Research Square

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The paradox of privilege: intersectional inequalities in ultra-processed food consumption in Brazil

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Abstract

Objective

To analyze the prevalence of ultra-processed food consumption and to investigate its association with sociodemographic characteristics considered from an intersectional perspective among adults living in Brazilian state capitals.

Methods

This was a cross-sectional study using data from the 2023 Surveillance System of Risk and Protective Factors for Chronic Diseases, conducted with adults aged 18 years or older. The outcome was defined as the consumption of at least five groups of ultra-processed foods on the day prior to the interview. The exposure variables were sex, skin color, and education, and the intersectionality of these characteristics was constructed using the Jeopardy Index.

Results

The sample comprised 21,690 individuals. The prevalence of consumption of five or more groups of ultra-processed foods was 17.7% (95% CI 16.6–18.9). Black, brown, yellow, and Indigenous women with low educational levels showed a 42% lower prevalence of consumption of these foods compared to white men with higher education.

Conclusion

Approximately one-fifth of the population consumed at least five groups of ultra-processed foods on the previous day, with the most privileged group (men, white individuals, and those with higher education) showing the highest prevalence of consumption. Public policies aimed at reducing the consumption of ultra-processed foods are needed, taking into account the intersectionality of social markers, since the occurrence of consumption differs across groups.

Introduction

The consumption of ultra-processed foods (UPFs) has risen notably in recent decades, making it one of the major current public health issues (1, 2). These foods are characterized by industrial formulations that include refined ingredients, additives, and low amounts of fresh foods, often with poor nutritional profiles that feature high levels of free sugars, saturated fats, sodium, and energy density, along with low fiber and micronutrients (1). Scientific evidence consistently links the intake of ultra-processed foods with several negative health outcomes, such as cardiovascular diseases, type 2 diabetes, obesity, certain cancers, and higher all-cause mortality (2–9).

In Brazil, the increase in ultra-processed food consumption occurs alongside the nutritional transition and changes in food systems, characterized by shifts in food production, distribution, and consumption patterns (4, 10). Data from national surveys, such as the Household Budget Survey (POF 2017–2018), show that ultra-processed foods already make up a significant part of the Brazilian diet, accounting for about 20% of the calories consumed, with a 1.02 percentage point rise compared to 2008–2009. This increase was more notable among men, black people, rural residents, individuals with less education, and those in the lowest income quintile, while a decline in intake was seen among people with higher education and income levels (10, 11). These results emphasize the importance of targeting ultra-processed foods in public policies aimed at promoting adequate and healthy eating, particularly for populations facing greater social vulnerability (8).

However, the distribution of food consumption in the population is not uniform. Sociodemographic characteristics such as gender, race/skin color, and education play a key role in shaping eating habits, reflecting historical, economic, and cultural processes that create social inequalities in health(10, 12). Previous research has found significant differences in the consumption of ultra-processed foods based on these social markers, indicating that dietary patterns are closely linked to individuals' social conditions and life contexts (10–13).

Traditionally, these characteristics have been examined separately. However, this method can oversimplify complex social phenomena by ignoring that different social markers do not act independently; instead, they are interconnected and overlap in creating inequalities, often intensifying their effects. In this way, the concept of intersectionality has become increasingly common in social epidemiology to understand how various dimensions of social identity, such as gender, race/skin color, and socioeconomic status, interact and result in specific patterns of exposure and vulnerability related to health.

Despite the growth of research on the health effects of ultra-processed foods, few nationwide studies examine their consumption from an intersectional perspective, especially using recent and comprehensive population data. Incorporating this approach can enhance understanding of inequalities in food consumption, helping to identify population groups with different patterns of exposure to ultra-processed foods.

In this context, the present study aimed to analyze the prevalence of ultra-processed food consumption and examine its association with sociodemographic characteristics considered through an intersectional lens in adults living in Brazilian capitals, based on data from VIGITEL 2023.

