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Measurements of reported morbidity and interrelationships with health dimensions

ABSTRACT

OBJECTIVE: To assess the interrelationships between self-rated health, perceptions of long-term illness and diagnoses of chronic diseases.

METHODS: In the World Health Survey, carried out in Brazil in 2003, 5,000 individuals aged 18 years and over who had been selected from a three-stage stratified sample were interviewed. The original questionnaire was adapted for the Brazilian context. It covered the presence of long-term illness or disability, self-rating of health (general and in several domains) and diagnoses of six chronic diseases (arthritis, angina, asthma, depression, schizophrenia and diabetes mellitus). To compare the relationships between self-rated health, perceptions of long-term illness and the chronic diseases evaluated, the statistical test of homogeneity of proportions and multiple logistic regression models were used.

RESULTS: Self-rating of health as "not good" and perceptions of having long-term illnesses were significantly more frequent among women, individuals aged 50 years and over and individuals with one or more of the diseases investigated. The interviewees with a diagnosis of diabetes mellitus presented the worst self-rated health: 70.9% reported having a long-term illness and 79.3% considered that their health was "not good". Worse health ratings were found when two or more diseases were present together. The effect of self-rating of health on the perceptions of long-term illness was stronger than was the number of diseases.

CONCLUSIONS: The three ways of measuring morbidity presented significant interrelationships. Self-rating of health as "not good" had a more important effect on the perceptions of long-term illness, thus suggesting that subjective measurements of health status may be more sensitive for establishing and monitoring individuals' wellbeing.

KEY WORDS: Chronic disease. Diagnosis of health situation. Program evaluation. Health knowledge, attitudes, practice. Brazil.

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INTRODUCTION

Health surveys are population-based studies that include questions that are generally not available in national information systems.[20] Among these are health perceptions, diseases, disabilities, behavioral patterns, risk factors, healthcare service usage and demographic and socioeconomic characteristics. Because they enable exploration of the interrelations between the different dimensions of healthcare, these characteristics are important for monitoring the

epidemiological profile of the population and the investment needs and for evaluating healthcare policies.[5]

Over recent decades, a variety of instruments have been developed for characterizing the state of health of populations using easily understood questions and covering a vast range of dimensions.[4] Inclusion of questions on perceptions of morbidity have made it possible to construct indicators for monitoring the population's state of health in its various domains. These indicators may also be used for constructing other measurements, thus producing estimates for healthy life expectancy and for quality of life.

Among the various indicators recommended by the World Health Organization (WHO) for evaluating the health of populations, self-rated health, perception of long-term (long-standing) illness and disease diagnosis stand out.[5]

Self-rated health has been widely used in population-based surveys because it is easily applied and allows international comparisons. Although it is measured by a single question, there is evidence that it has the power to cover several dimensions of healthcare, and that when answering it, individuals implicitly develop a thought process regarding these dimensions.[16] This indicator is considered to be a strong predictor of both morbidity and mortality, even when controlled for the presence of disease or disability.[13,17] Individual perception of health has been shown to be important in itself, independent of the objective presence of any disease. The feeling of wellbeing extrapolates the presence of objective conditions, although it presents well-established relationships with clinical conditions and with indicators of morbidity and mortality.[8]

The progressive aging of the population and the increasing prevalence of chronic diseases have been pointed out as the main factors responsible for the development of disabilities during adulthood.[14] This results in questions about the presence of long-term illness or disabilities, with or without limitations on activities, in health surveys. The indicator of perception of long-term illness has the positive characteristics of being easily applicable, presenting a high degree of agreement with clinical evaluations and allowing international comparison. While self-rated health is considered to be an overall health measurement, perception of long-term illness is focused more towards individual clinical conditions.[12] The introduction of this question into health surveys contributes further information on other aspects of the population's health, particularly the functional incapacity associated with chronic diseases.

