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Sandhi Maria Barreto[I]

Roberta Carvalho de Figueiredo[II]

Chronic diseases, self-perceived health status and health risk behaviors: gender differences

ABSTRACT

OBJECTIVE: To assess the association between chronic diseases and health risk behaviors and self-perceived health status by gender.

METHODS: A total of 39.821 adults (30+ years old) who participated in the system *Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico* (VIGITEL – Telephone-Based Surveillance of Risk and Protective Factors for Chronic Diseases) carried out in 27 Brazilian capitals in 2006 were included in the study. The dependent variable was medical diagnosis reporting of diabetes, hypertension and myocardial infarct or stroke. Respondents were grouped into three categories: no disease; one chronic disease; and two or more. The associations between the dependent variable and sociodemographic characteristics, behavioral risk factors (smoking, consumption of fatty meat and whole milk, leisure-time physical inactivity, low fruit and vegetable intake and intake of added salt) and self-perceived health status were assessed in men and women using multinomial logistic regression.

RESULTS: Chronic disease reporting was higher among older men and women with lower schooling, BMI≥30kg/m^2 and who were on a diet. There was an inverse association between number of risk behaviors and two or more chronic diseases (OR: 0.64; 95% CI: 0.54;0.76 among men and OR: 0.86; 95% CI: 0.77;0.97 among women). Those men (OR: 33.61; 95% CI: 15.70;71.93) and women (OR: 13.02; 95% CI: 6.86;24.73) who self-perceived their health as poor reported more chronic diseases. There was no statistical interaction between self-perceived health status and gender.

CONCLUSIONS: An inverse association between number of risk behaviors and reporting of two or more chronic diseases suggests a reverse causality and/or higher survival rates among those who take better care of themselves. Men seem to have poorer perception of their health status compared to women, after adjustment for confounders.

DESCRIPTORS: Risk taking. Gender and Health. Socioeconomic Factors. Chronic Diseases. Health Surveys. Brazil. Health self-assessment. Telephone interview.

[I] Departamento de Medicina Preventiva e Social. Faculdade de Medicina (FM). Universidade Federal de Minas Gerais (UFMG). Belo Horizonte, MG, Brasil

[II] Programa de Pós-Graduação em Saúde Pública. FM-UFMG. Belo Horizonte, MG, Brasil

Correspondence:
Sandhi Maria Barreto
Av. Alfredo Balena 190, sala 814
30130-100 Belo Horizonte, MG, Brasil
E-mail: sbarreto@medicina.ufmg.br

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INTRODUCTION

Chronic non-communicable diseases (CNCD) account for almost 60% of deaths worldwide.[21] A mortality study conducted in Brazilian capitals between 1930 and 1980 reported a shift in the mortality trends from the mid-1960s with marked reduction of mortality rates due to infectious and parasitic diseases and increased CNCD including cardiovascular diseases and diabetes.[9]

Self-reported morbidity has been an approach used in health surveys such as the Brazilian National Household Survey (PNAD) and the National Health and Nutrition Examination Survey in the United States. Besides providing information on CNCD, many population-based surveys also provide data on prevalence of modifiable risk factors for CNCD, which enables to monitor them and identify shifts over time.

From early 1980s, longitudinal studies have supported the predictive ability of self-perceived health status on ensuing mortality in adults and functional decline in elderly populations. Answers in a Likert-type scale to questions about one's own health status compared to same-age individuals are better predictors of mortality than objective health assessments, reflecting that people have an integrated perception of their own health, including biological, psychological, and social dimensions.[12,16]

The magnitude of association between self-perceived health status and chronic diseases, limited daily activities due to health conditions and health behaviors seems to vary according to gender.[18] In Canada, a study investigating the association between self-perceived health status and chronic diseases showed that social and psychosocial determinants have a stronger impact on women's health while behavioral determinants play a major role on men's health.[3] While men are less likely to report health conditions than women, they more often perceive their health as poor.[11]

The objective of the present study was to analyze the association between chronic disease reporting and risk behaviors and self-perceived health status, stratified by gender.

