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THE FIVE DIMENSIONS OF FOOD SYSTEMS IN BRAZIL:
A LITERATURE REVIEW

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1. PREFACE

Dear reader,

Idec, the Brazilian Institute for Consumer Protection, is a non-profit consumer association, independent of companies, parties or governments. Founded in 1987 by a group of volunteers, its mission is to guide, raise awareness, defend ethics in consumer relations and, above all, fight for the rights of consumers.

The search for the right to healthy and sustainable food is one of our causes. We strive for you, consumer, to be able to choose food that promotes your health and our planet's health. It is in this context that we present this literature review on pathways for transitioning food systems.

This document is part of the project "An Agenda for Action - Transition to a Healthy and Sustainable Food System in Latin America", which promotes a comprehensive review of the interconnection of the obesity, malnutrition and climate change pandemics, presenting the hegemonic food system as a central cause to such problems.

In line with our institutional objectives, we present this literature review, which will contribute to the development of an agenda for the transition of food systems, fundamental for the inflection on the way we produce, market, supply and consume food.

Enjoy your reading,

Carlota Aquino
Idec's Executive Director

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2. INTRODUCTION

The publication "The Five Dimensions of Food Systems in Brazil: a literature review" identifies the critical elements that guide the transition to healthier and more sustainable processes. This work is part of a research project ("An Agenda for Action - Transition to Healthy and Sustainable Food Systems in Latin America") promoted by Idec (Brazilian Institute for Consumer Protection) to provide the necessary scientific foundation for integrated action plans geared towards healthy and sustainable food systems in Brazil and Latin America. The broader project on Latin America (with the same name) is underway with the collaboration of researchers from Argentina (Center for the Study of State and Society (CEDES)) and Chile (the University of Adolfo Ibáñez (UAI)). Financial resources for the project are provided by the International Development Research Center (IDRC).

The primary source of the literature review is "The Global Syndemic of Obesity, Undernutrition, and Climate Change", report published by Swinburn et al. in the Lancet journal (2019). Although the report does not support a particular theory, it presents a strong conceptual framework based on the interconnection of obesity, malnutrition pandemics and climate change, which highlights the global agrifood system as a central cause of these problems. From the report, five important dimensions for

the sustainable and healthy transition of the food system were identified and utilized as the analytical framework of the results: business, supply and demand, ecological, health and governance. A metodologia utilizada teve como base uma revisão de escopo da literatura, com uma perspectiva qualitativa crítica. Após detalhada triagem, a ser explicada no capítulo seguinte, foram selecionados 113 materiais para comporem a revisão de literatura, que é apresentada na íntegra nesta publicação.

The methodology used was based on a review of the scope of the literature, with a critical qualitative perspective. After a detailed selection, to be explained in the following chapter, 113 materials were selected to compose the literature review, which is presented in full in this publication.

The document consists of eight sections. After the preface and this introduction, an executive summary of the results is presented. The fourth and fifth section introduce the global syndemic and data on Brazil. The sixth section presents the theoretical-conceptual framework and methodology of the literature review. The seventh section presents the results according to the five feedback cycles of the global syndemic. For each dimension, the thematic scope, challenges and recommendations are discussed. Also, the enforced political and legal frameworks in Brazil that contribute to the transition towards healthy and sustainable food system are presented. The last section is dedicated to the references.

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3. EXECUTIVE SUMMARY OF RESULTS

Using the report by Swinburn et al. (2019) (The Global Syndemic of Obesity, Undernutrition, and Climate change) as a conceptual reference, the literature review covered five dimensions - business, supply and demand, ecological, health and governance. It is understood that the dynamics of these dimensions provide the necessary inflection for the implementation of public policies to minimize health and environment damages.

The review explored the scope of the literature with a critical qualitative perspective. For articles of interest, twenty-four (24) keyword strings (Portuguese and English) were searched in the Scielo and Google Scholar databases, between March and July, 2021. The selection and screening of the search results were conducted in two phases, considering the following inclusion criteria: 1) publication year between 2011 and 2021; 2) scientific articles or book chapters; 3) central focus on Brazil or at least contemplating the reality of Brazil; 4) connection and relevance to the central theme of the study - transition to a healthy and sustainable food system. After the second screening stage, 113 materials were included in the literature review. Below, we present a brief summary of the results in each dimension.

3.1 1ST DIMENSION: BUSINESS

Brazil is an important food producer capable of supplying its domestic market with a wide variety of foods – in fact, 90% of food in Brazil is produced nationally. Despite this, the logic of agricultural production is dominated by public policies that encourage the production of commodities to be sold on the international market via long supply chains. This type of system is anchored in profit, productivity, agriculture and field technologies, thus culminating in food of low nutritional quality, negative environmental impacts and aggravation of social inequality linked to precarious living conditions in rural areas.

