

# Factors associated with physical activity in Goiania's adult population: surveillance through telephone interviews

## Abstract

**Introduction:** Practicing regular, moderate to vigorous physical activities has an inverse relation to morbidity-mortality caused by cardiovascular diseases and obesity. It is essential to identify the determinants of this practice in order to propose strategies for populations to adopt a physically active lifestyle. **Objective:** To determine the factors associated with practicing physical activity and sedentary lifestyle in the adult population of Goiania. **Methods:** Multi-center, cross-sectional study, carried out in Goiania with a probabilistic sample of the adult population with landline phones. 2,002 interviews were conducted through phone calls, setting a success rate of 73.1%. The database was built, and statistical analyses were carried out with the support of STATA software, version 8.0. **Results:** A sedentary lifestyle was more prevalent among women (55.5%) than among men (42.0%). The prevalence of hypertension was lower in individuals practicing physical activity ( $p=0.0002$ ). Regarding leisure-time physical activity, women were more inactive (79.3%) than men (66.9%). There was an inverse relationship between a sedentary lifestyle and the educational background for both genders. **Conclusion:** Due to this snapshot, showing a high frequency of sedentary lifestyle in the population, we suggest the implementation of primary prevention strategies to improve the risk profile for non-communicable chronic diseases.

**Keywords:** Physical activity. Sedentary lifestyle. Non-communicable chronic diseases. Risk factors. Surveillance.

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## Introduction

The number of non-communicable chronic diseases (NCCDs) went through three-fold increase between the decades of 30 and 90<sup>1</sup>, according to historical mortality data of Brazilian capitals, thus reflecting the change in the health profile of the Brazilian population.

Prospective cross-sectional epidemiological studies have shown a strong association between the main NCCDs (cardiovascular disease, diabetes and certain types of cancer) and a number of risk factors such as smoking, excessive alcohol consumption, overweight, hypertension, hypercholesterolemia, low consumption of fruits and vegetables, and a sedentary lifestyle<sup>2</sup>.

According to the World Health Organization (WHO), the determinants to identify an individual as sedentary or physically inactive are: occupation, commuting, household chores, and leisure<sup>3</sup>.

Some authors consider physical activity as any body movement produced by skeletal muscles that results in energy expenditure; and leisure time inactivity as the lack of physical activity at moments of leisure<sup>4</sup>.

Epidemiological studies show that there is an inverse relationship between the level of daily physical activity and morbimortality due to cardiovascular disease and diabetes type II, regardless of the degree of adiposity<sup>5</sup>.

Risk factors for NCCDs are not adequately monitored in Brazil<sup>6</sup>, despite its importance in defining the epidemiological profile of the population. According to the Survey of Living Standards (SLS), a household survey conducted in adults in 1996/1997 to identify patterns of physical activity in the Northeast and Southeast regions of Brazil, only 13% of the population reported practice of leisure-time physical activity. Among practitioners of physical activity, 18.2% were men and 8.2% women<sup>7</sup>.

Possible reasons for the low levels of physical activity of western populations, including developing countries, are changes in living habits, work, and purchase of

durable consumer goods, such as TV sets and computers, common products in the age of information technology. They lead people to spend many hours a day sitting and relatively inactive<sup>8,9</sup>.

Given the high rates of inactivity, it is essential to identify the determinants of physical activity, to then propose programs to foster its practice as well as strategies to encourage the population to adopt a physically active lifestyle<sup>10</sup>. In order to encourage the public to maintain an active lifestyle throughout life, for the control of NCCDs, the World Health Organization (WHO) has developed a Global Strategy (WHO/GS). It recommends the practice of moderate-intensity physical activities for at least 30 minutes on most days, which can be distributed along the day, including household chores, dance, and recreational activities<sup>11,12</sup>.

The incorporation of physical activity as habit contributes effectively to control body weight and can also alleviate the emotional stress and other psychosocial factors related to obesity<sup>13</sup>.

