


# Prevalence of overweight/obesity and associated factors among basic education teachers in a city in the north of *Minas Gerais*, Brazil

## *Prevalência de sobrepeso/obesidade e fatores associados em professores da educação básica de um município do norte de Minas Gerais, Brasil*

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**ABSTRACT**

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**Objective**

To estimate the prevalence of overweight/obesity and its associated factors among basic education teachers.

**Methods**

This is a cross-sectional study with probabilistic sampling by clustering. A questionnaire with socio-demographic, occupational, and psychosocial variables, as well as lifestyle, and health profiles was used.

**Results**

707 teachers participated in the study. Associations with overweight / obesity were found for the variables: the male gender, age >40 years, three or more children, workload, contracted/designated employment relationship, fat intake through meat, abusive consumption of alcoholic beverages, presence of depressive episodes, endocrine problems, arterial hypertension, and negative self-perception of health with the prevalence ratio ranging from 1.16 to 1.52 in the associated variables.

**Conclusion**

Overweight / obesity affected approximately half of those surveyed. There is a relationship between sociodemographic, occupational, and psychosocial variables and lifestyles, on the one hand, and health factors and the presence of overweight / obesity in teachers, on the other. Measures must be implemented on modifiable factors, aiming to promote their quality of life.

**Keywords:** Faculty. Obesity. Occupational health.

**RESUMO**

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**Objetivo**

*Estimar a prevalência e os fatores associados ao sobrepeso/obesidade entre professores da Educação Básica.*

**Métodos**

*Trata-se de um estudo transversal com amostragem probabilística por conglomerado. Utilizou-se questionário com variáveis sociodemográficas, ocupacionais, psicossociais, estilo de vida e perfil de saúde.*

**Resultados**

*Participaram do estudo 707 professores. Verificaram-se associações com sobrepeso/obesidade nas variáveis: sexo masculino, idade >40 anos, três ou mais filhos, carga horária de trabalho, vínculo empregatício contratado/designado, consumo de gordura através da ingestão de carnes, consumo abusivo de bebidas alcoólicas, presença de episódios depressivos, problemas endócrinos, hipertensão arterial e autopercepção negativa da saúde com razão de prevalência variando entre 1,16 a 1,52 entre as variáveis associadas.*

**Conclusão**

*O sobrepeso/obesidade acometeu, aproximadamente, metade dos pesquisados. Há uma relação entre os fatores sociodemográficos, ocupacionais, do estilo de vida, psicossociais e de saúde e a presença de sobrepeso/obesidade em professores. Medidas devem ser implementadas sobre os fatores modificáveis, com vistas a promoção da sua qualidade de vida.*

**Palavras-chave:** Docentes. Obesidade. Saúde do trabalhador.

## INTRODUCTION

Obesity is a multifactorial metabolic alteration that may lead to health problems. It is also a chronic disease whose prevalence has been rising to an epidemic level [1,2]. According to the World Health Organization (WHO), more than 1.9 billion adults (18 or older) were affected by these issues in 2016, 650 million of whom were obese [3]. It is estimated that the prevalence of such problems has almost tripled during the last decade, contributing to the increase of death from chronic diseases [4].

In Brazil, the Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel 2019) estimated that the prevalence of overweight and obesity among adults is 55.7% and 19.8%, respectively [4]. That represents a growth of approximately 30.8% in obesity and 67.8% in overweight in the Brazilian population in the last decade [4].

Teachers are usually understood as particularly prone to overweight/obesity due to the characteristics of their work and lifestyle [5,6]. From a worker's health perspective, teachers are exposed to long workloads and a great amount of work-related activities outside the classroom, resulting in overloads and endangering their health [7]. Professionals with longer workloads have less time to take care of their health, as evidenced by research carried out with teachers from a university in China, which pointed to 36.7% of the teachers being obese or overweight and demonstrated the association between scarcity of time due to work overload and overweight/obesity [5,7].

Given the lack of comparative studies regarding such issues among teachers in different Brazilian regions, the present research focused on the prevalence of obesity/overweight among basic education teachers in the north of the state of *Minas Gerais*.