Self-rated morbidity due to chronic diseases is an approximate measurement for the information obtained through clinical examinations.[6,7,11] It has been reported from several health surveys that the information ob-tained in relation to the prevalence of chronic diseases presented good concordance with medical records or clinical examinations, especially for some selected pathological conditions, particularly cardiovascular diseases and diabetes mellitus.[7,10,13,23] As a strategy for increasing the validity of self-reports on diseases, WHO has suggested that a list of outlining conditions that are more representative of the morbidity-mortality profile of each country should be used. This has been shown to be a sensitive instrument for measuring the perception of diseases, thereby minimizing recall bias.[5] Studies have shown that persistent conditions such as chronic coughs or back pain are not considered to be diseases when they are not specifically mentioned by the interviewer. Studies that do not use a list of outlining conditions have tended to only include the individuals who are more seriously sick.[11] The presence of chronic diseases depends on access to medical diagnosis and is not just based on the individual's perception.[10,23]

Studies have shown that the indicators for reported morbidity are influenced by sociodemographic characteristics (sex, age and schooling). These must be taken into consideration in the analyses.[17,18]

The present article had the aim of analyzing the interrelationships between three measurements of morbidity: self-rated health, perception of long-term illness and presence of chronic disease diagnoses.

METHODS

In an effort to obtain standardized information that was comparable at international level, WHO developed the World Health Survey together with its member countries. This was a survey to evaluate the performance of national health systems that was applied in several countries, including Brazil, in 2003.[18]

The original instrument of the World Health Survey was fully revised and adapted to the Brazilian context. With regard to reported morbidity and based on the international debate on this topic,[1,9] the questionnaire additionally dealt with the presence of long-term illness or disability, as well as self-rated health (general and in several domains) and presence of diagnoses of chronic diseases,[19] which were already part of the WHO survey.

In the World Health Survey carried out in Brazil, 5,000 individuals aged 18 years and over were interviewed. These participants were selected from a three-stage stratified sample. In the first stage, 250 census tracts were selected, with probabilities proportional to their sizes. The primary selection unit was stratified according to rural or urban location and the size of the municipality (< 50,000; 50,000–399,999; 400,000 or more inhabitants). Within each stratum, the census tracts were ranked according to the mean income of

the head of the family. In the second stage, the homes were selected with equal likelihood, using the inverse sampling method in order to ensure 20 households per census tract. In the final stage, one adult (18 years or over) was selected per household, by probabilistic sampling, to answer the questionnaire.

To measure the self-rating of health, the question asked was: "In general, how do you rate your health right now?" The responses ranged across a scale from 1 to 5 (1=very good; 2=good; 3=moderate; 4=bad; 5=very bad).

To measure the perception of long-term illness, the question asked was: "Do you have any long-term illness or disability?"

To evaluate the presence of any of the six diseases investigated (arthritis, angina, asthma, depression, schizophrenia and diabetes), the question asked was: "Have you ever had a diagnosis of...?"

To calculate the proportions of perceptions of having long-term illnesses among individuals who reported one of the diseases under analysis, according to age and sex, the following formula was used:

$$p_{ijk} = \frac{n_{ijk1}}{n_{ijk}} * 100$$

where:

i represented the age group (i=1 for less than 50 years old; i=2 for 50 years old or over);

j represented sex (j=1 for females; j=2 for males);

k represented presence of a disease (k=1 for arthritis; k=2 for angina; k=3 for asthma; k=4 for depression; k=5 for schizophrenia; k=6 for diabetes);

$n_{ij}k_1$ represented the number of people of age i, sex j and disease k with a perception of long-term illness;

$n_{ij}k$ represented the number of people of age i, sex j and disease k.

A similar procedure was adopted for calculating the proportion of self-rating of health as "not good" (moderate, bad and very bad) among the individuals who said that they had had one of the diseases under analysis.

Because this was a complex sample, weighting was needed to correct for design effects. This was done using the SPSS software, version 13.0, in the statistical analyses.