The practice of regular physical activity reduces the risk of cardiovascular diseases, some types of cancers, and helps to control blood pressure and diabetes type II, by promoting an increase in insulin turnover, enhancing liver absorption, improving the sensitivity of peripheral receptors, and reducing complications related to comorbidities; moreover, the practice of physical activity, associated to a healthy diet, improves the lipid profile in the long term<sup>13,14</sup>.

This study aimed to determine the factors associated with physical activity and inactivity in the adult population of the city of Goiânia through telephone interviews.

## Materials and Methods

This is a cross-sectional population study, conducted in the city of Goiânia/GO with a probabilistic sample of adults living in households served by landline telephones. Interviews were conducted via telephone, based on the municipal system

for monitoring NCCDs risk factors, called SIMTEL, which includes the application of periodic surveys.

The project was reviewed and approved by the Research Ethics Committee of the School of Public Health of the University of São Paulo in accordance with the requirements of resolution CNS196/96. As they were telephone interviews, the written informed consent was replaced by duly recorded verbal consent obtained by telephone contact.

The NCCD risk factor monitoring system was first used in the municipality of São Paulo in 2003; and in 2005, it was again held in this city and expanded to other Brazilian capitals (Belém, Florianópolis, Goiânia and Salvador). The results presented in this paper refer to the city of Goiânia, in 2005.

In 2006, the Ministry of Health, through the Department of Health Surveillance and the Department of Strategic and Participative Management, deployed the system VIGITEL – Telephone-Based Surveillance of Chronic Disease Risk Factors and Protection. This system aims at the continuous monitoring of the distribution and frequency of chronic diseases risk factors and protection in all the capitals of the 26 Brazilian states and the federal district.

Further details on the methodological procedures employed both in the sampling process and in SIMTEL operation have been described in a previous publication<sup>15</sup>.

Interviewers had to make the telephone calls to the lines drawn; confirm they were active residential lines; explain to respondents the purpose of the monitoring system; ask their consent to participate in the study; list in ascending order the ages of the adults living in that home; randomly choose from that list the adult to be interviewed; and write down the best days and times for the interview.

The stratified and systematic draw of phone lines, the selection of residents (one resident at least 18 years old for each telephone line drawn), and interviews occurred in the period between May and December 2005. 2002 interviews were conducted, thus providing estimates with 95% confidence

interval (95%CI) and maximum error of two percentage points of the prevalence for any risk factor for the NCCDs studied.

Each phone number that was drawn received up to 10 calls at various days and times. To that end, we used a microcomputer, whose software, developed for the research, drew the interviewee and recorded questions asked. Interviews lasted on average 8 minutes and included the reading of short and simple questions; recording of answers; skipping non-applicable questions, depending on answers; recording interviews for subsequent quality control; and the automatic creation of a database.

The questions of the questionnaire referred to socio-demographic characteristics, patterns of diet, physical activity, smoking, consumption of alcoholic beverages, weight, height, self-assessment of health status, and report of medical diagnosis of non-communicable chronic diseases (diabetes, hypertension and dyslipidemias).

The questionnaire is available at the website: [www.saude.gov.br/svs](http://www.saude.gov.br/svs) (questionário VIGITEL).

The following variables were used in this study: socio-demographic (age, sex, marital status, and full school years), physical activity, weight, height and self-reported diagnosis of NCCDs.

With regard to physical activity, we collected information on the type of exercise practiced; frequency or lack of leisure-time physical activity (active and inactive leisure time); and the general behavior in relation to exercise (sedentary lifestyle). To define the variable “inactivity”, all of the following categories had to be present: inactive leisure time (no leisure-time physical activity); inactive occupation (self-reported mild or very mild effort during work); inactive at household (no heavy domestic activity - less than 3 days per week lasting less than 3 hours); and inactive in commuting (commutes by car, bicycle, bus, or spends less than 10 minutes walking or cycling).

Following WHO's<sup>11</sup> international recommendations, sufficient leisure-time physical activity was the practice of at least

30 minutes of daily physical activity for mild or moderate intensity on five or more days of the week, or the practice of at least 20 minutes of daily physical activity of vigorous intensity on three or more days of the week. Conventional walking, walking on a treadmill, bodybuilding, water aerobics, general gymnastics, swimming, martial arts, cycling, and volleyball were classified as mild or moderate intensity exercise. Running, running on a treadmill, aerobics, soccer, basketball, and tennis were classified as vigorous intensity exercise<sup>16</sup>.

