

# Prevalence of food intake among individuals with hypertension and diabetes in the municipality of Nova Boa Vista, Rio Grande do Sul, Brazil, 2013\*

doi: 10.5123/S1679-49742017000400016

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## Abstract

**Objective:** to describe the food intake among individuals with hypertension and diabetes in a municipality in the south of Brazil. **Methods:** a cross-sectional descriptive study was conducted in Nova Boa Vista-RS, Brazil, from June to September 2013; food intake was collected from the questionnaire of the Food and Nutrition Surveillance System (SISVAN) and from an adaptation based on the 2008 Dietary Guidelines for the Brazilian Population. **Results:** 422 individuals were included in the study ( $\geq 18$  years old); the food that presented the highest recommended intake frequencies were raw salad (60.7%), fruits (73.0%), dairy products (61.4%), fried food (57.3%), snacks (66.4%) and soft drinks (76.3%); processed meat and sweets presented the highest non-recommended intake frequencies, with 34.8 and 23.9%, respectively. **Conclusion:** food intake among the population studied seems to be in accordance to the recommended frequencies, especially among women.

**Keywords:** Food consumption; Hypertension; Diabetes *Mellitus*; Chronic Diseases; Epidemiology, Descriptive.

\*Manuscript based on the Professional Masters' thesis by Kelli Destri, entitled 'Markers of Dietary Intake of Hypertensive and Diabetics in Nova Boa Vista-RS', defended and approved by the Post-graduation Program in Public Health Based on Evidence from the Federal University of Pelotas, in 2014.

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## Introduction

Population ageing is a global phenomenon which, along with sedentary lifestyle, poor nutrition and overweight, constitutes the main factors that contribute to the increase of non-communicable diseases (NCDs), such as hypertension (HT) and diabetes *mellitus* (DM).<sup>1</sup>

The World Health Organization (WHO) reported an increase in chronic diseases as a worldwide epidemics.<sup>2</sup> From 2008 to 2012, prevalences of HT and DM varied in different countries, reaching, on average, 40% and 7% of the population, respectively. For the following decades, increase estimates of these diseases are exponential. In 2025, there may be 1.5 million people living with HT, and, between 2010 and 2030, there may be a 69% growth in the number of adults with DM in developing countries.<sup>2-5</sup>

In Brazil, prevalences of self-reported HT and DM grew from 43.9% to 53.3% and from 10.3% to 16.1%, respectively, from 2003 to 2008. The South region of the country presented prevalence of approximately 30% for HT and 8% for DM, in 2005.<sup>1-7</sup>

*Around 80% of DM and HT cases could be avoided with the adoption of dietary habits, such as regular intake of fruit and vegetables, and low intake of saturated fat, sodium and sugary drinks.*

Prevention and control of NCDs and their risk factors are essential to avoid the epidemic growth of these diseases and their serious consequences to the individuals' quality of life. Among these modifiable factors, good eating habits is one of the essential elements to control non-communicable diseases, since they are frequently caused by unhealthy lifestyles.<sup>9</sup>

Data from WHO show that around 80% of DM and HT cases could be avoided with the adoption of dietary habits, such as regular intake of fruit and vegetables, and low intake of saturated fat, sodium and sugary drinks.<sup>10</sup> Nevertheless, a study conducted in Florianópolis, in 2009, showed that individuals with hypertension and diabetes presented high intake of fried foods and soft drinks, and low daily intake of fruits, in addition to insufficient intake of vegetables, excessive intake of high-fat meat and addition of salt to ready-to-eat foods.<sup>9</sup> Also in 2009, in a study also conducted in the south

of Brazil, Ozcariz et al. observed inadequate intake of healthy and unhealthy foods among individuals with hypertension and diabetes. In both sexes, the frequency of daily intake of fruits did not exceed 20%, whilst regular intake of fried foods and soft drinks varied from 40 to 60%, being higher among men.

These results have also been noticed in high income countries.<sup>9</sup> A study conducted in South Korea, by Kang et al., suggests that the intake of fried foods is associated to the growth of HT prevalence in women.<sup>11</sup> Another study, conducted in the United States, based on the National Health and Nutrition Examination Survey (NHANES) from 2003 to 2006, showed that only 26% of the participants – among individuals with DM and HT history –, ate five or more servings of fruit and vegetables during the week.<sup>12</sup>

Considering nutrition as one of the factors that encompasses the control and prevention of hypertension – HT – and diabetes *mellitus* – DM –, this study aimed to describe the food intake among individuals with hypertension and diabetes in a municipality in the south of Brazil having as reference the recommendations by the 2008 Dietary Guidelines for the Brazilian Population.