## METHODS

This is a cross-sectional, analytical, and epidemiological study derived from a project named "Chronic health conditions and associated factors among professors of the public network: a population-based study – Project ProfSMonc".

The population in the study consisted of 1,851 basic education teachers (elementary and high school) from 49 state schools in the urban zone of *Montes Claros*, MG, Brazil.

The sample size was determined by the multiple health aggravations the professors suffered, such as overweight/obesity, hypertension, diabetes, vocal problems, depression, anxiety, Burnet/Burnout syndrome, and quality of life. We considered an expected prevalence of up to 50%, offering the largest sample size, a confidence level of 95%, and a 5% margin of error. After correction for the effect of design (*deff*) of 2.0 and the addition of 10% for non-response rates, a minimum sample size of 700 individuals was determined.

The sample was established with single-stage cluster sampling. We selected 35 schools by probability proportional to size sampling. All teachers in exercise for at least a year were invited to participate. Those placed in different functions or currently in medical leaves were excluded.

The data collection took place in randomly selected schools from March to December 2016. Its three stages encompassed contacts with the school management, the teachers' sensibilization, application of the questionnaires, and physical evaluation of teachers who accepted to participate in the research. The collection was carried out by a multi-professional team previously capacitated and calibrated (Interclass Correlation Coefficient [ICC] >0.90).

The physical evaluation included measuring the weight, height (used to calculate the Body Mass Index [BMI]), and arterial blood pressure of the teachers. Each was taken in duplicate and considered in their means for the absolute final value.

The weight was measured with a digital calibrated scale (model Magna 150kg, G Tech Ltda®, São Paulo, SP). The teachers stayed in anatomic positions, barefoot and with light clothes during measurements. Their height was measured with an extensible tape measure (TBW®, São Paulo, SP, device for leveling the height, functioning as a square) [8,9].

Overweight and obesity, the outcomes observed in the present study, were evaluated with the BMI, adopting the reference values suggested by WHO and considering the following cutoffs:  $BMI < 25 \text{ kg/m}^2$  (eutrophic/normal-weight),  $25 \text{ kg/m}^2 \leq BMI < 30 \text{ kg/m}^2$  (overweight), and  $BMI \geq 30 \text{ kg/m}^2$  (obesity) [2]. The teachers who were overweight or obese were placed in a single category, named Overweight/obesity.

The arterial Blood Pressure (BP) was measured with a calibrated aneroid sphygmomanometer and a stethoscope (BIC®, São Paulo, SP, both), in the left arm, with the palm upwards and the teacher sitting in a comfortable position [10]. Teachers with systolic pressures above 140mmHg and/or diastolic pressures above 90mmHg and/or using blood pressure medications were considered as having altered BPs [10].

We also applied a questionnaire contemplating the following independent variables: (1) Sociodemographic and economic; (2) Occupational aspects; (3) Work-related satisfaction; (4) Psychosocial aspects: events of depression (evaluated by Beck's Depression Inventory [BDI]) and stress (assessed by Lipp's Stress Symptoms Inventory for Adults, [LSSI]); (5) Lifestyle: evaluated by the International Physical Activity Questionnaire (IPAQ); (6) Health profiles: self-declared problems/diseases (circulatory, endocrine, bone/articulatory/muscles, and respiratory) in the last three years, altered blood pressure, and self-perception of health and bodily image [11-13]. The self-perception of health was evaluated with the question "How do you classify your current health state?", with the following possible answers: excellent, good, regular, bad, and very bad. All the variables investigated in the study and their respective categories are described in Chart 1.

