Between wealth and hunger: conditions for the promotion of food and nutritional security in the capital cities of Southern Brazil

Entre a riqueza e a fome: condições para a promoção da segurança alimentar e nutricional nas capitais do Sul do Brasil

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ABSTRACT

Objective
The research was carried out with the objective of evaluating the conditions for the promotion of food and nutrition security in three capitals of the southern region of Brazil.

Methods
This is an evaluative research, which used an analysis and judgment matrix composed of 7 dimensions, 11 sub-dimensions, 27 indicators and 56 measures, which classified each of the elements of the matrix as excellent, good, regular or poor for the promotion of food and nutrition security in the three capitals. Data collection took place in public and freely accessible information systems.

Results
The three capitals were evaluated as poor in their conditions for promoting food and nutrition security. Florianópolis and Porto Alegre presented less favorable conditions compared to Curitiba. Aspects related to universal access to adequate food and water, agroecological production systems and sustainable food supply, and traditional peoples and communities stood out negatively in the three capitals.

Conclusion
Although the evaluated capitals present good socioeconomic indicators, the conditions for promoting food and nutrition security are still fragile, which is reflected in the inability to overcome hunger and food insecurity in the southern region of Brazil. The results indicate the need to qualify territorial strategies for food and nutrition security, considering different contexts, as a condition for guaranteeing the realization of the right to food with equity and priority for families and peoples in situations of social vulnerability.

Keywords: Food security. Health evaluation. Hunger. Local government. Public policy.

RESUMO

Objetivo

A pesquisa foi conduzida com o objetivo de avaliar as condições para a promoção da segurança alimentar e nutricional nas três capitais da região Sul do Brasil.

Métodos

Trata-se de uma pesquisa avaliativa, que utilizou uma matriz de análise e julgamento composta por 7 dimensões, 11 subdimensões, 27 indicadores e 56 medidas. Permitiu também classificar cada um dos elementos da matriz como ótimos, bons, regulares ou ruins para a promoção da segurança alimentar e nutricional nas três capitais. A coleta de dados ocorreu em sistemas de informação públicos e de acesso livre.

Resultados

As três capitais foram avaliadas como ruins em suas condições para a promoção da segurança alimentar e nutricional, sendo que Florianópolis e Porto Alegre apresentaram condições menos favoráveis em comparação com Curitiba. Destacaram-se negativamente nas três capitais, aspectos relacionados ao acesso universal à alimentação adequada e à água, aos sistemas de produção agroecológica e ao abastecimento sustentável de alimentos, e aos povos e comunidades tradicionais.

Conclusão

Apesar de as capitais avaliadas apresentarem bons indicadores socioeconômicos, ainda são frágeis as condições para a promoção da segurança alimentar e nutricional, o que tem se refletido na incapacidade de superação da fome e da insegurança alimentar na região Sul do país. Os resultados alertam para a necessidade de qualificação das estratégias territoriais de segurança alimentar e nutricional, considerando os diferentes contextos, como condição para garantir a realização do direito à alimentação com equidade e prioridade para as famílias e povos em situação de vulnerabilidade social.

Palavras-chave: *Segurança alimentar. Avaliação em saúde. Fome. Governo local. Política pública.*

INTRODUCTION

The South of Brazil has more favorable socioeconomic conditions than the other regions. It has the highest Human Development Index and the second highest *per capita* income in the country. However, concurrently, this region had more than 3 million hungry people between 2021 and 2022, and 14.6 million people living in some degree of food insecurity [1]. Admittedly, this scenario reflects the progressive increase of Food Insecurity (FI) and hunger in Brazil, aggravated by a sum of crises that act synergistically and with a local and global impact [2]. However, the specific case of the Southern region demands a particular analysis to understand how, even in an economically developed region, hunger persists.