METHODS

The Brazilian Ministry of Health implemented in 2006 the Telephone-Based Surveillance of Risk and Protective Factors for Chronic Diseases (VIGITEL).[a] This system allows ongoing monitoring of prevalence and distribution of risk and protective factors for chronic diseases in 26 Brazilian capitals and Federal District.

VIGITEL sampling comprised a systematic drawing of 5,000 telephone lines per city, followed by redrawing of telephone lines in each city and grouping into 25 replicates of 200 lines. All active home telephone lines were eligible to participate in the study. All individuals aged ≥18 years living in the household were listed and one of them was drawn to be interviewed. VIGITEL has set a minimum sample of 2,000 individuals per city to estimate the prevalence of risk factors for CNCD in adults with 95% confidence and maximum error of two percent points. Data was collected through computer-assisted telephone interviews in probabilistic samples of adult population living in households with fixed telephone lines.

Of 76,330 telephone calls made, 54,369 interviews were complete (71%) with response rates ranging between 64.4% (Porto Alegre, RS) and 81.0% (Palmas, TO). Unanswered calls were due to permanently busy lines, lines connected to fax or answering machines or impossibility to locate the adult selected from a household after 10 attempts. Refusal rate was 9.1%, ranging from 5.4% (Palmas) to 15.0% (Porto Alegre). Of 54,369 respondents, 21,294 were males and 33,075 were females. Detailed survey methods were described by Moura et al (2008) and published elsewhere.[14]

Telephone interviews took on average 7.4 minutes (median 6.9 minutes, standard deviation 3.3 minutes) and a structured questionnaire was applied. The present study included 39,821 adults (15,033 men and 24,788 women) aged ≥30 years. The dependent variable was medical diagnosis reporting of diabetes, hypertension, myocardial infarction and/or stroke, which are all conditions with common behavioral risk factors. The respondents were divided into three groups: no chronic diseases; one chronic disease; and two or more chronic diseases.

The independent variables were sociodemographic and behavioral factors, and health indicators. Sociodemographic variables included gender, age (30–39; 40–49; 50–59; 60–69; and ≥70 years old), self-referred skin color/race (white; black; mixed; Asian; and indigenous), marital status (married; single; separated; divorced and widowed), and schooling (0–8, 9–11, and ≥12 years).

The following were defined as risk behaviors: regular consumption of fatty red meat and poultry with skin; consumption of whole milk; low fruit, legume and vegetable intake (less than five days a week); inadequate leisure-time physical activity (defined as no leisure-time physical activity; no mild or moderate activity for

[a] Ministério da Saúde. VIGITEL Brasil 2006. Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre freqüência e distribuição sócio-demográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2006. Brasília; 2007.

at least 30 minutes a day in five or more days a week; or vigorous activity for at least 20 minutes a day in three or more days a week); current smoking regardless of the amount consumed; and practice to add salt to prepared food. Health indicators included body mass index (BMI), calculated using self-referred weight and height and categorized into <25 kg/m², 25–29 kg/m², and ≥30 kg/m²; currently on a diet (no/yes); and self-perceived health status (excellent, good, fair, and poor).

Risk behaviors were scored in a 0–6 scale corresponding to the sum of conditions: smoking, consumption of fatty red meat and/or poultry with skin, consumption of whole milk, leisure-time physical inactivity, fruit and vegetable intake less than five times a week, and intake of added salt. This continuous variable was also used to test the modifying effect of health perception on the relationship between risk profile and presence of chronic disease.

Pearson's chi-square test was performed to compare chronic disease reporting and age between men and women. The association between chronic diseases and independent variables was assessed through multinomial logistic regression. Considering that variables in the same domain are more likely to act as confounders, an intermediate multivariate analysis was performed within each block, including all variables associated at a level of significance of $p<0.20$ in the univariate analysis.

Only those variables included in the three intermediate models were tested in the final multivariate analysis at a 5% level of significance. Risk behavior was included in the final model as a continuous variable instead of individual behavioral variables. In the analysis, the reference category was having no chronic diseases. The magnitude of association was verified using odds ratios (OR) and 95% confidence intervals. The interactions between self-perceived health status and risk behaviors were tested by including interaction terms in the final model stratified by gender.