One way to assess the intensity of physical activity is through the amount of energy spent, expressed as a multiple of a Metabolic Unit (MET). The Compendium of Physical Activities presents a list of activities and relates them to their calorie expenditure and, consequently, the level of intensity of each activity<sup>16</sup>.

We investigated previous medical diagnoses of hypertension, diabetes mellitus, and dyslipidemia, as reported by participants in answering a yes/no question.

The anthropometric measures (reported weight and height) were used for determining the body mass index (BMI), calculated as the ratio of weight (kg) by the square of height (m). For the classification of the nutritional status, we used the WHO's recommendations<sup>17</sup>: BMI < 18.5 Kg/m<sup>2</sup> (underweight), 18.5 to 24.9 kg/m<sup>2</sup> (normal), 25 to 29.9 Kg/m<sup>2</sup> (overweight), and BMI ≥ 30Kg/m<sup>2</sup> (obese). The overweight category represents the sum of overweight and obese individuals, with the cutoff point at BMI ≥ 25 kg/m<sup>2</sup>.

The construction of the database and statistical analyses were performed by the application Statistical Software for Professionals (STATA)<sup>18</sup>, version 8.0, using the functions "svy", considering the complex nature of the sample. Statistical analyses of the association between risk indicators and socio-demographic characteristics with the practice of physical activity or inactivity were performed using the chi-square statistical test of distribution, weighted by an adjustment factor designed to "represent" the adult population.

## Results

3145 phone lines were drawn, and 2738 (87.1%) were considered eligible. The main causes of ineligibility were: line permanently without answer, or no answer after ten calls (10.1%); out of service or nonexistent line (2.8%). 2002 interviews were conducted, with a success rate of 73.1%. The main cause that prevented interviews was refusal to participate (6.8%).

In considering the factors that influenced the practice of physical activity, we noted that women are more active in household chores; on the other hand, as to leisure-time physical activity, men had a significantly more active lifestyle (33.1%) than women (20.7%) (Table 1).

In analyzing the frequency of the modalities of physical activity practiced by the population studied, we found gender differences. Among those who practiced some form of sport, 30.9% of the men and 60.6% of the women practiced walking, respectively; the most frequent sports modality for men was football (30.7%) and bodybuilding for women (7.4%) (this information is not presented in the tables).

With regard to the self-reported physical intensity of occupational activity, only 21.5% of men and 11.5% of women reported that their work was heavy or very heavy. When considering walking or cycling to commute to the workplace, only 8.5% of individuals of both sexes reported that habit. The prevalence of inactivity was higher among women (55.5%) than among men (42.0%) (Table 1).

After examining the distribution of the practice of leisure-time physical activity, according socio-demographic variables and gender, we noted that younger men with higher education practice leisure-time physical activity more often. For women, age, education and marital status did not influence the practice of leisure-time physical activity (Table 2).

Table 3 presents the frequencies of sedentary lifestyle according to gender for each of the variables analyzed. There

**Table 1** - Prevalence of physical activity and inactivity in the adult population according to adjustment. Goiânia, 2005

	Frequency (%)** (n = 2002)	
	Male % IC (95%)	Female % IC (95%)
Leisure Time Physical Activity		
Active	33.12 (29.07-37.43)	20.72 (17.84-23.93)
Inactive	66.88 (62.57-70.92)	79.28 (76.07-82.16)
Occupational Physical Activity		
Active	21.54 (17.460-26.28)	11.46 (9.31-14.02)
Inactive	78.46 (73.72-82.54)	88.54 (85.98-90.69)
Active	8.41 (6.14-11.41)	8.66 (6.66-11.18)
Inactive	91.59 (88.59-93.86)	91.34 (88.82-93.34)
Household Physical Activity		
Active	0.24 (0.04-0.84)	4.57 (3.17-6.53)
Inactive	99.76 (99.16-99.93)	95.43 (93.47-96.83)
Sedentary <sup>1</sup>	41.96 (37.36-46.71)	55.48 (51.47-59.42)