Identifying and measuring the conditions for promoting Food and Nutrition Security (FNS) at the local level is an obstacle to overcome in order to qualify public policies in this area [3,4]. Around the world, a number of methods and instruments have been created over the past decades to assess FNS, and adapting these models to local reality has proven to be a major challenge [5,6]. In Brazil, the *Escala Brasileira de Insegurança Alimentar* (Brazilian Food Insecurity Scale) is the main instrument adopted in academic research and governmental surveys to measure the situation of FI and hunger [1]. A nationwide survey conducted between 2021 and 2022, which applied the *Escala Brasileira de Insegurança Alimentar*, estimated that more than 33 million Brazilians reported living in a situation analogous to hunger, and more than half the population lived with some degree of FI. This situation expresses an environment marked by weakened governance of FNS and its public policies, and by the advancement of fiscal austerity measures that culminated in the progressive increase of unemployment, poverty, and extreme poverty in Brazil throughout the pandemic caused by Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2) virus Coronavirus Disease 2019 (COVID-19) [1,7].

A scenario of multiple crises (health, economic, social, and political) causes the need to advance in diagnoses that analyze the FNS situation from its multiple dimensions [8,9]. Preferably, from a territorial approach that allows a closer and more qualified look at structural and emerging issues of FNS, which highlights the inequalities present in different territories, and thus generates more accurate and assertive local analysis for the formulation and implementation of public policies [10,11].

Thus, the aim of this research was to evaluate the conditions for the promotion of FNS in the three capital cities of the Southern region of Brazil, considering the multiple dimensions of the Brazilian concept of FNS.

METHODS

This is an evaluative, multiple-case research (Curitiba (PR), Florianópolis (SC), and Porto Alegre (RS), Brazil), which applied an analysis and judgment matrix previously developed to assess the FNS situation at the municipal level through secondary data analysis [12]. Despite socioeconomic similarities, the three capitals we analyzed present important demographic differences, related to the situation of FI and the structuring of the *Sistema Nacional de Segurança Alimentar e Nutricional* (SISAN, National System for Food and Nutrition Security) (Table 1).

Table 1 – Characteristics of the analyzed cases regarding the Food and Nutrition Security situation. Curitiba (PR), Porto Alegre (RS), and Florianópolis (SC), Brazil, 2022.

Characteristics	Curitiba	Porto Alegre	Florianópolis
Population*	1,963,726	1,492,530	516,524
Area (km²)*	434.892	495.39	674.844
Municipal Human Development Index**	0.823	0.805	0.847
State level of Food Insecurity***	22.5	23.5	13.1
Year of entry into *Sistema Nacional de Segurança Alimentar e Nutricional****	2016	2014	No entry
Existence of a Food and Nutrition Security Plan****	Yes	Yes	No

Source: *Cidades@, Instituto Brasileiro de Geografia e Estatística, 2021 (https://cidades.ibge.gov.br/); ** *Atlas do Desenvolvimento Humano* (Atlas of Human Development in Brazil), *Pesquisa Nacional de Unidade Domiciliar* (PNUD, National Household Survey), 2010; *** IBGE, *Diretoria de Pesquisas, Coordenação de Trabalho e Rendimento* (Directorate of Research, Coordination of Work and Income), *Pesquisa de Orçamentos Familiares* (POF, Consumer Expenditure Survey) 2017-2018; **** MAPASAN, *Mapeamento de Segurança Alimentar e Nutricional* (Mapping of Food and Nutrition Security).

The matrix used in the research was originally composed of 7 dimensions, 11 sub-dimensions, 27 indicators, and 59 measures, in addition to the indication of the information systems to be visited to perform the collection for each of the measures (Chart 1). It was validated through consensus workshops with experts, and more details about the design and methodological development of this instrument have been described by Guedes et al. (2020) [12].

Chart 1 – Dimensions, sub-dimensions, indicators, and sources of information in the analysis and judgment matrix for Food and Nutrition Security at the municipal level.
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Dimensions	Sub-dimensions	Indicators	Sources of Information
Dimension 1 – Universal access to adequate food	S1- Populations in situation of social vulnerability	I1 - Families insocial vulnerability	CECAD, 2021; IBGE, 2021; CNES, 2021; SUAS Census, 2021
		I2 - Social Inequality	Population Census - IBGE, 2010; UNDP, 2010
	S2 - Income	I3 – Families benefiting from income transfer programs	CECAD, 2021
		I4 - Access to income	Population Census - IBGE, 2010
		I5 - Access to employment	Population Census - IBGE, 2010

Chart 1 – Dimensions, sub-dimensions, indicators, and sources of information in the analysis and judgment matrix for Food and Nutrition Security at the municipal level.

