ORIGINAL ARTICLE

Oral health coverage in the Family Health Strategy and use of dental services in adolescents in Mato Grosso do Sul, Brazil, 2019: cross-sectional study*

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Abstract

Objective: To analyze the association between the coverage by oral health teams in the Family Health Strategy (FHS-OH) and the use of dental services among 12-year-old adolescents in the state of Mato Grosso do Sul, Brazil, 2019. **Methods:** This is a cross-sectional study involving school-based research, which adopted the use of dental services as its outcome. Structural equation modeling was used to test the association between covariates and the outcome. **Results:** Of the 615 participants, 74.0% used dental services in the last three years. ESF-SB (oral health coverage by family health strategy, acronym in Portuguese) ≥50% was associated with a greater use of public dental services [standardized coefficient (SC) = 0.10 -95%CI 0.01;0.18], a lower use of these services for prevention (SC = -0.07 -95%CI -0.17;0.01) and higher unhealthy food consumption (SC = 0.19 -95%CI 0.11;0.26). **Conclusion:** Higher ESF-SB coverage was associated with a lower use of dental services for prevention and higher unhealthy food consumption. Teams must organize the access to oral health service and qualify the work process.

Keywords: Health Services Accessibility; Public Health; Family Health Strategy; Cross-sectional Studies; Oral Health.

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Introduction

The Family Health Strategy (FHS) is the central point of government actions and investments for reorientation of health care model. From the perspective of the integration model for health surveillance, the ESF incorporates light technologies for care in multi-professional actions of organized and programmatic offer, integrated to interventions that address social determinants and public policies, a privileged space for health promotion.[1]

Several determining, structural (at the organizational level of services) and social factors should be taken into consideration in the health-disease process, reinforcing the importance of primary health care services (PHC) in the organization of access to dental care services and provision of comprehensive care for children and adolescents, highlighting the preventive and protective role of health services at these stages of life.

Between 1998 and 2018, there was a significant increase in the number of Family Health teams. National data show that in 1998, there were 2,000 teams to serve 7 million people, 4% of the Brazilian population,[2] while twenty years later, in 2018, there were 43,000 teams responsible for primary health care for 134 million people, 64.7% of the population. With regard to oral health teams, there was also a significant growth, from 615 teams in 2003 to 25,905 in 2017, achieving coverage of 36.7% of the Brazilian population. This expansion had a positive effect on several health outcomes.[3-6]

Childhood and adolescence are particularly relevant moments for the study on the use of oral health services. In some way, child development stages reflect their family context related to dental care-seeking behavior. Sociodemographic and psychosocial factors and factors related to lifestyle adopted by the individual/family may influence their health habits and behaviors, at all stages of life,[7] although preventive interventions for children and adolescents are not sufficient to make a positive impact on health and quality of life in adulthood. Several determining, structural (at the organizational level of services) and social factors should be taken into consideration in the health-disease process, reinforcing the importance of primary health care services (PHC) in the organization of access to dental care services and provision of comprehensive care for children and adolescents, highlighting the preventive and protective role of health services at these stages of life.[8,9]

However, the need for dental treatment for dental caries and dental pain is one of the main reasons for the use of dental services among adolescents.[9] Seeking health service is a complex phenomenon, according to different contexts, and it needs to be better understood. The use of these services due to dental problems is associated with individual factors, such as non-satisfaction with their own oral health[9] and high consumption of sugars,[7] and contextual factors, such as greater population coverage by dentists.[9] The Ministry of Health recommends 50% of population coverage in primary health care of the Brazilian National Health System (SUS), as a potential indicator of provision of services.[10]

Inequities in oral health continue to represent a major challenge for Public Health.[11-13] Sisson's model[12] provides an overview of oral health inequities, explained by four main domain areas: (i) material, related to an individual's position in the social structure, measured by socioeconomic status (SES), such as schooling and family income; (ii) cultural/behavioral (e.g., health-damaging choices, such as unhealthy food, the use of services for treatment rather than prevention); (iii) contextual (e.g., population coverage of dentists); and (iv) individual characteristics (e.g. sex and self-reported race/skin color).

