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# Risk and protection factors for cardiovascular diseases among adults of Cuiabá, Mato Grosso, Brazil

*Fatores de risco e proteção para doenças cardiovasculares em adultos de Cuiabá, Mato Grosso, Brasil*

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**ABSTRACT:** Introduction: Cardiovascular diseases are the leading cause of death and hospital expenses in the state of Mato Grosso, Brazil. Objective: To describe the temporal variation on risk and protective factors for cardiovascular diseases in adults (≥18 years old). Methods: Data were obtained from population-based telephone surveys carried out between 2006 and 2009 in Cuiabá, the capital of Mato Grosso, Brazil. The prevalence of smoking, alcohol abuse, markers of diet quality consumption, physical activities, leisure, domestic work, and commute was estimated. Statistical significance of temporal variations in these estimators was estimated by logistic regression models, whose dependent variables were the analyzed risk factors (absent = 0; present = 1) and independent variable was the year of the survey. Results: There was an increase in the proportion of men who reported to never have smoked (from 53 to 61%, p = 0.04). The frequency of regular soft drink consumption was reduced by 23% (p < 0.01). Overall, the reference to the consumption of fruits and vegetables increased by 19% (p = 0.02), and among men this increase was clearer (49%; p < 0.01). There was a reduction in domestic work (p < 0.01) and in leisure physical activity among women (from 14 to 10%; p = 0.02). Conversely, there was an increase in the proportion of women and individuals older than 40 years of age who make active commuting every day. Conclusion: Favorable changes in cardiovascular risk and protective factors were mostly observed among men, young adults, and those with more than eight schooling years.

*Keywords:* Cardiovascular diseases. Interview. Food consumption. Motor activity. Alcoholic beverages. Risk factors. Smoking.

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**RESUMO:** *Introdução:* No Estado de Mato Grosso, as doenças cardiovasculares são causa importante de óbito e gastos com internações. Objetivo: Descrever a variação temporal dos fatores de risco e proteção para doenças cardiovasculares em adultos (≥ 18 anos de idade). *Métodos:* Os dados foram obtidos em inquéritos telefônicos de base populacional desenvolvidos entre 2006 e 2009 em Cuiabá, Mato Grosso. Foi calculada a prevalência de tabagismo, uso abusivo de bebida alcoólica, consumo de marcadores da qualidade da dieta e atividade física, de lazer, doméstica e de deslocamento. Para dimensionar a significância da variação desses estimadores no período, foram desenvolvidos modelos de regressão logística, tendo como variáveis dependentes os fatores de risco analisados (ausente = 0; presente = 1) e como variável independente o ano do inquérito. *Resultados:* Houve aumento na proporção de homens que relataram nunca ter fumado (de 53 para 61%; p = 0,04). A frequência de consumo regular de refrigerantes reduziu 23% (p < 0,01). De modo geral, a referência ao consumo de frutas, legumes e verduras aumentou em 19% (p = 0,02), sendo esse incremento mais evidente em homens (49%; p < 0,01). Foi observada redução do relato de atividade física no domicílio (p < 0,01) e de atividade física de lazer em mulheres (de 14 para 10%; p = 0,02), porém, foi observado incremento na proporção de mulheres e de indivíduos com mais de 40 anos de idade que fazem deslocamento ativo diariamente. *Conclusão:* Variações favoráveis nos fatores de risco e proteção para doenças cardiovasculares foram observadas principalmente em homens, adultos jovens e indivíduos com mais de oito anos de escolaridade.

*Palavras-chave:* Doenças cardiovasculares. Entrevista. Consumo de alimentos. Atividade motora. Bebidas alcoólicas. Fatores de risco. Hábito de fumar.

# INTRODUCTION

Chronic noncommunicable diseases (CNCDs) are an important cause of morbidity and mortality and are seen as a major health problem in Brazil. In 2007, they were responsible for 72% deaths in the country[1], and cardiovascular diseases (CVDs) were the cause of 35% deaths in 2008[2].