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Dimensions	Sub-dimensions	Indicators	Sources of Information
	S3 – Distribution of food and meals	I6 - Existence of Public Infrastructure for Food and Nutrition Security	MapaSAN, 2018
		I7 – Local food commercialization establishments	Population Census - IBGE, 2019
		I8 – Food purchased by the Government	Conab, 2021; IBGE, 2021; FNDE, 2020; INEP, 2020
		I9 - Families in poverty and extreme poverty benefiting from non-monetary food distribution	CECAD, 2021; Conab, 2021
Dimension 2 – Agroecological Production Systems and Sustainable Food Supply	S4 – Access to land	I10 - Land distribution	Census of Agriculture - IBGE, 2017
	S5 – Production and supply	I11 – Agriculture incentive programs	Census of Agriculture - IBGE, 2017; FNDE/2020
		I12 - Access to social programs in rural areas	Census of Agriculture - IBGE, 2017
		I13 – Organic production	Census of Agriculture - IBGE, 2017
Dimension 3 – Permanent processes of education, research, and training in FNS	S6 – Food and nutrition education	I14 – FNE actions within PNAE	FNDE, 2019
		I15 – PSE actions	Painel PSE, 2017
	S7 – Public education	I16 - Access to public education	Population Census - IBGE, 2010 and 2020
		I17 - Educational level	Population Census - IBGE, 2010
Dimension 4 – Food and Nutrition at All Levels of Health Care	S8 – Primary Health Care	I18 – Food and nutrition surveillance	SISVAN, 2021; Tabnet - DATASUS, 2020
		I19 – Promotion of adequate and healthy nutrition	Tabnet - DATASUS, 2015
		I20 – Prevention and control of health problems	Tabnet - DATASUS, 2015
		I21 – Sanitary and environmental surveillance	IBGE, 2017; Tabnet - DATASUS, 2021
		I22 – Primary care coverage	Tabnet - DATASUS, 2020 and 2021
Dimension 5 – Universal Access to Water	S9 – Basic sanitation	I23 – Water supply	Population Census - IBGE, 2010
		I24 – Sanitary sewer	Population Census - IBGE, 2010
		I25 - Garbage collection	Population Census - IBGE, 2010
Dimension 6 – Traditional Peoples and Communities	S10 – Traditional Peoples and Communities	I26 – Access to services for traditional peoples and communities	-
Dimension 7 – Assessment and Monitoring	S11 – Assessment and monitoring of SISAN	I27 – SISAN's structure	MapaSAN, 2014, 2015 and 2018

Note: CECAD: *Consulta, Seleção e Extração de Informações do CadÚnico* (Unified Registry Information Consultation, Selection and Extraction Tool); CNES: *Cadastro Nacional de Estabelecimentos de Saúde* (National Registry of Health Facilities); CONAB: *Companhia Nacional de Abastecimento* (National Company of Food Supply); DATASUS: *Departamento de Informática do Sistema Único de Saúde* (Department of Informatics of the Brazilian National Health System); FNDE: *O Fundo Nacional de Desenvolvimento da Educação* (The National Fund for Educational Development); FNE: Food and Nutrition Education; FNS: Food and Nutrition Security; IBGE: *Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics); INEP: *Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira* (National Institute of Educational Studies and Research Anísio Teixeira); MapaSAN: *Mapeamento de Segurança Alimentar e Nutricional* (Mapping of Food and Nutritional Security); PNAE: *Programa Nacional de Alimentação Escolar* (National School Nutrition Program); PSE: *Programa Saúde na Escola* (School Health Program); SISAN: *Sistema Nacional de SAN* (National System for FNS); SISVAN: *Sistema de Vigilância Alimentar e Nutricional* (Food and Nutrition Surveillance System); SUAS: *Sistema Único de Assistência Social* (Unified Social Assistance System); TABNET: Data tabulator for the Internet; UNDP: United Nations Development Programme

