

# Excess body weight and associated factors among adults in a rural community in the Southern Pantanal

## Excesso de peso e fatores associados entre adultos de uma comunidade rural do Pantanal Sul-mato-grossense

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### Resumo

**INTRODUÇÃO:** O excesso de peso atinge mais da metade da população adulta brasileira, e alguns grupos populacionais, podem ser ainda mais afetados. **OBJETIVOS:** Descrever a prevalência de excesso de peso entre adultos de uma comunidade rural pantaneira, e identificar os fatores associados. **MÉTODOS:** Estudo transversal, realizado com pacientes atendidos no ambulatório da Base de Estudos do Pantanal da Universidade Federal de Mato Grosso do Sul, localizado na área rural de Corumbá, Mato Grosso do Sul. Foram coletadas variáveis sociodemográficas, antropométricas, clínicas e de consumo alimentar. Considerou-se como desfecho o excesso de peso (índice de massa corporal  $\geq 25$  Kg/m<sup>2</sup>), e para análises estatísticas utilizou-se regressão de Poisson. **RESULTADOS:** Participaram do estudo 70 pacientes, com idade média de 38,6 $\pm$ 13,1 anos, 57,9% estudaram formalmente por até 8 anos e 57,1% eram mulheres. A prevalência de excesso de peso foi de 79,7%, sendo maior no sexo feminino ( $p=0,03$ ). A obesidade atingiu 55,1% dos avaliados. Os indivíduos com circunferência da cintura elevada, apresentaram prevalência de excesso de peso 4,56 vezes maior quando comparados àqueles com circunferência da cintura dentro dos padrões normais (97,7% versus 21,4%;  $p<0,01$ ). O excesso de peso foi maior nos indivíduos que tinham como motivo para o atendimento nutricional a perda de peso quando comparados àqueles que buscaram o atendimento para reeducação alimentar (95,8% versus 66,7%;  $p=0,02$ ). **CONCLUSÕES:** Os dados ressaltam a importância da efetiva execução das políticas públicas de saúde voltadas para as populações do campo e da floresta, visando reduzir as desigualdades presentes e promover melhorias na qualidade de vida.

**Palavras-chave:** Obesidade. Saúde da População Rural. Serviços de Saúde Rural.

### Abstract

**INTRODUCTION:** Excess weight affects more than half of the Brazilian adult population, and some population groups may be even more affected. **OBJECTIVES:** To describe the prevalence of overweight among adults in a rural community in the Pantanal, and to identify associated factors. **METHODS:** A cross-sectional study, carried out with patients treated at the outpatient clinic of the Pantanal Study Base of the Federal University of Mato Grosso do Sul,

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located in the rural area of Corumbá, Mato Grosso do Sul. Sociodemographic, anthropometric, clinical and food consumption variables were collected. Excess weight (body mass index  $\geq 25$  kg/m<sup>2</sup>) was considered as an outcome, and analyses were performed using Poisson regression. RESULTS: Seventy patients participated in the study, mean age 38.6 $\pm$ 13.1 years; 57.9% had formally studied for up to 8 years; 57.1% were female. The prevalence of overweight was 79.7%, being higher in females (p=0.03). Obesity reached 55.1% of those evaluated. Individuals with high waist circumference presented a prevalence of overweight 4.56 times higher when compared to those with waist circumference within normal standards (97.7% versus 21.4%; p<0.01). Excess weight was higher among individuals who had weight loss as the reason for seeking nutritional care when compared to those who sought care for food reeducation (95.8% versus 66.7%; p=0.02). CONCLUSIONS: The data underscore the importance of effectively implementing public health policies aimed at rural and forest populations, with a view to reducing present inequalities and promoting improvements in the quality of life.