The statistical test of homogeneity of proportions was used to compare the differences in the proportions of perceptions of long-term illness or disability between the individuals who said they had had one of the six diseases and those who had not had any of these diseases. The same procedure was used to compare this perception among those with just one disease, two or more diseases and no diseases. To compare the proportions in each of these categories, log-linear models were used.

The homogeneity of proportions test was also used for comparing the differences in the proportion of self-rating of health as "not good" between the interviewees who said they had had one of the diseases investigated and those who had not had any of them, and among those with just one disease, two or more diseases and no diseases.

With the aim of comparing the proportions of perceptions of long-term illness among the individuals who reported one of the six diseases, according to their self-rated health, a multiple logistic regression model was used. The dependent variable was the perception of long-term illness and the independent variables were self-rated health, the presence of each of the diseases analyzed, age and sex.

To measure the effects of self-rated health and number of diseases on the perception of long-term illness or disability, a multiple logistic regression procedure was used, with adjustment for age and sex. Both self-rated health and number of diseases were taken to be ordinal variables. The number of diseases was ranked as follows: 0=no disease; 1=only one disease; 2=two or more diseases. Self-rated health was ranked as follows: 1=very good; 2=moderate; 3=bad/very bad.

This study was approved by the *Comitê de Ética em Pesquisa* (Research Ethics Committee) of Fundação Oswaldo Cruz.

RESULTS

Table 1 shows that, in a general manner, the women with one of the six diseases analyzed perceived the presence of long-term illness or disability in a more accentuated way than did the men. The same occurred with the individuals aged 50 years or over, in comparison with the younger individuals, for both sexes. It was also observed that the greater the number of associated diseases was, the greater the prevalence of perceptions of disabilities was.

The perception of having a long-term illness or disability was mentioned by 70.9% of the individuals with a diagnosis of diabetes, 62.8% with angina, 61.6% with arthritis, 60.2% with schizophrenia and in smaller proportions by those with diagnoses of depression and asthma (respectively, 47.3% and 41.5%). Only 16.7% of the interviewees reported long-term illnesses or disability in the absence of the six diseases analyzed. The proportion of perceptions of long-term illnesses was always significantly greater (p<0.0001) among

Table 1. Proportion of perceptions of long-term illness among the individuals who said they had had one of the six chronic diseases analyzed, according to sex and age. Brazil, 2003.

Disease	Male			Female			Total		
	< 50	50+	Total	< 50	50+	Total	< 50	50+	Total
Arthritis	43.3	68.2	58.8	49.6	71.3	63.1	47.5	70.2	61.6
Angina	37.5	68.8	56.1	55.0	79.4	68.4	47.2	74.2	62.8
Asthma	32.2	62.5	41.5	37.6	70.5	47.8	35.3	67.0	45.1
Depression	35.5	64.6	45.5	39.3	63.8	48.1	38.2	64.0	47.3
Schizophrenia	41.7	85.7	65.4	36.4	87.5	57.9	37.8	86.8	60.2
Diabetes	53.8	71.7	67.8	62.7	77.3	72.8	60.0	75.0	70.9
None of these diseases	12.6	24.4	15.3	14.2	33.9	18.1	13.4	28.8	16.7
Only one disease	26.4	58.7	38.2	32.2	53.3	39.0	29.9	55.6	38.7
Two or more diseases	53.5	72.6	64.5	54.4	76.0	65.8	54.1	74.8	65.4

Table 2. Proportion of self-rating of health as "not good" among the individuals who said they had had one of the six chronic diseases analyzed, according to sex and age. Brazil, 2003.

