

ARTIGO ORIGINAL

DESIGUALDADE RACIAL E DESNUTRIÇÃO EM IDOSOS BRASILEIROS

RACE INEQUALITY AND UNDERNUTRITION IN OLDER BRAZILIAN ADULTS

Tânia Aparecida de Araujo¹
Isabela Martins Oliveira⁴
Alexandre da Silva⁷

Tarsila Guimarães Vieira da Silva²
Vanderlei Carneiro da Silva⁵

Amanda Cristina da Silva de Jesus³
Yeda Aparecida de Oliveira Duarte⁶

¹ Graduated in Nutrition. PhD in Public Health. Adjunct Professor at the Federal University of Fronteira Sul (UFFS) linked to the Medicine Course. Email: tania.araujo@uffs.edu.br.

² Graduated in Nutrition. PhD in Public Health. Adjunct Professor at the Federal University of Fronteira Sul (UFFS) linked to the Medicine Course. Email: tania.araujo@uffs.edu.br.

³ Graduated in Nutrition. Master in Public Health Nutrition. Researcher at the Faculty of Public Health - University of São Paulo (FSP/USP), linked to the Center for Epidemiological Research in Nutrition and Health (NUPENS). Email: amandacsj@alumni.usp.br.

⁴ Graduated in Gerontology. PhD in Public Health. Gerontology at São Carlos City Hall, Department of Basic Social Protection. Email: isabelamgo@gmail.com.

⁵ Graduated in Nutrition. PhD in Epidemiology. Post-doctoral student in epidemiology at the Center for Clinical and Epidemiological Research at the University Hospital of USP. Email: vnd.cs@hotmail.com.

⁶ Graduated in Nursing. Associate Professor at the University of São Paulo linked to the School of Public Health. Email: yedaenf@usp.br.

⁷ Graduated in Physiotherapist. Doctor in Public Health. Adjunct Professor at the Faculty of Medicine of Jundiaí (assigned to the Ministry of Human Rights and Citizenship). Email: alexandre.geronto@gmail.com.

Resumo

Objetivo: Avaliar a desnutrição em idosos segundo a cor da pele e outros fatores associados. **Delineamento:** estudo transversal. **Cenário:** estudo de base populacional realizado em 2015, Brasil. **Participantes:** Adultos com 60 anos ou mais (n=1.224) do Estudo SABE (Saúde, Bem-Estar e Envelhecimento). **Métodos:** Um modelo de regressão logística hierárquica foi usado para analisar fatores associados à desnutrição em idosos (categoria de referência: peso normal). As variáveis sociodemográficas e econômicas, seguidas pelo estado de saúde e aspectos comportamentais, considerados o fator mais proximal para a desnutrição. **Resultados:** Enquanto ser branco, amarelo ou pardo não esteve relacionado à desnutrição, a cor da pele preta aumentou a chance do idoso ser desnutrido (OR: 2,52; IC 95%: 1,18-5,36). Além disso, os fatores sociais - atividades sociais (OR: 1,60; IC 95%: 1,02-2,51), clínicos - autoavaliação da saúde regular (OR: 1,83; IC 95%: 1,17-2,86) e ruim (OR: 2,60; 95 % IC: 1,10-6,11) e ter uma doença (OR: 0,49; IC 95%: 0,30-0,81) e duas ou mais doenças (OR: 0,27; IC 95%: 0,15-0,46) foram associadas à desnutrição. **Conclusões:** Os idosos negros têm maior chance de serem desnutridos. Políticas equitativas podem prevenir esse desfecho, que está relacionado à fragilidade e maior mortalidade na velhice. Os profissionais de saúde também devem considerar essas particularidades em seu planejamento assistencial.

PALAVRAS-CHAVE

Racismo; Desnutrição; Envelhecimento.