Considering that, due to the time lag between the preparation of the original matrix and the collection of data for this research, the information systems indicated could be outdated and present changes or inconsistencies that might hinder data collection, all systems were reviewed to update the access addresses and the description of the collection protocols. This process resulted in the exclusion of 6 information systems from the original matrix, addition of 3 other systems: *Companhia Nacional de Abastecimento* (National Company of Food Supply); *Consulta, Seleção e Extração de Informações do CadÚnico* (Unified Registry Information Consultation, Selection and Extraction Tool); and *Sistema de Gestão Fundiária/Fundo Nacional de Desenvolvimento da Educação* (Land Management System/ National Education Development Fund), and update of the access address of 3 systems. The revision also involved adapting two measures from the matrix ("Proportion of male farm retirement beneficiaries in relation to the total number of farmers over 60 years old" and "Proportion of female farm retirement beneficiaries in relation to the total number of female farmers over 55 years old"), both from the same indicator, which were combined into only one measure, entitled "Proportion of farm retirement

beneficiaries in relation to total farmers old enough for farm retirement". We have also excluded two other measures ("Ratio between the value of benefits delivered and the population in poverty and extreme poverty" and "Proportion of *Declaração de Aptidão ao Programa Nacional de Fortalecimento da Agricultura* (Declaration of Aptitude to the National Program for Strengthening Family Agriculture) with access to the municipal *Programa de Aquisição de Alimentos* (Food Purchase Program) in relation to the total of Declaration of Aptitude to the National Program for Strengthening Family Agriculture") due to the absence of necessary data in the information systems at the time of collection. Thus, the analysis and judgment matrix we used in this research maintained the same number of dimensions, sub-dimensions, and indicators as the original matrix, but reduced the number of measures to 56. We defined 17 information systems for data collection, all of them are public, freely accessible, and with disaggregated information for the municipal level.

Data collection occurred during the months of October 2021 and January 2022, and the main researcher was responsible for it, with the support of an assistant researcher, in order to ensure that there were not any errors or inconsistencies in the data collection process. To store the data, we used a spreadsheet created in Microsoft Excel® (Microsoft Corp. Redmond, Washington, DC, United States).

For the results obtained for each measure, we assigned value judgments ("poor", "regular", "good", and "excellent"), based on parameters and equations proposed in the original matrix [12], and adapted for this research. In both the original matrix and the version adapted for this research, the parameters were based on theoretical references that indicated the cut-off points for the measures. When no references were found, parametrization was based on the quartile distribution of the results found for the measures or, as a last option, through the definition of cut-off points capable of showing contrast between the units of analysis. In addition, the original matrix defined parameters for the evaluation of the set of municipalities in Santa Catarina (n=295), and, in the replication for this research, some parameters did not promote a distinction between the capital cities, which would affect the evaluation. Thus, the adaptation was necessary to adapt the analysis and judgment matrix to the characteristics of the information collected for the units of analysis, and to enable a comparison between the capitals that we investigated. The value judgments were not only assigned to the measures, but also to the indicators, sub-dimensions, dimensions, and to determine the conditions of FNS promotion in the capital cities (Figure 1).
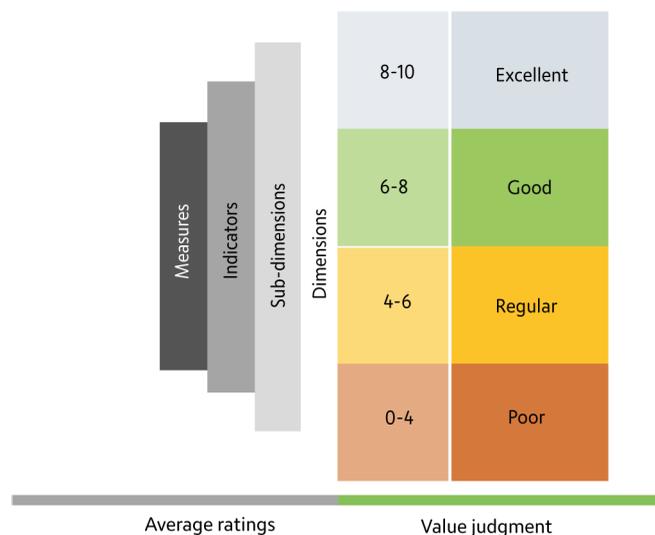

Figure 1 – Value judgment assigned to the performance of the measures, indicators, sub-dimensions, and dimensions of the Food and Nutrition Security situation assessment model.