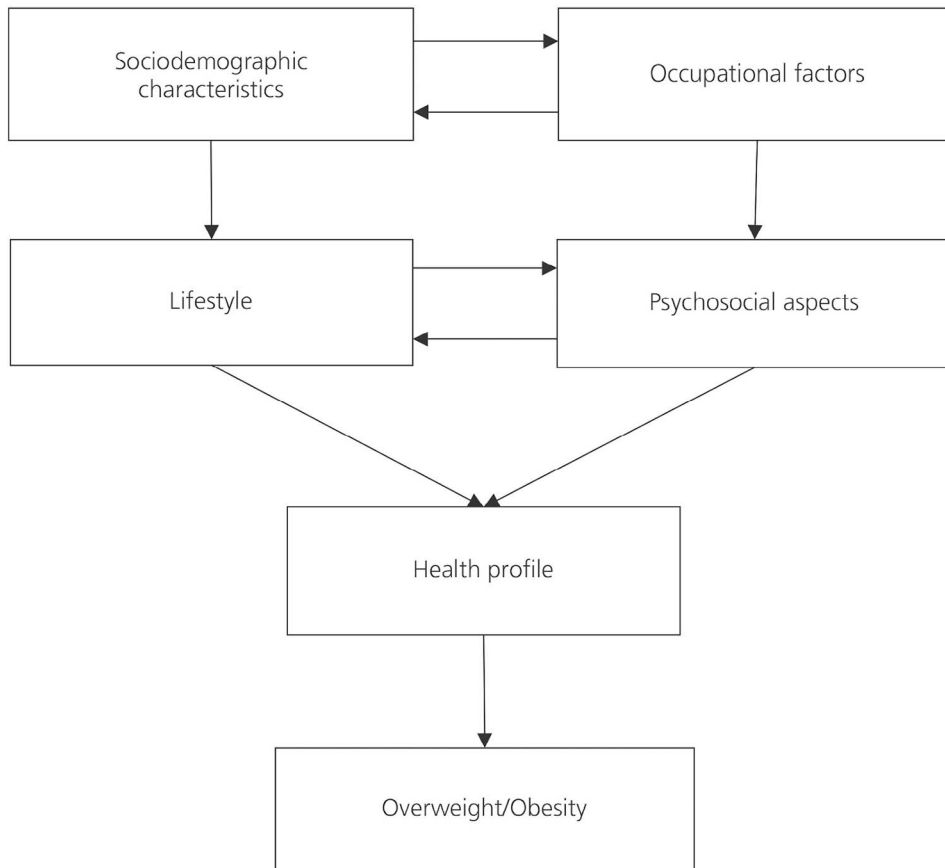
A descriptive analysis of the investigated variables was performed through their frequency distribution and corrected for the effect of design (*deff*). Bivariate analyses between the outcome variable and each independent variable were then carried out, and the unadjusted Prevalence Ratios (PR) were estimated with their respective 95% confidence intervals. The variables presenting a descriptive level (*p-value*) below 0.20 were selected for multiple analysis with the Poisson regression model with robust variance. For the multiple model, we adapted the theoretical model proposed by Höfelmann & Blank, composed of blocks of variables at distal (sociodemographic characteristics and occupational factors), intermediate (lifestyle and psychosocial aspects), and proximal (health profile) levels (Figure 1) [14].

The block of sociodemographic characteristics and occupational factors was included first in the model, becoming an adjustment factor for the intermediate and proximal determinants. Intermediate-level variables that remained as adjustment factors for the proximal-level variables were included next. We considered that the lifestyle is associated with the previous blocks and impacts the psychosocial aspects and the health profile. Lastly, we included variables of the proximal level (health profile). In all levels, only variables with a descriptive level of  $p < 0.05$  remained in the model after the adjustment of the variables in previous levels. PR were estimated with 95% confidence levels. The quality of the adjustment in the multiple model was assessed with the Deviance test. The data were tabulated and analyzed with the software Statistical Package for Social Sciences (SPSS), version 18.0.

The study met the ethical requirements of the National Council of Health's Resolution 466/2012 and was approved by the Research Ethics Committee (CEP/Unimontes, n. 1. 293.458). All the participants of the research received and signed an Informed Consent Form.