All analyses were conducted using Stata (version 9.2). To correct for the probability of selecting households with more than one telephone line and number of people living in the same household, different weights were assigned to each respondent. Given that fixed telephone coverage is not universal, a weighting factor was used to approach the sample's sociodemographic composition to that of those aged 18 years and more in each city. Additionally, a second weighting was applied to take into account differences between populations of each city and number of individuals selected per city.

As this was a telephone survey, an oral consent from all respondents was obtained at the time of phone contact. VIGITEL was approved by the *Comissão Nacional de Ética em Pesquisa para Seres Humanos* (Human Research Ethics Committee) of the Brazilian Ministry of Health.

RESULTS

The prevalences of people with one or two or more CNCD were significantly higher among women (Table 1).

The bivariate analysis showed that men with one or two or more CNCD were older, had ≤12 years of schooling and were mostly single, divorced, separated or widowed. Reporting two or more CNCD was about 22 times more common among men aged ≥70 years than those aged 30–39. Skin color did not show any association with CNCD reporting among men (Table 2).

Reporting one or two or more CNCD was significantly higher among older women, and reporting two or more CNCD were 62 times more common among women aged ≥70 years compared to those aged 30–39. CNCD reporting was more frequently seen among women with lower schooling, who were single, divorced, separated or widowed. Skin color was also not associated with CNCD reporting (Table 2).

Men with one CNCD were almost five times more likely to perceive their health as poor compared to those reporting no chronic diseases. And men with two or more CNCD were 28 times more likely to perceive it as poor. BMI ≥30 kg/m² was associated with one (OR=2.70; 95% CI: 2.13;3.43) and two or more

Table 1. Distribution of men and women (aged ≥30 years) according to chronic non-communicable disease reporting. Brazil, 2006.

Disease reporting	Men		Women		Total	
	%	95% CI	%	95% CI	%	95% CI
No CNCD	70.8	69.2;72.3	64.5	63.2;65.8	67.4	66.4;68.3
One CNCD	23.7	22.3;25.2	27.5	26.4;28.8	25.8	24.9;26.7
Two or more CNCD	5.5	4.7;6.4	7.9	7.2;8.7	6.8	6.3;7.4

Pearson's chi-square test, Pr=0.000
CNCD: Chronic non-communicable disease
[a] Weighed percent to adjust the sociodemographic distribution of VIGITEL sample to entire adult population from 2000 Population Census in each city.

Table 2. Odds ratio[a] of chronic non-communicable diseases reporting among men and women (aged ≥30 years) according to sociodemographic characteristics.[b] Brazil, 2006.

Sociodemographic characteristic	Men		Women	
	One CNCD OR (95% CI)	Two or more CNCD OR (95% CI)	One CNCD OR (95% CI)	Two or more CNCD OR (95% CI)
Age (years)	1.06 (1.05;1.06)	1.09 (1.07;1.10)	1.05 (1.05;1.06)	1.09 (1.08;1.10)
Age groups (years)				
30-39	1	1	1	1
40-49	2.05 (1.59;2.63)	1.38 (0.57;3.38)	1.76 (1.43;2.18)	5.75 (2.85;11.62)
50-59	4.26 (3.27;5.56)	6.59 (2.80;15.53)	3.88 (3.11;4.84)	22.95 (11.89;44.31)
60-69	6.22 (4.62; 8.38)	13.58 (5.70;32.33)	7.55 (5.98;9.53)	59.97 (31.18;115.32)
≥70	8.37 (6.15;11.38)	21.58 (9.17;50.79)	7.91 (6.25;10.02)	61.71 (32.20;118.26)
Schooling (years)				
0-8	1	1	1	1
9-11	0.86 (0.72;1.02)	0.44 (0.32;0.61)	0.50 (0.44;0.57)	0.33 (0.26;0.43)
≥12	0.88 (0.73;1.07)	0.66 (0.46;0.94)	0.38 (0.32;0.45)	0.17 (0.12;0.24)
Marital status				
Married	1	1	1	1
Single	1.88 (1.47;2.39)	1.77 (0.79;3.98)	1.18 (0.98;1.41)	2.28 (1.66;3.12)
Divorced./Separated/ Widowed	2.49 (1.76;3.52)	3.32 (1.41;7.81)	2.18 (1.79;2.65)	5.26 (3.84;7.20)
Skin color				
White	1	1	1	1
Black	1.43 (0.99;2.07)	1.11 (0.57;2.14)	1.63 (1.24;2.14)	1.68 (1.12;2.51)
Mixed	0.93 (0.78;1.09)	0.87 (0.62;1.22)	1.09 (0.96;1.24)	0.96 (0.77;1.19)
Asian	0.53 (0.12;2.39)	11.99 (3.92;36.64)	1.27 (0.57;2.83)	0.93 (0.29;2.94)
Indigenous	1.28 (0.31;5.21)	0.98 (0.20;4.70)	0.67 (0.13;3.41)	0.07 (0.01;0.58)