Abstract

Objective: To assess undernutrition among older adults according to skin color and other associated factors. **Design:** cross-sectional study. **Setting:** population-based study conducted in 2015, Brazil. **Participants:** Adults aged 60 years or over (n=1,224) from the SABE Study (Health, Well-Being and Aging). **Measurements:** A hierarchical logistic regression model was used to analyze factors associated with undernutrition in older adults (reference category: normal weight). The sociodemographic and economic variables were followed by health condition and behavioral aspects, considered the most proximal factor for undernutrition. **Results:** While being white, yellow, or brown was not related to undernutrition, black skin color increased the chance of the elderly being undernourished (OR: 2.52; 95% CI: 1.18-5.36). In addition, social factors - social activities (OR: 1.60; 95% CI: 1.02-2.51), clinical - fair self-rated health (OR: 1.83; 95% CI: 1.17-2.86) and poor (OR: 2.60; 95% CI: 1.10-6.11) and one disease (OR: 0.49; 95% CI: 0.30-

0.81) and two or more diseases (OR: 0.27; 95% CI: 0.15-0.46) were associated with undernutrition. Conclusions: Older black adults have a greater chance of being malnourished. Equitable policies can prevent this outcome, which is related to frailty and higher mortality in old age. Health professionals must also consider these particularities in their care planning.

KEYWORDS

Racism; Malnutrition; Aging.

1 Introdução

National development in Brazil began with the slavery of indigenous and black Africans, and the scars of the country's colonial past persist to this day (Reichenheim *et al.*, 2011). According to Werneck (2016), in Brazil racism is one of the central factors in the production of the iniquities in health experienced by black women and men, at all levels of education and income, at all stages of their lives.

Theories on the social determinants of health recognize that skin color can maintain health through its influence on access to economic resources, psychosocial resources and behavior (Perreira *et al.*, 2014). Skin color discrimination is also a risk factor for high levels of inflammation because, over time, repeated stressors overwhelm the ability of individuals to adapt, which in turn leaves individuals more vulnerable to the risk of disease (Cobb *et al.*, 2018). Among older black Americans, for example, the perception of racism was significantly associated with delayed/announced care, and poor communication with doctors was significantly and partially mediated in the relationship (Rhee *et al.*, 2019).

In Brazil, comprehensive research has demonstrated the association between a higher incidence of diseases and mortality among black people. In a Brazilian longitudinal study conducted with 8,528 participants, which evaluated racial inequality in the incidence of hypertension, the data demonstrate that, compared to whites, black men and women had a greater risk of developing hypertension (da Silva *et al.*, 2023). In an analysis of data generated in 2010 by the Brazilian Mortality Information System, it was found that mortality from stroke is also higher among black people compared to white people (Lotufo *et al.*, 2013).

Regarding nutritional status, compared to people of another race/ethnicity, older blacks also have a higher nutritional risk profile (Sheean *et al.*, 2019). The origin of undernutrition in old age is multifactorial, and risk factors may vary according to health and life situation (Kiesswetter *et al.*, 2020). It includes sensory loss, decreased appetite (associated with some chronic diseases, dental and swallowing problems, for example), adverse changes in body composition (i.e., loss of lean mass, strength and function) (Cederholm *et al.*, 2019) and psychosocial factors such as depression, loneliness and poverty (Boulos *et al.*, 2016). Undernutrition in the older population can lead, if left untreated, to numerous negative clinical consequences such as functional decline, hospital complications and increased mortality (Kiesswetter *et al.*, 2020).

2 Objective

Older adults Brazilians may be exposed to a double burden of prejudice regarding their skin color and age, which may increase the risks for undernutrition. Thus, the objective of this study was to evaluate undernutrition among older adults according to skin color and other associated factors.

3 Methods

Participants

This is a cross-sectional study using data collected in 2015 from the SABE, using a multiple-stage probabilistic sample that is representative of community-dwelling individuals aged 60 years or older residing

in the city of São Paulo. The SABE study began in 2000, and participants were reassessed in 2006, 2010 and 2015. In each wave of data collection, a new cohort of older individuals between the ages of 60 and 64 years is included in the study to maintain the representativeness of all age groups ≥ 60 years. Details on the sample design of the SABE study are described in another publication (Lebrão *et al.*, 2005).

In 2015, 1,224 older individuals were evaluated. Individuals with incomplete or missing anthropometric information were not included in this research ($n=140$, 11.4%). Those who were classified as obese ($\text{BMI} \geq 30 \text{ kg/m}^2$) were excluded from the analysis. Participants were interviewed in their households by a trained interviewer using a standardized questionnaire that addressed the lifestyle and health conditions of older adults. Anthropometric measures were collected by nutritionists.