## Methods

A cross-sectional descriptive study was conducted in Nova Boa Vista-RS, Brazil, from June to September, 2013. This is a micro-sized municipality, located in the Northeast of Rio Grande do Sul State, with a population estimated in 1,969 inhabitants and population density of 10.8 inhab./km<sup>2</sup> in 2010.<sup>13</sup> The municipality has a Family Health Team (FHT) inserted in Modality I, in accordance to the Primary Health Care of Rio Grande do Sul State. This team is composed of one doctor, one nurse, two nursing assistants and five health community agents (HCA), in addition to two Oral Health professionals: a dental surgeon and an oral health technician.<sup>21</sup>

The individuals considered eligible to the study were people with hypertension and diabetes, aged 18 or over, not bedridden, whose food intake in the week prior to the interview was not modified due to acute medical conditions, and were residents of the rural or urban area of the municipality. The participants were selected from registrations at the Primary Health Care Information System (SIAB) until 2012.

To evaluate the outcome of 'frequency of food intake', the questionnaire of food markers proposed by the System

of Food and Nutrition Surveillance (SISVAN) was used.<sup>14</sup> This instrument, composed of ten questions, evaluates the frequency of healthy and unhealthy food intake in the last seven days. Considered as 'healthy foods' are: raw salad (lettuce, tomato, carrot, cucumber, cabbage); cooked vegetables (kale, pumpkin, chayote, broccoli, spinach – not considering potato and cassava); fresh fruits or fruit salad; milk or yogurt (recommended intake: 7x/week); and beans (recommended intake:  $\geq 5$  times/week). Considered as 'unhealthy foods' are (recommended intake: up to once a week): French fries, crisps and fried salty snacks (*coxinha*, *kibe*, *pastel*); saltine cracker or packaged salty snacks; sweet or packaged cookies, sweets, candies and chocolate (bars or bonbons); and soft drinks (not considering diet or light).<sup>15</sup>

The following sociodemographic and health characteristics were investigated:

- sex (male/female);
- age (in years);
- self-reported skin color (white, black, brown, Asian or indigenous);
- education level (complete years of schooling);
- marital status (with or without a partner);
- residence area (urban/rural);
- family income in the previous month (in minimum wages: minimum wage fixed at BRL678.00);
- self-perception of health (excellent, very good, good, regular or bad);
- morbidity presence (only HT; only DM; or HT + DM);
- length of time with HT (<10 years or  $\geq 10$  years);
- length of time with DM (<8 years or  $\geq 8$  years);
- family history for HT and/or DM (yes/no); and
- recommendation on diet (yes/no)

The data collection was made in the participants' households by two previously trained health community agents (HCA). For the interview, the HCA should be fluent in German, which is widely used in that municipality, in order to make communication, acceptability and logistics of the research easier.

The collected data were double-typed in the EpiData 3.1 program, and the statistical analyses were made using Stata 12.1 program. First, the frequency of food intake in the previous week was calculated; afterwards, prevalences of the recommended frequency of intake were obtained, as well as its 95% confidence interval (95%CI). The chi-squared test of heterogeneity was used to evaluate the possible differences among the

exposition categories. For all analyses, a 5% significance level was considered.

The quality control was performed by the study's supervisor with a second visit to 10% of the respondents' households, which were randomly selected. For this, a shorter questionnaire was applied in order to evaluate the consistency of answers.

The study project was approved by the Ethics Research Committee of the School of Medicine of the Federal University of Pelotas, in accordance to Report No. 290.353. The signing of a Free Informed Term of Consent was requested from the respondents prior to the interview. In all steps of the study, it was guaranteed the compliance with the requirements of the Resolution of the National Health Council (CNS) No. 466, dated December 12th, 2012, which regulates the development of researches involving human beings.

## Results

According to SIAB's data, in 2012, Nova Boa Vista-RS had registrations from 441 individuals with hypertension and/or diabetes, aged 18 or over. From these, 422 (95.7%) participated in the research. Nineteen people did not participate because of the following reasons: one, due to death; fifteen were not found in their households, after several attempts; and three refused to participate in the study. The quality control was performed with 42 individuals (10% of the respondents). From the question '*What is your birth date?*', a kappa value for an agreement of 0.88 was obtained. It was considered satisfactory.

The majority of the studied population was composed of women (60.4%), individuals with white skin color (98.1%), elderly individuals (64.7%) and individuals suffering only from HT (85.1%) (Table 1). Approximately 70% of the respondents reported having received recommendation on diet from someone, and the doctor was the most cited person (36.7%).

Regarding the frequency of intake of the healthy diet markers in the week prior to the interview, more than 60% of the studied population reported having eaten raw salad, fruits and dairy products daily. By analyzing the frequency of intake according to the type of morbidity present, we observed that the daily intake of raw salad and fruits was higher among individuals who only had DM, whilst the daily frequency of dairy products intake was higher among those with HT. Among the foods

considered healthy, the group of to cooked vegetables was the one with the lowest daily intake, corresponding to 17.5% (Table 2).