Methods

Cross-sectional study using data from the VIGITEL survey—Surveillance System of Risk and Protective Factors for Chronic Diseases by Telephone Survey—covering data from 2023. VIGITEL is an annual survey conducted by the Brazilian Ministry of Health through telephone interviews with individuals aged 18 or older living in the 26 state capitals and the Federal District (14).

In 2023, for logistical reasons, a minimum of 800 interviews was established in each location. Due to the significant deterioration of landline telephone services in the country, half of the interviews were conducted via mobile phone. This approach ensured adequate representativeness and precision of estimates, with a final sample of 400 landline and 400 mobile phone interviews in each location, aiming for a 95% confidence level and a maximum margin of error of approximately 4 percentage points for any risk factor measured in the study. More details on the sampling process and methods used in this edition of VIGITEL are available in the official publications (14). Ethical approval was obtained from the National Committee for Ethics in Research with Human Beings of the Ministry of Health (65610017.1.0000.0008). VIGITEL databases are publicly available (< http://svs.aids.gov.br/download/Vigitel/%3E).

In this study, the outcome was the consumption of ultra-processed foods, assessed through a self-reported questionnaire that included 13 subgroups ingested the day before the interview: "Now I am going to list some foods and I would like you to tell me if you ate any of them *YESTERDAY* (from when you woke up to when you went to sleep)." The foods included in the questionnaire were soft drinks; fruit juice in boxes, cartons, or cans; powdered soft drinks; chocolate drinks; flavored yogurts; packaged snacks (or chips) or crackers; cookies/sweet crackers, stuffed cookies, or packaged cookies; chocolate, ice cream, gelatin, flan, or other industrialized desserts; sausage, processed meats (e.g., sausage, mortadella, or ham); sliced bread; hot dogs or hamburgers; mayonnaise, ketchup, or mustard; margarine; instant noodles, packaged soup, frozen lasagna, or other ready-to-eat dishes bought from frozen. The answer options were "yes" and "no." Based on positive responses to the consumption of these foods, ranging from 0 to 13, a cutoff point was established at 5 or more subgroups (15, 16).

The self-reported covariates used were sex (female/male), skin color (Caucasian, Black, Brown, Yellow, and Indigenous), and schooling in full years classified as low, middle, and high education (0–8, 9–11, and 12 or more). These variables were used to construct a measure of social inequality based on the "multiple risk" principle, known as the Jeopardy index. This approach guides research on the theory of intersectionality and social phenomena. The multiple risk framework shows that various aspects of an individual's identity, such as sex, class, or race, which lead to discrimination or oppression, are interdependent and exert a compound or cumulative effect (17). The intersectionality of these sociodemographic characteristics was categorized into five levels (0 to 4) and created by combining the categories of the variables mentioned: variables with two categories were coded as "0 and 1," and those with three categories as "0, 1, and 2." Within the framework of intersectionality, a score of 0 indicates the lowest inequality (male, Caucasian, and with a high level of education), while a score of 4 indicates the highest degree of inequality (female, Black/Brown/Yellow people, and Indigenous people with a low level of education).

Data analysis was conducted using Stata 15.0 statistical software. Prevalence rates and their 95% confidence intervals (95% CIs) for the outcomes were calculated based on exposures using the chi-square test. Poisson regression was used to estimate prevalence ratios (PRs) and 95% CIs. For all analyses, the survey (svy) command was employed for weighting. Intersectionality analyses of

sociodemographic characteristics, both in the total sample and stratified by sex, were performed using the Jeopardy index, which considers the score (the higher the score, the greater the risk), along with creating exposure variables that examine the intersection of social markers such as sex and skin color, using schooling as a stratifying variable.