Disease	Male			Female			Total		
	< 50	50+	Total	< 50	50+	Total	< 50	50+	Total
Arthritis	49.3	71.2	62.8	74.2	85.2	81.0	61.7	80.4	74.8
Angina	61.5	82.8	74.1	68.8	87.6	79.1	65.5	85.3	76.7
Asthma	33.3	68.4	44.0	50.4	85.7	61.3	43.0	78.3	53.8
Depression	42.7	77.1	54.4	59.7	82.0	67.7	54.6	80.6	63.8
Schizophrenia	50.0	78.6	65.4	56.3	78.3	65.5	54.5	78.4	65.4
Diabetes	65.4	84.8	80.5	67.8	83.3	78.5	67.1	83.9	79.3
None of these diseases	28.6	46.1	32.7	36.1	59.2	40.7	32.4	52.1	36.6
Only one disease	37.3	70.3	49.3	53.0	75.7	60.3	46.9	73.3	55.9
Two or more diseases	52.4	77.9	67.0	68.9	87.0	78.5	63.7	83.8	74.6

individuals with one of the six diseases, and also among those with one disease or more, in comparison with individuals with none of these diseases.

Individuals less than 50 years old with a diagnosis of diabetes presented a greater proportion of perceptions of long-term illness than did those with diagnoses of other diseases. Among the individuals aged 50 years or over, this perception was greater among those with a diagnosis of schizophrenia, for both sexes.

Table 2 shows the same type of behavioral pattern for self-rating of health as "not good". Among the individuals without diseases, 36.6% self-rated their health as "not good". The worst health ratings were found among individuals with diabetes (79.3%) and angina (76.7%). Among the men, the highest prevalence of self-rating of health as "not good" was found among those with diabetes, independent of age. Among the women, the highest proportion was presented by those with arthritis (younger age group) and with angina (older age group).

The proportion of self-rating of health as "not good" was generally significantly greater among those with one of the diseases investigated, in comparison with those without diseases. The exception was among the men less than 50 years old with asthma and schizophrenia. Among the women aged 50 years and over, it was schizophrenia. As was found with the perception of long-term illness, a gradient of worse health rating was found when two or more diseases were simultaneously present.

Table 3 shows the association between self-rated health and the perception of illness or disability. Among the individuals who rated their own health as good, the prevalence of perceptions of having a long-term illness was 14.4%. On the other hand, in the group of individuals who did not rate their own health as good, this rate was three times greater (45.5%). The difference between the proportions was statistically significant for any category formed by sex and age.

Table 3. Proportion of perceptions of long-term illness or disability among the individuals who self-rated their health as "good" and "not good", according to sex and age. Brazil, 2003.

| Sex | Age | Self-rated health | | | | p value (*) |
| | | "Good" | | "Not good" | | |
		N	%	N	%	
Male	< 50	1,100	11.1	504	32.5	0.000
	50 +	277	21.3	397	58.7	0.000
	Total	1,377	13.1	901	44.1	0.000
Female	< 50	1,068	12.1	846	37.8	0.000
	50 +	212	34.0	568	59.2	0.000
	Total	1,279	15.7	1,415	46.4	0.000
Total	< 50	2,167	11.6	1,352	35.9	0.000
	50 +	489	26.8	965	59.0	0.000
	Total	2,656	14.4	2,316	45.5	0.000

(*) p value – descriptive level of the comparative test on the proportions of self-rated health among individuals with perceptions of long-term illness

Table 4. Proportion of perceptions of long-term illness among the individuals who said they had had one of the six chronic diseases analyzed, according to self-rated state of health. Brazil, 2003.

Disease	Self-rating	N	% long-term illness	p value	p value adjusted for sex and age
Arthritis	Good	131	39.7	0.000	0.000
	Not good	393	69.0		
	Total	524	61.6		
Angina	Good	78	43.6	0.001	0.014
	Not good	175	68.9		
	Total	332	63.0		
Asthma	Good	277	23.5	0.000	0.000
	Not good	321	63.6		
	Total	598	45.0		
Depression	Good	346	23.1	0.000	0.000
	Not good	609	61.1		
	Total	955	47.3		
Schizophrenia	Good	28	25.0	0.000	0.000
	Not good	54	79.6		
	Total	82	61.0		
Diabetes	Good	64	53.1	0.001	0.004
	Not good	246	75.6		
	Total	310	71.1		
None of these diseases	Good	1.876	9.8	0.000	0.000
	Not good	1.079	28.8		
	Total	2.955	16.8		
Only one disease	Good	580	21.4	0.000	0.000
	Not good	730	52.3		
	Total	1.310	38.6		
Two or more diseases	Good	161	42.9	0.000	0.000
	Not good	474	73.2		
	Total	635	65.5		