The most important CVDs in terms of public health are the hypertensive conditions, ischemic heart diseases, and cerebrovascular conditions[3]. These diseases have modifiable risk factors in common, especially smoking, excessive intake of alcohol, sedentary lifestyle, unhealthy dietary habits, excessive weight, and metabolic changes, such as dyslipidemias[4]. Non-modifiable risk factors, such as gender, age, and genetic inheritance, also contribute to the occurrence of these diseases. CVDs have strong impact on the quality of life of the affected individuals, causing early death and disabilities; therefore, they have an impact on the economy and health and social security systems[5].

In the state of Mato Grosso, CVDs represented the leading cause of death in 2009, being responsible for 27.3% deaths and for more than R$ 74 million spent on hospitalizations. Between 2005 and 2009, CVDs were the second group of diseases in hospital expenses, only overcome by conditions from the respiratory system[6]. Some studies have been indicating the severity of risk factors for these diseases in that state[7-10].

The Surveillance System for Protective and Risk Factors using Telephone Survey (VIGITEL) has been carried out since 2006 by the Ministry of Health, together with *Núcleo de Pesquisas Epidemiológicas em Nutrição e Saúde*, at Universidade de São Paulo, in the capitals of the 26 states of the country and in the Federal District, aiming at monitoring risk and protective factors related to CNCDs in adult individuals, thus allowing to follow-up the occurrence of these factors[11-14].

The objective of this study was to describe the temporal variation of risk and protective factors for CVDs in the adult population of Cuiabá, Mato Grosso, from 2006 to 2009.

## METHODS

This is a cross-sectional population-based study, whose data were obtained by VIGITEL for the adult population (≥ 18 years old), living in Cuiabá, Mato Grosso, from 2006 to 2009.

The methods used for the sample selection are presented in detail in other publications[11-14]. To sum up, a probability sample of adults (≥ 18 years old), living in households with at least one landline, and minimum sample size of 2,000 individuals, was investigated in each one of the analyzed years. Therefore, it is possible to estimate the prevalence of any risk or protective factor with 95% confidence interval (95%CI) and maximum error of 2%; for gender estimation, the maximum expected error is 3%.

In Cuiabá, in 2006, 2,013 individuals were interviewed, which corresponded to a 73% response rate[11]; in 2007, 2,008 individuals answered the survey (71.5% response rate)[12]; and in 2008 and 2009, 2,012 people were interviewed, with 74.6 and 77.8% response rates, respectively[13,14]. VIGITEL was approved by the Human Research Ethics Committee, from the Ministry of Health, and the study was conducted in agreement with the precepts established in the Declaration of Helsinki. Since this was a telephone survey, the informed consent form was replaced by the verbal consent, obtained during the telephone calls. This study was approved by the Research Ethics Committee (CEP) of the State Secretary of Health of Mato Grosso, n. 511.523/2013.

## STUDY VARIABLES

Data on sociodemographic characteristics were used (gender, age, and schooling) as well as those related to lifestyle: smoking, alcohol consumption, dietary habits, and physical activity:
- age: categorized in ≤ 40 years old (young adults) and > 40 year old (adults), from the cutoff point established by the median age of the studied population;
- schooling: categorized in < 8 and ≥ 8 schooling years (at least complete elementary school);
- smoking: the extremes were analyzed, categorizing individuals as nonsmokers (those who had never smoked and gave negative answers to the questions: *Do you smoke? Have you ever smoked?* and smokers (the ones who smoked more than 20 cigarettes a

day at the time of the survey, as an answer to the question: *"How many cigarettes do you smoke a day"*?;

- abusive alcohol consumption: considered when more than four doses (women) or more than five doses (men) were consumed on the same day in the past 30 days; the indication of an alcohol dose was a can of beer or a glass or wine or a dose of distilled alcoholic drink;
- regarding dietary habits, the following indicators were assessed:
  - intake of beans ≥ 5 days a week: considering the answer to the question *"How many days of the week do you usually eat beans?"*;
  - intake of fruits, vegetables and greens (FVG) ≥ 5 days a week: estimated based on the answers to the questions: *"How many days of the week do you usually eat fruit?"* and *"How many days of the week do you usually eat at least one type of vegetable or green (lettuce, tomato, cabbage, carrot, chayote, eggplant, zucchini – potato, manioc or yam do not count)?"*;
  - consumption of soft drinks or artificial juice with ≥ 5 days a week: estimated based on the questions: *"How many days of the week do you usually drink soft drinks or artificial juice?* and *"What kind?"*;
  - consumption of visible meat fat: considered when the following had a positive answer: *"When you eat red meat with fat, do you eat the fat?"*;
  - eating chicken with the skin: considered when the following had a positive answer: *"When you eat chicken, do you usually eat the skin?"*;

Data related to dietary indicators of 2006 were not included in the analysis, except for the intake of beans, once the questions used to form these indicators changed in the analyzed period.