[a] Weighed percent to adjust the sociodemographic distribution of VIGITEL sample to entire adult population from 2000 Population Census in each city.
[b] Reference category: no chronic disease.

CNCD reporting (OR=3.65; 95% CI: 2.22;6.00). Among men, there was an inverse association between being on a diet and one reporting one CNCD (OR=0.49; 95% CI: 0.40;0.62) or two or more CNCD (OR=0.19; 95% CI: 0.12;0.30) (Table 3).

The prevalence of poor self-perceived health status was four times higher among women with one CNCD than in those who reported no chronic disease, and about 16 times higher among those with two or more CNCD. Women with BMI ≥30 kg/m² were almost four times more likely to report one CNCD, and almost seven times more likely to report two or more CNCD. Being on a diet was inversely associated with reporting of one CNCD (OR=0.64; 95% CI: 0.55;0.75) and two or more CNCD (OR=0.57; 95% CI: 0.45;–0.72). (Table 3)

The consumption of fatty red meat or poultry was inversely associated to reporting of one CNCD (OR=0.71; 95% CI: 0.60;0.83) and two or more CNCD (OR=0.33; 95% CI: 0.24;0.45) among men. Added salt to prepared food showed an inverse association (OR=0.82; 95% CI: 0.70;0.96) with reporting of one chronic disease among men, but it was not associated with reporting of two or more chronic diseases. Fruit and vegetable intake was lower (OR= 0.51; 95% CI: 0.35;0.75) among those with two or more CNCD (Table 4).

As for leisure-time physical activity, men who reported having two or more CNCD were more active (OR= 0.56; 95% CI: 0.35;0.90) than those who reported no CNCD. Consumption of whole milk and having at least one risk behavior were inversely associated with reporting of one or two or more CNCD among men (Table 4).

The consumption of fatty red meat among women was inversely associated with reporting of one CNCD (OR=0.78; 95% CI: 0.67;0.91) and two or more CNCD (OR=0.60; 95% CI: 0.46;0.80). Adding salt to prepared food showed an inverse association (OR=0.79; 95% CI: 0.70;0.90) with reporting of one CNCD, but was not associated with reporting of two or more CNCD. Women who reported CNCD were less active than those who reported no CNCD. Consumption of whole milk and having at least one risk

Table 3. Odds ratio[a] of chronic non-communicable disease reporting among men and women (aged ≥30 years) according to health indicators. Brazil, 2006.[b]

Health indicators	Men		Women	
	One CNCD OR (95% CI)	Two or more CNCD OR (95% CI)	One CNCD OR (95% CI)	Two or more CNCD OR (95% CI)
Self-perceived health status				
Excellent	1	1	1	1
Good	1.79 (1.36;2.36)	2.44 (1.40;4.24)	1.60 (1.23;2.08)	1.60 (0.98;2.62)
Fair	3.99 (3.00;5.32)	8.41 (4.79;14.75)	3.68 (2.83;4.79)	7.75 (5.20;12.37)
Poor	4.59 (2.82;7.49)	28.01 (14.27;55.00)	4.21 (3.00;5.91)	16.05 (9.51;27.10)
BMI (kg/m²)				
<25	1	1	1	1
25-29	1.58 (1.31;1.89)	1.70 (1.23;2.37)	2.09 (1.80;2.43)	2.22 (1.70;2.89)
≥30	2.70 (2.13;3.43)	3.65 (2.22;6.00)	3.88 (3.20;4.72)	6.86(5.06;9.30)
Current dieting				
No	1	1	1	1
Yes	0.49 (0.40;0.62)	0.19 (0.12;0.30)	0.64 (0.55;0.75)	0.57 (0.45;0.72)

[a] Weighed percent to adjust the sociodemographic distribution of VIGITEL sample to entire adult population from 2000 Population Census in each city.
[b] Reference category: no chronic disease.
BMI: Body mass index.

behavior were inversely associated with reporting of both one and two or more CNCD (Table 4).