The SABE study was approved by the Research Ethics Committee in 2015 under Protocol nº 3.600.782 (2015). All participants signed a consent form before the evaluations.

Dependent variable

The dependent variable was BMI (kg/m^2), calculated as the ratio between the values of body mass (kg) and squared height (m^2). Weight was measured using a portable scale, and height was measured with an anthropometer attached to the wall, with the barefoot individual wearing light clothing. Participants were classified into 3 categories: undernutrition ($\text{BMI} \leq 23 \text{ kg/m}^2$), normal weight (>23 and $< 30 \text{ kg/m}^2$) and obese ($\text{BMI} \geq 30 \text{ kg/m}^2$).

Nutritional status was classified based on the BMI cut-off points adopted by the Pan American Health Organization (2001).

Independent variables

Socioeconomic and demographic characteristics: Sex, age (60-69 years, 70-79 and ≥ 80), skin color (white, brown, black and yellow), years of education (illiterate, 1-4 years, 5-8 and >8 years), per capita household income (low tertile, medium, high), living arrangements (lives alone or not), participation in social activities such as clubs, community or religious groups, senior centers and bingo (yes/no). Indigenous individuals were excluded from the analysis due to low frequency in the sample ($n=1$).

Health conditions: Self-reported health status (good, fair and poor), number of chronic diseases (self-reported hypertension, diabetes, cancer, chronic pulmonary disease, heart disease, stroke, osteoarthritis and osteoporosis – classified as none, 1 and ≥ 1), reported difficulties in accessing health care (yes/no), and chewing difficulty (yes/no).

Behavioral Aspects: Eating less in the last three months (yes/no).

Statistical Analyses

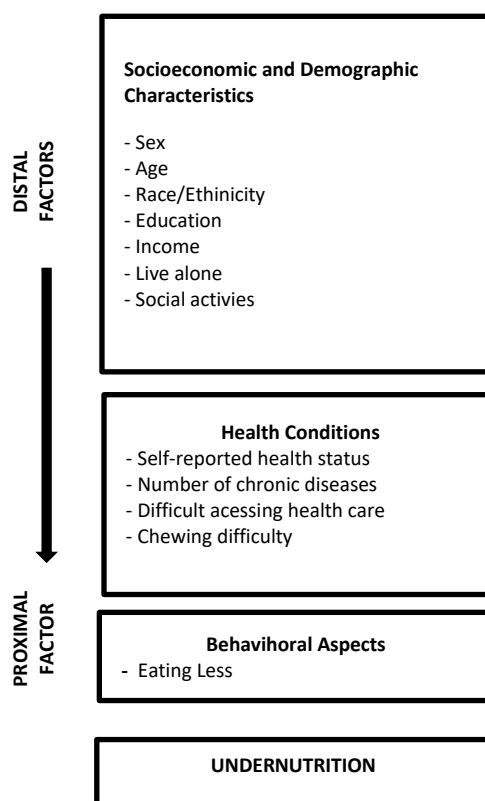
Characterization of the sample was presented through weighted proportions and compared by the chi-square (χ^2) test with Rao–Scott correction for complex samplings. The association of socioeconomic and demographic characteristics and health conditions with nutritional status (normal weight/undernutrition) by sex was assessed by χ^2 .

A hierarchical logistic regression model was used to analyze factors associated with undernutrition in older adults (reference category: normal weight). The theoretical model presented in figure 1 shows the variables inserted in each block and the order of insertion. The socioeconomic and demographic variables were followed by health condition and behavioral aspects, considered the most proximal factor for undernutrition.

Several factors influence the occurrence of malnutrition among the older adults. The theoretical model defined in this research considered models developed by Cederholm *et al.* (2019) and Sadarangani *et al.* (2020), highlighting social, demographic, economic, health, and behavioral aspects. Among social factors, the association of social isolation and involvement in social activities with nutritional status was observed. Demographic aspects, such as sex, age, and educational level, were also analyzed, along with the economic variable income. Health conditions, such as self-perception of health, the presence of chronic diseases, and difficulties in accessing health services and chewing, were considered intermediate determinants for the

occurrence of malnutrition among the elderly. Finally, as a proximal determinant, the decrease in food intake was evaluated. The construction of the conceptual model considered the specific reality of Brazilian older adults, based on previous studies (Araujo *et al.*, 2021) conducted with this population. Given that it is commonly not an evaluated demographic factor and considering its great importance, this study also assessed the association of the variable 'race/color' with the occurrence of malnutrition among the older adults.