As a recommendation, greater attention must be given to food systems in order to address the social needs of the domestic food market, using legislative measures to fight monopoly in the food sector, and promote incentives and acknowledgement of small and medium-scale family farmers. Furthermore, there is the need for productive diversification through incentives, promotion of short supply chains and agroecology, and most importantly, strengthening of the state's role as a regulator of food markets.

3.2 2ND DIMENSION: SUPPLY AND DEMAND

In general, food production is not a problem in Brazil; however, food distribution is. The distribution of food is unequal among the population, which is partly due to high social inequality. On one hand, a large number of people do not have the resources (financial and material) to afford healthy and adequate food. On the other hand, the small share of the population has many resources, thus considered "the target consumer". In addition, Brazil has a highly concentrated retail sector, making healthy foods even more expensive for individuals with limited resources. Further, this lar-

ge-scale food system produces waste at different stages of food production and processing.

The literature recommends that the State implement continuous actions which attend to the Food and Nutrition Security (SAN) of the population - in particular, those in vulnerable situations, guaranteeing supply in emergency. Also, actions must be developed to improve living conditions (income transfers, improvements in living conditions and income generation, etc.). Women, in particular, should be given more

attention, either due to their important role in the food and nutrition security of families and communities, or due to women being statistically in social disadvantaged. With regard to the population in general, greater attention must be paid to the processes that determine the formation and inflation of prices, and the control of monopolies in food retail (in particular, supermarket chains and "wholesale+retail"). The population should promote local supply driven by family farming, traditional communities, and small and medium-sized retailers.

3.3 3RD DIMENSION: ECOLOGICAL

Hegemonically, the Brazilian food system is based on large-scale food production, such as monocultural crops or extensive livestock farming, characterized by the excessive use of pesticides and chemical additives. This situation produces a large emission of greenhouse gases (GHG), changes in land use, pollution of natural resources, reduction of biodiversity and natural habitats. Since 1990, approximately 80% of gross GHG emissions in the country are linked to agriculture.

To reverse this scenario, food production must be combined with systems of less environmental impact, which ideally contribute to the preservation and maintenance of biodiversity. Among the recommendations, one can mention productive diversification, encouragement of agroecology, low-impact livestock production, reduction and control of pesticide use, expansion of protected areas, compliance with the National Policy on Climate Change (PNMC) and targets set in the Paris Agreement.

3.4 4TH DIMENSION: HEALTH

Large-scale food production is strongly based on the use of pesticides and additives, and with low diversity. The food processing techniques are mostly industrialized (ultra-processing). Ultra-processed foods are often cheaper than fruits, vegetables, and cereals. Collectively, the process leads to double malnutrition.

The Human Right to Adequate Food (DHAA) and the adequacy of food environments must be guaranteed through the provision of adequate food in institutional spaces (schools, hospitals, nursing homes, shelters, etc.) and resolution of supply problems such as food deserts. To restrict ultra-processed food consumption, it is recommended that actions be implemented to control production, labeling must be improved and tax mechanisms be devised. It is suggested that campaigns be organized to disseminate the Dietary Guidelines for the Brazilian Population and promote a greater connection between health, education and SAN policies.

3.5 5TH DIMENSION: GOVERNANCE

Brazil is considered an international reference in relation to its participatory governance process based on a legal framework strongly aligned with the multi-scale and multi-sector service of SAN and DHAA. The clear participatory governance and principles enable the social control of the State via the exercise of democracy by the multiple actors of society. Some of the highlights include: 1) the National System for Food and Nutrition Security (SISAN) active since 2006, and anchored by the Organic Law on Food and Nutrition security (LOSAN). One of SISAN principles is a public system aimed at intersectoral and participatory management; 2) The Dietary Guidelines for the Brazilian Population is a publication internationally recognized for its complex and comprehensive approach to food, and application of the NOVA classification; 3) at the beginning of the century, the country has launched a set of policies that were capable of improving the living conditions of the majority of the population, including improving SAN indexes

and prioritization of food production based on family farming and agroecology in local and sustainable dynamics.

Despite the positive context of the legal framework, studies that analyze the contemporary scenario have warned of serious political setback, where many SAN actions have been weakened by low resources, precarious services or even total extinction of highly relevant instances, such as the National Council for Food and Nutritional Security (Consea). Thus, a strong action from the society is required to maintain the rights conquered. Also, structural decentralization mechanisms which facilitate the capillarity of SAN are recommended, including self-financing to help states and municipalities prioritize transition to an agroecological and fair food system as well as consolidate local schedules that integrate rural and urban dynamics. It is also recommended that future studies explore the influence of the food sector on public decision-making in Brazil, including financing of electoral campaigns.

The literature also provided around 100 political-normative milestones already active in the country that positively contribute to the transition process towards healthy and sustainable food systems.