**Keywords:** Obesity. Rural Health. Rural Health Services.

## Introduction

Time series analyses have shown that excess body weight has increased among Brazil's population in recent decades<sup>1,2</sup>. Data from the National Health Survey (NHS) show that in 2019 60.0% of men and 63.3% of women were diagnosed with overweight<sup>3</sup>. Regarding obesity, the prevalence rate was 22.8% and 30.2% for men and women, respectively<sup>3</sup>.

Obesity is a multifactorial health condition involving socioeconomic, genetic and environmental factors, and, directly, aspects related to eating habits and practice of physical activity, resulting in a chronic positive energy balance<sup>4</sup>. Excess accumulation of abdominal fat is a predictive factor for the development of several diseases such as systemic arterial hypertension, diabetes mellitus, dyslipidemias, metabolic syndrome and some types of cancer, favoring morbimortality<sup>5,6</sup>.

Although the frequency of excess weight is very high among the Brazilian population, some groups can be even more affected by this condition than others. Socioeconomic, demographic and even geographic inequalities that some populations encounter in Brazil can affect their health, resulting in unequal access to health care services and differences in the distribution of diseases, mortality rates or even in people's life expectancy<sup>5</sup>.

Among the factors that contribute most to unequal distribution of excess weight in Brazil are household income, demography, education, and lifestyles. In the most developed regions in the country (south, southeast and center-west) excess weight is prevalent in poorer women. For men, the highest frequencies of this disease were found among richer individuals<sup>7</sup>. A study that examined differences between rural and urban populations found a higher prevalence of abdominal obesity in women living in the center-western rural areas<sup>8</sup>.

For individuals living in rural areas, access to health services is more difficult than for those who live in urban areas<sup>9</sup>. Rural and forest dwellers, who usually have lower income and lower level of education, have unequal access to health care services and basic sanitation, which can affect adversely their health conditions and nutrition<sup>9</sup>. Brazil's National Policy of Integral Healthcare of Rural and Forest Populations, created in 2011, aimed specifically at meeting the needs of these communities and improving their health indicators; however, in practice, many people continue to be underserved by health care services in their region, as is the case of some rural communities in the Southern Pantanal, state of Mato Grosso do Sul.

Carrying out studies that assess the health and nutrition conditions of these populations with the objective of providing interventions and reduction of existing inequalities are essential. Thus, this study

aimed at determining the prevalence of excess weight in adults treated at an outpatient care unit of the Pantanal Study Base located in a rural Pantanal community in the state of Mato Grosso do Sul and identify associated factors.

## Materials and Methods

### Kind of study and sample

It is a cross-sectional study carried out with adult patients (18 years old or over) of a rural Pantanal community assisted by the Course of Nutrition of the Federal University of Mato Grosso do Sul (UFMS), in an outpatient clinic, from 2015 to 2019. Since all patients treated at this unit were included in the study, there was no need to perform sample size calculation. The services provided to these patients are part of a university extension project that is developed in the outpatient care unit of the Pantanal Study Base.

The Pantanal Study Base belongs to UFMS and is located in Passo de Lontra, a Pantanal rural community in the municipality of Corumbá, Mato Grosso do Sul. This community is located on the banks of Miranda River<sup>10</sup>, 130 km from Corumbá and 319 km from Campo Grande, capital of the state of Mato Grosso do Sul, and the nearest town is Miranda, 113 km from the community. The Pantanal Study Base is a support structure for the development of research, teaching and extension studies in the Southern Pantanal. It is built on an area of 1371.63m<sup>2</sup>, with lodging facilities, kitchen, canteen, meeting room, conference room, laboratories, outpatient care unit, among others<sup>11</sup>.

Since the early 2000s, teachers and academics of health courses from UFMS provide assistance to the Pantanal communities through extension programs, at the outpatient clinic of the Pantanal Study Base. In addition to the residents of the Passo do Lontra community, other people living in neighboring communities such as Porto da Manga, Buraco das Piranhas and Abobral also seek assistance there.