- physical activity: considering reports of physical activities in leisure, work, commute, and housework:
  - physical activity in leisure: this indicator was estimated based on the questions *"In the past three months, did you practice any kind of physical activity or sports?"*; *"Which is the main type of physical activity or sports that you practiced?"*; *"Do you practice physical exercises or sports at least once a week?; "How many days a week do you usually practice physical exercises or sports?"*; and *"When you practice exercises or sports, how often does that activity last?"*. The person who reported practicing at least 150 weekly minutes of moderate activity, or at least 60 weekly minutes of vigorous activity, was considered to be "active in leisure". This classification considers the recommendations of the World Health Organization (WHO) of 2014[15]. The following activities were classified as being moderate: walking, walking on the treadmill, weight lifting, hydrogymnastics, gymnastics in general, swimming, martial arts, cycling, and volleyball. Vigorous activities were running, running on a treadmill, aerobic gymnastics, soccer, basketball, and tennis.
  - work-related physical activity: this indicator was based on the question: *"At work, do you walk a lot? And at work, do you lift weight or perform any other heavy*

*activities?"* Those who gave affirmative answers to these questions were considered to be active;

- active commuting: this indicator was based on the answers to the following questions: *"To go and come back from work, do you walk or ride a bicycle?"; "How long does it take for you to go and return (on foot or by bicycle?"*; those who commuted to work by bicycle or on foot, and who spent at least 30 minutes a day to go and come back, were considered to be active;
- active housework: estimated based on the answers to the questions: *"Who is usually in charge of cleaning your house?"* and *"is the heavy cleaning your responsibility?"*.

## DATA ANALYSIS

The analyses were conducted with a module to analyze complex samples from the Statistical Package for the Social Sciences (SPSS), version 17.0. The frequency of each variable was assessed regarding the total of the studied population, and the estimated frequencies were corrected by sample design, considering poststratification weights according to sex, age, and schooling. The base was the population of Census 2000[11-14]. These analyses used relative sample weights, which are estimated by the ratio between the observed original weights and mean weights. This strategy enables the adjustment for sample size, thus allowing the corrected calculation of statistical significance[16].

The prevalence for each one of the factors was calculated year after year, with the objective of studying the variation throughout time. To assess the statistical significance of the frequency variation observed from 2006 to 2009, binary logistic regression models were developed. The dependent variables of these models were the analyzed risk factors (absent = 0; present = 1), and the independent variable was the year of the survey; independent models were made for the different risk factors. The variation was considered significant when the regression coefficient for the variable "year of survey" was statistically different from zero ($p < 0.05$).

## RESULTS

Generally, between 2007 and 2009, it was possible to observe an increasing proportion of adults who reported consuming FVGs ≥ 5 times a week, and this increment was of 19% ($p = 0.02$). In the same period, the reference to the intake of soft drinks and/or juices with sugar ≥ 5 times a week decreased to 23% ($p < 0.01$). No variation was found in the proportion of people who reported consuming beans ≥ 5 times a week, which was around 80%. The same was observed for the intake of visible fat meat, which was around 30% (Table 1). It was also possible to verify reduced frequency of physical activity in the

household, which decreased from 49%, in 2006, to 39% in 2009 (p < 0.01) (Table 1); this reduction was present in all of the analyzed strata, as shown in Tables 2 to 4.

From 2006 to 2009, a 15% increment was observed among men regarding the proportion of individuals who mentioned to never have smoked (p = 0.04). Between 2007 and 2009, the reference to the consumption of FVGs increased from 15 to 22% (p < 0.01), and the intake of soft drinks and juices with sugar decreased by 19% (p < 0.01). In 2006, 7% women reported the abusive consumption of alcohol; and from 2007 to 2009, this proportion was 10%; however, this variation was not significant (p = 0.15). There was a 32% reduction in the prevalence of physical activities during leisure time (p = 0.02), and an increment of active commute, which was reported by 11% in 2006 and 17%, in 2009 (p < 0.01) (Table 2).