In the multivariate analysis, 9–11 years of schooling among men and ≥12 years of schooling among women remained inversely associated with reporting of one or two or more CNCD. BMI of 25–29 kg/m² and ≥30 kg/m² remained associated with reporting of one or two or more CNCD in both men and women. Being on a diet and number of risk behaviors remained inversely associated with reporting one or two or more CNCD in both men and women. The variable self-perceived health status remained associated with reporting of one or two or more CNCD in both men and women. It was also found that the inclusion of self-perceived health status in the model did not change the association with risk behaviors. Poor self-perceived health status remained associated with reporting of one CNCD (OR=4.41 in men and OR=3.32 in women) and two or more CNCD, being the magnitude of association among men (OR= 33.61) greater than the magnitude among women (OR=13.02). However, this variation in the magnitude of self-perceived health status by gender was no statistically different (Table 5).

The interaction between self-perceived health status and risk behaviors was not statistically significant.

DISCUSSION

The present study showed an inverse association between chronic disease reporting and risk behaviors but this association is not affected by self-perceived health status. Men and women with CNCD had poorer perception of their health, but there was no statistical interaction between self-perceived health status and gender.

Epidemiological studies are commonly based on self-reported information as it is a relatively simple and low-cost approach to data collection. However, quality of reporting varies depending on the condition studied.[2,10,a] Cardiovascular diseases and diabetes seem to be adequately reported in Brazil due to its universal health coverage.[14]

The prevalence of CNCD reporting increased with age and the magnitude of this association was greater among women. This remarkable increase was also described in the 2003 PNAD study and other studies.[8,b] Longer life span is parallel to increasing disease burden and social impact of CNCD.

The inverse association found between schooling and chronic disease reporting corroborates data from the 2003 PNAD, which showed a prevalence of CNCD 62% higher among adults with lower schooling.

[a] Ministério da Saúde. Inquérito domiciliar sobre comportamentos de risco e morbidade referida de doenças e agravos não transmissíveis: Brasil, 15 capitais e Distrito Federal, 2002-2003. Rio de Janeiro: INCA; 2004
[b] Cesar CLG, Carandina L, Alves MCGP, Barros MBA, Goldbaum M. Saúde e condição de vida em São Paulo. Inquérito multicêntrico de saúde no Estado de São Paulo – ISA-SP. São Paulo: FSP/USP; 2005

Table 4. Odds ratio[a] of chronic non-communicable disease reporting among men and women (aged ≥30 years) according to selected risk behaviors. Brazil, 2006.[b]

Variable	Men		Women	
	One CNCD OR (95% CI)	Two or more CNCD OR (95% CI)	One CNCD OR (95% CI)	Two or more CNCD OR (95% CI)
Consumption of fatty red meat or poultry				
No	1	1	1	1
Yes	0.71 (0.60;0.83)	0.33 (0.24;0.45)	0.78 (0.67;0.91)	0.60 (0.46;0.80)
Intake of added salt				
Não	1	1	1	1
Sim	0.82 (0.70;0.96)	1.02 (0.76;1.38)	0.79 (0.70;0.90)	1.02 (0.83;1.25)
Current smoking				
No	1	1	1	1
Yes	0.85 (0.69;1.04)	0.42 (0.28;0.64)	0.72 (0.59;0.88)	0.66 (0.45;0.98)
Low fruit and vegetable intake[c]				
No	1	1	1	1
Yes	0.85 (0.71;1.02)	0.51 (0.35;0.75)	0.95 (0.83;1.08)	1.30 (0.94;1.77)
Leisure-time physical inactivity[d]				
No	1	1	1	1
Yes	0.91 (0.79;1.21)	0.56 (0.35;0.90)	0.90 (0.76;1.08)	1.43 (1.14;1.80)
Consumption of whole milk				
No	1	1	1	1
Yes	0.84 (0.72;0.99)	0.51 (0.38;0.69)	0.81 (0.72;0.92)	0.67 (0.54;0.82)
Risk behavior[e]	0.85 (0.79;0.91)	0.59 (0.52;0.68)	0.86 (0.81;0.90)	0.85 (0.78;0.93)