Consultations take place on a weekend every month, usually between March and December, and currently are carried out by the courses of Nursing, Pharmacy, Medicine, Nutrition and Dentistry. The course of Nutrition joined the service in 2015, and since then provides individualized nutritional assistance to the community.

The Passo do Lontra region and neighboring communities are known for ecotourism, which contributes to the existing jobs linked to the river and hotel activities, in addition to jobs in cattle farms. The socioeconomic conditions of the residents in general are unfavorable, and there is no adequate basic sanitation infrastructure available. Water, in most cases, is pumped from the river and treated only with chloride. With no proper sewage system available, dejects are thrown in the river<sup>12</sup>.

There are none of the essential social services in the communities such as schools and health care units. Except for the health care offered by the UFMS' extension actions, which are sporadic and limited to some primary care services, the residents depend on public transportation to take them to the nearest towns to receive health care<sup>13</sup>. With respect to education, in the Passo do Lontra community, UFMS, in a partnership with Corumbá city administration, provides the physical structure so that classes for the 1<sup>st</sup> to 9<sup>th</sup> grades can take place in multigrade classes<sup>14</sup>. In another community, Porto da Manga, the single existing school also works in multigrade teaching system in two (class)rooms rented by the Corumbá city administration in a local hotel<sup>12</sup>.

### Study design

The variables were collected from the records of all adult patients (18 years old and over) assisted by the Nutrition Course in the outpatient care unit of the Pantanal Study Base from 2015 to 2019, consisting of secondary data.

### Criteria of eligibility

All adult patients (18 years old or over) treated at the outpatient unit of the Pantanal Study Base between 2015 and 2019 were included in the study. Pregnant women were excluded.

### Procedures

The collected sociodemographic variables were gender (male/female), age in years (18 – 35; 36 – 50; >50), years of formal education (0 – 8; >8), marital status (with or without a partner), household condition (living alone; with the family) and number of individuals in the household (1 – 3; >3).

Information about the reason of care (dietary reeducation; weight loss; some disease/symptom) was collected, as well as information about smoking (yes/no) and drinking (yes/no) habits and practice of physical activity (yes/no).

The collected anthropometric variables were waist circumference, body weight and stature. To obtain the anthropometric variables, the protocol described by Lohman, Roche & Martorel<sup>15</sup> was followed. Because it was an ambulatory service and data used comprised a five-year period, the anthropometric measures were performed by diverse evaluators, with possibility of occurring interpersonal errors in measurements. However, all evaluators were trained before performing the measurements by an individual considered gold standard, in an attempt to minimize said errors. Waist circumference was measured using a flexible, inextensible measuring tape (Cescorp, Brazil), precision of 0.1 cm. Body weight was measured in a portable, platform electronic scale (Marte Científica, São Paulo, Brazil), with a capacity for 200 kg and 50 g precision. Body height was measured using a portable stadiometer (Altorexata, Belo Horizonte, Brazil), precision of 0.1 cm, with individuals barefoot and minimum clothes, without adornments, caps and the like in the head, at the orthostatic position.

Waist circumference was rated as high when  $\geq 94$  cm for men and  $\geq 80$  cm for women<sup>16</sup>. Based on the body weight and height, the Body Mass Index (BMI) was determined, and according to the World Health Organization, it is rated as undernourished or underweight (BMI <18.5 Kg/m<sup>2</sup>), normal weight (BMI  $\geq 18.5$  to 24.9 Kg/m<sup>2</sup>), overweight (BMI  $\geq 25.0$  to 29.9 Kg/m<sup>2</sup>) and obesity (BMI  $\geq 30.0$  Kg/m<sup>2</sup>)<sup>17</sup>. The excess weight variable was built by the junction of the overweight and obesity categories.

The clinical variable collected was systemic arterial hypertension (SAH) which was self-reported by the patients – medical diagnosis and/or continuous use of anti-hypertensive medication – during the visits.