Results

The sample included 21,690 adults, with 54.0% identifying as female, 60.2% as Black, Brown, Yellow, or Indigenous, and 41.3% having 9 to 11 years of education. Regarding intersectional sociodemographic traits, 8.2% were White men with higher education, and 8.7% were Black, Brown, Yellow, or Indigenous women with lower education. Table 1 shows the prevalence of ultra-processed food consumption. The most common items were margarine (43.4%), sliced bread/hot dog buns/hamburger buns (36.5%), chocolate/ice cream/gelatin/flan (29.0%), and soft drinks (28.2%). Less frequently consumed foods included powdered soft drinks (10.5%), chocolate drinks (10.2%), and instant noodles/packaged soup/lasagna (6.1%). The percentage of individuals who ate five or more of the evaluated ultra-processed foods the day before the interview was 17.7% (95%CI 16.6;18.9).

Table 1
Prevalence and 95% confidence interval of ultra-processed food consumption on the day before the interview. Brazil, VIGITEL, 2023 (N = 21,690).

Ultra-processed foods	**Prevalence (CI95%)**
Margarine	43.4 (41.9–44.9)
Sliced bread, hot dog buns, or hamburger buns	36.5 (35.0-37.9)
Chocolate, ice cream, gelatin, flan, or other commercially produced desserts	29.0 (27.6–30.4)
Soft drink	28.2 (26.8–29.7)
Sausage, chorizo, mortadella, or ham	26.6 (25.3–27.9)
Packaged snack or savory biscuit	25.0 (23.7–26.3)
Sweet biscuit, filled biscuit, or packaged cake	21.5 (20.3–22.8)
Mayonnaise, ketchup, or mustard	18.4 (17.2–19.6)
Flavored yogurt	14.2 (13.1–15.2)
Fruit juice in a carton or can	13.3 (12.3–14.4)
Powdered soft drink	10.5 (9.6–11.5)
Chocolate drink	10.2 (9.2–11.3)
Instant noodles, packaged soup, lasagna, or other ready-made meals purchased frozen	6.1 (5.4–6.8)
Consumption of five or more ultra-processed foods	**17.7 (16.6;18.9)**
Values with *svy* weighting	

When evaluating ultra-processed food consumption based on intersectional sociodemographic factors, it is seen that the most privileged group (men, whites, and those with higher education) consumes a larger share of these foods compared to the most vulnerable group (women, Black/Brown/Yellow/Indigenous people with lower education), except for margarine, packaged snacks or savory biscuits, and powdered soft drinks (Fig. 1).

Regarding the consumption of five or more ultra-processed foods on the previous day, the adjusted analysis shows that women had a 36% lower prevalence of ultra-processed food consumption compared to men. Additionally, people with 9 to 11 years of schooling showed a 25% higher prevalence of consumption compared to those with more schooling (12 or more years). According to the Jeopardy index, black, brown, yellow, or indigenous women with low schooling have a prevalence of consuming at least five of these foods that is 42% lower compared to white men with high schooling (Table 2).

Table 2
Prevalence and 95% confidence interval of consuming five or more ultra-processed foods on the day before the interview, according to sociodemographic characteristics and Jeopardy index. Brazil. VIGITEL, 2023 (N = 21,690).

Variable	**Prevalence ratio (CI95%)**	**Prevalence ratio (CI95%)**
Sex		
Male	22.0 (20.1;24.1)	1.00
Female	14.1 (12.9;15.4)	0.64 (0.56;0.72)
Skin color		
Caucasian	17.1 (15.2;19.3)	1.00
Black/Brown/Yellow/Indigenous	18.4 (17.0;19.9)	1.05 (0.91;1.20)
Education (years)		
0–8	13.6 (11.7;15.8)	0.81 (0.67;0.99)
9–11	21.1 (19.3;23.1)	1.25 (1.08;1.45)
12 or more	16.7 (14.8;18.8)	1.00
Jeopardy index		
0 (less risk)	22.9 (17.7;28.9)	1.00
1	18.8 (16.3;21.6)	0.82 (0.62;1.09)
2	18.7 (16.9;20.8)	0.82 (0.63;1.07)
3	16.1 (14.2;18.3)	0.70 (0.53;0.93)
4 (more risk)	13.2 (10.3;16.8)	0.58 (0.41;0.82)
Model: sex, skin color, and education level		

Additionally, when analyzing the occurrence of consuming five or more ultra-processed foods based on sex and skin color in an intersectional way across different education levels, a higher prevalence was observed in men with medium education (9 to 11 years), with 26.7% in black/brown/yellow/indigenous men and 27.3% in whites. Overall, those with less education showed lower consumption frequencies, which was also seen in women with higher education (Fig. 2).

