





# Distribution of indicators for chronic non-communicable diseases in adult women beneficiaries and non-beneficiaries of the Bolsa Família Program — Vigitel 2016–2019

*Distribuição de indicadores de Doenças Crônicas Não Transmissíveis em mulheres adultas beneficiárias e não beneficiárias do Programa Bolsa Família — Vigitel 2016–2019*

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**ABSTRACT:** *Objective:* To compare the prevalence of and trend in risk and protective factors for chronic non-communicable diseases (NCDs) among women beneficiaries and non-beneficiaries of Bolsa Família from 2016 to 2019. *Methods:* This is a cross-sectional time-series study. We estimated the prevalence and prevalence ratios, both crude and adjusted for age and schooling, of NCD indicators with their respective confidence intervals, using the Poisson regression model. A time-trend analysis was also performed employing a simple linear regression model, regarding the indicators as the outcome variable and the year of the survey as the explanatory variable. *Results:* Women beneficiaries were more exposed to risk factors for NCDs compared to non-beneficiaries. Prevalence ratios adjusted for smokers were 1.15 (1.07 – 1.24), for overweight were 1.08 (1.03 – 1.14), and for obesity were 1.09 (1.04 – 1.14), while the recommended fruit and vegetable consumption was 0.93 (0.87 – 0.99); they also showed lower practice of leisure-time physical activities (0.88; 0.82 – 0.93), spent more time watching TV (1.08; 1.02 – 1.13), had worse self-rated health status (1.12; 1.04 – 1.21), and lower rates of mammography (0.80; 0.71 – 0.90) and pap smear (0.93; 0.88 – 0.98). Among the beneficiaries, the trend analysis showed an increased prevalence of overweight, from 55.9 to 62.6%, and screen time except for TV, from 13.5 to 27.8%. *Conclusion:* NCD risk factors were higher among women beneficiaries of Bolsa Família, indicating the importance of maintaining affirmative policies for this vulnerable population.

**Keywords:** Social programs. Health surveys. Socioeconomic factors. Health inequality indicators. Women's health. Noncommunicable diseases.

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**RESUMO:** *Objetivo:* Comparar a prevalência e a tendência dos fatores de risco e proteção de Doenças Crônicas Não Transmissíveis (DCNTs) entre mulheres beneficiárias e não beneficiárias do Bolsa Família no período de 2016 a 2019. *Métodos:* Estudo transversal e de série temporal. Foram estimadas as prevalências e as razões de prevalência brutas e ajustadas por idade e escolaridade dos indicadores para DCNT com os respectivos intervalos de confiança pelo modelo de Regressão de Poisson. Foi ainda realizada análise de tendência temporal na qual se empregou o modelo de regressão linear simples, sendo a variável desfecho os indicadores e a explicativa o ano do levantamento. *Resultados:* As mulheres beneficiárias estiveram mais expostas a fatores de risco para DCNT em relação às não beneficiárias. As razões de prevalência ajustadas para fumantes foram 1,15 (1,07 – 1,24); 1,08 (1,03 – 1,14) para excesso de peso e 1,09 (1,04 – 1,14) para obesidade, enquanto o consumo recomendado de frutas, legumes e verduras foi de 0,93 (0,87–0,99); tiveram ainda menor prática de atividades físicas no lazer (0,88; 0,82–0,93); maior tempo assistindo à TV (1,08; 1,02–1,13); pior autoavaliação do estado de saúde (1,12; 1,04–1,21); e apresentaram menor cobertura de mamografia (0,80; 0,71–0,90) e Papanicolau (0,93; 0,88–0,98). Entre as beneficiárias, a análise de tendência evidenciou elevação das prevalências de excesso de peso de 55,9 para 62,6% e de tempo de tela sem TV de 13,5 para 27,8%. *Conclusão:* Fatores de risco de DCNT foram mais elevados entre mulheres com Bolsa Família, apontando a importância da permanência de políticas afirmativas para essa população vulnerável. *Palavras-chave:* Programas sociais. Inquéritos epidemiológicos. Fatores socioeconômicos. Indicadores de desigualdade em saúde. Saúde da mulher. Doenças não transmissíveis.

## INTRODUCTION

Chronic non-communicable diseases (NCDs) — including cerebrovascular and cardiovascular diseases, diabetes mellitus, chronic respiratory diseases, and neoplasms — have the highest mortality rates in the world, in addition to sharing several modifiable risk factors, such as smoking, abusive alcohol consumption, insufficient intake of fruits and vegetables, sedentary lifestyle, and overweight<sup>1,2</sup>.

These diseases affect individuals of all socioeconomic classes; however, their more severe presentations reach vulnerable populations, such as those with low schooling and income<sup>2,3</sup>.

In this context, in order to further social justice and poverty relief, social policies targeted at assisting families living in poverty and extreme poverty aim to reduce social inequalities and promote greater equity and improvement of general life conditions<sup>4,5</sup>.

In this regard, recognizing that families have a better understanding as to how to employ the resources received, Conditional Cash Transfer (CCT) programs became the most effective instruments of social protection by increasing the income of families in a situation of vulnerability and extending, on a large scale, access to and the use of basic services in several developing countries<sup>4,7</sup>.

In Brazil, the Bolsa Família Program (BFP) stood out for being the largest CCT program in the world<sup>8,9</sup>; its purpose is to improve the living conditions of low-income families with restricted access to health, food, and education<sup>4,5,9,10</sup>.

The BFP, by imposing health and educational conditions, has its actions directed toward the development of human capital, aiming at promoting social ascent and breaking the inter-generational cycle of poverty in these families<sup>10,11</sup>. We emphasize that this program usually prioritizes women as the legal responsible for the family, under the assumption that they use a greater share of resources for behaviors that generate the well-being of the family<sup>5,11,12</sup>.