\*\* Adjusted to "represent" the total adult population of the municipality

<sup>1</sup> Inactive in leisure, occupational, cleaning and transport

**Table 2** - Frequency of leisure-time physical activity, according sociodemographic variables and gender, in the adult population of Goiania, 2005

Variables	Male (n= 763)			Female (n= 1239)		
	n	% 95%CI	p	n	% 95%CI	p
Age (years)						
18-24	82	44.86 (33.67-56.60)	0.00	34	20.58 (12.81-31.38)	0.79
25-34	71	35.93 (27.81-44.95)		66	20.14 (15.15-26.26)	
35-44	56	29.12 (22.21-37.15)		72	21.93 (17.00-27.81)	
45-54	39	30.19 (21.74-40.24)		49	17.37 (12.67-23.33)	
55-64	17	20.47 (12.31-32.07)		29	25.76 (17.79-35.76)	
65 e +	11	11.29 (5.78-20.89)		33	20.39 (13.97-28.78)	
Years of schooling						
0-4	17	12.34 (7.18-20.39)	0.00	44	17.45 (12.05-24.60)	0.10
5-8	42	32.13 (23.56-42.11)		37	18.39 (11.78-27.54)	
9-11	120	42.30 (36.29-48.54)		97	20.85 (16.95-25.37)	
12 e +	97	52.12 (43.99-60.14)		105	29.26 (24.15-34.36)	
Marital Status						
without partner	125	36.09 (29.56-43.18)	0.24	141	20.13 (16.29-24.59)	0.71
with partner	151	30.94 (25.95-36.42)		142	21.27 (17.16-26.06)	

p ≤ 0.05 according to x<sup>2</sup> test

**Table 3** - Frequency of inactivity second socio-demographic variables and gender, in the adult population of Goiania, 2005

Variables	Male (n= 763)			Female (n= 1239)		
	n	95%CI	p	n	95%CI	p
<b>Age (years)</b>						
18-24	92	67.56 (56.83-76.71)	0.16	99	56.91 (44.56-68.46)	0.05
25-34	116	74.50 (65.44-81.85)		124	45.24 (38.06-52.62)	
35-44	122	78.87 (71.36-84.83)		120	44.25 (37.36-51.37)	
45-54	89	63.75 (53.66-72.76)		95	48.06 (40.35-55.87)	
55-64	61	73.91 (62.48-82.82)		65	53.97 (43.88-63.75)	
65 +	44	76.88 (63.61-86-35)		83	65.02 (55.47-73.51)	
<b>Years of schooling</b>						
0-4	98	81.66 (72.23-88.41)	0.00	138	58.87 (48.76 -68.29)	0.04
5-8	120	80.24 (70.95-87.10)		90	42.16 (33.65-51.17)	
9-11	200	65.69 (59.49-71.40)		211	49.04 (43.94-54.16)	
12 e +	106	56.08 (47.87-63.97)		147	51.05 (44.87-57.20)	
<b>Marital Status</b>						
without partner	193	68.46 (61.59-74.61)	0.10	334	54.97 (49.75-60.07)	0.03
with partner	331	75.20 (70.00-79.75)		252	45.80 (39.39-52.35)	

$p \leq 0.05$  according to  $\chi^2$  test

**Table 4** - Association between leisure-time physical activity and NCCDs, according to gender, in the adult population of Goiania, 2005