Figure 1. Theoretical model for investigation of factors associated with undernutrition in older adults, structured into hierarchical blocks of variables.



Source: Own elaboration.

4 Results

The significance level was set at 5%. Model goodness of fit was evaluated through the Hosmer–Lemeshow test. All analyses were conducted using the statistical software Stata 14.0 in survey mode.

Of the 1,224 individuals evaluated in 2015 for the SABE study, 1,084 presented complete anthropometric data, and of these, 364 were excluded due to obesity (BMI ≥ 30 kg/m²). The final sample of this study was composed of 720 older individuals, of which 581 (81%) were classified as normal weight and 139 (19%) as undernutrition. The characteristics of the study population are shown in Table 1. Among older adults in the last age group (80 years or older), there are proportionately twice as many whites as browns and blacks. Higher levels of education and income are among whites and yellows, as well as better perception of health status. Among blacks, difficulty in accessing health care was reported by 64%, the highest prevalence in the sample.

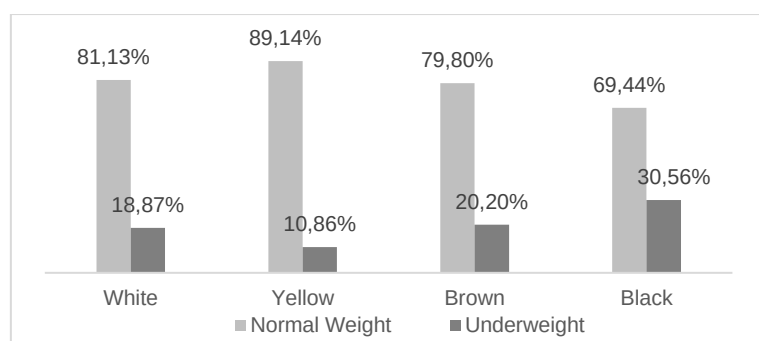
Table 1. Sample characteristics by skin color among the older adults. Brazil, 2015.

A	Total N=714	White (%) n=361	Brown (%) n=276	Black (%) n=44	Yellow (%) n=33	<i>p-value*</i>
Age						
60 - 69 years	51.9	46.5	57.2	61.6	54.6	0.038
70 - 79 years	32.5	33.5	32.3	27.7	28.8	
≥80 years	15.6	20.0	10.6	10.7	16.6	
Sex						
Female	50.9	50.2	50.7	58.0	50.8	0.843
Male	49.1	49.8	49.3	42.0	49.2	
Education						
Illiterate	14.8	15.1	15.6	17.5	0.0	<0.001
1 - 4 years	44.0	37.6	53.6	51.3	23.6	
5 - 8 years	17.8	17.7	19.3	13.2	11.5	
> 8 years	23.5	29.6	11.5	18.0	64.8	
Per capita household income						
Low tertile	34.5	29.3	41.3	43.5	21.3	<0.001
Medium tertile	33.6	32.0	37.6	32.7	16.5	
High tertile	32.0	38.7	21.1	23.7	62.2	
Live alone						
No	82.1	80.6	83.8	78.5	90.3	0.412
Yes	17.9	19.4	16.2	21.5	9.7	
Social activities [†]						
Yes	32.3	31.2	31.9	39.5	39.2	0.630
No	67.7	68.8	68.1	60.5	60.8	
Self-reported health status						
Good	54.3	57.7	48.2	46.4	78.9	0.022
Fair	41.2	38.5	46.0	47.8	21.1	
Poor	4.5	3.8	5.8	5.8	0	
Number of chronic diseases [§]						
No	25.3	24.6	27.5	12.7	31.8	0.541
1	33.9	34.1	33.8	35.2	32.1	
≥2	40.7	41.4	38.7	52.1	36.1	
Difficult accessing health care [‡]						
No	63.9	67.0	61.6	35.8	87.0	<0.001
Yes	36.1	33.0	38.4	64.2	13.0	
Chewing difficulty						
No	56.3	55.7	55.1	54.9	75.9	0.179
Yes	43.7	44.3	44.9	45.1	24.1	
Eating less in the past three months						
No	81.8	83.7	79.6	78.3	83.9	0.526
Yes	18.2	16.3	20.4	21.7	16.1	

* Rao-Scott- χ^2 test for comparisons between groups[†]Clubs, community or religious groups, senior living centers, bingo[‡]Good: good and very good; Poor: poor and very poor.[§]Self reported diseases: hypertension, diabetes, cancer, chronic pulmonary disease, heart disease, stroke, osteoarthritis, osteoporosis

Source: Own elaboration.