The objective of this study was to analyze the association between the coverage by oral health teams in the Family Health Strategy (FHS) and the use of dental services by 12-year-old adolescents in the state of Mato Grosso do Sul, Brazil, in 2019.

Methods

This is a school-based and population-based study conducted in five cities with more than 80,000 inhabitants in the state of Mato Grosso do Sul: Campo Grande, Corumbá, Dourados, Ponta Porã and Três

Lagoas. Conducted from April 2018 to February 2019, the study, known by the acronym SBMS 2018/2019, also included other age groups, such as 5-year-old children, adults and the elderly.

In 2018, the population of Campo Grande, the capital and largest city in the state of Mato Grosso do Sul, was estimated at 860,000 inhabitants. The population of Dourados, the second largest city in the state, was estimated at approximately 221,925 inhabitants. Together with Corumbá (119,465 inhabitants), Três Lagoas (119,464 inhabitants) and Ponta Porã (92,526 inhabitants), the five cities represented more than half of the 2,748,023 inhabitants of the state's 79 municipalities.[14] Moreover, they are the most representative cities in the four territorial macro-regions of the state (Dourados and Ponta Porã are in the same macro-region) and its main affluent areas.

Participants

All enrolled students were considered eligible for the study. The exclusion criteria ruled out students circumstantially transferred to other schools or those who did not have regular attendance due to health reasons. A random sample of schoolchildren aged 12 years was obtained from a coordination list of the director/manager board. We selected up to ten students in this age group per classroom. When there was more than one classroom, students were randomly selected respecting equal proportion per classroom.

Variables analyzed

In structural equation modeling, the outcome variable was defined as 'use of dental services in the last three years', obtained through a question addressed to the adolescent's parent/guardian – *When did your child last visit the dentist?* – and the following answer options: less than one year; between one and two years; between two and three years; more than three years ago; has never visited; don't know. This variable was dichotomized between 'Yes' (used in the last three years) and 'No' (used more than three years ago, has never visited or don't know). This was the cutoff point established because, among the reports on the use of dental services, no parent/guardian mentioned the use of dental services for a period longer than three years.

To estimate the population covered by the ESF-SB, the parameter of 3,450 individuals covered by oral health team was considered. The sample size calculation estimated the percentage of the population covered by the ESF-SB[18] in December 2018, chosen as the reference month, for each participating city. The data were obtained from the E-manager platform of the Ministry of Health.[18] The variable 'coverage by the ESF-SB' was dichotomized – less than 50%; equal to or greater than 50% – and estimated by municipality.[10]

The weekly frequency of unhealthy food consumption was investigated using an instrument recommended by the Brazilian Ministry of Health,[19] contemplating five food groups that adolescents reported having consumed: (1) French fries, packaged potato chips and fried snacks (chicken drumstick, kibbeh, fried pastry, and so on.); (2) hamburger and sausage (hotdog sausage, mortadella, salami, ham, sausage and so on); (3) cracker/salted biscuits or packet snacks; (4) cracker/filled sweet biscuits, sweets, candies and chocolate (bars or chocolate candies); and (5) regular soft drink consumption. The weekly unhealthy food intake was obtained from the sum of the frequencies of the five food groups, divided by five. Thus, the weekly consumption of unhealthy foods was stratified as follows: low, up to 2 times/week; moderate, 2 to 4 times/week; and high, 4 or more times/week.

Sex and race/skin color [white; non-white (black, brown, yellow or indigenous)] were self-reported. Household income *per capita* was categorized as follows: below the poverty line; equal to or above the poverty line. In the Brazilian context, the poverty threshold was established according to the household monthly income of up to R$ 466.00 in 2018.[14] Mother's education level (in years of study) was dichotomized between: 1 to 4 years; above 4 years. A latent variable was created based on the household income and mother's education level and it was applied to the structural equation modeling. The type of dental service used by the adolescent the last time he or she visited the dentist was characterized as private or public, and the reason for the use of the dental service when he/she attended his/her last appointment, dichotomized between use for treatment and use for prevention.