Dietary variables refer to the number of meals eaten per day (1 – 3; >3) and the frequency of weekly consumption of fruits, vegetables, sweets/sugary foods and sodas (everyday; sometimes/never) and fried foods (sometimes/never; 1 – 2 times a week; 3 – 7 times a week). The variables related to eating habits were obtained using a Food Frequency Questionnaire attached to the patient's record.

### Data analysis

Data were double-entered in a Microsoft Excel 2013 spreadsheet, and validation was performed by EpiData 3.1 software (EpiData Assoc., Odense, Denmark). Data analysis was conducted using STATA 16.0 (Stata Corp., College Station, US). Data descriptive analysis was performed using relative frequency. In bivariate analyses, the outcome considered was excess weight, and the robust Poisson regression model was used, calculating the prevalence ratios and respective 95% confidence intervals (95%CI). Variables with statistical significance were those with  $p < 0.05$ , as estimated by the Wald test.

### Ethical aspects

The research was approved by the Human Research Ethics Committee of

UFMS, process number 4.003.826, on May 03, 2020.

## Results

We analyzed 70 records of patients who received outpatient nutritional care. Of this total, 57.1% were women, 48.6% aged between 18 and 35 years, 65.7% had a maximum of eight years of formal education, 58.6% had a partner, and 69.6% lived in households with up to three residents. The main reason to seek nutritional care was to lose weight (42.1%). Smoking habit reached 11.4% of the individuals assessed; 30.0% reported

drinking alcoholic beverages and 64.3% did not practice physical activity (Table 1).

Waist circumference measure was high in 75.4% of the patients, and 24.2% had high blood pressure. The habit of having one to three meals per day was reported by 72.1% of the individuals. About the frequency of food consumption, 65.1% of the participants reported eating fruits sometimes or never; 48.5% ate vegetables sometimes or never; and 38.5% consumed fried foods three to seven times a week; 33.8% ate sweets every day; and 24.6% drank sodas every day. According to the BMI, 55.1% of the individuals were obese and 24.6% were overweight (Table 1).

**Table 1.** Sociodemographic, anthropometric and clinical characteristics and dietary patterns according to gender. Passo do Lontra, Corumbá, Mato Grosso do Sul, Brazil, 2015-2019.

Variables	Women (n=40)		Men (n=30)		Overall (n=70)	
	n*	%	n*	%	n*	%
<b>Age, years</b>						
18 – 35	22	55.0	12	40.0	34	48.6
36 – 50	11	27.5	7	23.3	18	25.7
> 50	7	17.5	11	36.7	18	25.7
<b>Education, years</b>						
0 – 8	22	57.9	22	75.9	44	65.7
> 8	16	42.1	7	24.1	23	34.3
<b>Marital status</b>						
With a partner	27	67.5	14	46.7	41	58.6
Without a partner	13	32.5	16	53.3	29	41.4
<b>Household condition</b>						
Lives alone (a)	5	12.5	12	40.0	17	24.3
Lives with family	35	87.5	18	60.0	53	75.7
<b>Number of individuals in the household</b>						
1 – 3	25	64.1	23	76.7	48	69.6
> 3	14	35.9	7	23.3	21	30.4
<b>Reason of care</b>						
Dietary reeducation	9	26.5	12	52.2	21	36.8
Weight loss	17	50.0	7	30.4	24	42.1
Some disease/symptom	8	23.5	4	17.4	12	21.1
<b>Smoking</b>						
Yes	4	10.0	4	13.3	8	11.4
No	36	90.0	26	86.7	62	88.6
<b>Drinking</b>						
Yes	8	20.0	13	43.3	21	30.0
No	32	80.0	17	56.7	49	70.0
<b>Physical activity</b>						
Yes	15	37.5	10	33.3	25	35.7
No	25	62.5	20	66.7	45	64.3
<b>Waist circumference</b>						