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4. FOOD SYSTEMS AND THE GLOBAL SYNDEMIC: A BRIEF INTRODUCTION

The dawn of the 21st century is being marked by the convergence of different pandemics at a global level, revealing an urgent redirection of the way we live as a society. The challenge ahead includes the resolution of historically persistent social problems, such as inequality and hunger, aggravated by contemporary environmental phenomena such as climate change, which together, prevent the attainment of a dignified and healthy life. Population projections predict about nine billion inhabitants concentrated in large cities by 2050. This is concerning when we consider the provision of basic needs (food, water, housing, income) with a minimum level of quality of life (education, health and leisure). The hegemonic model of food systems is among the cornerstones that need to undergo reconstruction, because it is one of the main causes of environmental degradation and precarious health.

The debate on food systems arises from an evident correlation between the persistence of food and nutrition insecurity and environmental degradation. For many decades, hunger was attributed to food scarcity, which encouraged progressive increase in agricultural production. However, since the beginning of the 21st century, several studies have reported sufficient[1] food to feed the current population and that of future projections (GODFRAY et al., 2010; INGRAM, 2011; REGANOLD; WATCHER, 2016; PONISIO et al., 2016). At the same time, intensive agricultural production exploits and abuses natural resources (soil, water, plant and animal biodiversity) resulting in contamination, scarcity and continuous emission of greenhouse gases (DE LAURENTIIS; HUNT; ROGERNS, 2016; FAO, 2017). In this light, Ingram (2011) proposes a systemic approach to food issues, where food security and ongoing environmental changes are considered complex and thus addressed simultaneously for solutions.

This perspective has been discussed and approved by other authors. It is understood as the joint perception and treatment of all elements (actors, institutions, resources, infrastructure, technologies) involved in food generation (agriculture, livestock, forestry and mariculture) and its activities (production, extraction, aggregation, processing, distribution, consumption and disposal), from a dynamic and integrated viewpoint with multiple scales and dimensions – social, economic and natural (INGRAM, 2011; HLPE 2014; IPES-Food, 2015). The different interactions between elements and processes produce different patterns and systems, stimulating outcomes and equally distinct consequences. Swinburn et al. (2019) argue that:

> **Sustainable food systems promote the global outcomes of human health, ecological health, social equity, and economic prosperity. They have a low environmental impact, support biodiversity, contribute to food and nutrition security, and support local food cultures and traditions (SWINBURN et al., 2019, p. 6).**

1. Although having different methodologies, the studies work with total food production and calorie consumption per capita, indicating that in quantitative terms the global production of food exceeds the calorie needs of the current population and future projections. However, it is worth noting that total calorie says little about the diversity and nutritional quality of foods. Given that a nutritionally adequate and healthy diet must consider very specific individual characteristics (weight, height, culture, health conditions, among others), it is very difficult to make a global projection based on adequate diet. That is, even if we do not need to produce more, it is very likely that more diversified production will be necessary to meet the population's need for healthy food.

This viewpoint is full bloom in the international literature, not only in the scientific world, but also in a significant number of reports published by international agencies, such as: the Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), the Inter-American Institute for Cooperation on Agriculture (IICA), the High-Level Panel of Experts on Food and Nutrition Security (HLPE) and the World Health Organization (WHO). Also, the theme is the central focus of a variety of research centers, such as the International Panel of Experts on Sustainable Food Systems (IPES-Food), the Center for International Cooperation on Agronomic Research for Development (Cirad), the Institute Sustainable Places Research (PLACE) and the Center for Sustainable Food Systems (CFSF).

The international consolidation of agrifood issues was reinforced in 2015, with the launch of Agenda 2030 by the United Nations. Nine of the seventeen Sustainable Development Goals (SDGs) are directly related to food systems (SDG 2, 3, 6, 8, 10, 12, 13, 14 and 15). Some authors, such as Shepon et al. (2017), argue that full compliance with the human right to adequate and healthy food would entail the contemplation of all the SDGs, since some SDGs encompass structural processes of society that need to be reformed and others directly influence family and individual life, improving living conditions. In this sense, sustainability is perceived as a dimension of Food and Nutrition Security (SAN).

The recent call for the first Summit on Food Systems, planned for September 2021, further attracts attention to this topic. The growing interest of the private and financial sectors is evident through reports by the World Bank, the World Economic Forum and a wide range of business organizations (see TOWNSEND et al., 2016; WEF, 2017), albeit in an intense process of disputed narratives, widely criticized by academics and civil society organizations.

Triches (2020) summarizes the challenges related to the transformation of hegemonic food systems in three questions: 1) they were unable to offer healthy and adequate food, generating the obesity pandemic; 2) a good part of agricultural production is not meant for human consumption but animal feed for meat production (97% of soy and 40% of cereals produced globally) or biofuels (7% of global grain production), greatly exploiting natural and financial resources; 3) food waste along the different stages of the food chains accounts for one third of the world food production, an amount that could supply twice as much food to the hungry.