Figure 3 shows the prevalence of consuming five or more ultra-processed foods according to the Jeopardy index (which considers skin color and education), broken down by sex. It was observed that the relationship between consumption and the Jeopardy index differs by gender, with a stronger association seen among men.

Discussion

This study examined ultra-processed food consumption among adults in Brazilian state capitals, considering sociodemographic factors through an intersectional lens. It was found that about two in ten individuals ate five or more ultra-processed foods the day before the interview; ultra-processed food consumption does not seem to be strongly influenced by social factors in Brazil. Our findings show that the most privileged group (men, whites, and those with higher education) had higher intake of ultra-processed foods compared to the most vulnerable group (women, Black/Brown/Yellow/Indigenous people with low education).

Although the prevalence of ultra-processed food consumption observed in this study may seem moderate, it indicates frequent consumption of low-nutritional-value foods, which tends to accumulate over time and has significant implications for the risk of chronic diseases (2). Women had a 36% lower prevalence of ultra-processed food consumption compared to men. This shows that the consumption of ultra-processed foods varies by sex and race, supporting previous findings indicating higher consumption among men, especially black/brown men (18).

A possible explanation for this result relates to gender differences in eating habits and household chores. Women are traditionally more encouraged to develop cooking skills and often assume greater responsibility for meal preparation at home (19). Furthermore, studies show that women tend to consume more natural or minimally processed foods, such as fruits and vegetables, compared to men (12, 20). In this regard, culinary knowledge and cooking at home have been linked to higher diet quality (21).

The lower prevalence of high ultra-processed food consumption among women from minority racial groups and with less education might initially be seen as a healthier dietary pattern. However, this finding should be approached with caution. Evidence from national studies suggests that lower consumption of ultra-processed foods may mainly result from economic constraints, lower purchasing power, and limited access to these products, rather than a greater commitment to a healthy diet. In such contexts, reduced consumption of ultra-processed foods can occur alongside other forms of food inequality, such as food insecurity, dietary monotony, and low food diversity, emphasizing the importance of considering the broader social environment in interpretations.

On the other hand, the lower prevalence of high consumption among women with higher education may be linked to greater access to health and nutrition information, a greater appreciation of healthy eating practices, and a better ability to incorporate nutritional recommendations into daily life. However, it is important to emphasize that such eating practices are connected to more favorable social conditions and greater choices, which facilitate the adoption of behaviors aligned with healthy eating guidelines (1, 13).

The lack of social factors influencing the consumption of ultra-processed foods identified in this study may be explained by several factors. This finding can be attributed to several factors (10, 22–25). The

first reason may be the high availability and easier access to ultra-processed foods across the country, leading to a recent increase in consumption among all population groups (10, 11), including men, rural residents (25), and the most vulnerable groups identified in this study (24).

The results observed in this study also reinforce the idea that the consumption of these foods may be becoming a habit in Brazilian society and that this dietary pattern is associated with food addiction (10, 11, 25). However, it is also important to note that these findings could be linked to other factors, such as the possible lack of access to these foods among people in vulnerable social conditions (22), since analyses indicate that populations living in more disadvantaged neighborhoods have greater access to both healthy and unhealthy food outlets (26). Additionally, cultural factors may play a role, as many families still value preparing foods at home, such as rice and beans, which are culturally central to the Brazilian diet (27). It is also known that most of the Brazilian population regularly consumes fruits and vegetables and follows recommendations to limit red meat intake, without regularly replacing meals with snacks (28). Conversely, families in more socially vulnerable contexts often maintain higher consumption of basic foods and traditional preparations, such as rice and beans, which continue to form the foundation of the Brazilian diet (27). This dietary pattern may partly explain the lower prevalence of high ultra-processed food consumption observed among certain population groups.