The increased proportion of individuals who reported to never have smoked was also observed among young adults (68 *versus* 77%; p = 0.04). In this group, it was also possible to observe reduction regarding the intake of soft drinks or juices with sugar ≥ 5 times a week, around 25%, decreasing from 42%, in 2007, to 31%, in 2009 (p < 0.01). Among participants aged more than 40 years old, it was possible to observe increasing consumption of FVGs ≥ 5 times a week (29 *versus* 34%; p = 0.01), from 2007 to 2009, and increasing active commute (7 *versus* 13%; p < 0.01), from 2006 to 2009 (Table 3).

For individuals with less than eight schooling years, no significant changes were observed among the assessed risk/protective factors, except regarding the reduced physical activity in the household. However, among those with higher schooling, changes were observed in

Table 1. Variation in the frequency of risk and protective factors for cardiovascular diseases among adults (≥ 18 years old) in Cuiabá, MT, 2006 – 2009.

| Risk and protective factors* | 2006 | 2007 | 2008 | 2009 | OR | p-value[†] |
|---|---|---|---|---|---|---|
| | % | % | % | % | | |
| Smoking | | | | | | |
|     Never smoked | 64 | 62 | 62 | 68 | 1.06 | 0.09 |
|     Smoker | 5 | 5 | 5 | 3 | 0.89 | 0.10 |
| Abusive consumption of alcohol | 19 | 21 | 20 | 18 | 0.97 | 0.53 |
| Dietary habits | | | | | | |
|     Meat with visible fat | – | 32 | 33 | 32 | 1.00 | 0.98 |
|     Chicken with skin | – | 25 | 27 | 28 | 1.09 | 0.13 |
|     Soft drinks ≥ 5 times a week | – | 34 | 30 | 26 | 0.83 | < 0.01 |
|     FVGs ≥ 5 times a week | – | 23 | 28 | 27 | 1.12 | 0.02 |
|     Beans ≥ 5 times a week | 85 | 78 | 82 | 82 | 0.98 | 0.53 |
| Physical activity | | | | | | |
|     Active in leisure | 17 | 15 | 16 | 15 | 0.96 | 0.34 |
|     Active at work | 46 | 46 | 43 | 46 | 0.99 | 0.67 |
|     Active commute | 13 | 10 | 11 | 16 | 1.11 | 0.08 |
|     Active in the household | 50 | 49 | 36 | 39 | 0.83 | < 0.01 |

*Data obtained by the Surveillance System for Protective and Risk Factors using Telephone Survey (VIGITEL) 2006, 2007, 2008, 2009; OR: *Odds Ratio*; [†]p-value refers to the estimator obtained in binary logistic regression models, whose independent variable was the year of the survey, and dependent variables were the risk and protective factors; FVGs: fruits, vegetables, and greens; Wald test for significance, p-value < 0.05.

dietary factors, from 2007 to 2006. There was a decrease in the proportion of individuals who consumed soft drinks or sweet juices with sugar ≥ 5 times a week (*36 versus* 28%; p = 0.01), and an increment in the consumption of FVGs ≥ 5 times a week (*25 versus* 30%; p = 0.04) and in the intake of chicken with skin, of 26% (p < 0.01) (Table 4).

## DISCUSSION

In the second half of the 2000, punctual variations were observed in the prevalence of risk and protective factors for CVDs among adults from Cuiabá, Mato Grosso. Women did not present with changes in the occurrence of the analyzed dietary factors, and among individuals with less than 8 schooling years, no changes were observed as to the prevalence of any of the assessed factors. The main changes involved men, individuals aged 40 years old or more, and with eight or more schooling years. The only change that was present in all of the strata was the reduced proportion of individuals considered to be physically active in the household, which was generally reduced to 22%. Another relevant change was the increasing proportion of individuals who had never smoked, especially among men and those aged 40 years or more. The increasing reference to the intake of FVGs ≥ 5 times a week was more significant among men, but it was also