Accordingly, facing these issues requires a closer look at the internal dynamics of the hegemonic food system, transforming negative externalities and repositioning its processes so that human and environmental needs are at the core of all actions.

In relation to the investigation of this context at the global level, the consortium of international experts led by Swinburn proposes the concept of "global syndemic," founded on the synergy between three pandemics (malnutrition, obesity, and climate change) that coexist, interact with each other, and share common social

factors among their causes and consequences (SWINBURN et al., 2019). The wide repercussion of this work is not only due to its diligent literature review and supporting evidence, but also the systemic and pragmatic approach employed. With this approach, problems with common causes need joint and complex solutions that in parallel can mitigate the determinants of malnutrition and obesity, and the impacts of climate change.

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5. MALNUTRITION, OBESITY AND CLIMATE CHANGE IN BRAZIL

Unfortunately, evidence points out to the existence of the global syndemic in Brazil. First, we cannot fail to mention that the paper was written in the midst of a new pandemic, due to the sanitary crises of Covid-19. After more than a year, more than 500,000 deaths have been recorded only in Brazil. The eminent political collapse and economic recession in the country affect different areas of social life and worsens socio-economic vulnerabilities. Thus, data on population conditions, to a large extent, are permeated by the present moment.

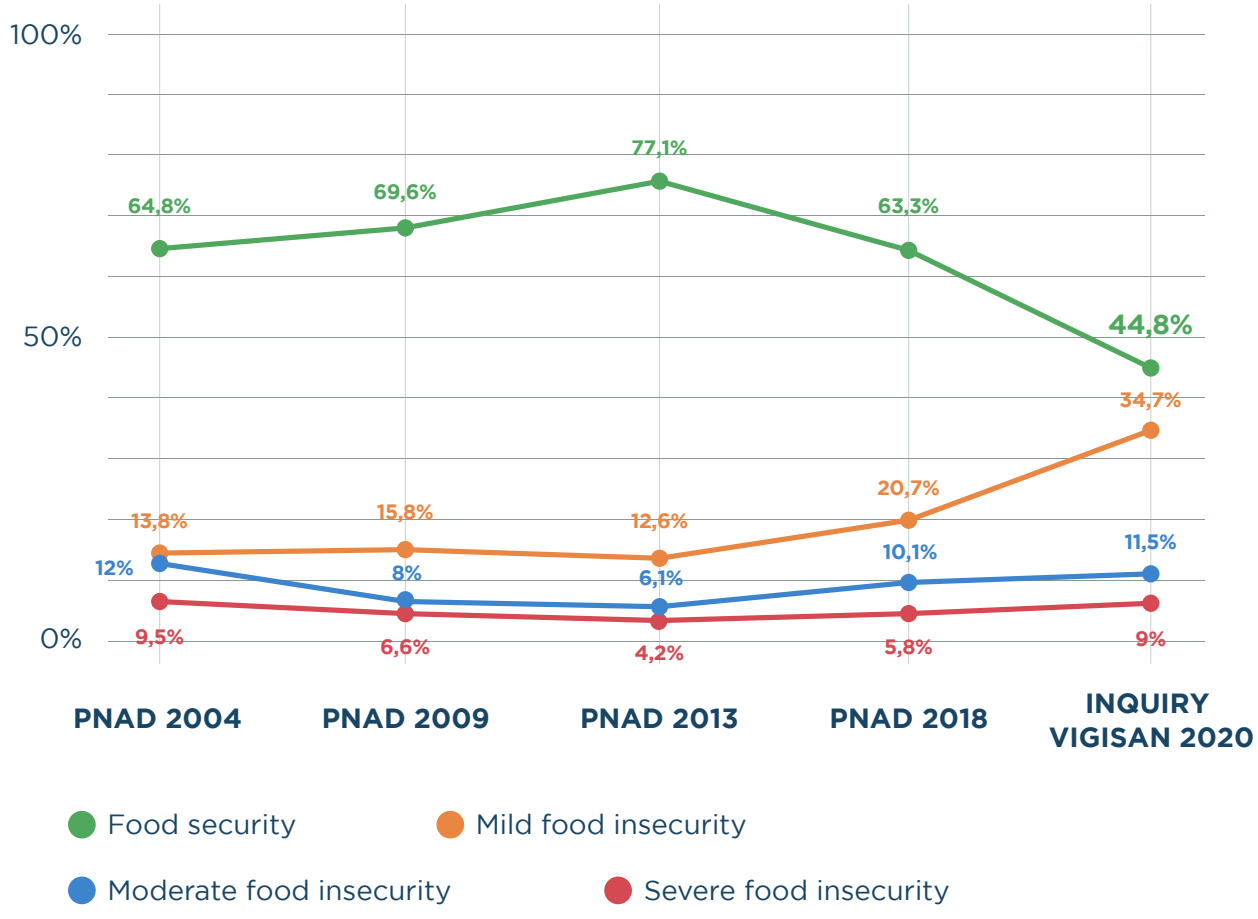
Since 2004, food security (SAN) and food insecurity (INSAN) have been measured through the Brazilian Food Insecurity Scale (EBIA). The most recent data are provided by the National Survey on Food Insecurity in the context of Covid-19 Pandemic in Brazil. The survey was conducted at the end of 2020, by the Brazilian Research Network on Food and Nutritional Sovereignty and Security, and the results were published in April, 2021. The data indicate that 55,2% of Brazilian households were facing moderate food insecurity (about 116.8 million people), while 19 million Brazilians (9% of the population) were in the condition of hunger (REDE PENSSAN, 2021). The study also reveals that INSAN is more severe in rural areas (affecting 12% of this population), and, by region, the North and Northeast regions are the most affected, with 50,084,700 people being food insecure (REDE PENSSAN, 2021).