RESULTS

The three capitals of the Southern region received the evaluation *poor* regarding their conditions for FNS promotion (Table 2). Among the seven dimensions analyzed, Curitiba only had the dimension "Assessment and Monitoring" evaluated as 'excellent' for FNS promotion, while Florianópolis and Porto Alegre did not have any dimension with this classification. However, Porto Alegre was the capital with the smallest number of dimensions evaluated as 'poor' (n=3) for FNS promotion.

Regarding Curitiba, the dimension "Permanent Processes of Education, Research, and Training in FNS" was also considered 'good' for FNS promotion, and the situation is the same for Florianópolis. In Porto Alegre, the only dimension evaluated as 'good' was "Assessment and Monitoring" (Table 2).

The dimensions "Universal Access to Adequate Nutrition" and "Traditional Peoples and Communities" were evaluated as 'poor' for all three capitals. Moreover, only the dimensions "Permanent processes of education, research, and training in FNS" and "Assessment and Monitoring" were not evaluated as 'poor' for any of the capitals (Table 2).

Table 2 – Results of the Food and Nutrition Security assessment according to dimension and sub-dimension, by municipality. Curitiba (PR), Porto Alegre (RS) and Florianópolis (SC), Brazil, 2022.

Dimension		C1	C2	C3	Sub-dimension		C1	C2	C3
1 - Universal access to adequate food		Poor	Poor	Poor	1- Populations in situation of social vulnerability		Regular	Regular	Poor
					2 - Income		Regular	Poor	Poor
					3 - Distribution of food and meals		Poor	Poor	Regular
2 - Agroecological production systems and sustainable food supply		Poor	Poor	Regular	4 - Access to land		Regular	Poor	Regular
					5 - Production and supply		Poor	Good	Regular
3 - Permanent processes of education, research, and training in FNS		Good	Good	Regular	6 - Food and nutrition education		Excellent	Regular	Regular
					7 - Public education		Good	Excellent	Good
4 - Food and nutrition at all levels of health care		Poor	Regular	Regular	8 - Primary Health Care		Poor	Regular	Regular
5 - Universal access to water		Regular	Poor	Regular	9 - Basic sanitation		Regular	Poor	Poor
6 - Traditional peoples and communities		Poor	Poor	Poor	10 - Traditional peoples and communities		Poor	Regular	Poor
7 - Assessment and monitoring		Excellent	Regular	Good	11 - Assessment and monitoring of SISAN		Excellent	Regular	Good
Total "excellent" classifications per municipality	n	1	0	0	Total "excellent" classifications per municipality	n	2	1	0
	%	14	0	0		%	18	9	0
Total "poor" classifications per municipality	n	4	4	3	Total "poor" classifications per municipality	n	4	5	5
	%	57	57	42		%	36	45	45
Total FNS Situation Assessment							Poor	Poor	Poor

Legenda: ■ Poor   ■ Regular   ■ Good   ■ Excellent

Note: C1: Curitiba; C2: Florianópolis; C3: Porto Alegre; FNS: Food and Nutrition Security; SISAN: National System for Food and Nutrition Security.

Table 3 presents the results of the evaluation of the sub-dimensions and indicators. Two sub-dimensions of Curitiba had an *excellent* evaluation regarding FNS promotion, while the other capitals had only one sub-dimension with this evaluation. However, Florianópolis was the capital with the highest number (n=3) of 'excellent' or 'good' sub-dimensions for FNS promotion. Porto Alegre was the capital city with the lowest number (n=4) of 'poor' sub-dimensions (Table 3).

The sub-dimensions "Population in Situation of Social Vulnerability", "Income", "Food and Meal Distribution", "Basic Sanitation", and "Traditional Peoples and Communities" received the evaluation 'poor' or 'regular' for the three capitals. Only the sub-dimension related to "Public Education" was rated as 'good' or 'excellent' for Curitiba, Florianópolis, and Porto Alegre.