Sample size

For the sample size calculation, the formula proposed by Silva[16] was used to estimate the prevalence of the use of services by Brazilian adolescents. Data on the use of oral health services by 12-year-old adolescents from the Midwest region who took part

in the Brazilian Oral Health Survey (SBBrasil 2010),[15] were used as a parameter.

Probability cluster sampling was adopted. The five participating cities were pre-selected and considered the primary sampling units (PSU). The municipal public elementary schools were defined as secondary sampling units (SSU). The largest Brazilian Oral Health Survey, SBBrasil 2010,[15] selected 32 secondary sampling units per city. Thus, we randomly selected 32 schools in the two largest cities (both have more than 32 schools) and all schools in the other three cities.

The national survey showed that 79.8% of adolescents reported using dental services. The design effect (deff) of 2.0, the 95%confidence interval and the 20% loss rate were considered. Sample size calculation for analysis of the use of the services was comprised of 536 adolescents.

Calibration of oral health teams

Five oral health teams, per municipality, comprised of a dentist and an annotator, had 32 hours of practical and theoretical training to join the research.[17] The intra- and inter-examiner calibration showed a Kappa coefficient of 0.73.[17]

Data collection

Data were collected through a questionnaire, the same applied in SBBrasil 2010,[16] distributed to adolescent's parents/guardians. Sociodemographic questions were answered, being gender and race/skin color self-reported. The adolescent returned the completed questionnaire and, in the school setting, answered another questionnaire about their eating habits. Then, each participating adolescent got a dental exam.[17]

Statistical analysis

We performed a descriptive analysis of proportion, taking into consideration the sample weights, and analyses of structural equation modeling. These analyses allowed the development of association relationships between independent variables and their outcomes, with the advantage of using only one confirmatory factor model.[19,20] The structural equation modeling was used to estimate possible association between material explanation, contextual, behavioral health and sociodemographic variables, and the use of dental services. In the performed model, we used robust regression coefficients for interpretation, estimating direct and indirect effects, and the potential paths to the associations, taking into consideration sample complexity. Sisson's interpretative model,[12] designed to explain inequities in oral health, was adopted as a reference for the analysis. Variables that support (i) the material explanation, related to the position of an individual in the social structure, measured by socioeconomic status, (ii) cultural/behavioral explanations, measured by unhealthy food consumption and use of services for the treatment of dental caries and dental pain rather than prevention, and (iii) the contextual perspective, measured by Family Health Strategy coverage and type of dental service (public or private), were used. Figure 1 shows the graphical representation of the model-based testing. Variables drawn as rectangle are observable. The ellipse, a variable constructed from observable variables (income and schooling), is a variable that best represents family socioeconomic status. The arrows indicate potential association paths between variables.