Normal	3	10.7	11	37.9	14	24.6
High	25	89.3	18	62.1	43	75.4
<b>Systemic arterial hypertension</b>						
No	28	82.3	19	67.9	47	75.8
Yes	6	17.7	9	32.1	15	24.2
<b>Number of meals/day</b>						
1 – 3	26	68.4	23	76.7	49	72.1
> 3	12	31.6	7	23.3	19	27.9
<b>Fruit consumption</b>						
Every day	16	43.2	7	24.1	23	34.9
Sometimes/never	21	56.8	22	75.9	43	65.1
<b>Vegetable consumption</b>						
Every day	23	62.2	11	37.9	34	51.5
Sometimes/never	14	37.8	18	62.1	32	48.5
<b>Fried food consumption</b>						
Sometimes/never	19	51.4	11	39.3	30	46.1
1 – 2 times/week	7	18.9	3	10.7	10	15.4
3 – 7 times/week	11	29.7	14	50.0	25	38.5
<b>Sweet consumption</b>						
Sometimes/never	22	59.5	21	75.0	43	66.2
Every day	15	40.5	7	25.0	22	33.8
<b>Soda consumption</b>						
Sometimes/never	28	75.7	21	75.0	49	75.4
Every day	9	24.3	7	25.0	16	24.6
<b>Body mass index</b>						
Normal	4	10.3	10	33.3	14	20.3
Overweight	11	28.2	6	20.0	17	24.6
Obesity	24	61.5	14	46.7	38	55.1

\*n maximum for each category, which can be different among the variables due to absence of data

In the bivariate analyses, excess weight was more frequent in women (89.7% versus 66.7%,  $p=0.035$ ). Prevalence of excess weight was 1.44 times (95%CI=1.05-1.98;  $p=0.025$ ) higher for individuals who had weight loss as the reason to seek care when compared with those who sought care for dietary

reeducation. Patients with high waist circumference exhibited a prevalence of excess weight 4.56 times (95%CI =1.66-12.55;  $p=0.003$ ) higher than those who did not exhibit a high measure. The other variables were not significantly associated with the outcome (Table 2).

**Table 2.** Prevalence, prevalence ratio and confidence interval for excess body weight according to independent variables. Passo do Lontra, Corumbá, Mato Grosso do Sul, Brazil, 2015-2019.

Variables	Excess body weight			
	n*	Prevalence	PR (95%CI)	p-value
<b>Age, years</b>			0.806	
18 – 35	26	76.5	Ref (1)	
36 – 50	14	82.4	1.08 (0.805; 1.44)	0.617
> 50	15	83.3	1.09 (0.82; 1.44)	0.548
<b>Education, years</b>			0.231	
0 – 8	36	83.7	Ref (1)	
> 8	16	69.6	0.83 (0.61; 1.13)	0.231
<b>Gender</b>			0.035	
Female	35	89.7	Ref (1)	
Male	20	66.7	0.74 (0.56; 0.98)	0.035
<b>Marital status</b>			0.230	