Variables	Total n	Male		p	Female		p
		Active % 95%CI	Inactive % 95%CI		Active % CI 95%	Inactive % 95%CI	
Obesity	186	7.77 (4.6-12.9)	11.50 (8.5-15.4)	0.19	7.28 (3.9-13.2)	10.20 (8.0-13.0)	0.30
Overweight	698	37.79 (31.2-44.9)	46.29 (40.3-52.4)	0.07	25.01 (18.9-32.3)	32.51 (28.7-6.5)	0.07
Hypertension	466	10.88 (7.5-15.5)	20.04 (16.2-24.5)	0.00	20.09 (15.1-26.2)	21.59 (18.5-5.0)	0.65
Diabetes	83	1.85 (0.5-6.2)	4.59 (2.7-7.8)	0.16	2.64 (1.0-7.0)	4.37 (3.1-6.1)	0.34
Dyslipidemias	360	8.97 (5.8-13.5)	12.76 (9.6-16.8)	0.16	22.82 (17.4-29.4)	15.52 (12.9-8.5)	0.02

$p \leq 0.05$  according to  $\chi^2$  test

was a statistically significant association between inactivity and schooling in both sexes, in that those who have less education were more sedentary. With regard to marital status, women without partners were more inactive than those with a partner. Regarding age, no significant differences were found.

In examining the association between NCCDs and leisure-time physical activity (Table 4), only in males hypertension showed a significant inverse association with this practice ( $p = 0.00$ ); for women there was a positive association between this practice and dyslipidemia ( $p = 0.02$ ).

## Discussion

SIMTEL was based on the Behavioral Risk Factor Surveillance System (BRFSS), the world's largest telephone-based surveillance system designed to collect data from a representative sample of 50 U.S. states and three territories. The main purpose of this system is to provide estimates of health-related behaviors for the main causes of morbidity and mortality among American adults, such as obesity, hypertension, diabetes, also providing estimates on the level of leisure-time physical activity and the proportion of inactive adults<sup>19</sup>.

The system for tracking telephone calls, provides information that can be easily obtained for a representative sample with low operating cost, convenience and applicability; moreover, this type of method does not interfere in the physical activity of the interviewee<sup>19</sup>.

However, this monitoring system has certain limitations such as: accuracy of self-reported information; respondent awareness of relevant information; recall capacity and reliability; respondents' tendency to omit, underestimate or overestimate some behaviors.

As this was a cross-sectional study focused on a specific population of adults, with landline telephones in Goiânia, the generalization of results for the overall population is limited.

Despite the limitations pointed out, this telephone-based monitoring system has proven to be sensitive to capture the evolution of diseases and NCCD risk behaviors in the American population. In 2001, 54.6% of adult Americans were estimated to not be physically active, indicating that most of these individuals were not engaged in the practice of physical exercise. This information was useful to identify and characterize the population at risk and to shape and evaluate health prevention and promotion programs in the American states<sup>19</sup>.

It is difficult to assess the measurement of physical activity because of the lack of tools for such; for this reason, most of

the population-based surveys focuses on leisure-time physical activity, because it is difficult to obtain information related to occupation, household chores, and commuting<sup>20</sup>. Therefore, assessment of leisure-time physical activity is one of the most important in the field of public health, considering that the practice of regular physical activity is a protective factor for various NCCDs and the risk factors of such diseases<sup>21</sup>.

Looking at the adult population of Goiânia, in terms of the frequency of leisure-time physical activity, figures were considered high. However, there was a gap between sexes: women were more inactive (79.3%) than men (66.9%). Similarly to the data of a survey conducted in Rio de Janeiro, the frequency of leisure-time physical inactivity varied between genders, with 77.8% to 58.9% for women and men, respectively. Likewise, in Pelotas, figures were 89.4% and 69.1% for women and men, respectively, during leisure-time<sup>22,23</sup>. In the Household Survey on Reported Morbidity and Risk Behaviors for Noncommunicable Diseases, women also were less sufficiently active (34-58%) than men (23-36%), except for Belém<sup>24</sup>.

The evaluation of occupational physical activity and commuting has been included in some epidemiological studies. With regard to occupational activity, in Goiânia, 21.5% of men and 11.5% of women reported that their jobs were heavy or too heavy; and 8.4% of men and 8.7% of women reported they walk or cycle to work. In a study conducted in Rio de Janeiro, the percentage of heavy occupational physical activity (3.6% men and 0.3% women) was well below that found by the authors of this study; and as to commuting, 9.6% of men and 7.0% of women reported that they walk or cycle to work<sup>22</sup>.