**Chart 1** – Sociodemographic, occupational, and psychosocial variables, lifestyles, and health profile with their respective categories. *Montes Claros (MG) Brazil, 2016.*

Variables	Measures (self-referred)	Category
<b>Sociodemographic</b>		
Gender	Classification of the teacher according to sex	Male
		Female
Age group	Teacher's age group	≤40 years
		>40 years
Marital status	Teacher's marital status	Without a companion: single/widower/ divorced/separated
		With a companion: married/ stable union
Race	Teacher's self-declared ethnic group	White
		Non-white: Black, biracial, Asian, indigenous/native
Income per capita	Self-declared income by tercile	>R\$1.629 (3 <sup>rd</sup> tercile)
		R\$1.000 a 1.628 (2 <sup>nd</sup> tercile)
		<R\$1.000 (1 <sup>st</sup> tercile)
Level of schooling	The highest current level of schooling	Graduate ( <i>lato</i> and <i>stricto sensu</i> )
		Undergraduate
Number of kids	The teacher's number of kids	Doesn't have kids
		1 or 2 kids
		≥3 kids
<b>Occupational factors</b>		
Time working as a teacher	Time working as a teacher in years	1 to 10 years
		11 to 20 years
		>20 years
Teaching network he/she works in	Teaching network he/she works in	Only public network
		Public and private networks
Weekly workload	Weekly workload in hours	≤24 hours (weekly)
		>24 hours (weekly)
Work contract	Type of contract	Tenured/ safe job
		Hired/ designated
<b>Lifestyle</b>		
Consuming fruits or juice	Number of days a week the teacher has natural fruit juices or eat whole fruits <sup>18</sup>	≥5 times a week
		<5 times a week
Consuming sweets	Frequency the teacher has sweet foods like ice cream, chocolate, cake, cookies, or candies [18]	2 times a week
		≥3 times a week
Consuming fat	Ingestion of fatty meats (or skin-on chicken) [18]	No
		Yes
Consuming alcohol in excess	Consumption of alcohol: excessive consumption of alcoholic beverages (defined as 5 or more doses for men and 4 or more doses for women, on the same occasion) [18]	No
		Yes
Practicing physical activities	Classification according to the International Physical Activity Questionnaire	Active/very active
		Irregularly active
		Sedentary
<b>Psychosocial aspects</b>		
Depressive episodes	Score in Beck's Depression Scale	No symptoms (≤11)
		With symptoms (≥12)
Symptoms of stress	Score in the Stress Symptoms Inventory for Adults	Stage I (alert >6)
		Stage II (resistance >3)
		Stage III (exhaustion >8)
<b>Health profile</b>		
Problems/diseases	Has condition/disease (circulatory, endocrine, bone/ articulations/ muscles, respiratory) that is diagnosed, treated, medicated or accompanied in the last three years	Absence of disease
		Presence of disease
Altered blood pressure	Systemic blood pressure Systolic BP superior to 140mmHg, and/or BP above 90mmHg, and/or reporting use of medications to control BP [14]	No
		Yes
Self-perception of health	Evaluated by the question "How do you classify your health state?"	Positive: Excellent/good
		Negative: Regular/bad/very bad



**Figure 1** – Theoretical model adopted to evaluate factors associated with overweight/obesity among teachers in state basic education in the city of *Montes Claros, Minas Gerais, Brazil*, in 2016.

## RESULTS

Of the 760 teachers who participated in the study, 7% refused to go through the anthropometric evaluation. Thus, the final sample was 707 teachers. The general means of the teachers' BMI was 25.71kg/m<sup>2</sup> (SD±4.56), 25.60kg/m<sup>2</sup> (SD±4.66) for men and 26.27kg/m<sup>2</sup> (SD±3.97) for women. The results showed that 35.8% of the teachers had a BMI between 25 and 30 (overweight), while 16.8% had a BMI≥30 (obesity). The prevalence of overweight/obesity in the total sample was of 52.7% (CI95%:48.4% to 57.0%), 58.7% among men (CI95%: 49.4% to 67.5%) and 51.7% for women (CI95%: 47.1% to 56.4%).

The average age of the participants was 40.5 years old (minimum of 21 and maximum of 67,0 SD±9,7). The majority were female (85.9%), with graduate diplomas (55.4%), and 66.8% had a monthly per capita income of less than R\$1628,00. The work relationship of 59.1% was by hiring or designation, and 47.6% had more than ten years on the job. The other sociodemographic and occupational characteristics are in Table 1.