Half of the individuals interviewed ate unhealthy foods – such as fried foods, salty snacks or soft drinks – within the limits recommended by the 2008 Dietary Guidelines for the Brazilian population, that is, up to once a week. However, processed meats and sweets surpassed the proposed recommendations, reaching 70.8 and 61.9%, respectively, for intake more than once a week. The frequency of recommended weekly intake of fried foods and salty snacks was higher among individuals who had, simultaneously, HT and DM, whilst the frequency of intake of soft drinks up to once a week was higher among individuals with only DM. It is

important to highlight that the recommended frequency of intake of sweets was higher in both categories which included individuals with diabetes (Table 3).

Table 4 shows the prevalences and the 95%CI of recommended weekly intake of food considered healthy. The prevalence of raw salad intake was 1.1 times higher among individuals that consider their health excellent or good, in comparison to those who consider their health regular or bad ( $p=0.032$ ). Regarding the length of time with HT, individuals with a diagnosis of less than ten years showed a prevalence of recommended weekly intake of raw salad 25% higher than those with a diagnosis of ten years or over ( $p=0.007$ ).

The prevalence of recommended weekly intake of fruit was 19% higher among women ( $p=0.004$ ).

**Table 1 – Description of the studied population (n=422), Nova Boa Vista-RS, 2013**

Demographic characteristics and morbidity for hypertension and diabetes mellitus	n	%
<b>Sex</b>		
Male	167	39.6
Female	255	60.4
<b>Skin color</b>		
White	414	98.1
Black + Brown	08	1.9
<b>Age (in years)</b>		
20-59	149	35.3
≥60	273	64.7
<b>Education level (complete years of schooling)</b>		
0-4	206	49.3
5-8	175	41.9
≥9	37	8.8
<b>Family income (in minimum wages)</b>		
≤1.0	13	3.1
1.1-3.0	191	45.3
3.1-6.0	130	30.8
6.1-10.0	54	12.8
>10.0	34	8.0
<b>Residence area</b>		
Urban	102	24.2
Rural	320	75.8
<b>Morbidity present</b>		
Only hypertension	359	85.1
Only diabetes mellitus	12	2.8
Hypertension + diabetes mellitus	51	12.1

**Table 2 – Weekly frequency of food markers intake in individuals with hypertension and diabetes (n=422), Nova Boa Vista-RS, 2013**

Markers	None	1x	2x	3x	4x	5x	6x	7x
	%	%	%	%	%	%	%	%
Raw salad	7.3	2.8	5.0	10.0	5.9	4.3	4.0	60.7
Cooked vegetables	16.6	12.8	19.4	17.3	8.3	4.5	4.0	17.5
Fruits	3.3	4.5	2.8	5.9	3.1	4.0	3.3	73.0
Beans	9.2	6.4	15.4	16.8	11.4	24.4	11.4	5.0
Dairy products	27.0	1.0	2.6	2.1	1.2	1.2	3.5	61.4
Fried food	30.3	27.0	19.2	11.4	5.7	1.4	0.5	4.5
Processed meat	19.2	9.9	9.7	9.5	6.6	4.7	5.6	34.8
Salty snacks	56.2	10.2	12.1	7.8	2.8	1.2	0.9	8.8
Sweets	21.6	16.6	14.0	10.9	5.4	3.8	3.8	23.9
Soft drink	46.4	29.9	14.0	5.7	1.7	0.9	0.2	1.2

and 47% higher in people who live in the rural area ( $p < 0.001$ ). Regarding family income, a lower prevalence of recommended weekly intake among individuals of a lower income group was observed ( $p < 0.001$ ). In addition, participants of the study who reported having already received recommendation on nutrition had a prevalence of recommended intake of fruit 0.8 times higher in comparison to those who had not received this recommendation ( $p = 0.019$ ) (Table 4).

Prevalences and 95%CI of recommended weekly intake of foods considered unhealthy are presented in Table 5. The prevalence of the recommended weekly intake of fried foods was 26% higher among women ( $p = 0.010$ ). Moreover, women showed a prevalence of recommended weekly intake of processed meats 2.2 times higher in comparison to men ( $p < 0.001$ ). Soft drinks intake followed the same trend, showing a prevalence of recommended intake 13% higher in females ( $p = 0.027$ ). However, regarding salty snacks intake, men had a prevalence of adequate intake of 72.5%, surpassing women ( $p = 0.032$ ).