According to the level of inactivity found in this study, 49.2% of respondents were sedentary. In another study in Goiânia, this prevalence was even higher, 62.3%<sup>25</sup>. In relation to gender, 42.0% of males and 55.5% females were considered sedentary, similar to the values found in Porto Alegre (38% men and 58% women)<sup>26</sup>.

As in other national studies on this topic, the level of education and age were determining factors for the practice of physical activity. Regarding the findings of this study, males had a positive relationship between education and leisure-time physical activity, while the prevalence of physical activity was higher among the younger, similarly to other Brazilian cities<sup>22, 23</sup>.

According to the results of previous studies, this survey found an association between some socio-demographic variables and sedentary lifestyle. In relation to marital status, we only found an association for women: those without partners were more inactive. Conversely, a study conducted in Europe found a positive association between leisure time inactivity and being married<sup>27</sup>.

The data found in our study showed a trend of association between lower fre-

quency physical activity and the presence of NCCDs. However, only the data for hypertensive males was significant ( $p = 0.0002$ ). The interpretation of the relationship of NCCDs and leisure-time physical activity must be made with caution, because this is a cross-sectional study and cannot exclude the possibility of reverse causality<sup>28</sup>.

Goiânia's SIMTEL proved to be efficient, with good reliability, and its convenience may support health prevention and promotion measures and also contribute to the implementation of the WHO/GS recommendations for the tracking and surveillance of NCCDs, identifying ways to reduce the morbimortality associated to risk factors. Therefore, it is important to implement policies and actions at the regional and community levels targeted at the practice of regular physical activity<sup>11</sup>.

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## References

1. Barreto ML, Carmo EL. Tendências recentes das doenças crônicas no Brasil. In: Lessa I. (org.) *O adulto brasileiro e as doenças da modernidade: epidemiologia das doenças crônicas não-transmissíveis*. Rio de Janeiro: Hucitec/Abrasco; 1998. p. 15-27.
2. World Health Organization. *Diet, nutrition and prevention of chronic diseases. Report of the joint WHO/FAO expert consultation*, Geneva, 2003. (WHO).
3. World Health Organization. *The world health report 2002: reducing risks, promoting healthy life*. Geneva; 2002. (WHO).
4. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise and physical fitness: definitions and distinctions for health – related research. *Public Health Rep* 1985; 100 (2): 172-9.
5. Rique ABR, Soares EA, Meirelles CM. Nutrição e exercício na prevenção e controle das doenças cardiovasculares. *Rev Bras Med Esporte* 2002; 8 (6): 244-54.
6. Monteiro CA, Conde WL, Popkin BM. Is obesity replacing or adding to under-nutrition? Evidence from different social classes in Brazil. *Public Health Nutr* 2002; 5 (1A): 104-12.
7. Monteiro CA, Wolney LC, Matsudo SM, Matsudo VR, Bosenor IM, Lotufo PA. A descriptive epidemiology of leisure-time physical activity in Brazil, 1996/97. *Rev Panam Salud Publica* 2003; 14 (4): 246-54.
8. Popkin BM. The nutrition transition and obesity in the developing world. *J Nutr* 2001; 131: 871-3S.
9. Mendonça CP, Anjos LA. Aspectos das práticas alimentares e da atividade física como determinantes do crescimento do sobrepeso/obesidade no Brasil. *Cad Saude Pública* 2004; 20 (3): 698-709.
10. Pitanga FJG. Epidemiologia, atividade física e saúde. *Rev Bras Ciên Mov* 2002; 10: 49-54.
11. World Health Organization. *Global strategy on diet, physical activity and health*. Geneva: WHO, 2004. [Fifty-Seventh World Assembly, WHA57. 17 ].
12. Beraldo FC, Vaz IMV, Naves MMV. Nutrição, atividade física e obesidade em adultos: aspectos atuais e recomendações para prevenção e tratamento. *Rev Med Minas Gerais* 2004; 14 (1): 57-62.
13. Lahti-Koski M, Pitinem P, Heliövaara M, Vartiainen E. Associations of body mass index and obesity with physical activity, food choices, alcohol intake, and smoking in the 1982-1997. *Am J Clin Nutr* 2002; 75: 809-17.
14. Dengel DR, Galecki AT, Hagberg JM, Pratley RE. The independent and combined effects of weight loss and aerobic exercise on blood pressure and oral glucose tolerance in older men. *Am J Hypertens* 1998; 11: 1405-1412.