According to Rede Penssan (2021), financial inequality is an aggravating factor for hunger. In households with incomes of up to a quarter of the minimum wage, hunger is doubled compared to the average for the rest of the country, and the situation is worse among the unemployed and informal workers. Among family farmers, hunger affects 14.3% of

the population, with 65.2% of this category having some level of INSAN. Gender and race are emblematic because when the responsible person in the household is evaluated, women are the most affected, with 64.1% presenting at least one INSAN dimension and 11.1% in a state of hunger. Among self-declared blacks, 59.3% are INSAN. It is a high statistic that requires urgent action.

There is no doubt that the Covid-19 pandemic affected the living conditions of the Brazilians, but it is important to note that SAN indexes were already in decline prior to the onset of Covid-19. The data summarized in Figure 1 show the results of EBIA since 2004, showing an increase in SAN in Brazil until 2013, however, in 2018, there was a decrement to an index of 36.6% of the population in INSAN.

Figure 1 - Comparison of estimates of Food Security/Insecurity from the VigiSAN survey and the national surveys reanalyzed according to an eight-item scale.



Source: Rede Penssan Network (2021, p. 48)

Therefore, it is necessary to look broadly at the factors that contribute to the drastic reduction of SAN in the country. In this sense, two processes seem to stand out in the most recent literature. The first refers to the role of the hegemonic model of food systems in the production of low quality food, worsening of social inequalities and environmental depredation, in line with the arguments of Swinburn et al. (2019). Among the various publications that address the subject, Machado; Sperandium (2020); Preiss et al (2020) and Triches (2020) can be cited.

The second factor is more recent and refers to the political directions taken in Brazil since 2016, in which there was a redirection of the State's action with the disruption of SAN policies and extinction of the National Security Council of Food and Nutrition - Consea (Recine et al., 2020; Oliveira, Abranches and Lana, 2020; Ribeiro-Silva et al.; 2021). The context is aggravated by the current situation of the population (further intensified due to the COVID-19 pandemic) characterized by reduced purchasing power of families, high unemployment rates, food inflation, currency depreciation against the US dollar and reduced value of family farming as a central actor in food production (SILVA FILHO; GOMES-JÚNIOR, 2020; OLIVEIRA; ABRANCHES; LANA, 2020; VALADARES et al., 2020; MARTINELLI et al., 2020; RIBEIRO-SILVA et al., 2021).

Different authors have discussed how the Covid-19 pandemic reinforced the relevance of promoting public policies aimed at family farming and food supply, thus ensuring the promotion of SAN (VALADARES et al., 2020; SILVA FILHO; GOMES- JÚNIOR, 2020; OLIVEIRA; ABRANCHES; LANA, 2020; RECINE et al., 2020; CAVALLI et al., 2020; MARTINELLI et al., 2020). It should also be noted that these factors are not isolated or parallel phenomena, on the contrary, they converge since the redirection of government action has precisely supported the maintenance and expansion of the hegemonic model of the food system in Brazil.

With regard to obesity, national data refer to surveys conducted by the Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel) in all Brazilian states since 2006. The last measurement was carried out in 2018 and published in 2019, and the results indicate that 20.7% of the women and 18.7% of the men interviewed were obese (VIGITEL BRASIL, 2019). In the 27 Brazilian cities analyzed, obesity rates were lower among adults aged between 18 and 34 years and among those with a higher level of education (VIGITEL BRASIL, 2019). The latter factor has a more intense variation in women, as the percentage of obesity doubled among those with lower education: when comparing data from the last thirteen years, obesity in Brazil increased from 11.8% in 2006 to 19.8% in 2018.