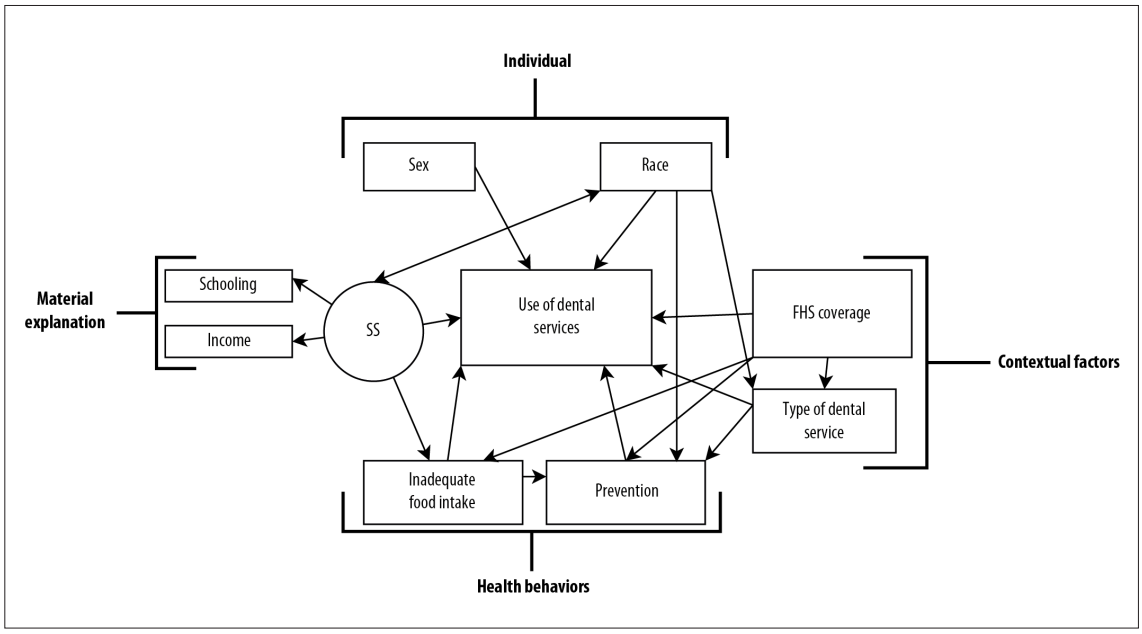
The quality of the adjustment of the models was evaluated by the coefficient of determination (CD) and supplemented through applying the Root Mean Square Error of Approximation (RMSEA), in which values less than or equal to 0.08 are considered adequate. The comparative fit index (CFI) and the Tucker-Lewis index (TLI) provided additional reliability; and values greater than 0.80 were considered adequate.[20,21] All analyses were performed using Stata software version 14.2 (College Station, TX, USA).

Ethical aspects

The research project was submitted to the Human Research Ethics Committee of the Federal University of Mato Grosso do Sul (CEP/UFMS) and was approved. Opinion No. 2,596,211, issued on April 12, 2018 (Certificate of Submission for Ethical Appreciation (CAAE) No. 85647518.4.0000.0021), based on the ethical guidelines established in the Resolution of the National Health Council (CNS) No. 466 of December 12, 2012. All participants signed the Free and Informed Consent Form; and their Parents/guardians, the Free and Informed Assent Form.

Results

The study included 615 12-year-old adolescents. Table 1, taking into consideration the sample weights, it could be seen that 43.9% of them



Note: SS: socioeconomic status; FHS: family health strategy coverage.

Figure 1 – Graphical representation of the theoretical model applied to Oral Health Study in Mato Grosso do Sul, 2018/2019

self-reported being white, 51.2% were female and 61.1% had household income *per capita* above the poverty line; 62.0% of their mothers had up to four years of schooling. Regarding the coverage of the ESF-SB, 55.3% were in a context of coverage of less than 50% and of these, 56.8% used dental services in the last three years. Of the 44.7% who had ESF-SB coverage equal to or greater than 50%, 90.8% reported having used dental services in the last three years. Regarding food, 35.3% of the participants reported high unhealthy food consumption (four to seven times a week) and of these, 85.4% used the dental service in the last three years.

Table 2 shows that 74.0% of the participants used dental services in the last three years. Regarding the type of service used, 56.7% reported having used the public dental service and 43.3% private service. With regard to the use, 46.2% sought dental service for prevention and 53.8% for treatment.

Table 3 shows the results of the structural equation modeling, according to Sisson's theoretical framework, with the individual variables (sex; race/skin color), health behaviors (unhealthy eating; use of dental services for prevention), material explanation (family income; maternal education) and contextual variables (ESF-SB coverage ≥50%). It could be seen that the use of dental services in the last three years was associated with higher socioeconomic status (CP = 0.79; $p<0.001$), self-declared race/skin color as being white (CP = 0.14; $p<0.001$) and higher unhealthy food consumption (CP = 0.30; $p<0.001$). White adolescents used dental services mostly for prevention, and they used public services less than non-white adolescents. The higher ESF-SB coverage was positively related to higher unhealthy food consumption (CP = 0.19; $p<0.001$), use of public dental services (CP = 0.10 - $p=0.045$) and lower use of services for prevention (CP = -0.07; $p=0.067$). An indirect association was identified, through unhealthy food consumption, which measured the association of greater coverage of the ESF-SB with the greater use of dental services in the last three years.