Current research suggests that disadvantaged groups have a greater burden of chronic diseases<sup>3,13</sup>. Recent studies that used data from the system of Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey (*Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (Vigitel) e da Pesquisa Nacional de Saúde — Vigitel*) and the National Health Survey (NHS) revealed that women beneficiaries of the BFP presented higher prevalence of risk factors for NCDs<sup>14,15</sup>, indicating that CCT programs fulfill the important role of prioritizing populations at greater risk, striving for affirmative actions and, consequently, seeking to prevent and minimize the incidence of NCDs in this population<sup>13-15</sup>.

In this sense, aiming to monitor risk and protective factors for NCDs, Vigitel has fulfilled this role when assessing vulnerable populations, such as in 2016, with the inclusion of a specific question about the receipt of the Bolsa Família (BF) aid<sup>14</sup>. Therefore, given the short time since the indicator for receiving aid from the BFP was included in databases, no studies have analyzed the trends in NCD indicators, which can support surveillance policies for this population and encourage measures for prevention and health promotion.

Thus, this study aimed to compare the prevalence of and trends in risk and protective factors for NCDs among women beneficiaries and non-beneficiaries of the BFP, based on the inclusion of the question about the receipt of the BF aid in 2016.

## METHODS

This is a population-based, epidemiological, cross-sectional, time-series study based on Vigitel data from the 26 Brazilian state capitals and the Federal District.

Vigitel is a surveillance system that seeks to obtain, in each capital of the 26 Brazilian states and the Federal District, probabilistic samples of the adult population ( $\geq 18$  years of age) living in households with at least one landline telephone<sup>16</sup>. Approximately 2 thousand interviews are conducted per Brazilian state capital. Further methodological details related to the sampling plan can be found in other publications<sup>17-19</sup>.

The analyses in this study covered the period between 2016 and 2019, comprising a total of 133,927 adult women aged 18 years or older, of whom 6,133 were BFP beneficiaries. Men were excluded from the study, since 90% of BFP beneficiaries are women — according to data from the 2019 Continuous National Household Sample Survey (*Pesquisa Nacional por Amostra de Domicílios — PNAD*)<sup>20</sup>.

The analysis of databases composed only of women required calculating new post-stratification weights to adjust the distribution of the female population who receives and does

not receive BF, in order to reduce the bias resulting from the low coverage of landline telephones, particularly in the North and Northeast regions<sup>17-19</sup>. We constructed these weights using as reference the estimated female population with or without BF aid obtained by the 2019 Continuous PNAD. The variables age, schooling, and region were used to construct the weights<sup>19</sup>.

As to the outcome variable, we performed a dichotomous analysis of receiving BF (yes) or not receiving BF (no). The question used to construct this indicator was: Do you or someone in your family who lives in your home receives Bolsa Família? (yes or no).

For the data analysis, the following indicators were treated as explanatory variables:

Risk factors:

- smoker: people who reported smoking, regardless of the amount, considering the positive responses to the question: “Currently, do you smoke?”;
- ex-smoker: people who reported smoking in the past, considering the positive responses to the question: “Have you smoked in the past?”;
- nutritional status: assessed by the questions: “Do you know your weight (can be a rough value)?” and “Do you know your height?”. Nutritional status was classified according to the World Health Organization (WHO)<sup>21</sup>, with overweight corresponding to Body Mass Index (BMI)  $\geq 25$  kg/m<sup>2</sup> and obesity to BMI  $\geq 30$  kg/m<sup>2</sup>. The missing overweight and obesity values underwent imputation, following methodology available in other publications<sup>17-19</sup>;
- regular consumption of soft drinks or processed juices on five or more days per week, defined according to the answer to the question: “How many days of the week do you usually consume soft drinks or processed juices?”;
- TV watching for 3 hours or more per day, determined by the answer to the question: “On average, how many hours a day do you usually spend watching television?”;
- use of computer, tablet, or mobile phone for 3 or more hours per day, considering the positive responses to the question: “On average, how many hours of your free time (excluding work) do you spend using the computer, tablet, or mobile phone per day?”;
- abusive alcohol consumption (considered four or more drinks on a single occasion in the previous 30 days for women), evaluated by the question: “During the past 30 days, have you consumed four or more alcoholic drinks on a single occasion?”.
- poor self-rated health status, considering the responses “poor” and “very poor” to the question: “Would you rate your health status as: very good, good, regular, poor, or very poor?”;
- reported morbidities (report of prior medical diagnosis of hypertension and diabetes), considering the positive answers to questions: “Has any physician ever told you that you have high blood pressure?” and “Has any physician ever told you that you have diabetes?”;
- physically inactive: based on questions about leisure-time physical activities (PA), commute, occupational activity, and PA while cleaning the house. We considered

the negative answers to the questions: “In the past three months, have you practiced some type of physical activity or sport?”; “While going to or returning from work, do you walk or bike part of the route?”; “In your work, do you walk a lot?”; “How long does this part of the commute take (on foot or by bike)?”; “Who usually does the heavy cleaning at your home?”; and “Are you responsible for the heavier part of the cleaning?”.

Protective factors:

- recommended fruit and vegetable intake: report of consuming five or more daily servings on five or more days a week;
- regular consumption of beans on five or more days a week: considering the positive answer to the question: “How many days of the week do you usually consume beans?”;
- leisure-time PA (PA  $\geq$  150 minutes of moderate activity per week): estimated from the questions: “In the past three months, have you practiced some type of physical activity or sport?”; “What is the main type of physical activity or sport that you practiced?”; “Do you practice physical activity at least once a week?”; “How many days per week do you usually practice physical activity or sport?”; and “In the days that you practice physical activity or sport, how long does this activity lasts?”;
- PA at home: assessed according to the activity at home, considering the positive report of doing the heavy cleaning in the household, based on the questions: “Who usually does the heavy cleaning at your home?” and “Are you responsible for the heavier part of the cleaning”;
- undergoing tests for early cancer detection in women according to recommendations from the Ministry of Health<sup>22</sup>: corresponding to the positive report of mammography screening in the previous two years among women aged 50 to 69 years, with the question: “How long has it been since you had a mammography?”; and of pap smear in the previous three years for women aged 25 to 64 years, with the question: “How long has it been since you had a pap smear?”.