The prevalence of recommended weekly intake of salty snacks was 12.8% higher in people who reported living without a partner ( $p = 0.011$ ) and 1.2 times higher in residents of the urban area ( $p = 0.045$ ). Besides salty snacks, the prevalence of recommended intake of fried foods and sweets was also different regarding the area of residence, being higher among residents of the urban area ( $p = 0.008$  and  $p = 0.009$ , respectively). Regarding family income, the prevalence of recommended weekly

intake of processed meats stands out. It is higher among individuals with income up to three minimum wages, in comparison to the categories of higher income ( $p = 0.002$ ) (Table 5).

Finally, regarding the presence of morbidities, results show that individuals with only HT had lower prevalence of recommended intake of sweets when compared with the other categories ( $p = 0.041$ ) (Table 5).

## Discussion

From all the results obtained, two must be highlighted. First, both regarding the set of healthy and unhealthy foods, the prevalence of recommended food intake was higher in women than in men. Second: when the prevalence of recommended food intake among people with DM and/or HT is compared, groups that had DM as morbidity showed higher prevalence of recommended food intake. These results are relevant for Public Health, as they identify, in the studied population, in which groups, diet and nutrition actions must be reinforced.<sup>10,16,17</sup>

For the majority of the food items investigated, prevalence of recommended intake superior to 50% was observed, showing that, usually, the studied population follows the recommendations of the Dietary Guidelines for the Brazilian Population. This finding can possibly be explained by the region's population scale, small sized and essentially rural, with wide access to products in natura and more limited access to industrialized products and fast food.

**Table 3 – Frequency of weekly food intake according to the morbidity (n=422), Nova Boa Vista-RS, 2013**

Markers	0x	1x	2x	3x	4x	5x	6x	7x
	%	%	%	%	%	%	%	%
<b>Raw salad</b>	7.4	2.8	5.0	10.0	5.9	4.3	4.0	60.7
Only hypertension	6.7	2.8	5.0	10.9	5.3	4.2	4.2	61.0
Only diabetes mellitus	8.3	8.3	0.0	0.0	0.0	8.3	0.0	75.0
Hypertension + diabetes mellitus	11.8	2.0	5.9	5.9	11.8	3.9	3.9	54.9
<b>Cooked vegetables</b>	16.6	12.8	19.4	17.3	8.3	4.5	3.6	17.5
Only hypertension	17.0	12.8	19.8	16.4	8.6	4.2	3.1	18.1
Only diabetes mellitus	16.7	8.3	33.3	16.7	0.0	0.0	8.3	16.7
Hypertension + diabetes mellitus	13.7	13.7	13.7	23.5	7.8	7.8	5.9	13.7
<b>Fruits</b>	3.3	4.5	2.8	5.9	3.1	4.0	3.3	73.0
Only hypertension	2.8	4.2	2.8	6.1	3.6	4.2	3.1	73.3
Only diabetes mellitus	16.7	8.3	0.0	0.0	0.0	0.0	0.0	75.0
Hypertension + diabetes mellitus	3.9	5.9	3.9	5.9	0.0	3.9	5.9	70.6
<b>Beans</b>	9.2	6.4	15.4	16.8	11.4	24.4	11.4	5.0
Only hypertension	8.9	6.1	16.4	17.0	12.0	24.5	11.1	3.9
Only diabetes mellitus	16.7	0.0	16.7	8.3	0.0	50.0	0.0	8.3
Hypertension + diabetes mellitus	9.8	9.8	7.8	17.7	9.8	17.7	15.7	11.8
<b>Dairy products</b>	27.0	1.0	2.6	2.1	1.2	1.2	3.6	61.4
Only hypertension	27.6	1.1	2.5	2.0	0.8	1.1	3.1	61.8
Only diabetes mellitus	25.0	0.0	0.0	8.3	8.3	0.0	0.0	58.3
Hypertension + diabetes mellitus	23.5	0.0	3.9	2.0	2.0	2.0	7.8	58.8
<b>Fried food</b>	30.3	27.0	19.2	11.4	5.7	1.4	0.5	4.5
Only hypertension	30.6	25.4	19.8	11.1	6.1	1.7	0.6	4.7
Only diabetes mellitus	25.0	33.3	16.7	8.3	8.3	0.0	0.0	8.3
Hypertension + diabetes mellitus	29.4	37.3	15.7	13.7	2.0	0.0	0.0	2.0
<b>Processed meat</b>	19.2	10.0	9.7	9.5	6.6	4.7	5.5	34.8
Only hypertension	19.2	9.8	9.2	9.8	6.1	3.6	5.0	37.3
Only diabetes mellitus	16.7	0.0	8.3	16.7	16.7	16.7	0.0	25.0
Hypertension + diabetes mellitus	19.6	13.7	13.7	5.9	7.8	9.8	9.8	19.6
<b>Salty snacks</b>	56.2	10.2	12.1	7.8	2.8	1.2	1.0	8.8
Only hypertension	57.9	9.5	12.0	7.2	3.1	1.1	1.1	8.1
Only diabetes mellitus	41.7	8.3	25.0	8.3	0.0	0.0	0.0	16.7
Hypertension + diabetes mellitus	47.1	15.7	9.8	11.8	2.0	2.0	0.0	11.8