Discussion

The study, conducted with school adolescents from the five cities in Mato Grasso do Sul with more than 80,000 inhabitants, showed three important findings. The first one was the association among the greater ESF-SB coverage, the greater use of dental services in

Table 1 – Individual and contextual characteristics, absolute values and proportions taking into consideration the sample weights among 12-year-old adolescents (n=615), according to the use of dental services, Oral Health Study in Mato Grosso do Sul, Brazil, 2018/2019

Variables	Sampling distribution		Use of dental services	
	n=615	%	N	(95%IC[a])
Individual				
Race/skin color				
White	270	43.9	202	75.4 (54.2;85.1)
Brown	266	43.3	193	71.7 (52.2;83.1)
Asian	24	3.9	23	97.4 (86.2;99.6)
Black	32	5.3	21	62.4 (42.4;78.9)
Indigenous	6	0.9	5	76.7 (72.5;80.3)
Had no information	17	2.8	11	64.7 (38.9;84.0)
Sex				
Female	315	51.2	237	75.6 (50.6;89.4)
Male	300	48.8	218	72.9 (46.4;88.4)
Household income *per capita*				
Below the poverty line	216	35.1	177	87.6 (78.3;93.2)
Above the poverty line	376	61.1	278	61.8 (41.3;78.8)
Mather's education level (in years of study)				
1 to 4	381	62.0	239	57.0 (38.1;74.0)
Over 4	234	38.0	216	91.8 (83.0;96.3)
Contextual				
ESF-SB[b]				
Less than 50%	340	55.3	217	56.8 (37.4;74.4)
Equal to or greater than 50%	275	44.7	238	90.8 (84.6;94.6)
Unhealthy food				
Low (up to 2 times/week)	168	27.3	73	30.8 (16.0;50.9)
Moderate (2 to 4 times/week)	197	32.0	179	91.9 (80.0;97.1)
High (4 to 7 times/week)	217	35.3	187	85.4 (77.5;90.8)
Had no information	33	5.4	16	46.8 (34.5;59.5)

a) 95%CI: 95% confidence interval; b) ESF-SB: oral health coverage by the Family Health Strategy.

the public network and the use of services for treatment. The second important finding was the association between the higher frequency of weekly consumption of unhealthy foods and the higher use of dental services for treatment rather than for prevention, partially mediating the relationship between greater coverage of ESF-SB and greater use of dental services. The third finding of considerable importance was a higher frequency of the use of private dental services for preventive care, by self-declared white adolescents when compared to non-white adolescents.

In the places where ESF-SB coverage was equal to or greater than 50%, a higher percentage of the use of public dental services was observed, showing how contextual factors can influence individual choices. Thus, it should be taken into consideration that greater ESF-SB coverage occurs in municipalities with a smaller population size, where the provision of private dental services is lower, and public service is the main access to oral health care. This result, particularly, reinforces the importance of public dental services to reduce inequalities in access to oral health care.

Table 2 – Absolute and relative distribution of 12-year-old adolescents (n=615), according to the use of dental services in the last three years, taking into consideration the reason and type of service, Oral Health Study in Mato Grosso do Sul, Brazil, 2018/2019

Use of dental services	N	(95%IC[a])
Used in the last three years		
Yes	455	74.0 (70.4;77.3)
No	160	26.0 (22.7;29.6)
Type of service (among those who used the service in the last three years)		
Public	258	56.7 (52.1;61.2)
Private	197	43.3 (38.8;47.9)
Reason for its use		
Prevention	210	46.2 (41.6;50.8)
Treatment	245	53.8 (49.2;58.4)

a) 95%IC: 95%confidence interval.