The descriptive analyses show the calculation of the distribution of women who receive and do not receive the BF aid, according to sociodemographic characteristics (age, schooling, and region of residence).

With respect to health behaviors and NCDs among women beneficiaries and non-beneficiaries, we analyzed the prevalence and prevalence ratio (PR) of the indicators with their respective 95% confidence intervals (95%CI). PRs were estimated by Poisson regression model with robust variance. We carried out bivariate analyses between the outcome variable and each explanatory variable and estimated crude PRs (crude PR A/B) and PRs adjusted for age and schooling (PR<sub>adj</sub> A/B), similar to the analysis of the study by Malta et al.<sup>14</sup>.

For the time trend analysis of the population with and without BF, we adopted simple linear regression models<sup>23</sup>. This analysis considered indicators as the outcome variable (Y)

and the year of the survey as the explanatory variable ( $X$ ). The angular coefficient ( $\beta$ ) of the model expressed the mean annual reduction or increase in the indicator. We regarded the existence of a linear trend as significant when the  $\beta$  of the model was different from zero, with a  $p$ -value lower than or equal to 0.05. The model accuracy was expressed by the coefficient of determination ( $R^2$ ).

Analyses were performed using the Statistical Software for Professionals (Stata), version 14, with the commands of the *survey* module, taking into account the post-stratification weights.

The National Human Research Ethics Committee of the Ministry of Health approved Vigitel. The signing of the Informed Consent Form (ICF) was replaced by the interviewee's verbal consent at the time of the call.

## RESULTS

Between 2016 and 2019, 6,133 women lived in households that benefited from the BFP, mostly in the Northeast (3,001 or 48.93%) and North (1,760 or 28.70%) regions. Concerning education, 52.49% had a high school degree or incomplete or complete higher education. We also identified a greater proportion of women aged 55 years or older who received the aid, with 27.82%, followed by those aged 35 to 44 years, with 23.12% (Table 1).

Among women who did not receive BF, most interviewees presented high schooling (67.23%), over half of them were aged 55 years or older (53.94%) and, despite the higher number of respondents in the Northeast and North regions (34 and 23.81%, respectively), their proportion was lower than that of women participating in the BFP (Table 1).

The NCD indicators presented in Table 2 show that women beneficiaries from the BFP have higher prevalence and PRs related to risk factors and lower ones regarding protective factors.

The  $PR_{adj}$  for age and schooling for smoker women was 1.15 (95%CI 1.07 – 1.24). Overweight and obesity were higher among women with BF — 1.08 (95%CI 1.03 – 1.14) and 1.09 (95%CI 1.04 – 1.14), respectively. With respect to eating habits, the recommended intake of fruits and vegetables was lower among women with BF ( $PR_{adj} = 0.93$ ; 95%CI 0.87 – 0.99), while the consumption of beans ( $PR_{adj} = 1.10$ ; 95%CI 1.03 – 1.18) and soft drinks ( $PR_{adj} = 1.10$ ; 95%CI 1.04 – 1.17) was higher. Women beneficiaries of the BFP practiced less leisure-time PA ( $PR_{adj} = 0.88$ ; 95%CI 0.82 – 0.93), more PA at home ( $PR_{adj} = 1.30$ ; 95%CI 1.21 – 1.39), and spent more time watching TV ( $PR_{adj} = 1.08$ ; 95%CI 1.02 – 1.13); however, they considered themselves less physically inactive, with  $PR_{adj} = 0.86$  (95%CI 0.78 – 0.94). They presented worse self-rated health status ( $PR_{adj} = 1.12$ ; 95%CI 1.04 – 1.21) and lower rates of mammography ( $PR_{adj} = 0.80$ ; 95%CI 0.71 – 0.90) and pap smear ( $PR_{adj} = 0.93$ ; 95%CI 0.88 – 0.98). We found no statistically significant differences between the prevalence of beneficiaries and non-beneficiaries in other indicators.

Among the indicators considered statistically significant ( $p \leq 0.05$ ) in the trend analysis of women beneficiaries of the BFP between 2016 and 2019 (Table 3), ex-smokers decreased

Table 1. Female sample ( $\geq 18$  years) frequency by age, schooling, and region of residence, according to the declaration of receiving (or not) aid from the Bolsa Família Program. State capitals and Federal District. Vigitel, Brazil. 2016 to 2019.

Variables		Receives BF (n = 6,133)		Does not receive BF (n=127,794)		Total (n = 133,927)	
		n	%	n	%	n	%
Age (years)	18 to 24	761	12.41	8,502	6.65	9,263	6.91
	25 to 34	1,139	18.57	12,366	9.68	13,505	10.10
	35 to 44	1,418	23.12	16,906	13.23	18,324	13.68
	45 to 54	1,109	18.08	21,090	16.50	22,199	16.57
	55 or older	1,706	27.82	68,930	53.94	70,636	52.74
Schooling	Illiterate/incomplete elementary school	1,759	28.68	28,428	22.24	30,187	22.54
	Complete elementary school/incomplete high school	1,155	18.83	13,454	10.53	14,609	10.91
	Complete high school/incomplete or complete higher education	3,219	52.49	85,912	67.23	89,131	66.55
Region of residence	Midwest	400	6.52	17,532	13.72	17,932	13.39
	Northeast	3,001	48.93	43,445	34.00	46,446	34.68
	North	1,760	28.70	30,433	23.81	32,193	24.04
	Southeast	700	11.41	19,855	15.54	20,555	15.35
	South	272	4.44	16,529	12.93	16,801	12.54

BF: Bolsa Família.

from 21.8 to 17.8% ( $p = 0.022$ ); the consumption of fruits and vegetables increased from 18.1 to 25.2% ( $p = 0.041$ ); overweight increased from 55.9 to 62.6% ( $p = 0.005$ ); and screen time except TV — over 3 h/day, which includes the use of computer, tablet, or mobile phone, increased from 13.5 to 27.8% ( $p = 0.015$ ). The remaining indicators were not statistically significant.