With a partner	21	72.4	Ref (1)	
Without a partner	34	85.0	1.17 (0.90; 1.53)	0.230
<b>Household condition</b>			0.352	
Lives alone (a)	12	70.6	Ref (1)	
Lives with family	43	82.7	1.17 (0.84; 1.64)	0.352
<b>Number of individuals in the household</b>			0.144	
1 – 3	40	85.1	Ref (1)	
> 3	14	66.7	0.78 (0.57; 1.09)	0.144
Reason of care			0.036	
Dietary reeducation	14	66.7	Ref (1)	
Weight loss	23	95.8	1.44 (1.05; 1.98)	0.025
Some disease/symptom	9	75.0	1.13 (0.72; 1.76)	0.607
Smoking			0.480	
Yes	48	78.7	Ref (1)	
No	7	87.5	1.11 (0.83; 1.49)	0.480
<b>Drinking</b>			0.864	
Yes	38	79.2	Ref (1)	
No	17	81.0	1.02 (0.79; 1.32)	0.864
<b>Physical activity</b>			0.582	
Yes	36	81.8	Ref (1)	
No	19	76.0	0.93 (0.71; 1.21)	0.582
<b>Waist circumference</b>			0.003	
Normal	3	21.4	Ref (1)	
High	42	97.7	4.56 (1.66; 12.55)	0.003
<b>Systemic arterial hypertension</b>			0.053	
No	35	74.5	Ref (1)	
Yes	13	92.9	1.25 (1.00; 1.56)	0.053
<b>Number of meals/day</b>			0.451	
1 – 3	40	81.6	Ref (1)	
> 3	13	72.2	0.89 (0.64; 1.22)	0.451
<b>Fruit consumption</b>			0.326	
Every day	19	86.4	Ref (1)	
Sometimes/never	33	76.7	0.89 (0.70; 1.13)	0.326
<b>Vegetable consumption</b>			0.145	
Every day	24	72.7	Ref (1)	
Sometimes/never	28	87.5	1.20 (0.94; 1.54)	0.145
<b>Fried food consumption</b>			0.370	
Sometimes/never	21	72.4	Ref (1)	
1 – 2 times/week	9	90.0	1.24 (0.91; 1.69)	0.166
3 – 7 times/week	21	84.0	1.16 (0.87; 1.54)	0.307
<b>Sweet consumption</b>			0.304	
Sometimes/never	32	76.2	Ref (1)	
Every day	19	86.4	1.13 (0.89; 1.44)	0.304
<b>Soda/soft drinks consumption</b>			0.056	
Sometimes/never	37	77.1	Ref (1)	
Every day	15	93.8	1.22 (1.00; 1.49)	0.056

\*n maximum for each category, which can be different for variables due to absence of data. 95%CI: 95% confidence interval; PR prevalence ratio

## Discussion

The data obtained in the present study indicate that excess weight is a major health issue in the patients assisted by the Course of Nutrition, UFMS, at the outpatient care unit of the Pantanal Study Base, as well as in the Brazilian population in general<sup>3</sup>. The prevalence of excess

weight found in adults in the present study (79.7%) was higher than that indicated by the NHS in 2019 (61.7%)<sup>3</sup>. In addition, the frequency of obesity in the present study was higher when compared with national data<sup>3</sup>.

Although it can be a characteristic of the population investigated, since most of the individuals who live in the communities

in the Passo do Lontra region are patients assisted at the outpatient unit, and even those who are not, share similar socioeconomic, environmental and demographic characteristics, it is worth noting that this study shows data from a group of individuals that sought nutritional care, which may have influenced the results and partially explain the high prevalence of excess weight. Furthermore, the main reason that individuals sought nutritional assistance was the desire to lose weight, and they were the ones who had the highest frequency of overweight when compared to those that sought nutritional assistance for other reasons. So, this population's specificities of this population should be considered in comparisons with other studies.

Other studies that assessed the nutritional status of rural populations observed a frequency of excess weight of 45.5% in the state of Mato Grosso do Sul<sup>18</sup> and 40.7% in rural communities in the state of Sergipe<sup>19</sup>. High frequency of excess weight plays a significant role as it poses risks for developing cardiovascular diseases, the main cause of mortality worldwide<sup>20</sup>.

Information on Brazilian adult population found in recent decades show that there has been an alarming increase of overweight and obesity, the latter more than doubling the number of cases. There is a growing trend of overweight and obesity in both men and women, with more prevalence of overweight in men (37.2%) and obesity in women (30.2%)<sup>3</sup>. Although the excess weight in men (60.0%) is close to the reality found in our study (66.7%), the frequency of excess weight in women is higher (89.7%) when compared with the NHS (63.3%)<sup>3</sup>. This reality can be explained by greater body fat accumulation as a result of pregnancies, differences in body composition and hormonal alterations, typical of female gender<sup>5,21</sup>.