While Curitiba and Porto Alegre had the highest percentage (25%) of indicators classified as 'excellent', Florianópolis was the capital with the highest prevalence (37%) of indicators evaluated as 'poor'. Curitiba was the capital city with the lowest number of indicators considered 'poor' (n=8) for FNS promotion (Table 3).

The indicators "Access to Social Action Programs in the Rural Area", "School Health Program Actions", "Social Inequality", "Access to Income", "Access to Public Education", "Prevention and Control of Health Problems", "Sanitary and Environmental Surveillance", and "Sanitary Sewer" stand out, as they were evaluated as 'excellent' or 'good' for the three capitals.

On the other hand, the three municipalities were evaluated as 'poor' or 'regular' for the indicators related to "Families in Social Vulnerability", "Access to Employment", "Food Purchased by the Government", "Families in Poverty and Extreme Poverty Benefiting from Non-Monetary Food Distribution", "Land Distribution", "Agriculture Incentive Programs", "Water Supply", "Garbage Collection", and "Access to Services for Traditional Peoples and Communities".

Curitiba stood out compared to the other capitals for its evaluation as 'excellent' regarding the indicators "Families who Benefit from Income Transfer Programs" and "Access to Social Action Programs in the Rural Area", while in the same indicators, Florianópolis and Porto Alegre were classified as 'poor'. Florianópolis had the indicator related to "Local Food Commercialization Establishments" evaluated as 'excellent', while Curitiba and Porto Alegre were classified as 'regular' for this indicator. Regarding the "Organic Production" indicator, it is noteworthy that, while Florianópolis and Porto Alegre were considered 'good', the evaluation for Curitiba was 'poor'.

Table 3 – Results of the assessment of the Food and Nutrition Security (FNS) situation according to sub-dimension and indicators. Florianópolis (SC), Curitiba (PR) and Porto Alegre (RS), Brazil, 2022.

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Sub-dimension	Indicators	C1	C2	C3	No. municipalities with classification "excellent"	No. municipalities with classification "poor"
1- Populations in situation of social vulnerability	1 - Families in social vulnerability				0	1
	2 - Social inequality				0	0
2 - Income	3 - Families who benefit from income transfer programs				1	2
	4 - Access to income				0	0
	5 - Access to employment				0	3
3 - Distribution of food and meals	6 - Existence of Public Infrastructure for Food and Nutrition Security				1	1
	7 - Local food commercialization establishments				1	0
	8 - Food purchased by the Government				0	2
	9 - Families in poverty and extreme poverty benefiting from non-monetary food distribution				0	3
4 - Access to land	10 - Land distribution				0	1
5 - Production and supply	11 - Agriculture incentive programs				0	2
	12 - Access to social programs in rural areas				3	0
	13 - Organic production				0	1
6 - Food and nutrition education	14 - FNE actions within PNAE				1	2
	15 - PSE actions				3	0
7 - Public education	16 - Access to public education				1	0
	17 - Educational level				3	0
8 - Primary Health Care	18 - Food and nutrition surveillance				0	1
	19 - Promotion of adequate and healthy eating				0	0
	20 - Prevention and control of health problems				1	0
	21 - Sanitary and environmental surveillance				1	0
	22 - Primary care coverage				1	1

Table 3 – Results of the assessment of the Food and Nutrition Security (FNS) situation according to sub-dimension and indicators. Florianópolis (SC), Curitiba (PR) and Porto Alegre (RS), Brazil, 2022.

Sub-dimension	Indicators	C1	C2	C3	No. municipalities with classification "excellent"	No. municipalities with classification "poor"
9 - Basic sanitation	23 - Water supply				0	3
	24 - Sanitary sewer				2	0
	25 - Garbage collection				0	1
10 - Traditional peoples and communities	26 - Access to services for traditional peoples and communities				0	3
11 - Assessment and monitoring of SISAN	27 - SISAN's structure				1	0
Total "excellent" classifications per municipality	n	7	6	7		
	%	25	22	25		
Total "poor" classifications per municipality	n	8	10	9		
	%	29	37	33		

Legenda: ■ Poor ■ Regular ■ Good ■ Excellent

Note: C1: Curitiba; C2: Florianópolis; C3: Porto Alegre; FNE: Food and Nutrition Education; FNS: Food and Nutrition Security; PNAE: School Feeding National Program; PSE: School Health Program; SISAN: Brazilian System for Food and Nutrition Security.