As to women non-beneficiaries, among the assessed indicators with statistical significance (Table 4), ex-smokers decreased from 18.1 to 16.4% ( $p = 0.028$ ); being physically inactive increased from 14.7 to 15.5% ( $p = 0.049$ ); and women's health indicators (mammography and pap smear) dropped from 80.8 to 77.8% ( $p = 0.017$ ) and 85.5 to 82.1% ( $p = 0.014$ ), respectively.

Table 2. Prevalence and prevalence ratio of indicators for chronic non-communicable diseases among women who receive or do not receive aid from the Bolsa Família Program. Vigitel, Brazil. 2016 to 2019.

Indicators	Receives BF (A)			Does not receive BF (B)			Crude PR A/B	95%CI		PR <sub>adj.</sub> (A/B)**	95%CI	
	%	95%CI		%	95%CI							
Smoker*	14.22	10.62	18.77	6.16	5.88	6.46	1.46	1.31	1.63	1.15	1.07	1.24
Ex-smoker	18.33	14.45	22.97	16.83	16.28	17.41	1.05	0.92	1.20	1.04	0.97	1.11
Overweight*	60.38	56.05	64.55	50.22	49.66	50.78	1.23	1.12	1.35	1.08	1.03	1.14
Obesity*	27.32	23.70	31.27	18.53	18.12	18.96	1.26	1.16	1.38	1.09	1.04	1.14
Recommended FV consumption*	20.74	17.67	24.18	29.14	28.63	29.65	0.79	0.70	0.88	0.93	0.87	0.99
Soft drink consumption*	20.07	16.12	24.71	9.83	9.46	10.21	1.43	1.30	1.57	1.10	1.04	1.17
Bean consumption*	58.46	51.68	64.94	48.42	47.63	49.21	1.23	1.06	1.43	1.10	1.03	1.18
Physically inactive*	7.12	5.66	8.92	14.21	13.87	14.55	0.64	0.55	0.75	0.86	0.78	0.94
Leisure-time PA (≥ 150 min)*	23.70	20.48	27.26	35.60	35.06	36.14	0.74	0.66	0.82	0.88	0.82	0.93
PA at home*	77.77	74.77	80.51	51.76	51.20	52.31	1.90	1.73	2.10	1.30	1.21	1.39
TV watching (3 h/day)	26.20	22.68	30.05	23.16	22.72	23.62	1.08	0.99	1.19	1.08	1.02	1.13
Screen time, except TV (3 h/day)	22.11	18.27	26.50	18.57	18.09	19.06	1.11	0.99	1.24	1.00	0.95	1.07
Abusive alcohol consumption	12.50	10.10	15.37	11.21	10.82	11.61	1.06	0.95	1.19	1.08	0.99	1.17
Poor self-rated health	6.64	5.32	8.26	5.34	5.10	5.59	1.12	1.00	1.24	1.12	1.04	1.21
Mammography (50 to 69 years)*	63.80	57.10	70.01	78.51	77.82	79.19	0.65	0.56	0.76	0.80	0.71	0.90
Pap smear (25 to 64 years)*	76.42	72.01	80.34	83.99	83.47	84.50	0.82	0.75	0.90	0.93	0.88	0.98
Hypertension*	23.29	19.88	27.08	27.65	27.21	28.10	0.89	0.80	0.99	1.05	1.00	1.11
Diabetes*	5.49	4.36	6.90	8.09	7.85	8.33	0.80	0.69	0.92	1.06	0.97	1.16

BF: Bolsa Família; 95%CI: 95% confidence interval; PR: prevalence ratio; PR<sub>adj.</sub>: adjusted prevalence ratio; FV: fruits and vegetables; PA: physical activity; \*p < 0.05; \*\*adjusted for age and schooling.



Table 3. Trend in indicators for chronic non-communicable diseases among women who receive aid from the Bolsa Família Program. Vigitel, Brazil. 2016 to 2019.

Indicators	Year				$\beta$	R2	p-value
	2016	2017	2018	2019			
Smoker	13.0	14.5	14.5	11.7	-0.39	0.1391	0.627
Ex-smoker	21.8	19.7	18.9	17.8	-1.28	0.9559	0.022
Overweight	55.9	57.5	60.1	62.6	2.27	0.9899	0.005
Obesity	27.6	27.8	26.6	30.9	0.87	0.3650	0.396
Recommended FV consumption	18.1	21.2	21.5	25.2	2.16	0.9206	0.041
Soft drink consumption	20.4	16.5	20.9	17.1	-0.55	0.1000	0.684
Bean consumption	65.7	53.0	0.0	61.1	-6.68	0.0804	0.717
Physically inactive	7.6	9.8	10.3	9.6	0.65	0.4997	0.293
Leisure-time PA ( $\geq 150$ min)	23.8	23.5	24.1	25.0	0.42	0.7000	0.163
PA at home	76.6	76.8	69.3	67.4	-3.51	0.8610	0.072
TV watching (3 h/day)	27.6	32.7	28.0	24.1	-1.52	0.3087	0.444
Screen time, except TV (3 h/day)	13.5	19.1	21.3	27.8	4.51	0.9698	0.015
Abusive alcohol consumption	9.2	19.9	12.4	13.4	0.51	0.0215	0.853
Poor self-rated health	9.2	5.8	6.8	8.9	0.01	0.0001	0.992
Mammography (50 to 69 years)	67.7	70.3	66.6	59.5	-2.83	0.6258	0.209
Pap smear (25 to 64 years)	76.5	78.8	76.4	70.8	-1.95	0.5475	0.260
Hypertension	26.3	18.1	22.2	24.2	-0.22	0.0066	0.919
Diabetes	8.1	7.2	6.0	6.2	-0.69	0.8419	0.082

$\beta$ : angular coefficient; R2: coefficient of determination; FV: fruits and vegetables; PA: physical activity.