The prevalence of malnutrition was much higher among blacks (30.6%), as shown in figure 2.

Figure 2. Nutritional status according to the skin color in older adults.

Source: own elaboration.

Compared to women, the proportion of undernutrition was significantly higher among men (58.1%; $p = 0.024$). Table 2 shows that there is a higher proportion of women living alone compared to men. In addition,

living alone is associated with a higher prevalence of undernutrition. Participation in social activities was more frequent among women, and the absence was more associated with a worse nutritional status among men, that is, 70% vs 82%. The presence of chronic disease, as well as difficulty in accessing health care, was associated with sex. The reduction in food intake was also associated with sex and was greater among women than among elderly men.

Table 2. Association of socioeconomic and demographic characteristics and health conditions according to nutritional status and sex in older adults. Brazil, 2015.

	Normal Weight (%)			Underweight (%)		
	Women n=355	Men n=226	<i>p-value</i>	Women n=71	Men n=68	<i>p-value</i>
Race/ethnicity						
White	51.7	51.2	0.601	42.6	53.1	0.144
Brown	38.1	39.1		41.5	38.5	
Black	6.08	4.0		10.1	8.5	
Yellow	4.1	5.7		5.8	0	
Age						
60 - 69 years	50.5	53.8	0.744	52.8	48.4	0.459
70 - 79 years	33.9	31.9		25.1	34.7	
≥80 years	15.6	14.3		22.1	16.9	
Education						
Illiterate	13.5	16.2	0.714	14.7	14.4	0.545
1 - 4 years	45.8	41.0		41.1	48.1	
5 - 8 years	17.4	18.7		21.7	12.4	
> 8 years	23.3	24.1		22.5	25.2	
Per capita household income						
Low tertile	35.9	30.0	0.402	35.6	42.5	0.540
Medium tertile	32.9	34.9		37.9	28.3	
High tertile	31.2	35.1		26.5	29.2	
Live alone						
No	78.1	88.9	0.001	69.3	85.0	0.036
Yes	21.9	11.1		30.7	15.0	
Social activities [†]						
Yes	37.6	29.6	0.062	36.2	17.9	0.025
No	62.4	70.4		63.8	82.2	
Self-reported health status [‡]						
Good	54.8	58.3	0.596	42.8	48.5	0.077
Fair	40.2	38.2		45.6	49.4	
Poor	5.0	3.5		11.6	2.2	
Number of chronic diseases [§]						
No	19.3	24.9	0.149	25.1	48.1	0.011
1	37.5	30.3		46.7	23.7	
≥2	43.2	44.8		28.3	28.3	
Difficult accessing health care						
No	58.6	71.6	0.002	53.9	67.4	0.124
Yes	41.4	28.4		46.1	32.6	
Chewing difficulty						
No	56.6	58.5	0.685	45.7	56.6	0.225
Yes	43.4	41.5		54.3	43.5	
Eating less						
No	75.6	87.3	<0.001	76.2	90.2	0.034
Yes	24.4	12.7		23.8	9.8	

RaoScott- χ^2 test for comparisons between groups. [†]Clubs, community or religious groups, senior living centers, bingo. [‡]Good: good and very good; Poor: poor and very poor.

[§]Diseases: hypertension, diabetes, cancer, chronic pulmonary disease, heart disease, stroke, osteoarthritis, osteoporosis.

Source: own elaboration

Table 3 shows the results of the hierarchical logistic regression model, which presents the odds ratio of the sociodemographic factors and health conditions associated with nutritional status. Although on the margin of statistical significance, with aging, there is a tendency to increase the odds of undernutrition among old adults aged 80 years or older (OR 1.73; 95% CI 1.00-3.00). Black skin color was another factor positively associated, and the odds ratio was two and a half times that of white participants (OR: 2.52; 95% CI 1.18-5.36). In addition, the absence of social activities (OR 1.60; 95% CI 1.02-2.51) and poorer self-reported health status (2.60; 95% CI 1.02-2.51) were also positively associated with worse nutritional status, while the presence of chronic disease was inversely associated with undernutrition. There were no differences by sex.