The prevalence of processed meat and sweets surpassed the maximum intake recommendations, since 70.8% and 61.9% of individuals, respectively, mentioned eating this kind of food more than once a week. This high frequency intake of processed meats and sweets can be explained by the municipality's cultural aspects, such as the German ancestry and its

culture, in which the presence of both food groups is very common. Other studies show similar results, such as inadequacy of food intake among individuals with hypertension and diabetes, mainly, because of a diet rich in fat and sugars.<sup>18-21</sup>

The high percentage of individuals (more than 60%) who had eaten raw salad, fruits and dairy products

**Table 4 – Prevalences (P) and confidence intervals of 95% (95%CI) of frequency of recommended weekly intake of the healthy diet food markers (n=422), Nova Boa Vista-RS, 2013**

Variables	Raw salad <sup>a</sup>	Cooked vegetables <sup>a</sup>	Fruits <sup>a</sup>	Beans <sup>b</sup>	Dairy products <sup>a</sup>
	P (95%CI)	P (95%CI)	P (95%CI)	P (95%CI)	P (95%CI)
<b>Sex</b>					
Male	58.7 (51.2;66.2)	18.0 (12.1;23.8)	65.3 (58.0;72.5) <sup>c</sup>	43.1 (35.6;50.7)	55.7(48.1;63.3)
Female	62.0 (56.0;67.9)	17.3 (12.6;21.9)	78.0 (72.9;83.1)	39.2 (33.2;45.2)	65.1 (59.2;71.0)
<b>Age (in years)</b>					
20-59	57.0 (49.0;65.0)	17.4 (11.3;23.6)	77.9 (71.1;84.6)	38.3 (30.4;46.1)	59.1 (51.1;67.0)
≥60	62.6 (56.9;68.4)	17.6 (13.0;22.1)	70.3 (64.9;75.8)	42.1 (36.2;48.0)	62.6 (56.9;68.4)
<b>Education level (in complete years of schooling)</b>					
0-4	59.7 (53.0;66.4)	17.5 (12.3;22.7)	73.3 (67.2;79.4)	44.7 (37.8;51.5)	60.2 (53.5;66.9)
5-8	60.6 (53.3;67.9)	16.0 (10.5;21.5)	73.7 (67.2;80.3)	37.1 (29.9;44.3)	62.3 (55.1;69.5)
≥9	67.6 (52.2;82.9)	27.0 (12.5;41.6)	70.3 (55.3;85.2)	40.5 (24.5;56.6)	62.2 (46.3;78.1)
<b>Marital status</b>					
With partner	58.9 (50.1;67.6)	18.5 (11.7;25.4)	73.4 (65.6;81.2)	33.9 (25.5;42.3)	58.9 (50.1;67.6)
Without partner	61.4 (55.9;67.0)	17.1 (12.8;21.4)	72.8 (67.7;77.9)	43.6 (38.0;49.3)	62.4 (56.9;67.9)
<b>Residence area</b>					
Urban	56.9 (47.2;66.5)	12.7 (6.2;19.3)	53.9 (44.2;63.7) <sup>d</sup>	43.1 (33.5;52.8)	56.9 (47.2;66.5)
Rural	61.9 (56.5;67.2)	19.1 (14.7;23.4)	79.1 (74.6;83.5)	40.0 (34.6;45.4)	62.8 (57.5;68.1)
<b>Family income (in minimum wages)</b>					
≤3.0	56.9 (50.0;63.7)	18.6 (13.3;24.0)	64.2 (57.6;70.8) <sup>d</sup>	44.1 (37.3;51.0)	59.8 (53.0;66.6)
3.1-6.0	67.7 (59.6;75.8)	18.5 (11.7;25.2)	82.3 (75.7;88.9)	39.2 (30.8;47.7)	60.0 (51.5;68.5)
>6.0	59.1 (48.7-69.5)	13.6 (6.4;20.9)	79.5 (71.0;88.0)	35.2 (25.2;45.3)	67.0 (57.1;77.0)
<b>Self-perception of health</b>					
Excellent-Good	65.7 (59.3;72.1) <sup>c</sup>	19.2 (13.9;24.6)	77.0 (71.3;82.7)	39.9 (33.3;46.5)	59.2 (52.5;65.8)
Regular-Bad	55.5 (48.7;62.3)	15.8 (10.8;20.8)	68.9 (62.6;75.2)	41.6 (34.9;48.3)	63.6 (57.1;70.2)
<b>Morbidity present</b>					
Only hypertension	61.0 (55.9;66.1)	18.1 (14.1;22.1)	73.3 (68.7;77.9)	39.6 (34.5;44.6)	61.8 (56.8;66.9)
Only diabetes mellitus	75.0 (49.3-*)	16.7 (0.0;38.8)	75.0 (49.3-*)	58.3 (29.1;87.6)	58.3 (29.1;87.6)
Hypertension + diabetes mellitus	54.9 (41.1;68.7)	13.7 (4.2;23.3)	70.6 (57.9;83.3)	45.1 (31.3;58.9)	58.8 (45.1;72.5)
<b>Length of time with hypertension (in years)</b>					
<10	68.2 (61.2;75.3) <sup>c</sup>	17.6 (11.9;23.4)	74.7 (68.1;81.3)	39.4 (32.0;46.8)	57.6 (50.2;65.1)
≥10	54.7 (48.1;61.3)	18.4 (23.3;23.5)	72.2 (66.3;78.1)	41.3 (34.8;47.8)	64.1 (57.8;70.5)
<b>Length of time with diabetes mellitus (in years)</b>					
< 8	57.7 (37.9;77.5)	11.5 (0.0;24.3)	73.1 (55.3;90.8)	46.2 (26.2;66.1)	61.0 (42.1;81.0)
≥ 8	58.8 (41.7;76.0)	17.6 (4.4;30.9)	73.5 (58.2;88.9)	52.9 (35.6;70.3)	58.8 (41.7;76.0)
<b>Recommendation</b>					
No	56.9 (48.4;65.5)	16.9 (10.4;23.4)	65.4 (57.2;73.6) <sup>c</sup>	38.5 (30.0;46.9)	58.5 (49.9;67.0)
Yes	62.3 (56.7;67.9)	17.8 (13.4;22.2)	76.4 (71.5;81.3)	41.8 (36.1;47.5)	62.7 (57.1;68.2)