Regarding formal education, there was a higher frequency of individuals who reported having attended primary school,

complete or incomplete, very close to the data described in a previous study about the same population, in which most individuals informed that they had only incomplete primary school<sup>13</sup>. The geographical isolation of rural areas is a condition that may contribute to more difficulties of access to school<sup>22</sup>, thus interfering adversely with the opportunities of professional development and employment, resulting in lower household income, a factor that contributes to increasing the vulnerability of these individuals<sup>23</sup>.

In a study with the same population, Costa et al.<sup>13</sup> cited that the household income of approximately 70.0% of individuals treated in the outpatient clinic was between one and two minimum wages, a fact that has a direct influence on the supply of individuals' basic needs such as food and even access to health services, since the outpatient unit of the Pantanal Study Base is not constantly available and, therefore, the individuals living in the Pantanal communities have to travel to the nearest urban centers, and such locomotion may compromise a substantial portion of the families' income.

The possibility that socioeconomic determinants, such as income and education, are associated with obesity is clearly seen in diverse studies<sup>2,21</sup>. Even though there was no significant association between education and excess weight in the present study, the frequency of excess weight was higher in individuals with less formal education. Women are more likely to become obese when their level of education is lower, while men have more prevalence of obesity when their education and socioeconomic levels are higher<sup>2,8</sup>.

Other important points that should be mentioned are the unsafe housing conditions and lack of basic sanitation services in the community (treated water, collection, treatment and proper disposal of sewage), similar to situations found in other communities living in the rural areas of the Pantanal<sup>24,12</sup>. The disposal of wastes from houses in the river in the region and the use



of the same source of water for consumption is a serious public health problem, as health and environment have an interdependent relationship<sup>24,12</sup>.

The excess weight found in the present study was higher in individuals who had a large waist circumference. The high prevalence of individuals with accumulated abdominal fat observed in this study shows the relevance of this health problem, which has reached alarming figures in several countries, both in urban and rural areas<sup>5,25,21</sup>. Excess abdominal fat is a predictive factor of diseases such as diabetes mellitus, dyslipidemias and SAH, which favor the occurrence of cardiovascular events and increased metabolic complications<sup>5,26</sup>.

Even though a significant relationship between excess weight and SAH was not identified, hypertensive individuals showed a lower frequency of overweight when compared to normal individuals. A study conducted in the outpatient clinic of the Pantanal Study Base with individuals suffering from hypertension showed that the SAH symptoms had a negative effect on the performance of everyday activities and in household income, a fact that makes the control of this disease even more complex with impacts on the physical and psychological wellbeing of these individuals<sup>13</sup>. Luz et al.<sup>27</sup> pointed out that SAH is one of the most prevalent cardiovascular risk factors among rural populations, showing the importance of promoting more comprehensive health care practices.

Even though the frequency of physical activity has not been specified in terms of time and intensity, the results showed that almost two-thirds of the individuals studied did not practice physical activity regularly. The place of living, at some extent, can influence these results; there are no facilities in the community for the practice of physical activity. By observing the data of previous study with the same population, it can be seen that half

of the individuals, most of them men, had sedentary lifestyle habits<sup>13</sup>. A study by Mielke et al.<sup>28</sup> found that 45.6% of Brazil's urban population and 48.3% of rural population were physically inactive.

Likewise physical activity, the eating habits of a population can partially justify excess weight<sup>29</sup>. Thus, understanding the diet characteristics can be an important instrument in public health care<sup>29</sup>. The lifestyle particularities of people living in the region of Passo do Lontra may impact the free time available for meals and even the number of meals eaten per day; many individuals spend all day outside their homes working in the river or in the Pantanal wetlands<sup>13</sup>.