As to the teachers' lifestyles, 19.3% consumed fatty meats and 9.4% reported abusive consumption of alcohol. Regarding psychosocial aspects and health profiles, 17.6% reported depressive events, 39.0% presented stress symptoms in the resistance stage, and 19.5% were hypertensive. Other characteristics related to their lifestyles, psychosocial aspects, and health profiles are in Table 2.

**Table 1** – Prevalence of overweight and obesity among teachers of basic education per sociodemographic and occupational characteristics. Montes Claros (MG), Brazil, 2016.

Variables	n	%	Prevalence Overweight/Obesity	PR <sub>unadjusted</sub>	CI95%	p-value
<b>Sociodemographic characteristics</b>						
<b>Sex</b>						
Female	591	85.9	51.7	1.0		0.165
Male	116	14.1	58.7	1.14	0.96-1.36	
<b>Age group</b>						
≤ 40 years-old	359	50.3	42.9	1.0		0.001
> 40 years-old	348	49.7	62.7	1.46	1.26-1.71	
<b>Marital status</b>						
Without partners	267	38.3	48.2	1.0		0.080
With partners	440	61.7	55.6	1.15	0.98-1.35	
<b>Skin color</b>						
Non-white	497	71.1	51.5	1.0		0.284
White	209	28.9	56.0	1.09	0.93-1.27	
<b>Income per capita</b>						
> 1.629 (3rd tercile)	231	32.2	48.5	1.0		0.074
1000 to 1.628 (2nd tercile)	251	35.1	51.4	1.06	0.88-1.28	
<1000 (1st tercile)	220	31.7	57.5	1.18	0.98-1.43	
<b>Level of schooling</b>						
Graduate	395	55.4	50.7	1.0		0.262
Undergraduate	312	44.6	55.2	1.09	0.94-1.26	
<b>Number of kids</b>						
Does not have kids	221	31.2	41.4	1.0		0.012
1 or 2 kids	376	52.8	53.1	1.28	1.06-1.56	
≥ 3 kids	110	16.0	73.5	1.78	1.45-2.17	
<b>Occupational factors</b>						
<b>Time working as a teacher</b>						
1 to 10 years	362	52.4	45.8	1.0		0.006
11 to 20 years	204	28.1	60.9	1.33	1.13-1.57	
> 20 years	141	19.5	59.5	1.30	1.08-1.56	
<b>Teaching network</b>						
Public	642	91.6	53.5	1.0		0.224
Public and private	65	8.4	44.6	0.84	0.62-1.12	
<b>Workload</b>						
≤ 24 h weekly	396	56.8	49.5	1.0		0.062
> 24 h weekly	311	43.2	57.0	1.15	0.99-1.33	
<b>Work relationship</b>						
Tenured	312	40.9	47.4	1.0		0.027
Hired	395	59.1	56.4	1.19	1.02-1.39	

Note: CI: confidence interval; PR<sub>unadjusted</sub>: Ratio of unadjusted Prevalence.

Tables 1 and 2 contemplate the values of unadjusted PRs. The results of the multiple analysis are in Table 3. At the distal-level block, we identified the following variables associated to overweight/obesity: male gender (PR=1.25;  $p=0.017$ ), age >40 years (PR=1.33;  $p=0.001$ ), having three or more kids (PR=1.47;  $p=0.001$ ), a weekly workload above 24 hours (PR=1.16;  $p=0.047$ ), and a hired/designated work relationship (PR=1.25;  $p=0.003$ ). At the intermediate level, we identified the association of overweight/obesity with teachers who reported eating fats through meat (PR=1.21;  $p=0.013$ ), excessive consumption of alcohol (PR=1.20;  $p=0.045$ ), and depressive events (PR=1.32;  $p<0.001$ ). At the proximal level, teachers with endocrine problems (PR=1.20;  $p=0.025$ ), altered blood pressure (PR=1.52;  $p<0.001$ ), and a negative perception of their health (PR=1.15;  $p=0.044$ ), presented a larger prevalence of overweight/obesity, after adjustments by the variables of the hierarchically previous blocks.