Vigitel Brazil also publishes data on the intake of fruits and vegetables, a relevant factor for maintaining health in accordance with World Health Organization (WHO) recommendations of daily consumption. The results indicate that only 23.1% of the population follows

this recommendation, with the rate being lower among men than women – respectively 18.4% and 27.2% (VIGITEL BRASIL, 2019). In both cases, there is an increase in this index among older people and individuals with a high level of education.

Martinez-Steele et al. (2020) present the consumption of healthy foods, such as vegetables, fruits and legumes, compared to unhealthy foods, such as ultra-processed foods, immediately before and during the Covid-19 pandemic in Brazil. The study indicates a statistically significant increase in the consumption of healthy diet markers and the stability of the unhealthy ones in most sociodemographic strata. However, in the Northeast and North regions and among the population with lower education, the results indicate significant increases in both the consumption frequency of vegetables and fruits and the amount of ultra-processed food groups ingested (MARTINEZ-STEELE et al., 2020). According to the authors, these results show that social inequalities, especially in education and economy, considered striking characteristics of these regions, are influential on the population's diet patterns and, therefore, increases the risk of obesity and other chronic diseases as well as greater vulnerability and lethality of Covid-19.

It is important to emphasize that some studies on obesity adopt individual behavior approaches (MILL et al., 2021; STREB et al., 2020). There is, however, a growing literature that discusses the multifactorial and complex causes that lead to overweight and obesity, as well as the role of the State in creating multiple prevention and treatment strategies. In addition to the socioeconomic factors already mentioned, other causes and aggravating factors of overweight are discussed in the Brazilian literature, such as: access to healthy foods, level of information, lifestyles, healthcare service, regulation of the supply of food and the influence of industrial and corporate practices, either by individual choice or political and governmental processes (HENRIQUES et al., 2020; NOGUEIRA et al. 2020; GUIMARÃES; PEREIRA, 2020; GUIMARÃES; PEREZ; DUNKER, 2020; LIMA et al., 2020; BRANDÃO et al., 2020; ARAÚJO et al., 2019; HENRIQUES; 2018; BAIRD; 2016; BURLANDY et al., 2016; GOMES, 2015).

In terms of climate change, the complex dynamics of this natural phenomenon as well as its causes and consequences do not respect geographical borders utilized to manage territories politically and administratively. Thus, unlike the malnutrition and obesity pandemics, the characterization of its incidence in a given country is a complicated task, as it is not measured by a single indicator. Thus, we cover expressions in the Brazilian territory that notoriously contribute to the aggravation of climate change – excessive emission of greenhouse gases, deforestation and the loss of biodiversity.

The Greenhouse Gas Emission and Removal Estimating System (SEEG) of the Climate Observatory has been recording data since 1990. The most recent measurement (2018) indicates a total of 1.939 billion gross tons of greenhouse gases (GHG) in carbon dioxide equivalent (CO2e). This value is slightly

higher than that found in the previous year, pointing to some form of stability, which seems to have been maintained since 2013 (OBSERVATÓRIO DO CLIMA, 2019). When analyzing the contributions by activity, the majority (44%, equivalent to 845 Mt CO2e) come from changes in land use, in particular from deforestation in the Amazon and Cerrado. The second largest contribution comes from agriculture (25%), the energy sector contributes (21%), and the remaining (10%) is produced by both industrial processes and waste (OBSERVATÓRIO DO CLIMA, 2019).

Internationally, Brazil is the 7th largest emitting country of greenhouse gases, a position maintained mainly by deforestation rates, unlike other countries, where the energy sector stands out in terms of emissions (OBSERVATÓRIO DO CLIMA, 2019). Note that most of the fires are aimed at "cleaning" and transforming forests into areas of intensive production of grain or cattle. Therefore, they are indirectly linked to agriculture, making this sector effectively responsible for 69% of emissions in 2018 (Figure 2), in a historical pattern which has been maintained since 1990.