Table 2. Variations in the frequency of risk and protective factors for cardiovascular diseases among adults (≥ 18 years old), according to gender, in Cuiabá, MT, 2006 – 2009.

| Risk and protective factors* | 2006 | 2007 | 2008 | 2009 | OR | p-value[†] | 2006 | 2007 | 2008 | 2009 | OR | p-value[†] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men (%) | | | | | | Women (%) | | | | | |
| Smoking | | | | | | | | | | | | |
|   Never smoked | 53 | 50 | 51 | 61 | 1.11 | 0.04 | 73 | 72 | 72 | 74 | 1.01 | 0.83 |
|   Smoker | 7 | 7 | 8 | 4 | 0.90 | 0.27 | 3 | 3 | 2 | 2 | 0.85 | 0.18 |
| Abusive consumption of alcohol | 32 | 33 | 32 | 27 | 0.93 | 0.14 | 7 | 10 | 10 | 10 | 1.09 | 0.15 |
| Dietary habits | | | | | | | | | | | | |
|   Meat with visible fat | – | 42 | 42 | 41 | 0.99 | 0.86 | – | 23 | 24 | 24 | 1.02 | 0.81 |
|   Chicken with skin | – | 33 | 33 | 36 | 1.07 | 0.43 | – | 18 | 21 | 22 | 1.12 | 0.15 |
|   Soft drinks ≥ 5 times a week | – | 36 | 35 | 29 | 0.81 | ≤ 0.01 | – | 32 | 25 | 27 | 0.85 | 0.05 |
|   FVGs ≥ 5 times a week | – | 15 | 20 | 22 | 1.26 | ≤ 0.01 | – | 31 | 34 | 33 | 1.05 | 0.48 |
|   Beans ≥ 5 times a week | 89 | 84 | 87 | 86 | 0.94 | 0.25 | 80 | 73 | 79 | 79 | 1.00 | 0.94 |
| Physical activity | | | | | | | | | | | | |
|   Active in leisure | 20 | 19 | 22 | 21 | 1.02 | 0.74 | 14 | 11 | 10 | 10 | 0.87 | 0.02 |
|   Active at work | 58 | 56 | 51 | 60 | 1.00 | 0.92 | 36 | 37 | 36 | 34 | 0.97 | 0.45 |
|   Active commute | 15 | 15 | 12 | 16 | 1.00 | 0.95 | 11 | 6 | 9 | 17 | 1.23 | < 0.01 |
|   Active in the household | 27 | 24 | 16 | 15 | 0.75 | ≤ 0.01 | 71 | 72 | 55 | 61 | 0.82 | ≤ 0.01 |

*Data obtained by the Surveillance System for Protective and Risk Factors using Telephone Survey (VIGITEL) 2006, 2007, 2008, 2009; OR: *Odds Ratio;* [†]p-value refers to the estimator obtained in binary logistic regression models, whose independent variable was the year of the survey, and dependent variables were the risk and protective factors; FVGs: fruits, vegetables, and greens; Wald test for significance, p-value < 0.05.

observed for those aged more than 40 years old and people with eight or more schooling years. However, the reduced proportion of individuals who reported the intake of soft drinks and juice with sugar ≥ 5 times a week was clearer among men, people aged more than 40 years old and with less than eight schooling years.

Smoking is considered to be a risk factor for CVDs, once tobacco is a mixture of over 4 thousand chemical and bioactive substances (carbon monoxide, nicotine, benzopyrene, among others) that can interact with the human biological systems, thus exposing the body to oxidative stress and generating potential inductors of lesion on the vessel walls, favoring atherogenesis[17]. In cohort studies, smokers presented higher concentrations of total cholesterol, body mass index, and blood pressure, besides higher risks for CVDs[18].