Table 3. Multiple model of factors associated with undernutrition in the older adults. Brazil, 2015.

	OR	95% CI	<i>p-value</i>
Age			
60 - 69 years	1.00		
70 - 79 years	1.12	0.68-1.84	0.662
≥80 years	1.73	1.00-3.00	0.051
Sex			
Female	1.00		
Male	1.73	0.95-2.16	0.083
Race/ethnicity			
White	1.00		
Brown	1.08	0.69-1.67	0.740
Black	2.52	1.18-5.36	0.017
Yellow	0.61	0.19-1.97	0.405
Social activities*			
Yes	1.00		
No	1.60	1.02-2.51	0.039
Self-reported health status [†]			
Good	1.00		
Fair	1.83	1.17-2.86	0.009
Poor	2.60	1.10-6.11	0.029
Number of chronic diseases [§]			
No	1.00		
1	0.49	0.30-0.81	0.005
≥2	0.27	0.15-0.46	<0.001
Eating less			
No	1.00		
Yes	0.80	0.45-1.44	0.457

OR: odds ratio; CI: confidence interval

*Clubs, community or religious groups, senior living centers, bingo

[†]Good: good and very good; Poor: poor and very poor.

[§]Diseases: hypertension, diabetes, cancer, chronic pulmonary disease, heart disease, stroke, osteoarthritis, osteoporosis.

Source: own elaboration

4 Discussion

In this study, brown and black elderly people had proportionally lower age, income, educational level and worse health condition compared to whites and yellows. Additionally, black elderly people still had greater difficulty accessing health services. The highest prevalence of undernutrition occurred among men, who practiced fewer social activities than women. Malnourished elderly women, on the other hand, lived more alone, had a greater number of chronic illnesses and have recently decreased their food intake. In the adjusted model of factors associated with undernutrition, the hierarchical analysis revealed commonly known factors, such as clinical and social conditions. However, the skin color that is not usually included in the models for determining nutritional status, when black, increased the chance of undernutrition by more than twice.

The circumstances of aging are worse for those with lower income and education (Shu, 2018). When these elderly people live alone, for example, they may not have enough money to buy meals or even greater difficulty in reading and understanding health guidelines (Chang *et al.*, 2018; Whitelock *et al.*, 2018). In this work, brown and black elderly people had comparatively lower income and educational levels. For Werneck (2016) and Bailey *et al.* (2017), the hierarchy system - defined by structural racism - allows privileges to whites, conferring higher levels of education, income, health status and access to health services.

Possibly these are some of the reasons that, in this study, the proportion of white elderly people over the age of 80 was twice as high as that of brown and black elderly people. Data from Brazilian research shows that while black men lose 1.73 years of life, non black men lose 0.81 (Cerqueira *et al.*, 2013). In a work carried out with data from the SABE cohort, in 2010, the authors also showed a higher proportion of early deaths among blacks and browns (Silva *et al.*, 2018).

However, while reaching old age is an even greater challenge for brown and black people, old age also does not guarantee better living and health conditions. The results of this work revealed, for example, that the aging of this portion of the population is accompanied by a greater number of diseases and worse health status, which should result in a better state apparatus. However, as we have shown, black elderly people were those who had the greatest difficulty in accessing health services. Despite the high rate of use of health services among the elderly, as already indicated by other results of the SABE study, the use of services among elderly in the public health system is more associated with emergency care, reinforcing the need for a effective reorganization of the health care model for the prevention and control of chronic diseases and their complications (Louvison *et al.*, 2008).

As they have worse financial conditions, it is also common for these elderly people to live in cheaper places, far from large centers and the service network, and therefore also have greater difficulty in accessing health facilities. Even if they get care, the care provided by health professionals is sometimes of lower quality, as demonstrated by the systematic review by Hall *et al.*, (2015), in which the authors realized that health professionals had more positive attitudes in the care of white people. However, the national policy for the elderly, created in 1994, argues that the elderly should not suffer discrimination of any kind and reaffirms their rights to health care at any level of Brazil's National Health System (Brasil, 1994). This lesser care of health professionals may impact smaller clinical investigations that could prevent and treat undernutrition, for example.