Along with the known health risks of ultra-processed foods demonstrated in the literature (29, 30, 31), increased consumption of these products is also linked to environmental impacts. The production of ultra-processed foods significantly contributes to greenhouse gas emissions, which in turn lead to deforestation, soil degradation, and biodiversity loss (32). Therefore, policies should be tailored to populations that consume the most, considering health, lifestyle, and sociodemographic characteristics.

In this context, implementing public policies to address the increasing consumption of ultra-processed foods becomes essential. In Brazil, initiatives such as the Food Guide for the Brazilian Population represent significant progress by making the degree of food processing a key factor in guiding food choices (33). However, further efforts are necessary, especially in regulating the food industry and the food environment. Successful public health strategies, like tobacco control policies, demonstrate that regulatory measures targeting the industry can substantially reduce risk behaviors at the population level (34). Reducing the influence of the ultra-processed food industry would involve disrupting their business models, reallocating resources to other types of food producers, and establishing strong safeguards against conflicts of interest in policymaking, research, and professional practice. Additionally, it requires framing ultra-processed foods as a critical global health issue, building legal, research, and communication capacities, and promoting a fairer, more encouraging transition to diets low in ultra-processed foods (35).

The present study has some limitations that should be considered when interpreting the results. First, data were collected only in Brazil's capitals, which may not reflect conditions in smaller municipalities or rural areas across the country. Additionally, food consumption was assessed through recall of the day before the interview, which may not reflect individuals' habitual eating patterns, especially given potential

variations in food intake between weekdays and weekends, times when people tend to eat different foods. However, this method is widely used in population surveys and allows for the estimation of food consumption in large samples with relative ease (36–38). Furthermore, the information collected is self-reported, which may be subject to bias. Finally, categorizing the skin color variable grouped different racial groups into the same category for analysis, which may mask important differences between these groups. Nonetheless, we had to operationalize it this way for statistical purposes.

Even with these limitations, the study has notable strengths. Using data from a nationwide population survey, with a large sample size and standardized data collection methods, improves the reliability of the estimates. Additionally, analyzing UPFs consumption through social markers in an intersectional way advances beyond traditional methods that examine social markers separately, enabling a more comprehensive understanding of inequalities in food consumption among Brazilian adults.

Conclusion

In this study, two out of ten people consumed five or more ultra-processed foods the day before the interview. Consumption was higher among men, white individuals, and those with higher education, highlighting significant inequalities. Given the widespread availability of these foods in the food environment, the study's findings reinforce the need for regulatory and intersectoral policies to develop industry-level strategies targeting adults, similar to those implemented for tobacco control.

Declarations

Ethics approval and consent to participate

The data is public and was used for research purposes, respecting ethical principles and the confidentiality of information provided by respondents.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Author Contribution

R.G.N. performed the statistical analyses. R.G.N, K.M., N.G.R.M. and T.R.F. wrote all sections of the article and worked on the literature review. M.O.S and J.K.P. critically reviewed the entire manuscript. All authors approved this version of the manuscript.

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Data Availability

The datasets analyzed during the current study are publicly available from the Brazilian Ministry of Health. Data from the VIGITEL (Surveillance System of Risk and Protective Factors for Chronic Diseases by Telephone Survey), including the 2023 edition, as well as microdata, data dictionaries, and technical documentation, are available at:https://www.gov.br/saude/pt-br/composicao/svsa/inqueritos-de-saude/vigitel/vigitelThe VIGITEL dataset is fully anonymized and publicly accessible; therefore, no ethical approval was required for this secondary data analysis.