**Table 2** – Prevalence of overweight and obesity among teachers in basic education per lifestyle, psychosocial aspects, and health profiles. Montes Claros (MG), Brazil, 2016.

Variables	n	%	Overweight/Obesity prevalence	PR <sub>unadjusted</sub>	CI95%	p-value
<b>Lifestyle</b>						
Having fruits or juice						
≥ 5 times a week	332	47.4	49.9	1.0		
< 5 times a week	375	52.6	55.3	1.11	0.95-0.13	0.185
<b>Consumption of sweets</b>						
2 times a week	407	57.2	55.3	1.0		
≥ 3 times a week	300	42.8	49.3	0.89	0.76-1.04	0.141
<b>Fat intake</b>						
No	561	80.7	50.0	1.0		
Yes	141	19.3	64.0	1.28	1.09-1.50	0.002
<b>Abusive consumption of alcohol</b>						
No	643	90.6	51.1	1.0		
Yes	64	9.4	67.9	1.33	1.10-1.62	0.005
<b>Physical exercise</b>						
Active/Very active	337	48.9	49.5	1.0		
Irregularly active	228	32.1	54.1	1.10	0.92-1.30	0.305
Sedentary	133	18.9	58.1	1.17	0.97-1.42	0.097
<b>Psychosocial aspects</b>						
<b>Depressive events</b>						
No symptoms	588	82.4	49.9	1.0		
With symptoms	119	17.6	66.1	1.33	1.13-1.55	<0.001
<b>Stress</b>						
<b>Stage I (alert)</b>						
No	669	94.9	52.6	1.0		
Yes	35	5.1	57.9	1.10	0.81-1.50	0.544
<b>Stage II (resistance)</b>						
No	426	61.0	48.8	1.0		
Yes	278	39.0	59.2	1.21	(1.03 – 1.58)	0.009
<b>Stage III (exhaustion)</b>						
No	653	92.8	51.8	1.0		
Yes	51	7.2	66.2	1.28	(1.03 – 1.53)	0.025
<b>Health profiles</b>						
<b>Circulatory problems/diseases</b>						
Absent	596	84.4	51.2	1.0		
Present	110	15.6	58.2	1.14	(0.95 – 1.36)	0.176
<b>Endocrine</b>						
Absent	657	92.7	50.8	1.0		
Present	50	7.3	70.0	1.38	(1.13 – 1.68)	0.009
<b>Bone, muscle, articulation problems</b>						
Absent	564	79.5	50.7	1.0		
Present	143	20.5	58.0	1.15	0.99-1.35	0.117
<b>Respiratory</b>						
Absent	654	92.0	51.4	1.0		
Present	53	8.0	62.3	1.21	0.97-1.51	0.127
<b>Hypertension</b>						
Absent	569	80.5	45.7	1.0		
Present	138	19.5	79.0	1.73	1.53-1.96	<0.001
<b>Health self-perception</b>						
Positive	469	67.3	47.7	1.0		
Negative	238	32.7	63.1	1.32	1.15-1.53	<0.001

Note: CI: Confidence Interval; PR<sub>unadjusted</sub>: Ratio of unadjusted Prevalence.



**Table 3** – Ratios of adjusted prevalence of the association between Overweight/Obesity and sociodemographic characteristics, occupational factors, psychosocial aspects, lifestyles, and health profiles among teachers in basic education (n=707). *Montes Claros* (MG), Brazil, 2016.