a) Daily intake.

b) Intake equal or higher than five times a week.

c) Value p&lt;0.05.

d) Value p&lt;0.001.

**Table 5 – Prevalences (P) and confidence intervals of 95% (95%CI) of frequency of recommended weekly intake of the unhealthy diet food markers (n=422), Nova Boa Vista-RS, 2013**

Variables	Fried food <sup>a</sup>	Processed meat <sup>a</sup>	Salty snacks <sup>a</sup>	Sweets <sup>a</sup>	Soft drink <sup>a</sup>
	P (IC <sub>95%</sub> )				
<b>Sex</b>					
Male	49.7 (42.1;57.3) <sup>b</sup>	17.4 (11.6;23.1) <sup>c</sup>	72.5 (65.6;79.3) <sup>b</sup>	42.5 (35.0;50.1)	70.7 (63.7;77.6) <sup>b</sup>
Female	62.4 (56.4;68.3)	36.9 (30.9;42.8)	62.4 (56.4;68.3)	35.3 (29.4;41.2)	80.0 (75.1;84.9)
<b>Age (in years)</b>					
20-59	57.0 (49.0;65.0)	29.5 (22.2;36.9)	65.1 (57.4;72.8)	41.6 (33.6;49.6)	73.2 (66.0;80.3)
≥60	57.5 (51.6;63.4)	28.9 (23.5;34.3)	67.0 (61.4;72.6)	36.3 (30.5;42.0)	78.0 (73.1;83.0)
<b>Education level (in complete years of schooling)</b>					
0-4	56.8 (50.0;63.6)	30.1 (23.8;36.4)	68.9 (62.6;75.3)	37.9 (31.2;44.5)	77.2 (71.4;82.9)
5-8	55.4 (48.0;62.8)	28.0 (21.3;34.7)	62.9 (55.7;70.1)	37.1 (29.9;44.3)	74.9 (68.4;81.3)
≥9	67.6 (52.2;82.9)	29.7 (14.8;44.7)	67.6 (52.2;82.9)	40.5 (24.5;56.6)	78.4 (64.9;91.9)
<b>Marital status</b>					
With partner	58.1 (49.3;66.8)	32.3 (24.0;40.5)	57.3 (48.5;66.0) <sup>b</sup>	33.1 (24.7;41.4)	73.4 (65.6;81.2)
Without partner	57.0 (51.4;62.7)	27.9 (22.7;33.0)	70.1 (64.9;75.4)	40.3 (34.7;45.9)	77.5 (72.8;82.3)
<b>Residence area</b>					
Urban	68.6 (59.6;77.7) <sup>c</sup>	36.3 (26.9;45.7)	74.5 (66.0;83.0) <sup>b</sup>	49.0 (39.2;58.8) <sup>b</sup>	79.4 (71.5;87.3)
Rural	53.8 (48.3;59.2)	26.9 (22.0;31.8)	63.8 (58.5;69.0)	34.7 (29.4;39.9)	75.3 (70.6;80.1)
<b>Family income (in minimum wages)</b>					
≤3.0	61.8 (55.1;68.5)	36.8 (30.1;43.4) <sup>b</sup>	67.6 (61.2;74.1)	39.2 (32.5;46.0)	78.4 (72.8;84.1)
3.1-6.0	57.7 (49.1;66.2)	19.2 (12.4;26.1)	63.1 (54.7;71.4)	40.8 (32.3;49.3)	76.2 (68.8;83.5)
>6.0	46.6 (36.1;57.1)	26.1 (16.9;35.4)	68.2 (58.4;78.0)	31.8 (22.0;41.6)	71.6 (62.1;81.1)
<b>Self-perception of health</b>					
Excellent-Good	60.6 (54.0;67.2)	31.5 (25.2;37.7)	68.5 (62.3;74.8)	37.6 (31.0;44.1)	76.5 (70.8;82.2)
Regular-Bad	54.1 (47.3;60.9)	26.8 (20.8;32.8)	64.1 (57.6;70.7)	38.8 (32.1;45.4)	76.1 (70.3;81.9)
<b>Morbidity present</b>					
Only hypertension	56.0 (50.8;61.1)	29.0 (24.3;33.7)	67.4 (62.5;72.3)	35.7 (30.7;40.6) <sup>b</sup>	75.2 (70.7;79.7)
Only diabetes mellitus	58.3 (29.1;87.6)	16.7 (0.0;38.8)	50.0 (20.4;79.6)	50.0 (20.4;79.6)	91.7 (75.3-*)
Hypertension + diabetes mellitus	66.7 (53.6;79.8)	33.3 (20.2;46.4)	62.7 (49.3;76.2)	52.9 (39.1;66.8)	80.0 (69.4;91.4)