[a] Weighed percent to adjust the sociodemographic distribution of VIGITEL sample to entire adult population from 2000 Population Census in each city.
[b] Reference category: no chronic disease.
[c] Consumption less than five days a week.
[d] Inadequate leisure-time physical activity: no leisure-time physical activity; no mild or moderate activity for at least 30 minutes a day in five or more days a week; or no intense activity for at least 20 minutes a day in three or more days a week.
[e] Continuous variable from zero to six corresponding to the number of risk factors.

Higher prevalence of CNCD has also been reported in other countries in individuals with lower schooling or income.[8,10]

CNCD reporting was more commonly seen among non-married respondents. This finding corroborates that reported in a study by GAZEL[13] that reported higher number of diseases in those living alone compared to those living with a partner. This association seems to be due to greater exposure of non-married individuals to behavioral risk factors for CNCD.[7] In the present study, this association was seen in the univariate analysis but it disappeared in the final model.

Higher rates of CNCD reporting seen in men and women with BMI ≥30kg/m² support an association between weight gain, abdominal obesity, and development of diabetes and cardiovascular diseases.[21]

The present study showed that CNCD was associated to poor self-perceived health status in both men and women. However, men were over two times more likely to perceive their health as poor, although the gender difference was not statistically significant. Even though men tend to report less health conditions than women, they seem to have a poorer perception of their health when they are diagnosed with CNCD.[3,19] Studies on health-related gender differences in industrialized countries showed that, although women live longer than men, they tend to report more health conditions and psychological problems and utilize more health services. This apparent contradiction is attenuated by different age-related disease patterns.[17,19]

Our results show that respondents who reported CNCD consumed less added salt and whole milk and smoked less. A similar association was seen between risk behaviors and CNCD reporting, suggesting probably a reverse causality. Cross-sectional studies have demonstrated that this finding largely reflects lifestyle changes because of disease and/or longer survival of those who report fewer risk behaviors. Individuals with CNCD tend to utilize more health services and thus are advised to change their behaviors includ-

Table 5. Factors statistically associated to one or two or more chronic disease reporting among men and women (aged ≥30 years) in the multivariate analysis. Brazil, 2006.[a]

Variable	Men		Women	
	One CNCD OR[b] (95% CI	Two or more CNCD OR[b] (95% CI)	One CNCD OR[b] (95% CI)	Two or more CNCD OR[b] (95% CI)
Age (years)	1.06 (1.05;1.07)	1.09 (1.07; 1.10)	1.05 (1.05;1.06)	1.09 (1.08;1.10)
Schooling (years)				
0-8	1	1	1	1
9-11	1.13 (0.93; 1.38)	0.64 (0.43;0.95)	0.69 (0.59;0.82)	0.64 (0.48;0.85)
≥12	1.01 (0.81;1.26)	0.68 (0.43;1.08)	0.55 (0.46;0.67)	0.37 (0.26;0.53)
BMI (kg/m²)				
<25	1	1	1	1
25-29	1.63 (1.34;1.99)	1.78 (1.23;2.63)	1.59 (1.35;1.88)	1.55 (1.17;2.07)
≥30	2.58 (2.01;3.31)	3.26 (2.03;5.23)	2.77 (2.23;3.44)	3.98 (2.79;5.68)
Current dieting				
No	1	1	1	1
Yes	0.64 (0.49;0.83)	0.25 (0.17;0.39)	0.77 (0.63;0.92)	0.57 (0.42;0.78)
Risk behavior	0.89 (0.82;0.96)	0.64 (0.54;0.76)	0.86 (0.80;0.92)	0.86 (0.77;0.97)
Self-perceived health status				
Excellent	1	1	1	1
Good	1.70 (1.26;2.30)	2.43 (1.33;4.33)	1.50 (1.09;2.06)	1.44 (0.80;2.57)
Fair	3.61 (2.62;4.98)	7.83 (4.21;14.58)	3.11 (2.24;4.32)	6.58 (3.74;11.57)
Poor	4.41 (2.56;7.58)	33.61 (15.70;71.93)	3.32 (2.17;5.09)	13.02 (6.86;24.73)