## DISCUSSION

Women beneficiaries of the BFP, when compared to non-beneficiaries, are concentrated in the North and Northeast regions, have lower schooling, and are younger. Concerning NCD risk factors, women beneficiaries of the BFP presented greater prevalence of smoking, overweight and obesity, and consumption of soft drinks; spent more time watching TV; consumed fewer fruits and vegetables; practiced less leisure-time PA; showed lower rates of preventive cancer screening tests (mammography and pap smear);

Table 4. Trend in indicators for chronic non-communicable diseases among women who do not receive aid from the Bolsa Família Program. Vigitel, Brazil. 2016 to 2019.

Indicators	Year				$\beta$	R2	p-value
	2016	2017	2018	2019			
Smoker	6.6	6.0	5.7	6.3	-0.12	0.1600	0.600
Ex-smoker	18.1	17.3	16.6	16.4	-0.58	0.9449	0.028
Overweight	48.2	48.0	51.4	51.5	1.33	0.7864	0.113
Obesity	17.3	17.1	19.1	19.7	0.92	0.8397	0.084
Recommended FV consumption	30.8	30.6	28.5	28.2	-0.99	0.8770	0.063
Soft drink consumption	11.8	10.6	9.8	10.5	-0.47	0.5342	0.269
Bean consumption	51.1	49.3	0.0	50.9	0.05	0.0078	0.944
Physically inactive	14.7	15.2	15.3	15.5	0.25	0.8993	0.049
Leisure-time PA ( $\geq 150$ min)	33.6	35.1	35.2	34.4	0.25	0.1897	0.564
PA at home	51.4	51.1	47.5	47.5	-1.53	0.8297	0.089
TV watching (3 h/day)	25.5	23.4	21.8	22.4	-1.09	0.7512	0.133
Screen time, except TV (3 h/day)	17.4	17.0	19.0	19.5	0.82	0.7815	0.116
Abusive alcohol consumption	11.6	10.7	10.6	11.6	-0.01	0.0006	0.977
Poor self-rated health	4.9	4.7	5.3	5.3	0.18	0.6000	0.225
Mammography (50 to 69 years)	80.8	79.5	78.3	77.8	-1.02	0.9669	0.017
Pap smear (25 to 64 years)	85.5	84.7	82.9	82.1	-1.20	0.9730	0.014
Hypertension	27.6	26.9	27.5	27.9	0.15	0.2133	0.538
Diabetes	9.6	7.9	8.2	8.1	-0.42	0.4873	0.302

$\beta$ : angular coefficient; R2: coefficient of determination; FV: fruits and vegetables; PA: physical activity.

and worse self-rated health status. On the other hand, they consumed more beans and practiced more PA at home. The trend analyses, between 2016 and 2019, indicated an increase in overweight and screen time, higher consumption of fruits and vegetables, and a decrease in ex-smokers. Among non-beneficiaries, we found a reduction in the prevalence of mammography and pap smear, as well as of ex-smokers, and an increase in the length of physical inactivity.

The results of this investigation are similar to those of PNAD 2019 and studies by Malta et al.<sup>14</sup> and Bernal et al.<sup>15</sup>, which indicated that most beneficiaries of the BFP lived in the North and Northeast regions, reflecting the greater concentration of vulnerable populations in these regions. Since its implementation, BFP positively impacted families residing

in the Northeast region, representing an increase in their income, with improvement in their quality of life<sup>24</sup>.

The prevalence of smokers was higher among women who receive the aid, which has also been reported in the literature<sup>14,15</sup>, as well as among populations with lower schooling<sup>25,26</sup>, evidencing their low perception about the dangers of cigarette smoking. The use of this substance is associated with high rates of comorbidities, such as cancer, diabetes, cardiovascular and pulmonary diseases, disability, and death<sup>26</sup>.

The present study found higher prevalence of overweight and obesity among women recipients of BF, in line with studies by Malta et al. and Bernal et al.<sup>14,15</sup>. These are global health problems, with a significant increase in urban areas of developing countries, raising the NCD risk.

The advent of nutritional transition, marked by the consumption of foods with high caloric density — such as soft drinks —, and the lower intake of fiber-rich foods, such as fruits and vegetables<sup>27,28</sup>, are the main responsible for the epidemic of overweight and obesity<sup>28</sup>. In addition, the insufficient consumption of foods derived from vegetables is responsible for one-third of ischemic heart diseases and approximately 20% of gastrointestinal cancers in the world per year<sup>3</sup>. The present study identified a greater prevalence of consumption of soft drinks, which may lead to a high prevalence of overweight and obesity, given the high sugar content of these beverages<sup>29</sup>.

In contrast, studies have indicated that the growth in household income has improved the quality of foods from the Brazilian basic food basket<sup>27,30</sup> consumed by these women and their families, since a greater intake of beans was identified among beneficiaries compared to non-beneficiaries. Even though the financial aid provided by the BFP is incapable of changing the living standards of families, it meets the immediate needs, with food purchase reaching around 90%, which reinforces the program intent of alleviating poverty and stopping hunger in future generations<sup>31</sup>.