<b>Length of time with hypertension (in years)</b>					
<10	54.7 (47.2;62.2)	31.2 (24.2;38.2)	70.0 (63.1;76.9)	40.6 (33.2;48.0)	74.1 (67.5;80.7)
≥10	59.2 (52.7;65.7)	27.8 (21.9;33.7)	63.2 (56.9;69.6)	35.4 (29.1;41.7)	77.6 (72.1;83.1)
<b>Length of time with diabetes mellitus (in years)</b>					
<8	57.7 (37.9;77.5)	34.6 (15.6;53.7)	61.5 (42.1;81.0)	57.7 (37.9;77.5)	80.8 (65.0;96.5)
≥8	70.6 (54.7;86.5)	26.5 (11.1;41.8)	58.8 (41.7;76.0)	52.9 (35.6;70.3)	85.3 (73.0;97.6)
<b>Recommendation</b>					
No	55.4 (46.8;64.0)	26.9 (19.2;34.6)	65.4 (57.2;73.6)	38.5 (30.0;46.9)	74.6 (67.1;82.1)
Yes	58.2 (52.5;63.9)	30.1 (24.8;35.4)	66.8 (61.4;72.2)	38.0 (32.4;43.6)	77.1 (72.2;81.9)

a) Intake equal or lower than once a week.

b) Value p&lt;0.05.

c) Value p&lt;0.001.

\*The mentioned value for the upper limit of the confidence interval exceeds 100% and for this reason has not been reported in this table.

daily reflects the community's global scenario, which is endowed with an abundant offer of horticultural, and orchard products, as well as milk and dairy products, since its production is very common in the region. These characteristics can be observed in other studies, also because the rural area offers conditions for a more frequent intake of this kind of food, in addition to highlighting the role of fiber and dairy products in HT and DM control diets, which has already been described in literature.<sup>19</sup>

The study also showed that women presented higher frequency of recommended food intake for fruits, fried foods, processed meats and soft drinks, in comparison to men. This finding is similar to evidences from another study,<sup>22</sup> which presents women as being more careful with what they eat, by choosing a diet poor in fat and sugar and rich in fiber.<sup>23-16</sup>

The results of this study show that the prevalence of recommended daily intake of sweets among individuals with hypertension was higher than the other groups. A research conducted by Cotta et al. in Minas Gerais State, in 2005, showed that 66.9% of the evaluated individuals with hypertension and 100% of those with diabetes reported avoiding some type of food with the objective of improving their health.<sup>24</sup>

The prevalence of fruit intake was 47% higher for individuals who live in the rural area ( $p < 0,001$ ). The majority of the studied municipality's population lives in the rural area and keeps their own gardens and orchards, having a broad availability of these foods at a lower cost, which can explain their higher intake.<sup>1,25</sup>