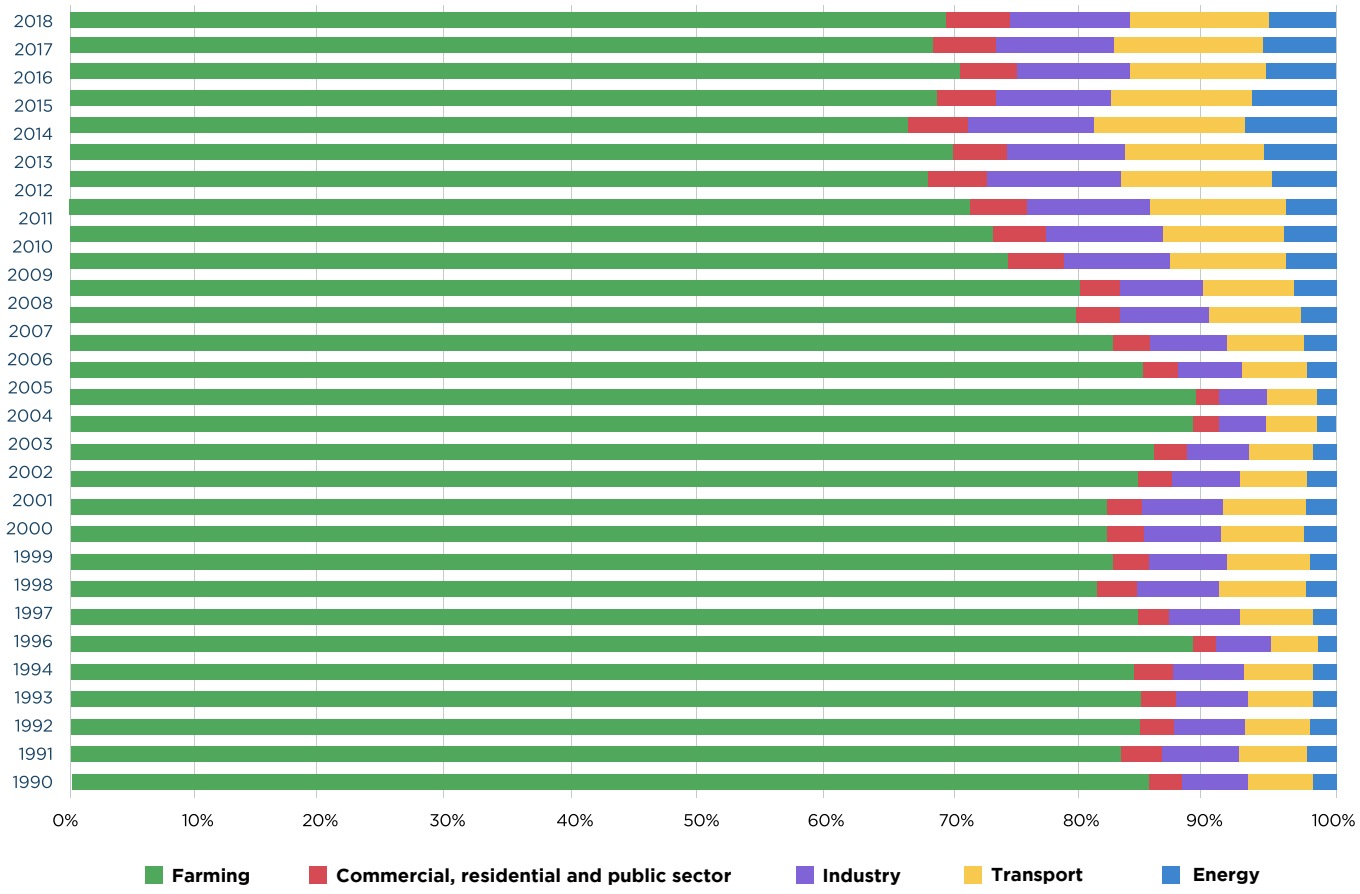
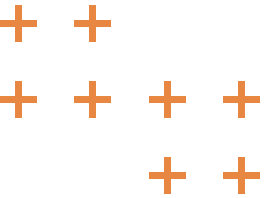


Figure 2 - Contribution of economic activities in gross greenhouse gas emissions.
Source: Climate Observatory, 2019.

In relation to agricultural activities that contribute the most to greenhouse gas emissions, cattle herd can be cited as a major source due to methane generated from rumen fermentation (enteric fermentation), followed by the use of nitrogen fertilizers for soil management (OBSERVATÓRIO DO CLIMA, 2019). In addition, the cultivation of irrigated rice and burning of crop residues such as sugarcane and cereal straw are activities that significantly contribute to greenhouse gas emissions. The Climate Observatory (2019) reported that since 2016, there has been approximately 1% decrease in greenhouse gas emissions per year from agriculture, which could help in meeting the reduction targets set by the sector as part of the Paris Agreement (NDC) enforced in 2020. Meeting this target becomes possible with the gradual adoption of low-carbon practices and the expansion of public policies that encourage more ecological forms of production.

Another important element to be considered is the loss of biodiversity precisely through changes in land use and climate crisis, being agriculture once again the main vector in the transformation of natural habitats. According to data from the 1st Brazilian Diagnosis of Biodiversity and Ecosystem Services, the loss of vegetation cover is more intense in the Atlantic Forest and the Pampa, which, respectively, retain only 28% and 26% of their original form (JOLY et al., 2019). The Caatinga and the Cerrado show intermediate rates, with a maintenance of 57% and 55%, respectively. Therefore, the best preservation indexes are in the Amazon, which maintains 82% of its original coverage, and in the Pantanal with 73%. Two considerations should be made in relation to these data: 1) of the five biomes, the Atlantic Forest is the only biome that has not been expanded for agriculture and pasture in the last 15 years; 2) scientific production focused on the biodiversity of Brazilian biomes is highly uneven - most studies are focused on the Amazon (42.7%), the Atlantic Forest (19.2%) and the Cerrado (18.7%), while investigation on the Pampa, Pantanal and Caatinga are crawling (JOLY et al., 2019).