Variables	PR <sub>adjusted</sub>	CI95%	p-value
Sociodemographic characteristics			
Sex			
Female	1.00		
Male	1.25	1.04-1.45	0.017
Age group			
≤ 40 years	1.00		
> 40 years	1.33	1.12-1.58	0.001
Number of kids			
None	1.00		
1- 2	1.19	0.97-1.46	0.100
≥3	1.47	1.17-1.86	0.001
Occupation factors			
Workload			
≤ 24 hours a week	1.00		
> 24 hours a week	1.16	1.01-1.34	0.047
Work relationship			
Tenured	1.00		
Hired	1.25	1.08-1.46	0.003
Lifestyle			
Fat intake			
No	1.00		
Yes	1.21	1.04-1.41	0.013
Abusive consumption of alcohol			
No	1.00		
Yes	1.20	1.02-1.43	0.045
Psychosocial aspects			
Depressive events			
No symptoms	1.00		
With symptoms	1.32	1.13-1.54	<0.001
Health profiles			
Endocrine problems			
No	1.00		
Yes	1.20	1.02-1.43	0.025
Altered blood pressure			
No	1.00		
Yes	1.52	1.34-1.74	<0.001
Health self-perception			
Positive	1.00		
Negative	1.15	1.01-1.32	0.044

Note: CI: Confidence Interval; PR<sub>adjusted</sub>: Ratio of prevalence.

## DISCUSSION

The study verified that the prevalence of overweight/obesity hits more than half of the teachers in the public network and has the following associated factors: male gender, age >40 years, having three or more kids, a weekly workload above 24 hours, a hired/designated work relationship, eating fats through meat, excessive consumption of alcohol, presence of depressive events, endocrine problems, altered blood pressure, and a negative health self-perception.

The expressive prevalence of overweight/obesity in teachers was also verified in previous international and national studies. Indeed, the characteristics of the work as a teacher at an accelerated pace, work overload, long working hours, and reduction of resting pauses may compromise these professionals' health [6,7,15-18].

In the present study, overweight/obesity have been positively associated with the male gender. Similar results were observed in research carried out in Turkey and in Brazil's northeastern region [6,19]. Such findings may be explained by Brazilian health campaigns focused on prevention and promotion of health, which have centered on female self-care for decades, despite being designed for men and women equally [20]. Generally, Brazilian men have less interest in self-care and do not usually look for preventive health services [20]. Also, their lifestyles tend to include a larger consumption of alcohol and they usually have more hypercaloric diets than women, all of which may influence weight gain [21].

Being older than 40 was also associated with overweight/obesity. The same was observed in population-based research with adults in *Viçosa*, in the state of *Minas Gerais* [22]. The reduction of the basal metabolic rate occurs physiologically during the aging process and causes alterations in body composition. That in turn, leads to a reduction in muscle mass and therefore to a relative decrease of 2% to 3% of the body's resting metabolic rate per decade, along with excessive fat accumulation in the body [23,24]. Lifestyle changes may also explain this connection, as aging people usually adopt more sedentary behaviors, decrease physical activity levels, and consume more hypercaloric foods [24,25].

The study also found an association between overweight/obesity and the number of kids one has, which is in agreement with research on women in Nepal and Rio Grande do Sul, a Brazilian state [24,25]. Having kids impact the dynamics of families and their lifestyles, possibly contributing to weight gain [26].

Regarding the weekly workload, the study determined that teachers with longer shifts presented a larger prevalence of overweight/obesity, as previous studies had also demonstrated [6]. The restructuring of education in Brazil imposed new demands on the teacher, leading to an increase in labor activities without the necessary corresponding resources, which is hardly dealt with exclusively in the school. Consequently, the teacher's lifestyle may be jeopardized, with an increasing consumption of calories and sedentarism contributing to diseases like obesity [6,24,27].

Being hired or designated is also associated with the study's outcome. A likely explanation for that association is that as the work relationship is made precarious, the teacher may feel insecure and pressured given the levels of competitiveness and lack of autonomy to develop activities, adding to a stressful work environment and causing psychological suffering [28-30]. Work-related psychosocial stress is associated with binge eating disorder, which may lead to a larger intake of foods due to anxiety, unchaining overweight, or obesity [31].

Depressive events are also associated with overweight/obesity. Similar results were found in a meta-analysis of the association between excess body weight and depression in adults [32]. There is evidence that depression and obesity are associated due to their similar factors like inadequate lifestyles, biological disorders, and psychological determinants [33].