Despite the increased level of leisure-time PA in the capitals<sup>32</sup>, this indicator is associated with populations with high schooling and income<sup>33</sup>, which explains its low prevalence among women with BF. However, this population presented higher practice of PA at home, revealing the social and gender inequality resulting from the double burden in domestic activities among women with low schooling and income<sup>33,34</sup>. The study confirms the huge inequality in PA indicators<sup>35,36</sup>, as women with BF are more active in household chores and simultaneously more sedentary, while others are more active in their leisure time.

Sedentary behavior is characterized by low levels of calorie expenditure in a sitting or reclined position, given the consensus that a sedentary lifestyle is not only the lack of PA but includes entertainment while sitting and lying down, as well as screen-based entertainment<sup>37-39</sup>. This behavior is considered the most prevalent form of sedentary lifestyle, regarded as detrimental to the overall health<sup>37</sup>, and is increasing among the BF beneficiaries.

The women participating in the BFP showed worse self-rated health status, also evidenced in the study by Bernal et al.<sup>15</sup>. We underline that the BFP acts to reduce social and health inequalities, which may break the intergenerational poverty cycle<sup>40,41</sup>.

NHS data have revealed lower rates of mammography and pap smear in the North and Northeast regions. These differences may explain their lower prevalence among women participating in the BFP<sup>42</sup>.

In an investigation using Vigitel data, overweight increased in both genders from 2006 to 2013 and was more accelerated among women with low schooling<sup>43</sup>, a finding also identified in this study.

As to the ex-smoker indicator, we detected a decreasing trend in both BFP beneficiaries and non-beneficiaries. Studies have shown an overall decreasing trend in the prevalence of smoking<sup>25,44</sup>. This reduction has also been identified in the general Brazilian population<sup>25</sup>, as the result of public policies that offer smoking cessation services in the public health system (*Sistema Único de Saúde* — SUS), regulatory policies to control advertisement, smoke-free environments, among others<sup>45</sup>.

In short, these results work in monitoring NCD indicators and show that the direct cash transfer to these women represents a continuous and necessary governmental policy, as it benefits the most vulnerable populations, with worse health indicators<sup>46-48</sup>, shaping the concept of positive discrimination<sup>49</sup>.

Moreover, since this is a cross-sectional study, we could not establish a causal relationship between the variables examined and being a BF beneficiary. The adoption of telephone interviews may lead to possible selection bias, requiring the use of post-stratification weights to balance the sample, as well as information bias, although national and international experiences have indicated that some variables can obtain good estimates using this methodology, with the advantages of faster information, sensitivity, and low cost<sup>50</sup>. Lastly, we used a four-point series in the trend analysis because the question about the receipt of BF was included in 2016; thus, the results should be interpreted with caution and followed over the years so that more findings can allow identifying changes in the behavior of these indicators.

## REFERENCES

1. Malta DC, Campos MO, Oliveira MM de, Iser BPM, Bernal RTI, Claro RM, et al. Prevalência de fatores de risco e proteção para doenças crônicas não transmissíveis em adultos residentes em capitais brasileiras, 2013. *Epidemiol Serv Saúde* 2015; 24(3): 387-73. <https://doi.org/10.5123/S1679-49742015000300004>
2. Melo SPSC, Cesse EÂP, Lira PIC, Rissin A, Cruz RSBLC, Batista Filho M. Doenças crônicas não transmissíveis e fatores associados em adultos numa área urbana de pobreza do nordeste brasileiro. *Ciênc Saúde Coletiva* 2019; 24(8): 3159-68. <https://doi.org/10.1590/1413-81232018248.30742017>
3. Malta DC, Gosch CS, Buss P, Rocha DG, Rezende R, Freitas PC, et al. Doenças crônicas não transmissíveis e o suporte das ações intersetoriais no seu enfrentamento. *Ciênc Saúde Coletiva* 2014; 19(11): 4341-50. <https://doi.org/10.1590/1413-812320141911.07712014>
4. Roque DM, Ferreira MAM. O que realmente importa em programas de transferência condicionada de renda? Abordagens em diferentes países. *Saúde Soc* 2015; 24(4): 1193-207. <https://doi.org/10.1590/S0104-12902015138971>
5. Paes-Sousa R. Plano Brasil sem Miséria: incremento e mudança na política de proteção e promoção social no Brasil [Internet]. Brasília: Centro Internacional de Políticas para o Crescimento Inclusivo / PNUD; 2013 [accessed on Jul. 21, 2020]. (Documento de Trabalho, n. 113). Available at: <http://www.org.br/wp-content/uploads/2016/12/IPCWorkingPaper113.pdf>