In Cuiabá, the proportion of nonsmokers follows up the tendency observed for the country as a whole. According to Monteiro et al.[19], in Brazil, between 1989 and 2003, among individuals aged 18 years or more, the prevalence of smoking decreased from 35 to 22%, which shows a 37% decline in the period, approximately 2.5% a year. These data show the effects of the educational, preventive, and regulatory actions and measures to control smoking that were established in the country[20], which, in 2005, ratified the Convention for Tobacco Control in the National Congress, thus reinforcing the need to protect the present and future generations from the devastating sanitary,

Table 3. Variations in the frequency of risk and protective factors for cardiovascular diseases among adults (≥ 18 years old) according to age, in Cuiabá, MT, 2006 – 2009.

| Risk and protective factors* | 2006 | 2007 | 2008 | 2009 | OR | p-value[†] | 2006 | 2007 | 2008 | 2009 | OR | p-value[†] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ≤ 40 years old (%) | | | | | | > 40 years old (%) | | | | | |
| Smoking | | | | | | | | | | | | |
| Never smoked | 69 | 69 | 66 | 77 | 1.11 | 0.04 | 55 | 49 | 53 | 52 | 0.98 | 0.58 |
| Smoker | 5 | 4 | 4 | 3 | 0.84 | 0.13 | 5 | 6 | 7 | 4 | 0.95 | 0.55 |
| Abusive consumption of alcohol | 21 | 25 | 24 | 19 | 0.97 | 0.53 | 15 | 15 | 13 | 15 | 0.99 | 0.81 |
| Dietary habits | | | | | | | | | | | | |
| Meat with visible fat | – | 34 | 36 | 36 | 1.03 | 0.66 | – | 28 | 27 | 25 | 0.93 | 0.32 |
| Chicken with skin | – | 26 | 27 | 30 | 1.10 | 0.23 | – | 23 | 26 | 26 | 1.07 | 0.33 |
| Soft drinks ≥ 5 times a week | – | 42 | 36 | 31 | 0.80 | ≤ 0.01 | – | 19 | 18 | 16 | 0.89 | 0.15 |
| FVGs ≥ 5 times a week | – | 20 | 25 | 23 | 1.11 | 0.18 | – | 29 | 33 | 34 | 1.15 | 0.01 |
| Beans ≥ 5 times a week | 87 | 80 | 84 | 83 | 0.95 | 0.33 | 81 | 76 | 79 | 81 | 1.02 | 0.70 |
| Physical activity | | | | | | | | | | | | |
| Active in leisure | 18 | 15 | 16 | 16 | 0.96 | 0.49 | 15 | 16 | 16 | 13 | 0.96 | 0.38 |
| Active at work | 48 | 49 | 46 | 49 | 1.00 | 0.96 | 44 | 41 | 37 | 42 | 0.96 | 0.26 |
| Active commute | 16 | 10 | 11 | 18 | 1.06 | 0.43 | 7 | 11 | 11 | 14 | 1.20 | ≤ 0.01 |
| Active in the household | 50 | 49 | 36 | 40 | 0.83 | ≤ 0.01 | 49 | 49 | 36 | 37 | 0.82 | ≤ 0.01 |

*Data obtained by the Surveillance System for Protective and Risk Factors using Telephone Survey (VIGITEL) 2006, 2007, 2008, 2009; OR: *Odds Ratio;* [†]p-value refers to the estimator obtained in binary logistic regression models, whose independent variable was the year of the survey, and dependent variables were the risk and protective factors; FVGs: fruits, vegetables, and greens; Wald test for significance, p-value < 0.05.

social, environmental, and economic consequences of consumption and exposure to tobacco smoke[21].

However, smoking is still a matter of concern in the country. According to the Special Survey on Smoking (PETab), the prevalence of tobacco use in Brazil in 2008 was 17.5%, which corresponded to approximately 25 million people[21]. In this study, similar to the study by Azevedo and Silva et al.[22], there was no linear and continuous tendency of reduction in the prevalence of smokers (individuals who reported smoking for 20 or more cigarettes a day), even though there was an increase in the proportion of people who reported to never have smoked.

According to estimations from the WHO, the low intake of fruits and vegetables is associated with about 31% ischemic heart diseases and 11% cases of stroke in the world[23]. Fruits and vegetables provide micronutrients, fibers, and bioactive and antioxidant substances that can protect the body against oxidative damage and inhibit the synthesis of inflammatory subtances[24], and therefore work for the prevention of CVDs[24,25].