Fat intake was positively associated with the outcome, as a previous study observed [6]. The growing fat intake is a determinant for overweight/obesity [4]. When the consumption is more elevated than the energy output, energy storage peaks and so do the consequent adipose deposits, generating a series of differentiation factors that induce a larger absorption of glucose and fatty acids, as well as lipogenesis [34]. When related to the ingestion of meat or skin-on chicken, fat intake is a common habit among Brazilian people and might be influenced by demographic, economic, cultural, and behavioral factors [35].

Eating sweets three or more times a week and consuming fruits or juices less than five times a week have not been associated with obesity in the analyzed group of teachers. Previous studies found similar results, not associating the consumption of sweets and fruits directly with obesity [36-38]. The nature of the study may justify the absence of association, as it evaluates exposure along with aggravation.

Abusive consumption of alcoholic beverages was also significantly associated with overweight/obesity. In that, the present study is in agreement with research performed with teachers in the Brazilian south and with the general adult population [39,40]. The association of alcohol and obesity may increase the risk of liver-related mortality, justifying monitoring of obese people's alcohol intake [41].

We also verified the larger prevalence of overweight/obesity in teachers with self-referred endocrine problems. Excessive fatty tissue alters the metabolism, increasing the secretion of hormones, glycerol, adiponectin, pro-inflammatory substances, among other substances, and promoting high plasma concentration of fatty acids [42]. This in turn may contribute to altered glycoses, insulin resistance, pancreatic Beta-cell dysfunction, and deficient secretion of insulin, which is closely linked to glucose intolerance and Type 2 diabetes [43].

The association between overweight/obesity and altered systemic blood pressure was also evidenced. Despite their important consequences for individuals and health systems, growing overweight/obesity and associated issues such as hypertension are still some of the most neglected health problems in the world [44]. Framingham's cohort study demonstrated that overweight and obese men and women have a larger risk of developing arterial hypertension in the long term than those with regular weights [45].

The negative health self-perception of the teachers is significantly associated with overweight/obesity. Similar findings occurred in research with teachers in Belgium and the Brazilian south [46,47]. People with positive health self-perceptions tend to adopt healthier lifestyles, with good eating habits and physical exercises, and thus have more control of their weights [48].

Obesity may impact health-related work productivity and add to associated costs [49]. In that perspective, interventions in the occupational environment targeting modifiable behavioral risk factors for chronic diseases and aiming to improve the workers' health are desirable [50]. Promoting healthy habits like physical exercise and healthy diets are promising strategies for workers' health. The present investigation might contribute to a better understanding of overweight/obesity and subsidize public institutions in their actions to promote healthier lifestyles among teachers. Creating or improving multifactorial approaches to these issues in the school environment is fundamental, especially in the context of primary attention and prevention.

The main limitation of this study is the exclusion of teachers with medical leaves from the data collection, which may lead to an underestimation of the real prevalence of overweight/obesity, as such leaves may be related to clinical conditions associated with obesity.

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## CONCLUSION

Overweight/obesity was present in approximately half of the surveyed. A relation among teachers' sociodemographic and occupational factors, their lifestyles, psychosocial and health factors, and the presence of overweight/obesity was found. Therefore, actions must be developed focusing on modifiable factors, aiming to promote a better quality of life for the teachers. Related social policies must favor the teachers' working conditions and foster lifestyle changes when needed. Thus, important actions must take place in the school in a separate time, stimulating knowledge and awareness of healthy behaviors, and their adoption. Also, interventions to protect and promote the workers' physical and mental health must be implemented by public health and education managers in a coordinated fashion.

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## CONTRIBUTORS

L.A.V. ALMEIDA worked in the conception of the study, data collection, methodological analyses, data interpretation, and writing. M.F.S.F. BRITO was involved in the conception, data collection, methodological analysis and statistics, data interpretation, writing, and final revision of the article. L. PINHO worked in the conception, methodological analysis and statistics, data interpretation, writing, and final revision of the article. T.A. MAGALHÃES and D.S. HAIKAL were involved in the research's conception, data collection, and writing. M.F. SILVEIRA was involved in the conception, data collection, methodological analysis and statistics, data interpretation, writing, and final revision of the article.

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