6. Programa Territórios Sustentáveis. Programas de transferência de renda do desenho à implementação [Internet]. Programa Territórios Sustentáveis; 2019 [accessed on Jul. 21, 2020]. Available at: <http://ecam.org.br/categoria/publicacoes/>
7. Banco Interamericano de Desenvolvimento. Como funciona o Bolsa Família? Melhores práticas na implementação de programas de transferência de renda condicionadas na América Latina e Caribe. Banco Interamericano de Desenvolvimento; 2015. (Nota técnica do BID 856).
8. Brasil. Ministério do Desenvolvimento Social e Combate à Fome. O Brasil sem miséria. Brasília: Ministério do Desenvolvimento Social e Combate à Fome; 2014.
9. Sperandio N, Rodrigues CT, Franceschini S do CC, Priore SE. Impacto do Programa Bolsa Família no consumo de alimentos: estudo comparativo das regiões Sudeste e Nordeste do Brasil. *Ciênc Saúde Coletiva* 2017; 22(6): 1771-80. <https://doi.org/10.1590/1413-81232017226.25852016>
10. Moraes VD de, Pitthan RGV, Machado CV. Programas de Transferência de Renda com Condicionais: Brasil e México em perspectiva comparada. *Saúde Debate* 2018; 42(117): 364-81. <https://doi.org/10.1590/0103-1104201811702>
11. Souza XR de, Marin AH. Intervenção com famílias em descumprimentos das condicionalidades do Programa Bolsa Família. *Saúde Soc* 2017; 26(2): 596-605. <https://doi.org/10.1590/S0104-12902017160112>
12. Moreira NC, Ferreira MAM, Lima AAT de FC, Ckagnazaroff IB. Empoderamento das mulheres beneficiárias do Programa Bolsa Família na percepção dos agentes dos Centros de Referência de Assistência Social. *Rev Adm Pública* 2012; 46(2): 403-23. <https://doi.org/10.1590/S0034-76122012000200004>
13. Williams J, Allen L, Wickramasinghe K, Mikkelsen B, Roberts N, Townsend N. Uma revisão sistemática das associações entre doenças não transmissíveis e status socioeconômico em países de baixa e média-baixa renda. *J Global Health* 2018; 8(2): 020409. <https://doi.org/10.7189/jogh.08.020409>
14. Malta DC, Bernal RTI, Carvalho QH de, Pell JP, Dundas R, Leyland A, et al. Mulheres e avaliação das desigualdades na distribuição de fatores de risco de doenças crônicas, Vigitel 2016-2017. *Rev Bras Epidemiol* 2020; 23: e200058. <https://doi.org/10.1590/1980-549720200058>
15. Bernal RTI, Felisbino-Mendes MS, Carvalho QH de, Pell J, Dundas R, Leyland A, et al. Indicadores de doenças crônicas não transmissíveis em mulheres com idade reprodutiva, beneficiárias e não beneficiárias do Programa Bolsa Família. *Rev Bras Epidemiol* 2019; 22(Supl. 2): e190012.supl.2. <https://doi.org/10.1590/1980-549720190012.supl.2>
16. Brasil. Ministério da Saúde. Vigitel Brasil 2019: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Brasília: Ministério da Saúde; 2020.
17. Brasil. Ministério da Saúde. Vigitel Brasil 2018: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Brasília: Ministério da Saúde; 2019.
18. Brasil. Ministério da Saúde. Vigitel Brasil 2017: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Brasília: Ministério da Saúde; 2018.
19. Bernal RTI, Iser BPM, Malta DC, Claro RM. Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (Vigitel): mudança na metodologia de ponderação. *Epidemiol Serv Saúde* 2017; 26(4): 701-12. <https://doi.org/10.5123/s1679-49742017000400003>
20. Instituto Brasileiro de Geografia e Estatística (IBGE). Pesquisa Nacional por Amostra de Domicílios Contínua – PNAD Contínua 2018. Rio de Janeiro: IBGE; 2019.
21. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a WHO Consultation on Obesity. Geneva: World Health Organization; 2000.
22. Brasil. Instituto Nacional de Câncer José Alencar Gomes da Silva. Coordenação de Prevenção e Vigilância. Divisão de Detecção Precoce e Apoio à Organização de Rede. Diretrizes brasileiras para o rastreamento do câncer do colo do útero. 2. ed. Rio de Janeiro: INCA; 2016.
23. Antunes JLF, Cardoso MRA. Uso da análise de séries temporais em estudos epidemiológicos. *Epidemiol Serv Saúde* 2015; 24(3): 565-76. <https://doi.org/10.5123/s1679-49742015000300024>
24. Cavalcanti DM, Costa EM, Silva JLM da. Programa Bolsa Família e o Nordeste: impactos na renda e na educação, nos anos de 2004 e 2006. *Rev Econ Contemp* 2013; 17(1): 99-128. <https://doi.org/10.1590/S1415-98482013000100004>
25. Malta DC, Silva AG da, Machado ÍE, Sá ACMGND, Santos FM dos, Prates EJS, et al. Tendências da prevalência do tabagismo em todas as capitais brasileiras entre 2006 e 2017. *J Bras Pneumol* 2019; 45(5): e20180384. <https://doi.org/10.1590/1806-3713/e20180384>
26. Malta DC, Stopa SR, Santos MAS, Andrade SSC de A, Oliveira TP, Cristo EB, et al. Evolução de indicadores do tabagismo segundo inquéritos de telefone, 2006-2014. *Cad Saúde Pública* 2017; 33(Supl. 3): e00134915. <https://doi.org/10.1590/0102-311x00134915>