Among the factors that may have contributed with the apparent increase of the FVG consumption in Cuiabá, the following can be mentioned: increasing internal production and expanded commerce of these products, as well as the increasing income

Table 4. Variations in the frequency of risk and protective factors for cardiovascular diseases among adults (≥ 18 years old) according to schooling, in Cuiabá, MT, 2006 – 2009.

| Risk and protective factors* | 2006 | 2007 | 2008 | 2009 | OR | p-value | 2006 | 2007 | 2008 | 2009 | OR | p-value[†] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | < 8 schooling years (%) | | | | | | ≥ 8 schooling years (%) | | | | | |
| Smoking | | | | | | | | | | | | |
| Never smoked | 53 | 49 | 45 | 60 | 1.07 | 0.28 | 69 | 69 | 71 | 72 | 1.05 | 0.20 |
| Smoker | 7 | 5 | 10 | 3 | 0.91 | 0.43 | 4 | 5 | 2 | 3 | 0.87 | 0.11 |
| Abusive consumption of alcohol | 16 | 19 | 19 | 14 | 0.95 | 0.53 | 21 | 22 | 21 | 20 | 0.98 | 0.74 |
| Dietary habits | | | | | | | | | | | | |
| Meat with visible fat | – | 33 | 33 | 29 | 0.90 | 0.36 | – | 31 | 33 | 33 | 1.06 | 0.36 |
| Chicken with skin | – | 29 | 27 | 23 | 0.88 | 0.23 | – | 23 | 26 | 31 | 1.22 | < 0.01 |
| Soft drinks ≥ 5 times a week | – | 29 | 27 | 21 | 0.80 | 0.08 | – | 36 | 31 | 29 | 0.84 | < 0.01 |
| FVGs ≥ 5 times a week | – | 19 | 23 | 23 | 1.13 | 0.25 | – | 25 | 30 | 30 | 1.12 | 0.04 |
| Beans ≥ 5 times a week | 87 | 81 | 87 | 84 | 0.97 | 0.74 | 84 | 77 | 80 | 81 | 0.98 | 0.61 |
| Physical activity | | | | | | | | | | | | |
| Active in leisure | 13 | 9 | 9 | 8 | 0.84 | 0.10 | 19 | 18 | 19 | 18 | 0.99 | 0.93 |
| Active at work | 51 | 46 | 39 | 44 | 0.89 | 0.07 | 44 | 46 | 45 | 48 | 1.04 | 0.25 |
| Active commute | 15 | 14 | 14 | 17 | 1.06 | 0.55 | 12 | 9 | 9 | 16 | 1.14 | 0.07 |
| Active in the household | 53 | 54 | 38 | 42 | 0.83 | < 0.01 | 49 | 46 | 36 | 37 | 0.83 | < 0.01 |

*Data obtained by the Surveillance System for Protective and Risk Factors using Telephone Survey (VIGITEL) 2006, 2007, 2008, 2009; OR: *Odds Ratio;* [†]p-value refers to the estimator obtained in binary logistic regression models, whose independent variable was the year of the survey, and dependent variables were the risk and protective factors; FVGs: fruits, vegetables, and greens; Wald test for significance, p-value < 0.05.

of the population, thus elevating the purchasing power[26]. However, this increase in the studied period was in accordance with different standards of gender, age, and schooling. According to the Family Health Survey (POF), the Center-West region was the only one with increasing consumption of vegetables in the household between 2002 – 2003 and 2008 – 2009[27,28]. The region also stood out in the increasing consumption of fruits, of about 50% in a 6-year period (from 2002 to 2008), which represented more than 8.61 kg of fruit per person/year[27,28].

In terms of public policies in Brazil, there is the proposition of the Global Strategy, from the WHO, especially actions in food and nutrition addressed to promoting the increasing intake of FVG; elaboration and promotion of materials, such as the Dietary Guidelines for the Brazilian Population; promotion of regional foods, among others[29]. The increasing consumption of fruits and vegetables is among the priorities of the National Policy of Food and Nutrition (PNAN) and the Healthy Diet Promotion, whose objectives are related to controlling and preventing nutritional diseases and CNCDs[30].

A review about the evaluation of measures to promote the intake of FVGs had a positive effect on the interventions, in the population level, and the effectiveness of these interventions seems to be related to the multisectoral approach, which involves broader aspects such as facilitating the availability and the access to food, and also more specific ones, which include orientation for the preparation of foods and individual and family guidance[31].