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Figures

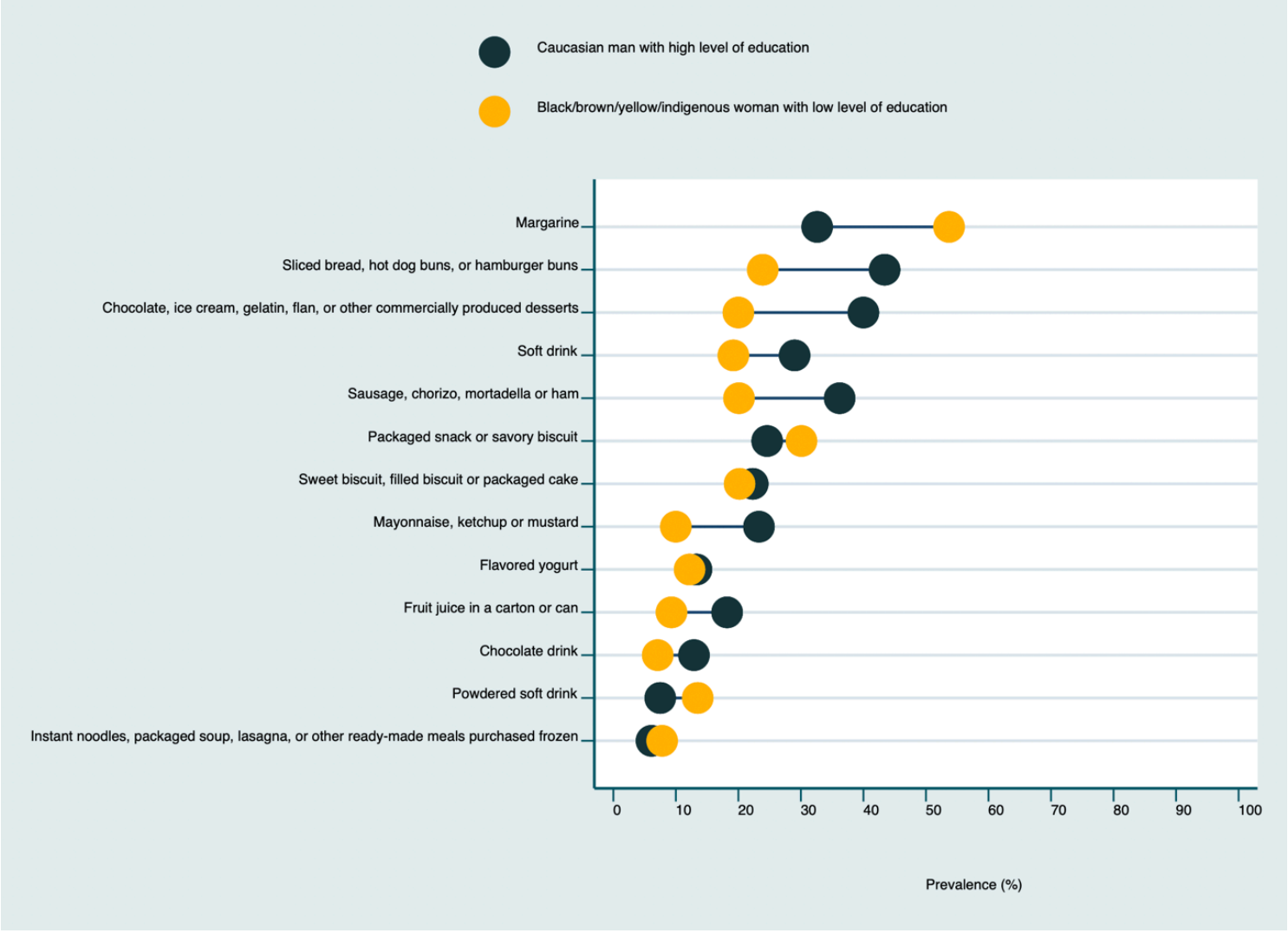


Figure 1

Prevalence of ultra-processed food consumption on the day before the interview according to intersectional sociodemographic characteristics Brazil, VIGITEL, 2023 (N=21,690).