Another result related to the area of residence showed that inhabitants of the urban area had higher prevalence of unhealthy food intake. Studies conducted in the Southeast region of the country, in 2005 and 2010,<sup>16,26</sup> showed that, in general, living in urban areas is a factor that contributes to inadequate nutrition, rich in fats, processed and ultra-processed products.<sup>16,26</sup>

The economic level also seems to be related with this population's food intake. The group with the lowest income showed the lowest prevalence of recommended food intake of fruits, whilst the group of medium income, higher prevalence of intake of processed meat. The aforementioned results suggest that, despite income being related to food intake, it is not possible to determine a higher or lower recommended intake of healthy or unhealthy foods in this population, according to their economic status. Notwithstanding, some studies suggest

that the choice of a healthy diet is associated to family income, with individuals of higher income having a more balanced diet.<sup>26,27</sup>

Individuals with excellent or good self-perception of health showed higher prevalence of recommended intake of raw salad. This result differs from what Costa et al. observed in a study on data from the National Household Sample Survey (PNAD), in its 1998, 2003 and 2008 editions. PNAD showed that elderly people with worse perception of their own health had adequate intake of fibers.<sup>1</sup> Questions regarding how each individual perceives their health are hard to be interpreted.

From all the food items analyzed, only the prevalence of recommended intake of fruits had significant difference to the variable 'food recommendation'. The doctors were the most cited professionals. Even when confirming that most part of the population knows the importance of foods for health, the change in eating habits, frequently, builds up resistance. In general, elderly people, which correspond to 64.7% of the studied population, have very solid cultural roots and are difficult to change opinions. This factor makes individuals not always follow such recommendations, even if they receive some type of nutritional guidance, due to habits, beliefs and/or economic factors.<sup>27</sup>

As study limitations, it is important to highlight that the results found do not reflect the eating habits of the studied population, since the instrument used for the collection of information only represents the food intake during seven days before the interview. The season must also be taken into consideration, since it was a period in which the supply of healthy foods, such as fruits, for example, is higher than in other months of the year.

Regarding possible biases, since it is a community with very close inter-relations and high esteem among individuals, the fact that the data collection was made by the health community agents themselves may have influenced the answers and, eventually, generated information bias. Because of logistical and budgetary constraints, this was the way found to make the study feasible.

[...] Adequate and healthy diet is a basic human right. This right implies ensuring permanent and regular access, in a socially fair manner, to food and ways of eating that satisfy the social and biological requirements of everybody. It also takes into account special dietary needs, and the needs to be culturally appropriate, and allow

for differences in gender, race, and ethnicity. Adequate and healthy diet should be accessible both physically and financially, and harmonious in quantity and quality, meeting the needs of variety, balance, moderation, and pleasure. Furthermore, it should derive from sustainable practices of production and distribution.<sup>28</sup>

The 2008 Dietary Guidelines for the Brazilian population, partially reproduced above, was used as reference to evaluate the adequacy of intake frequency of each food group. The aforementioned guideline was chosen for its quantitative character, which allowed more adequate measure of the outcomes described previously. The latest version of these guidelines, from 2014, was written with distinctive language and a proposal that encompasses broader dietary concepts; therefore, it is not suitable to measure quantitative outcomes. Furthermore, during data collection, the recent release of the 2014 guidelines was one of the reasons for which the present study chose to use the previous version, from 2008.

The Dietary Guidelines for the Brazilian population's new version, published in 2014, has brought a completely innovative approach by covering all aspects of how a healthy diet should be. This new version complements the one used in this study, as it provides the reader with new perspectives of a healthy diet that is not only

restricted to quantities or portions recommended to be consumed throughout the day for each food group.

Given the constant social and economic inequalities present in Brazil, the 2014 Dietary Guidelines for the Brazilian population is an instrument of total relevance, both for the population and for health managers, concerning the improvement of the Brazilian population quality of life.

To understand food intake aspects of individuals who have diseases with high demand for services from primary health care units, such as hypertension and diabetes *mellitus*, it is important to support actions capable of providing improvements to users and to the public health care system. Therefore, we recommend other studies to be conducted with the goal of verifying not only the intake frequency, but also the eating habits of people with the evaluated morbidities.

### Authors' Contributions

Destri K, Zanini RV and Assunção MCF planned and designed the study. Destri K coordinated the field work and wrote the manuscript. Zanini RV analyzed the data. Assunção MCF guided all steps of the study. All authors revised and approved the final version of the manuscript and declared to be responsible for all aspects of the study, ensuring its accuracy and integrity.

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Received on 06/12/2016  
Approved on 02/05/2017