[a] Reference category: no chronic disease.
[b] Weighed percent to adjust the sociodemographic distribution of VIGITEL sample to entire adult population from 2000 Population Census in each city.

ing dietary changes and smoking cessation as these positive changes can delay or prevent complications commonly associated to CNCD mortality. An inverse association is a positive indicator especially among men with medical conditions because it suggests better care of their health.

The present study did not find an interaction between poor self-perceived health status and risk behaviors, suggesting a need for longitudinal studies to further investigate whether poor self-perceived health status is associated to health behavioral changes. Health self-perception can influence behaviors that may have a late effect on health; individuals who self-perceive their health as poor tend to have more risk behaviors.[6] A longitudinal study conducted in Russia[15] showed that smoking was significantly associated to mortality, but not with poor health perception. The results of the present study suggest that poor self-perceived health status can be correlated to lower prevalence of risk behaviors among those with CNCD, especially in men with two or more CNCD, compared to those reporting no CNCD. A nested case-control study conducted in adults who had myocardial infarction found a relationship between poor self-perceived health status and number of risk factors.[20] Another case-control study on risk factors for stroke identified a higher, though not statistically significant, positive interaction between poor self-perceived health status and smoking in men compared to women.[4] This assumption may explain the apparent paradox seen in the present study, but it needs to be further investigated in longitudinal studies.

The present study design does not allow to making any causal or temporal inferences on the associations found. Self-reported information may be influenced by access to health services and recall bias. However, studies carried out in Brazil and other countries have demonstrated the validity of self-reported information with good sensitivity and specificity to detect health conditions.[9,16]

The main advantages of telephone-based surveys compared to face-to-face interviews is that the former are less costly and time-consuming and potentially have greater coverage of areas for data collection. Nonetheless, even in countries with wide telephone coverage, respondents of telephone surveys have different characteristics compared to general population, especially regarding income and schooling. The same is true in Brazil, where access to fixed telephone line

is determined by socioeconomic factors. Therefore, poor populations are usually underrepresented in the samples while those with higher purchase power are overrepresented as they may have more than one phone line at home.[1,8]

A recent study based on PNAD data found that the existence of a subgroup of people living in households with no telephone lines and having different sociodemographic and geographical characteristics can be a source of error and may affect the predefined level of confidence for the estimates found. An approach commonly applied to counterbalance errors resulting from the exclusion of households with no fixed telephone lines is to adjust the distribution of the sample with telephone lines to that of the entire population according to telephone line-related characteristics.[5] Thus, potential distortions associated to the inferences made are expected to be reduced.

In Brazil, fixed telephone coverage is estimated between 31.4% and 89.9% in the lowest and highest quintiles of per capita family income distribution of households in 27 cities included in VIGITEL.[a] Despite these differences, VIGITEL had a high response rate (71.1%), which contributed to improved data quality, allied to weighting factors applied to reduce bias.[14] The number of male respondents (n=15,033) was much lower than female respondents (n=24,788) in this study, suggesting a differential participation rate by gender. However, this may not affect the associations studied because the analysis was stratified by gender and there is no indication that participation was related to the variables included in the analysis.

Albeit men and women take into account the same factors while assessing their own health,[18] the diagnosis of CNCD seems to have a different impact on self-perceived health status.[9] Men who have been diagnosed with CNCD, especially with two or more CNCD, seem to have a poorer perception of their own health, even after considering different schooling levels, risk behaviors, and objective health indicators. It is necessary to further explore distinctive characteristics and mechanisms associated to the impact of diseases on self-perceived health status in men and women for better disease management and promotion of protective health behaviors. This knowledge may help explaining why men with two or more chronic diseases report fewer risk behaviors than women with the same conditions.

[a] Ministério da Saúde. VIGITEL Brasil 2006. Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre freqüência e distribuição sócio-demográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2006. Brasília; 2007.

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