27. Velásquez-Meléndez G, Mendes LL, Pessoa MC, Sardinha LMV, Yokota RT de C, Bernal RTI, et al. Tendências da frequência do consumo de feijão por meio de pesquisa telefônico nas capitais brasileiras, 2006 a 2009. *Ciênc Saúde Coletiva* 2012; 17(12): 3363-70. <https://doi.org/10.1590/s1413-81232012001200021>
28. Azevedo EC de C, Diniz A da S, Monteiro JS, Cabral PC. Padrão alimentar de risco para doenças crônicas não transmissíveis e sua associação com a gordura corporal – uma revisão sistemática. *Ciênc Saúde Coletiva* 2014; 19(5): 1447-58. <https://doi.org/10.1590/1413-81232014195.14572013>
29. Monteiro CA, Cannon G, Lawrence M, Costa Louzada ML, Pereira Machado P. Ultra-processed foods, diet quality, and health using the NOVA classification system. Roma: FAO; 2019.
30. Passos KE dos, Bernardi JR, Mendes KG. Análise da composição nutricional da Cesta Básica brasileira. *Ciênc Saúde Coletiva* 2014; 19(5): 1623-30. <https://doi.org/10.1590/1413-81232014195.11862013>
31. Zimmermann CR, Espínola GM. Programas sociais no Brasil: um estudo sobre o Programa Bolsa Família no interior do Nordeste brasileiro. *Cad CRH* 2015; 28(73): 147-64. <https://doi.org/10.1590/S0103-49792015000100010>
32. Casas RCRL, Bernal RTI, Jorge AO, Melo EM, Malta DC. Fatores associados à prática de atividade Física na população brasileira – Vigitel 2013. *Saúde Debate* 2018; 42(Esp. 4): 134-44. <https://doi.org/10.1590/0103-11042018s410>
33. Barbosa ALN de H. Tendências na alocação do tempo no Brasil: trabalho e lazer. *Rev Bras Estud Popul* 2018; 35(1): 1-28. <https://doi.org/10.20947/s102-3098a0063>
34. Sato T, Fermiano N, Batistão M, Moccellini AS, Driusso P, Mascarenhas S. Doenças crônicas não transmissíveis em usuários de unidades de saúde da família – prevalência, perfil demográfico, utilização de serviços de saúde e necessidades clínicas. *Rev Bras Ciênc Saúde* 2017; 21(1): 35-42. <https://doi.org/10.4034/rbcs.2017.21.01.05>
35. Florindo AA, Hallal PC, Moura EC de, Malta DC. Prática de atividades físicas e fatores associados em adultos, Brasil, 2006. *Rev Saúde Pública* 2009; 43(Supl. 2): 65-73. <https://doi.org/10.1590/s0034-89102009000900009>
36. Malta D, Andrade S, Santos M, Rodrigues G, Mielke G. Tendências dos indicadores de atividade física em adultos: Conjunto de capitais do Brasil 2006-2013. *Rev Bras Ativ Fís Saúde* 2015; 20(2): 141-51. <https://doi.org/10.12820/rbafs.v.20n2p141>
37. Schaan CW, Cureau FV, Sbaraini M, Sparrenberger K, Kohl III HW, Schaan BD. Prevalência de tempo excessivo de tela e tempo de TV entre adolescentes brasileiros: uma revisão sistemática e metanálise. *J Pediatr* 2019; 95(2): 155-65. <https://doi.org/10.1016/j.jped.2018.04.011>
38. Meneguci J, Santos DAT, Silva RB, Santos RG, Sasaki JE, Tribess S, et al. Comportamento sedentário: conceito, conceito fisiológicas e procedimentos de avaliação. *Motricidade* 2015; 11(1): 160-74. <https://doi.org/10.6063/motricidade.3178>
39. Greca JP de A, Silva DAS, Loch MR. Atividade física e tempo de tela em crianças e adolescentes em uma cidade de médio porte do Sul do Brasil. *Rev Paul Pediatr* 2016; 34(3): 316-22. <https://doi.org/10.1016/j.rppede.2016.01.001>
40. Moraes VD de, Machado CV. O Programa Bolsa Família e as condicionalidades de saúde: desafios da coordenação intergovernamental e intersetorial. *Saúde Debate* 2017; 41(Esp. 3): 129-43. <https://doi.org/10.1590/0103-11042017S310>
41. Pase HL, Melo CC. Políticas públicas de transferência de renda na América Latina. *Rev Adm Pública* 2017; 51(2): 312-29. <https://doi.org/10.1590/0034-7612150770>
42. Oliveira MM de, Andrade SSC de A, Oliveira PPV de, Silva GA e, Silva MMA da, Malta DC. Cobertura de exame Papanicolaou em mulheres de 25 a 64 anos, segundo a Pesquisa Nacional de Saúde e o Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico, 2013. *Rev Bras Epidemiol* 2018; 21: e180014. <https://doi.org/10.1590/1980-549720180014>
43. Malta DC, Santos MAS, Andrade SSC de A, Oliveira TP, Stopa SR, Oliveira MM de, et al. Tendência temporal dos indicadores de excesso de peso em adultos nas capitais brasileiras, 2006-2013. *Ciênc Saúde Coletiva* 2016; 21(4): 1061-9. <https://doi.org/10.1590/1413-81232015214.12292015>
44. World Health Organization. WHO report on the global tobacco epidemic, 2017: Monitoring tobacco use and prevention policies [Internet]. Geneva: World Health Organization; 2017 [accessed on Aug. 12, 2020]. Available at: [http://www.who.int/tobacco/global\\_report/2017/en/](http://www.who.int/tobacco/global_report/2017/en/)
45. Malta DC, Bernal RTI, Vieira Neto E, Curci KA, Pasinato MT de M, Lisboa RM, et al. Tendências de risco e proteção de doenças crônicas não transmissíveis na população com planos de saúde no Brasil de 2008 a 2015. *Rev Bras Epidemiol* 2018; 21(Supl. 1): e180020.supl.1. <https://doi.org/10.1590/1980-549720180020.supl.1>
46. Dantas C, Neri E. As consequências do programa de transferência de renda condicionada Bolsa Família na vida das suas beneficiárias. *Gênero Direito* [Internet]. 2013 [accessed on Sep. 3, 2020]; 2(1). Available at: <https://periodicos.ufpb.br/index.php/ged/article/view/16954>

47. De Souza LP, Waltenberg FD. Bolsa Família e assimetrias de gênero: reforço ou mitigação? *Rev Bras Estud Popul* 2016; 33(3): 517-39. <https://doi.org/10.20947/S0102-30982016c0004>
48. Campara JP, Vieira KM, Potrich ACG. Satisfação Global de Vida e Bem-estar Financeiro: desvendando a recebimento de beneficiários do Programa Bolsa Família. *Rev Adm Pública* 2017; 51(2): 182-200. <https://doi.org/10.1590/0034-7612156168>
49. Souza LP. Bolsa Família: socializando cuidados e mudando as relações de gênero? [dissertação]. Niterói: Universidade Federal Fluminense; 2015.
50. Moreira JPL, Almeida RMVR, Rocha NCS, Luiz RR. Correção da prevalência autorreferida em estudos epidemiológicos com grandes líderes. *Cad Saúde Pública* 2016; 32(12): e00050816. <https://doi.org/10.1590/0102-311x00050816>

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