After the reorientation of the care model for health promotion in the Brazilian National Health System (SUS),[2] PHC has provided services aimed at comprehensive care to the population. Generally, associated with the significant increase in population coverage by the ESF, there is evidence of the positive impact of Family Health Strategy on important health indicators,[4] especially in reducing hospitalizations due to primary health care-sensitive conditions.[5]

The results presented showed that a greater ESF-SB coverage was associated with a greater use of services for treatment than for prevention, contrary to authors' hypothesis. The pent-up demand for dental treatments is high in Brazil,[9] imposing the challenge of balancing prevention and curative care actions on public dental services. Although no causality was analyzed, since we kept focused on associated factors, this finding contributed to the discussion on the need for the ESF-SB to qualify the work process, especially with regard to the expansion of prevention and health education, through a model of comprehensive health care for adolescents.

ESF-SB coverage equal to or greater than 50% was also associated with a higher frequency of weekly consumption of unhealthy foods, which in turn, partially measured the relationship between ESF-SB coverage and the use of dental services for treatment. A study conducted with adolescents in Rio Grande do Sul, in 2009, showed that sugar consumption was the highest predictor for the use of curative dental services.[7] The causal relationship between sugar consumption and dental caries is well established in the literature:[7] the higher the frequency of consumption, the greater the probability of occurrence of the disease. Tooth decay is the main reason for seeking dental treatment by adolescents[9] and possibly explains the relationship between unhealthy food consumption (with large amounts of sugars) and the use of dental services for treatment. The result shows the importance of public policies in promoting healthy eating, family strategies for preventing oral health problems, through the use of oral care technologies and interdisciplinary work at PHC aimed at changes in eating behaviors of the population.

Using Sisson's reference,[12] it was possible to understand these findings through the material explanation, related to socioeconomic status. Differences in socioeconomic status can influence the access to food resources, making the socioeconomic status one of the main determinants of health inequalities.[12] In Brazil, between 2003 and 2010, there were unequal improvements in oral health, especially related to dental caries,[22,23] favoring higher-income individuals. The results showed that the highest use of private dental services was associated with the highest socioeconomic level and adolescents who self-reported being white, factors which in turn, are related to better health behaviors and lower prevalence of diseases.[24] One of the explanations for the association between whites and a higher use of private dental services for prevention is the fact that these adolescents are from higher-income families and also have higher

Table 3 – Associations, through the structural equation modeling, between the variables analyzed and their respective outcomes, among 12-year-old adolescents (n=615), Oral Health Study in Mato Grosso do Sul, Brazil, 2018/2019

Effects	SC[a] (robust standard errors)	(95%IC[b])	p-value
Direct effects			
Sociodemographic			
Sex ⟶ Use	0.04 (0.03)	(-0.02;0.09)	0.563
SS[c] ⟶ Use	0.49 (0.16)	(0.35;0.62)	<0.001
SS[c] ⟶ Inadequate food intake	-0.02 (0.05)	(-0.09;0.05)	0.534
White ⟶ Use	0.14 (0.06)	(0.07;0.20)	<0.001
White ⟶ Checkups	0.24 (0.08)	(0.14;0.32)	0.023
White ⟶ Public	-0.22 (0.10)	(-0.32;-0.12)	<0.001
Latent variable SS[c]			
Income ⟶ SS[c]	0.79 (0.10)	(0.69;0.89)	<0.001
Schooling ⟶ SS[c]	0.69 (0.10)	(0.59;0.89)	<0.001
Health behaviors			
Inadequate food intake ⟶ Use	0.30 (0.10)	(0.20;0.40)	<0.001
Inadequate food intake ⟶ Checkups	-0.18 (0.06)	(-0.38;-0.07)	0.001
Contextual			
ESF-SB[d] ⟶ Use	-0.02 (0.05)	(-0.09;0.08)	0.904
ESF-SB[d] ⟶ Inadequate food intake	0.19 (0.07)	(0.11;0.26)	<0.001
ESF-SB[d] ⟶ Public	0.10 (0.07)	(0.01;0.18)	0.045
ESF-SB[d] ⟶ Checkups	-0.07 (0.05)	(-0.17;0.01)	0.067
Public ⟶ Checkups	-0.06 (0.03)	(-0.15;0.03)	0.185
Indirect effects			
Via inadequate food intake			
ESF-SB[d] ⟶ Use of services	0.05 (0.02)	(0.02;0.07)	<0.001
ESF-SB[d] ⟶ Checkups	-0.04 (0.02)	(-0.07;-0.02)	0.005
Total effect			
ESF-SB[d] ⟶ Use	0.04 (0.06)	(-0.04;0.12)	0.297
ESF-SB[d] ⟶ Checkups	-0.11 (0.06)	(-0.21;-0.03)	0.007
Covariance			
SS[c] ⟷ White	0.11 (0.05)	(0.04;0.20)	0.005
Model fitting quality			
AIC[e]		7110	
BIC[f]		7300	
Log likelihood		-3512	
Coefficient of determination		0.80	
CFI[g]		0.88	
TLI[h]		0.85	
RMSEA[i]		0.08	