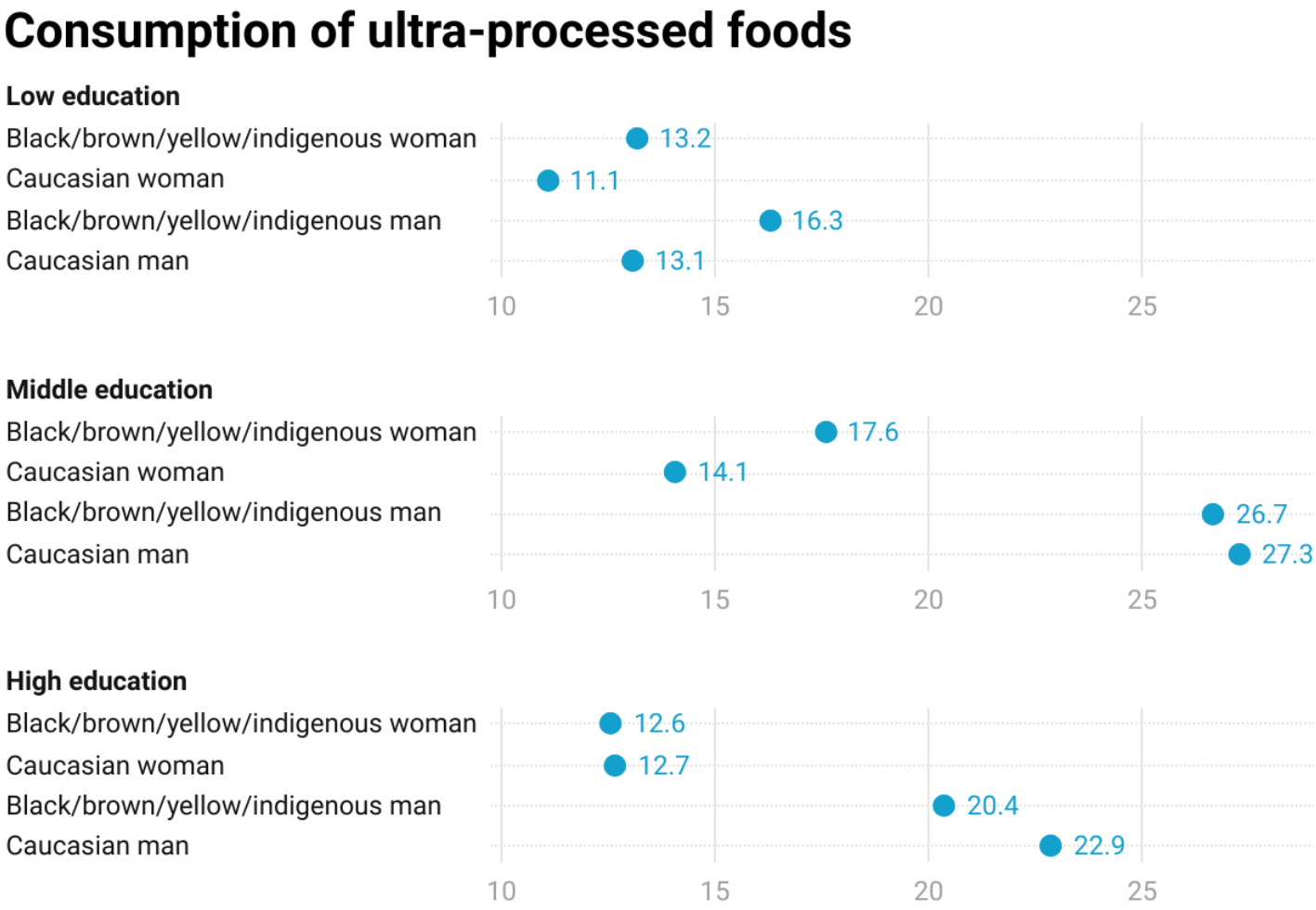


Figure 2

Prevalence of consuming five or more ultra-processed foods on the day before the interview, based on intersectional sociodemographic characteristics. Brazil. VIGITEL, 2023 (N=21,690).

