	2 700	45 471
Depression	484 200	0.23	111 366	-	111 366

V. The European Disability Weights Project

33. A BIOMED project, funded by the European Union, has started as a concerted action with eight partners in 7 countries (including Denmark, France, Norway, Spain, Sweden, The Netherlands and United Kingdom) in March 1998. The project is coordinated by Prof. Dr. Paul J. van der Maas, from the Department of Public Health at Erasmus University in Rotterdam, the Netherlands. The project aims at, firstly, establishing a comprehensive list of the disability weights associated with the various diseases that constitute the major part of ill health in Europe; secondly, to improve, refine and validate the methodology to estimate the disability weights; and thirdly, to investigate the cross-national stability of the disability weights (and interpretation of the differences, if found). Finally, burden of disease estimates per country for a number of diseases will be computed and compared, provided that available incidence and mortality data are similar to an acceptable degree in the participating countries.

34. The work content of the project is divided into three stages. First, a comprehensive and consistent list of diseases that constitute the major part of ill health in Western Europe will be made. Each disease will than be subdivided into homogenous clinical stages. Compatibility of the disease stages to be valued with epidemiological data will be taken care of. The health status associated with each disease stage will be described in a standardized manner. All together, this list will be the input for the weighting sessions. Next, the weighting protocol will be applied in each of the participating countries. Studies on reliability and validity of the methodology will be conducted alongside. The third phase of the project consists of an international comparison of the weights obtained in the participating countries. Burden of disease estimates for at least three major diseases in each of the countries and an international comparison of these burden of disease estimates. In the end, an approved European list of disability weights will be available for use in public health research and cost-effectiveness evaluations.

Acknowledgement

35. I am grateful to Jan J. Barendregt PhD for his helpful comments on a previous version of this paper.

Literature

Barendregt JJ, Bonneux L, Van der Maas PJ. DALYs: the age-weights on balance. Bull World Health Organ 1996;74(4):439-43.

Murray CJL, Lopez A (eds). The Global Burden of Disease (volume I in The Global Burden of Disease and Injury Series). Boston, USA: Harvard University Press, 1996a.

Murray CJL, Lopez AD. The incremental effect of age-weighting on YLLs, YLDs, and DALYs: a response. Bull World Health Organ 1996b;74(4):445-6.

Murray CJL, Lopez AD. Mortality by cause for eight regions in the world: Global Burden of Disease Study. Lancet 1997a;349:1269-76.

Murray CJL, Lopez AD. Regional patterns of disability-free life expectancy and disability-adjusted life expectancy: Global Burden of Disease Study. Lancet 1997b;349:1347-52.

Murray CJL, Lopez AD. Global mortality, disability, and the contribution of risk factors: : Global Burden of Disease Study. Lancet 1997c;349:1436-42.

Murray CJL, Lopez AD. Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. Lancet 1997d;349:1498-504.

Nord E. The person trade-off approach to valuing health care programs. Med Decis Making 1995;15:201-208.

Ruwaard D, Kramers PG (eds). Public Health Status and Forecast 1997 - the sum of the parts. The Hague, The Netherlands: Elsevier/De Tijdstroom, 1997.

Stouthard MEA, Essink-Bot ML, Bonsel GJ, Barendregt JJ, Kramers PGN, Van de Water HPA, Gunning-Schepers LJ, Van der Maas PJ. Disability Weights for Diseases in The Netherlands. Rotterdam, The Netherlands: Department of Public Health, Erasmus University, 1997.

Stouthard MEA, Essink-Bot ML, Bonsel GJ. Disability weights for diseases in The Netherlands. Submitted for publication.

World Bank. World Development Report 1993: Investing in health - world development indicators. Oxford, UK: Oxford University Press, 1993.

Figure 1 YLLs, YLDs and DALYs, The Netherlands, 1994
(source: Public Health Status and Forecast 1997)