Another important aspect is the apparent reduction in the regular intake of soft drinks and juices with sugar. Even though it seems to be incoherent with the increment of excess weight and obesity[32], it is similar to that found for the Federal District, where data from VIGITEL showed that, from 2007 to 2010, the prevalence of the frequent intake of soft drinks reduced[33]. Some factors may have influenced these results: the introduction of other drinks with sugar in the Brazilian market[34] and the increase in the consumption of alcoholic drinks[35]. It is also important to consider possible biases to obtain data, once the intake of soft drinks and sweet juices has been increasing in the whole country[36], corresponding to practically 50% of the total sugar in the diet[37].

Until 2009, VIGITEL assessed physical activity in four domains[36], and all of those were incorporated to this study. To classify the individuals as active during leisure time, the recommendations of 2004 regarding physical activity for the prevention of CVD were used[15]. However, after 2010, the WHO began to recommend the weekly practice of 150 minutes of mild or moderate physical activity, or 75 minutes of intense activity[38]. However, it was chosen to maintain the previous recommendation, once the study refers to a period that is prior to that indication. In Cuiabá, between 2006 and 2009, the frequency of physical activity during leisure time decreased among women, whereas the active commute increased in this group and in those of people aged more than 40 years old. The physical activity in the household decreased in all strata. Similar to the rest of the country, the most active individuals in Cuiabá in the assessed period were men, younger people, and those with higher schooling[36].

Physical activities are one of the priorities in health promotion actions and have been incorporated to the agenda of the Ministry of Health, especially in the National Health Promotion Policy, published in 2006[39].

Studies approaching the prevention and the treatment of heart diseases encourage the practice of regular physical activity as a way to promote, maintain, and improve the general health of individuals and populations. Eaton and Eaton[40] divided the benefits of the regular practice of physical activity into the components related to the muscular and cardiovascular system, to body composition, and to resistance to insulin, whereas Thompson et al.[41] presented the main clinical conditions prevented by the regular practice of physical exercises, especially coronary artery disease, systemic arterial hypertension, stroke, and peripheral vascular disease.

Some actions to encourage body practices and physical activities have been taken in different levels of SUS[39]; however, in Cuiabá, that practice is still very incipient. The lack of offers and incentive for these practices and the precarious situation of public services, especially safety and lack of adequate spaces (walking tracks, squares, pavement streets, etc.), become a limit to the adoption of a sufficiently active life.

The main limitation of this study refers to the fact that the sample is restricted to the households with a landline, whose coverage comprehends about 80% of the population in the metropolitan regions of the Center-West region. Bernal and Silva[42] showed that coverages of about 60% are efficient to estimate population prevalence rates. Besides, the weighing factors used to correct the estimations aimed at reducing that bias[36].

Another limitation refers to the validity of self-reported information, which may be influenced by the access to health services and memory bias. However, studies conducted to validate some indicators from VIGITEL were conducted in Brazil and showed agreement between the information reported in VIGITEL and the data reported in household surveys[43-45].

Finally, the analyzed period can also be considered as a limit for the study, considering that the evolution of the variables could be better established if the period of observation had been longer. However, the analyzed series, even if reduced, enabled the evaluation and perception of changes and tendencies.

## CONCLUSION

This study analyzed adults living in Cuiabá, Mato Grosso, as to the evolution of risk factors for CVDs, which have been approached by the Plan of Strategic Actions to Face Chronic Non-Communicable Diseases in Brazil, 2011 – 2022, in an integrated manner[46]. The results showed that men, young adults, and individuals with higher schooling presented clear favorable variations regarding the risk/protective factors for CVDs. It is important to mention that, generally, there was a reduction in the proportion of adults who reported physical activities in the household. Besides, no changes were observed in

the occurrence of risk factors assessed in individuals with low schooling, and men did not present changes in dietary factors.

The findings presented in this study can contribute with the basis for the formulation of local health promotion programs and CVD prevention, as well as other CNCDs (cancer, chronic respiratory conditions, and diabetes) that present risk factors in common. Besides, they provide information to subsidize the surveillance program and the evaluation of health promotion actions conducted by the city of Cuiabá.

## ACKNOWLEDGEMENTS

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