Table 5. Results from the multivariate logistic regression models, with the dependent variable of perceptions of long-term illness. Brazil, 2003.

Variable	Exp (ß)	95% CI	p value
Model 1			
Age	1.032	1.027;1.037	0.000
Sex	1.213	1.030;1.429	0.021
Self-rated health	3.030	2.663;3.448	0.000
Model 2			
Age	1.036	1.031;1.040	0.000
Sex	1.187	1.009;1.396	0.038
Number of diseases	2.628	2.356;2.930	0.000
Model 3			
Age	1.026	1.021;1.032	0.000
Sex	1.057	0.891;1.255	0.522
Self-rated health	2.603	2.284;2.967	0.000
Number of diseases	2.288	2.037;2.870	0.000

Table 4 compares the three measurements of self-reported morbidity. Among the individuals without any of the diseases analyzed, 9.8% of those who rated their health as good said they had perceptions of long-term illness, while among those whose self-rating was "not good", 28.8% had such perceptions. Consistently and independent of the disease analyzed, and after adjustment for sex and age, the individuals who rated their own health as good presented a lower percentage of perceptions of long-term illness than did those who rated their own health as "not good".

Table 5 presents the results from the logistic regression model using the variable of perceptions of long-term illness as a dependent variable. Model 1 took the independent variables to be age, sex and self-rated health. Model 2 used the number of diseases, as well as age and sex; and model 3 included both ways of measuring morbidity: self-rated health and number of diseases. In the first two models, all the variables were significant for explaining the perceptions of long-term illness, although self-rated health had a greater effect on the outcome. In model 3, the effect of self-rated health was shown to be greater than that of the number of diseases, although both presented statistical significance.

DISCUSSION

The measurements of self-rated health and presence of long-term illnesses have been used in various studies.[1,9,12,21] These have allowed international comparisons and evaluations of temporal trends and healthy life expectancy. One study[12] evaluating the interrelation-ships between self-rated health and long-term illness showed a strong association between the two indicators in individuals of both sexes. There were strong associations with the presence of chronic diseases such as diabetes, arthritis, cardiac diseases, arterial hypertension and cancer. The chances that an individual with a long-term illness would present self-rating of health as "not good" were seven times greater for men and almost ten times greater for women.

In the present study, the results found were similar, showing interrelationships between the overall health indicators in a general manner and in association with the diseases analyzed in this investigation. This demonstrates a pronounced gradient in the perceptions of long-term illness or disability, in relation to self-rating of health as "not good".

The validity of the morbidity measurements used has been investigated in several studies. Regarding self-rated health, despite its subjective nature, studies[2,17,21] have shown its power to predict morbidity-mortality among individuals of both sexes, even after adjusting for the effects of age, marital status and socioeconomic level.

Although perception of long-term illness or disability and self-related morbidity are related, they are conceptually distinct constructs. This can easily be seen when individuals say they have a disease but feel relatively healthy and are not undergoing any treatment.[a]

Because of the importance of perception of disease for health service utilization, this measurement was selected as a dependent variable in the logistic regression

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[a] Sturgis P, Thomas R, Purdon S, Bridgwood A, Dodd T. Comparative Review and Assessment of Key Health State Measures of the General Population. Department of Health. UK. 2001. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_4008058 [2005, Dec 20].

models. The results indicate that a notable proportion of the individuals with chronic diseases do not see themselves as sick.