DISCUSSION

The findings of this study show that, despite the fact that the capital cities of the South of Brazil have good social and economic development indicators, the conditions for promoting FNS are still poor. Although we acknowledge that a territorial approach to ensure FNS tends to be complex and often dependent on technical and budgetary issues that are not fully available in Brazilian municipalities, including capital cities [13,14], it is important to use the results of this research to direct actions and resources to ensure greater coherence of governance in the face of local reality [11,13].

Thus, we point out the need for Curitiba, Florianópolis, and Porto Alegre's governors and public administrators to assume their responsibilities and duties to ensure the human right to adequate food, by focusing on the areas of greatest deficit identified in this study. Thus, the results indicate that the improvement of the FNS situation in the analyzed capitals depends on greater investment and prioritization of actions directed at families in a situation of economic and social vulnerability. Furthermore, it is urgent to promote strategies to reduce unemployment rates, expand government programs for food purchases, land distribution, and incentives for agriculture, in addition to actions that qualify the water supply, garbage collection, and access to services for traditional peoples and communities.

Specifically, regarding traditional peoples and communities, it is necessary to reinforce that they constitute priority populations for the FNS agenda in Brazil. However, we did not find any disaggregated data at the municipal level referring to these populations in the information systems used in the research, which resulted in a *poor* evaluation for all capitals in the dimension "Traditional Peoples and Communities". The capital cities analyzed do not comply with the recommendations of the *Política Nacional de Segurança Alimentar e Nutricional* (Brazilian National Food and Nutrition Policy), which determines the establishment of monitoring and assessment strategies for the population groups most vulnerable to violations of the right to adequate food, through the collection of ethnic-racial information [15].

Although the three capitals have similarities in their conditions for FNS promotion, it is possible to state that Curitiba has somewhat fewer challenges compared to the other capitals. This may be because the capital of the state of Paraná stands out regarding the consolidation of FNS public

strategies and the structuring of the SISAN [16]. On the other hand, Florianópolis has a longer way to go, as it is the only capital in the South of Brazil that has not yet formalized its commitment to the national FNS agenda, since it has not adhered to SISAN and has never elaborated a FNS Plan.

The several limitations found in this study on the conditions for promoting FNS in the capitals of the Southern region can partially explain the fact that 9.9% of the population of this region is severely food insecure, and 48.2% live in some degree of food insecurity, while less than a decade ago this situation affected 14.9% of the households [1,17].

By analyzing specific aspects of the indicators that we measured in this research, it is possible to identify that, despite the high Human Development Index and Gross Domestic Product in the three capitals, income concentration, which we evaluated using the Gini index, remains an important factor of social inequality, which shows a level of income concentration capable of hindering the right to adequate food, especially for economically and socially vulnerable populations [18,19]. The discontinuity of regular access to food in sufficient quantity and in the desired quality is associated with insufficient income. The lower the monthly income, the greater the possibility of FI in the household [20]. Considering how access to income is dependent on access to employment, it is important to point out that, since 2015, unemployment has increased nationwide, and became worse in 2020 [21]. Although in the South the unemployment rate was the lowest (6.5%) of all Brazilian regions, the generation of informal jobs has increased since 2015, which causes greater instability for workers, who consequently have increasingly depended on social benefits amidst their income insecurity [22].