15. Monteiro CA, Moura EC, De, Jaime PC, Lucca A, Florindo AA, Figueiredo ICR, Bernal R, Silva NN. Monitoramento de fatores de risco para doenças crônicas por meio de entrevistas telefônicas: métodos e resultados no município de São Paulo. *Rev Saúde Pública* 2005; 39 (1): 47-57.
16. Ainsworth BE, Haskell, WL, Whitt MC, Irwin ML, Swartz AM, Strath SJ, o'Brien WL, Bassett Jr DR, Schmitz KH, Emplainscourt PO, Jacobs Jr DR, Leon AS. Compendium of physical activities: an update of activity codes and MET intensities. *Med Sci Sports Exerc* 2000; 32: S498-504.
17. World Health Organization. *Physical status: the use and interpretation of anthropometry*. WHO Technical report series 854. Geneva: WHO, 1995.
18. Stata Corporation. Stata Statistical Software: release 8.0. College Station, TX: Stata Corporation, 2003.
19. Centers for Disease Control and Prevention. BRFSS in action: a state-by-state listing of how data are used. Nation Center for Chronic Disease Prevention and Health Promotion. [Available at <http://www.cdc.gov/nccdphp/dataused.htm>]; 2003. Accessed on July 23, 2006.
20. Caspersen CJ, Mathew MZ. Physical activity and cardiovascular health. In: *The Prevalence of Physical Inactivity in the United States*. Champaign: Human Kinetics Books; 1997. p. 32-39.
21. Florindo AA, Latorre MRDO, Jaime, PC, Tanaka T, Zerbini CAF Metodologia para a avaliação da atividade física habitual em homens com 50 anos ou mais. *Rev Saúde Pública* 2004; 38 (2): 307-14.
22. Gomes VB, Siqueira KS, Sichieri R. Atividade física em uma amostra probabilística da população do município do Rio de Janeiro. *Cad Saúde Pública* 2001; 17 (4): 969-76.
23. Dias-da-Costa JS, Hallal PC, Wells JCK, Daltoé T, Fuchs SC, Menezes AMB, Olinto MTA. Epidemiology of leisure-time physical activity: a population-based study in southern Brazil. *Cad Saúde Pública* 2005; 21 (1): 275-82.
24. Ministério da Saúde. Instituto Nacional do Câncer. Inquérito Domiciliar sobre Comportamentos de Risco e Morbidade Referida de Doenças e Agravos não Transmissíveis (INCA). Brasil, 15 capitais e Distrito Federal 2002/2003. Available at <http://www.saude/alimentacaoenutricao/documentos>. [Accessed on June 15, 2006.]
25. Jardim, PCBV, Gondim, MRPG, Monego, ET, Humberto, GM, Priscila, VOV, Weimar, KSBS *et al*. Hipertensão arterial e alguns fatores de risco em uma capital brasileira. *Arq Bras Cardiol* 2007; 88 (4): 452-7.
26. Duncan, BB, Schmidt, MI, Polanczyk, CA, Homrich, CS, Rosa, RS, Achutti, AC. Fatores de risco para doenças não transmissíveis em área metropolitana na região sul do Brasil. Prevalência e simultaneidade. *Rev Saúde Pública* 1993; 27 (1): 43-8.
27. Martinez-Gonzalez MA, Varo JJ, Santos JI, De Irala J, Gibney M, Kearney J. Prevalence of physical activity during leisure time in the Europe Union. *Med Sci Sports Exerc* 2001; 33: 1142-6.
28. Gigante DP, Barros FC, Post CLA, Olinto MTA. Prevalência de obesidade em adultos e seus fatores de risco. *Rev Saúde Pública* 1997; 31 (3): 236-46.