The role of self-rated health was more important than the number of diseases with regard to perceptions of long-term illness or disability. Moreover, the differences relating to sex and age persisted for all of the measurements analyzed.

The perception of long-term illness varied between the diseases analyzed, and it was accentuated when comorbidities were present. Nonetheless, in the case of diabetes, the percentages of perceptions of long-term illnesses were generally greater than for the group that reported two or more diseases.

Studies have shown that it is necessary for there to be coexistence of several diseases for individuals to report that they have long-term illnesses.[9] A study carried out in the United Kingdom[1] among individuals aged 65 years or over showed that 61.8% of the interviewees said they had long-term illnesses or disabilities, with greater prevalence among women and more elderly individuals. There was also a progressive increase according to the number of chronic diseases. Among the interviewees who said they had not had the diseases investigated, 16.8% said that they had perceptions of having long-term illness, which increased to 91.3% among those with five or more chronic conditions. Osteoarticular, cardiovascular and respiratory diseases presented the largest associations with long-term illness. Notwithstanding the sociocultural differences and the diseases investigated in each study, the present study found a prevalence of 28.8% of perceptions of long-term illness among the individuals aged 50 years or over who said they had not had the diseases analyzed, whereas this figure reached 74.8% among those who had had two or more diseases.

Although arthritis and cardiovascular diseases had an impact on health ratings, studies have shown that because diabetes mellitus is associated with other chronic diseases, it significantly reduces the quality-of-life indices, which has repercussions on perceptions of good health. A multiethnic study carried out among individuals aged 21 to 65 years in Singapore showed that other chronic conditions coexisted among individuals with diabetes, at rates ranging from 2.9% for mental disorders to 37.2% for arterial hypertension. After adjustment for other sociodemographic variables, the coexistence of diabetes with hypertension or joint diseases reduced the physical function scores[22]. Although in the present study the coexistence of specific diseases was not evaluated, diabetes was the disease that presented greatest prevalence of perceptions of

long-term illness and self-rating of health as "not good", for the whole sample.

In addition to the influence of chronic diseases on self-rating of health as bad, the importance of psychosocial determinants has been highlighted in the literature.[13,15] In a study by Stewart-Brown & Layte[16] (1997), it was concluded that the presence of emotional disorders interfered in work and other activities of daily living, thus causing more incapacities than all the other health problems investigated. There were similar findings in another study, in which positive health indicators like states of good mood and spirit and presence of social support, were important in determining self-rating of health as "good". On the other hand, histories of diseases, use of medications and depression had a negative effect on judging the perception of health. Self-rated health would therefore represent a state of physical and emotional wellbeing and quality of life.[3]

With regard to measurements of perceptions of long-term illness or disability, not only is there subjectivity in the response, but also there is the influence of the question, which includes two sub-questions: the perception of illness and the presence of disabilities. Although this way of asking the question is often used,[21] asking about two different events together may alter the responses. It could mean that individuals with a diagnosis of a given chronic disease might not see themselves as sick because they do not have disabilities.

The main objective of health actions is to promote quality of life, even if it is impossible to achieve a cure in certain situations, like in cases of long-term non-transmittable chronic diseases. The change in the paradigm of healthcare policies in the 1980s broadened the scope of actions for health promotion in general and for improving wellbeing and particularly functional capacity, thereby consequently increasing healthy life expectancy.

Within this context, subjective measurements of the state of health may be more sensitive for establishing and monitoring individuals' wellbeing. In the proposal for action "Healthy People 2010", the Centers for Disease Control and Prevention (CDC)[24] put forward two challenges: to increase the quality of life and number of healthy years of life, and to eliminate inequalities in healthcare. To achieve this objective, administrators, researchers and healthcare policy-makers need to continue to monitor quality of life and its correlates among the population. A new logic for resource allocation should also be instituted, based on health needs that are defined by the new indicators and not just by morbidity-mortality rates.

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