a) SC: standardized coefficient; b)95% CI: 95% confidence interval; c) SS: socioeconomic status; d) ESF-SB: oral health coverage by the Family Health Strategy; e) AIC: Akaike information criterion; f) BIC: Bayesian information criterion; g) CFI: comparative Fit index; h) TLI: Tucker-Lewis index; i) RMSEA: root mean error of approximation.

schooling, which expands their access to preventive resources and the purchase of services, therefore they tend to seek private health services for routine checkup/prevention.[24]

However, inequalities in the availability of dental care may favor the use of these services among certain groups, in places with higher concentrations of individuals of white race/skin color.[25,26] Although it is essential to focus on social inequalities in oral health, racial inequalities cannot be eliminated simply by addressing only the mechanisms that link socioeconomic status to health.[27] This is one of the greatest challenges of the ESF-SB and public health services. Positive discrimination in health care in neighborhoods with racial groups at higher risk could be one of the solutions to minimize racial inequalities in the use of preventive services.[27] Racial inequities in tooth loss among Brazilian elderly population, through decomposition analysis, were 50% explained by the reasons and frequency of use of dental services,[28] behaviors possible to be modified, pointing out, once again, the importance of the Family Health Strategy action in this context.

Implementation of changes, in the reorganization of the workflow and work process in PHC, requires proposition for strategies and innovations.[29] Possible ways to be taken into consideration by managers are the organization of services/programs for prevention that meet the attributes of PHC, interdisciplinary work qualification and the use of innovative educational approaches in order to achieve family and individual changes. Public policies to promote healthy eating, such as taxing sugary drinks, could also be taken into account by health managers in Brazil. Future research on the use of public and private dental services should analyze racial issues in greater depth, given the importance of the SUS for certain racial groups.[30]

This is a cross-sectional study, therefore some limitations for the analysis should be pointed out. It is not possible to establish a causal relationship between the associations found. However, the instruments used were validated for the Brazilian context, and the questionnaire adopted is used in the Food and Nutrition Surveillance System (Sisvan-Web) of the Ministry of Health to access the frequency of unhealthy food consumption.[19] These associations may imply public policies aimed at reducing inadequate food consumption, especially the consumption of ultra-processed foods, and implementing strategies for changes in health services.[29] The strong point of the study is the fact that this was a research conducted in the most affluent and representative cities in the four macro-regions of an important State in the Midwest region of Brazil, responsible for a strong agribusiness that supplies other geographic areas.

It can be concluded that higher coverage of ESF-SB was associated with higher use of public dental services, lower use of dental services for prevention and higher unhealthy food consumption. Oral health teams should organize access and qualify the work process, focusing on comprehensive care, in addition to contributing to the implementation of transdisciplinary actions aimed at reducing the consumption of unhealthy foods by school adolescents.

Authors' contribution

Martinelli DLF, Cascaes AM, Frias AC and Souza LB collaborated with the study conception and design, data interpretation, drafting and critical reviewing of the manuscript intellectual content. Bomfim RA collaborated with the study conception and design, statistical analysis and data interpretation, drafting and critical reviewing the manuscript intellectual content. All authors have approved the final version of the manuscript and declared themselves to be responsible for all aspects of the work, including ensuring its accuracy and integrity.

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