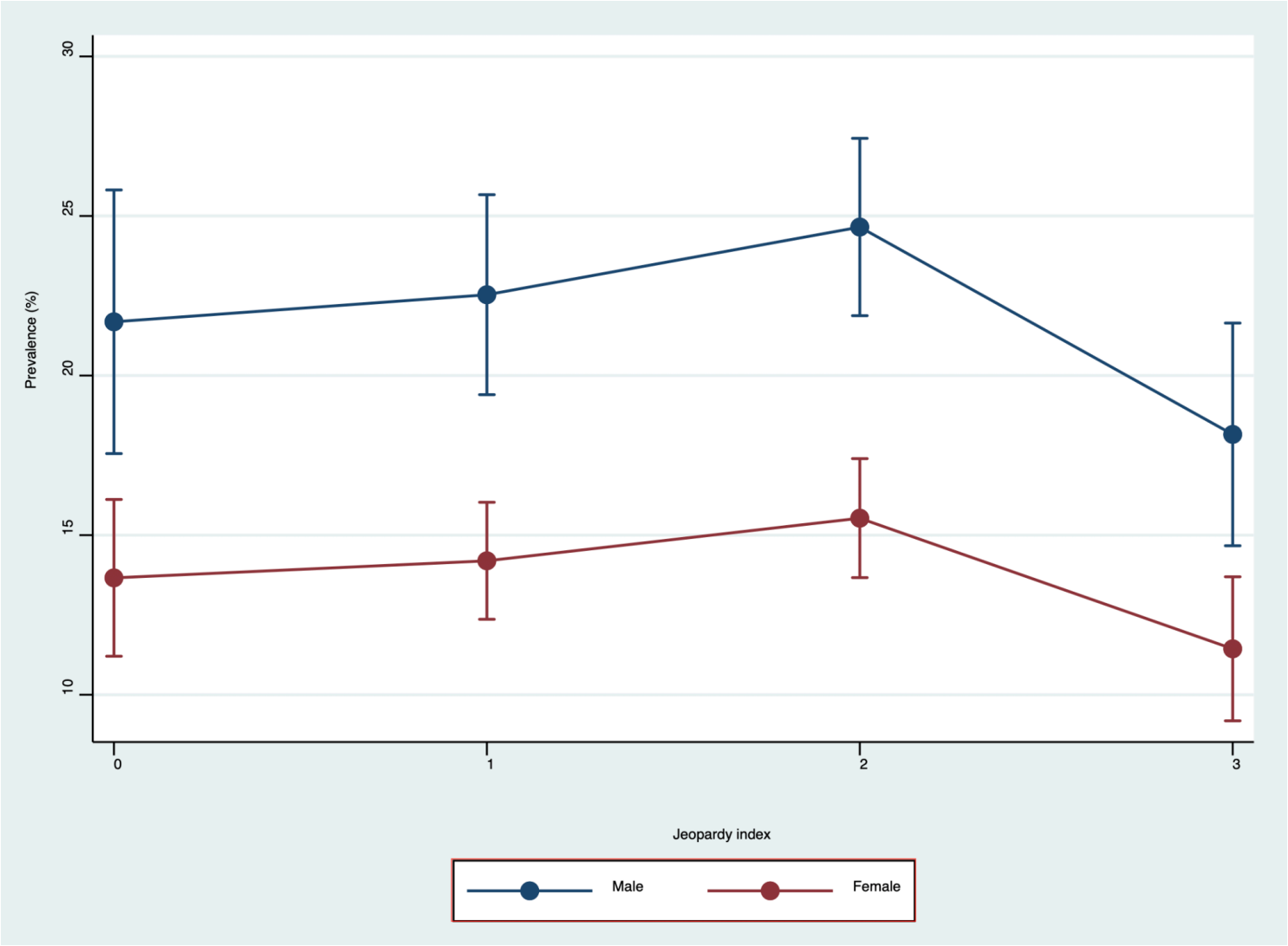


Figure 3

Prevalence of consuming five or more ultra-processed foods the day before the interview, based on the Jeopardy Index (considering skin color and education level) stratified by sex. Brazil, VIGITEL, 2023 (N=21,690).