In the present study, a daily low intake of fruits and vegetables was recorded. Hirschmann et al.<sup>30</sup> and Felisbino-Mendes et al.<sup>31</sup>, in studies conducted with a rural population in the state of Rio Grande do Sul and Minas Gerais, respectively, found an inadequate consumption of leafy greens and other vegetables by adults, with higher prevalence of inadequacy among male individuals, as also observed in the present study. National data indicate that only 37.3% of Brazilian adults consume at least five portions of fruits and/or vegetables daily, with higher prevalence among women. In the comparison between rural and urban populations, the prevalence of adequate intake of fruits and vegetables was lower among individuals living in the rural areas (31.2%)<sup>32</sup>.

It is also noteworthy that geographic and socioeconomic factors are connected with food insecurity since they influence the availability and choice of foods<sup>29</sup>. The distance of Passo do Lontra community from urban areas, where most foods are marketed in the region, is a major limiting factor for the acquisition of fruits, vegetables and other perishable foods, as well as the economic difficulties this population<sup>13</sup>, which makes families have monotonous and unhealthy dietary patterns. Other explanation is related to natural

phenomena<sup>31</sup>, such as the floods in the Pantanal, which makes it difficult to cultivate and produce vegetables.

In addition to the low intake of fruits and vegetables, daily sodas intake was also significant, consumed by 24.6% of the population assessed, as well as sweets, which were consumed by 33.8% of participants. NHS data indicate a frequency of regular intake of sodas (five days or over/week) by 13.5% of the country's rural population. Sweets were consumed (five days or over/week) by 19.5% of this same population<sup>32</sup>. Excessive consumption of ultra-processed foods and rich in simple carbohydrates may contribute to the onset of NCD<sup>33,34</sup>.

Passos et al.<sup>35</sup> investigated the relationship between the prevalence of excess weight and the price of ultra-processed foods in Brazil, and the results showed an inverse relation between the variables, i.e., for every 1.00% price increase in ultra-processed foods, there was an average reduction of 0.33% in the prevalence of excess weight and 0.59% in the prevalence of obesity, especially among low-income populations, such as that of the present study. Therefore, taxation on this class of foods, along with the development of policies to enhance food and nutrition education, are possible resources to prevent and control excess weight in the country<sup>35</sup>.

Living conditions largely explain the health/disease process of a population. Access to health is essential for quality of life, influencing morbimortality and life expectancy, since there are significant differences in health care needs between urban and rural population<sup>9</sup>.

Inequalities in the distribution of health-related conditions, which negatively affect rural populations when compared to urban population, has a relation with factors such as: lower wages paid to rural individuals; informal jobs, which limit the access to labor benefits such as health insurance, less availability of health services in the rural areas; distance to health care services, which often require long

travels. Therefore, the differences between urban and rural areas reflect “*important structural factors and the government's difficulties to meet all demands in the farthest places in the country*”<sup>9</sup>.

Aiming at diminishing inequalities in health care, in 2011 the National Policy for Integral Healthcare of Rural and Forest Populations was created to meet the needs of these populations, assuming the particularities and the determinants of the health/disease process, and to improve the health conditions of these people<sup>36</sup>. However, although there is a specific health policy for rural and forest populations, the experience with the academic extension action, which provided an intense interaction with the Pantanal communities, showed serious difficulties of access to health services, due to non-existing local services that provide continuous assistance to individuals and the long distance to be traveled to reach the nearest health care units.

## Conclusion

The prevalence of excess weight found in this study was very high, especially in female individuals, above that found in other surveys that assessed the frequency of excess weight in both urban and rural areas. The individuals with large waist circumference had a higher frequency of excess weight as well as those who had weight loss as the reason for seeking nutritional care.

The socioeconomic conditions of the population assessed, the difficulties of access to health care services and the lack of basic sanitation infrastructure in the region show the social vulnerability and food insecurity of this community. It also reveals the need for coverage of public health policies, similar to the National Policy for Integral Healthcare of Rural and Forest Populations. Thus, efforts to effectively put the public policies already existing into practice are vitally important, aiming to reduce present inequalities and

promote improvements in the quality of life of this population.

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