Faced with a scenario of precarious work and income, it would be up to local governments to guarantee the right to food through policies and programs of food and meal distribution. However, the results of the research indicate that the capitals have not achieved satisfactory results regarding actions to provide access to food through structures capable of meeting the existing demands. Florianópolis stood out negatively regarding the *Equipamentos Públicos de Segurança Alimentar e Nutricional* (EPSAN, Public Infrastructure for Food and Nutrition Security), which are SISAN's operational structures aimed at the supply, distribution, and commercialization of meals or food [23]. Although Curitiba has a better evaluation than Florianópolis as to *Equipamentos Públicos de Segurança Alimentar e Nutricional*, a study carried out in the capital of Paraná identified an irregular distribution of these equipments, prioritizing regions where income is higher, which shows a territorial segregation in the FNS strategies of this municipality [24].

In addition to measures to ensure access to food, it is also important that the capitals advance in strategies to expand agroecological production and sustainable food supply. It is noteworthy that the capital cities of the Southern region of Brazil were those that allocated the least resources for purchasing food from family farming under the *Programa Nacional de Alimentação Escolar* (National School Nutrition Program) [25]. Even if we consider that capital cities are characterized by a concentration of urban areas, this would not justify a lower development of public actions aimed at food production and supply. For example, Florianópolis, whose territory is composed entirely of urban areas, has its own law that regulates a pesticide-free zone to ensure access to quality water and regulates agroecological and organic production in the municipality [4].

Another dimension to consider in the conditions for FNS promotion is access to public health services, and, in this aspect, the capitals were evaluated as *regular* or *poor*. This scenario can be explained by the reduced budget allocated to the *Sistema Único de Saúde* (Brazilian National Health System), which compromised public services at a time of increased demand caused by the COVID-19 pandemic [26,27]. Primary Health Care is powerful in reducing health inequities, and it

is the duty of municipal governments to organize, execute, and manage services and actions in this regard [27]. The relationship between SISAN and *Sistema* Único *de Saúde* should be strengthened, since the contributions of Primary Health Care to FNS involve issues related to health surveillance, prevention, diagnosis, treatment, and rehabilitation of diseases and illnesses [28]. Another aspect that needs attention in the assessed capitals is basic sanitation. By 2015, water supplied about 80.0% of Brazilian households and only 50.3% of Brazilians had access to sewage treatment [29]. Florianópolis was among the capitals with the lowest sanitary sewer coverage (60.2%) in 2013 [30].

FINAL CONSIDERATIONS

This study evaluated the conditions for FNS promotion in the three capital cities of the Southern region of Brazil. Florianópolis and Porto Alegre presented less favorable conditions for the promotion of FNS, compared to Curitiba. However, in all the capitals, we identified important limitations in different dimensions, which require greater commitment of local public administrators with the FNS agenda, with SISAN and *Política Nacional de Segurança Alimentar e Nutricional.*

In a national context of backward steps in social protection policies and the progressive increase of hunger and all levels of FI in Brazil, the results of this research alert to the need for the territorial strategies of FNS to be qualified, respecting and considering the different contexts, to ensure the right to adequate food in an equitable way, by prioritizing families and people in situations of social vulnerability.

We acknowledge that the use of secondary data can compromise the detailing and description of the reality of the evaluated capitals, although we prioritized recent data in the collection of all variables. The data from MapaSAN and the Population Census may present a result not corresponding to the current moment, however, we emphasize that the data we used were the most recent and available at the time of collection. Therefore, we emphasize the need for new applications of these surveys and the promotion of up-to-date data collection, as well as an evaluation of these surveys for the continuous improvement of information about the Brazilian reality. At the same time, the proposed methodology can be considered a breakthrough in FNS evaluative research in Brazil, as it is an unprecedented tool for the country's big cities, with the potential to contribute to decision-making and local public management.

Considering that the situation of FI and hunger in the South of Brazil is not as bad as in the rest of the country, we expect that the replication of this study in other capitals can help understand regional differences regarding the FNS situation. In the same context, the findings of this study are expected to contribute to the technical and scientific discussion about FNS public policies, and to mitigate the problems that are characterized as obstacles to the governance of FNS in Brazil.

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GF LIMA participated in the conception, design, data collection, analysis, writing, revision, and final approval of the article. ML MACHADO participated in the conception, design, analysis, and final revision of the article. MC MARTINS and ML PINTO participated in the writing, revision, and final approval of the article. CG GABRIEL participated in the conception, design, analysis, writing, revision and final approval of the article.