Conditions such as a greater number of diseases, polypharmacy, hospitalization (Fávaro-Moreira *et al.*, 2016) or even psychosocial (loneliness, pain and living alone) (Boulos *et al.*, 2016) are factors generally associated with undernutrition in old age; however, in this study, it was also revealed that skin color when black increases more than twice the chance of undernutrition. And although the browns also showed worse social and clinical results, their skin color was not related to this nutritional state.

The occurrence of undernutrition in this portion of the population may be the result of lower income, lower education level, greater difficulty in accessing health services and worse health status. These factors can contribute to less access to food, resulting in food insecurity, hunger and undernutrition (Grammatikopoulou *et al.*, 2019). In this sense, we can confirm that the worst health levels in brown and black populations reflect structural racism (Werneck, 2016).

The relationship between undernutrition according to skin color has also been revealed by other authors. Data from the study by Canella *et al.* (2019), for example, demonstrate a higher prevalence of undernutrition and short stature among the brown and black Brazilian population. Similar results analyzed by racial or ethnical groups as indigenous or afro-descendants were also found in other Latin American countries, such as Bolivia

(Miranda *et al.*, 2020) and Colombia (Cediel *et al.*, 2020). However, in general, these studies were not carried out with the elderly population.

Among the factors that increase the chance of undernutrition, only the non-performance of social activities (in community groups, religious centers and bingos) was not different among white, brown, black and yellow elderly. However, in the comparison between sexes, women participated more in these activities. Perhaps because they lived more alone, which may also have contributed to a lower frequency of undernutrition among them. On the other hand, they had more diseases and recently reported more decreased food intake.

Many studies have pointed out that being a man and white *per se* is a positive factor for better income; these people have better social apparatus and thus generally achieve greater personal fulfillment (Arias *et al.*, 2011; Perreira *et al.*, 2014; Bailey *et al.*, 2017). Racial differences, however, pose a greater health risk than gender. In this work, for example, the prevalence of undernutrition was higher among men. In addition, while comparatively older men receive greater assistance in times of disability, racism and prejudice contributes to older black men receiving less care. Those who need help and do not receive it are more likely to be undernourished.

The effects of racism on health, however, are not a recent topic; the Pan American Health Organization (PAHO) and the United Nations (UN) held the III World Conference Against Racism, Racial Discrimination, Xenophobia and Related Intolerances in 2001. This meeting produced a favorable environment for the state and society to act more sharply in overcoming the social disadvantages generated by racism (Alves, 2002). In addition, black social movements and landholding peoples like the "Marcha Zumbi dos Palmares" since the 80's have been fighting for better living conditions and greater equity in health, but it was only in 2007 that the "National Policy for the Integral Health of the Black Population" was approved (Chehuen Neto *et al.*, 2015). These demands and achievements, however, do not seem to be enough to overcome the barriers of racism that exposes black elderly people to greater risks of undernutrition. The black population still dies the most, due to violence or even carelessness in health.

The effects of racism on nutritional status are also not a frequent theme in academic studies. In this way, we have advanced in investigating and revealing greater undernutrition among black elderly people. In addition, the variables used in the hierarchical model allow a greater understanding of factors related to undernutrition in old age. Even restricted to the Brazilian elderly, these data can be extrapolated and used to prevent malnutrition in regions where racism still affects people's health and life.

The limitations of this study include the fact that the sample, although representative of the community's elderly, did not consider the proportion of black and brown elderly in its planning. In addition, access to food and food and nutritional security were not evaluated, although income and schooling evaluated in this study are indirect indicators - reflecting purchasing power, for example. Finally, since this study is a cross-sectional study we do not know the cause and effect relationship between some of the factors related to malnutrition.

5 Conclusion

Although aging can be significant of the better social and health conditions, for brown and black elderly people this phase of life can be marked by helplessness and even greater inequalities - especially among black elderly people. Thus, there is a clear need to ensure equity in health care for black elders, such as greater access to health services and training of health professionals to assess in advance changes in nutritional status, prevent and treat undernutrition and other health outcomes.

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