According to the authors, the impacts on biodiversity loss are relevant not only because they harm the environmental capacity of the vegetation to store carbon, thus directly affecting climate regulation, but they also affect the ability and maintenance of the so-called ecosystem services, that is, the direct or indirect use of benefits that natural ecosystems offer to human beings. Among them are: the production of atmospheric oxygen; soil formation and retention; nutrient cycling; supply of water and energy; genetic resources; biochemical and medicinal products; regulatory processes (maintenance of air quality, erosion con-

trol, water purification, population regulation among different species), as well as the interaction between humans and non-humans (JOLY et al., 2019) affected by the dynamics of knowledge generation processes and social interactions (cultural, religious and spiritual).

Another element directly related to biodiversity loss and environmental impact is the use of pesticides. Only in the last decade, the use of these products in agriculture grew 190%, which is two times higher than the incidence of pesticide use for the entire global market (JOLY et al., 2019). The registration of pesticides in biodiversity is very complex, and few studies are dedicated to studying the effects of pesticides on non-target organisms and the ecosystem; however, scientific evidence indicates environmental consequences such as water contamination in its different forms (underground, rain, rivers and streams), the emission of greenhouse gases, soil pollution by heavy metals and eutrophication in aquatic environments due to nitrogen and phosphorus runoff (JOLY et al., 2019).

Besides the environmental consequences related to pesticide use in food production, severe health problems have been widely documented. According to data from the Brazilian Association of Public Health (ABRASCO), some direct consequences are: acute and chronic respiratory allergy symptoms; bronchial asthma; pulmonary fibrosis; different types of cancer; cardiac arrhythmias; Parkinson's disease; liver and kidney damage; dermatitis; peripheral neuropathies (CARNEIRO et al, 2015). Between 2000 and 2009, 2052 deaths from pesticide poisoning were recorded in the country (SANTANA; MOURA; NOGUEIRA, 2013). In 2011, a study in Mato Grosso detected pesticide residues (different types of active ingredients) in breast milk samples of lactating women (PALMA, 2011).

Bombardi (2017), in turn, presents detailed data on contamination rates in different regions of the country according to different social profiles (age, gender, education and ethnic-racial group), biomes and cultivars. The study conducted a parallel analysis that demonstrated that in most cases products banned in other countries are permissible in Brazil and are often utilized in quantities considered highly toxic. Therefore, reducing the use of pesticides and encouraging more ecological practices are both environmental and social needs.

Joly et al. (2019) presents some interesting projections on how Brazil may be affected by climate change. For example, forecasts suggest that there will be an average temperature increase of 2º-3ºC by 2070, intensely affecting the Midwest, North and Northeast regions. The significant reduction in rainfall, parallel with the exponential growth of droughts, will tend to trigger savannization processes in the Amazon, altered dynamics of desertification in the Caatinga, and a territorial change in biomes

coupled with Atlantic Forest expansion, thus reducing the Pampa (JOLY et al., 2019). On the other hand, these last two biomes have lower resilience to climate change, given their degree of degradation, fragmentation of native vegetation and lower conservation units. In fact, reduced amphibian and coral populations, and acute reduction in endangered species have been observed. Further, evidence of migration of mammals, birds and plants to more southern areas of the country (JOLY et al., 2019) have been reported.

Considering the intrinsic dependence of human beings on biodiversity and natural resources that enable ecosystem services, there is the need for actions that mitigate harmful processes as well as guarantee the development and promotion of dynamics that facilitate the adequate use of natural elements. Different authors emphasize the essential role of traditional people and family farmers as actors having the knowledge and practices aligned with the sustainable use of biodiversity (JOLY et al., 2019, OBSERVATÓRIO DO CLIMA, 2019, PEREIRA et al., 2020). We cannot fail to mention that climate change and environmental depredation caused by the hegemonic food system have been reported in the literature as a disruptive factor in health pandemics such as Covid-19 (WALLACE, 2016; POLLAN, 2020; OLIVEIRA, 2020).

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6. CONCEPTUAL AND METHODOLOGICAL FRAMEWORKS

As already mentioned, the main conceptual reference of this work is The Global Syndemic of Obesity, Undernutrition, and Climate Change (SWINBURN et al., 2019) report. In methodological terms, given the central purpose of this document - a basis for building a national agenda of priority actions for the transition to a healthy and sustainable food system -, it is believed that the five feedback loops[2] defended by the authors as levers with the potential to generate the necessary inflection forces for the implementation of public policies that have the real capacity to reduce damages to human health and the environment.

2. feedback loops in original article.

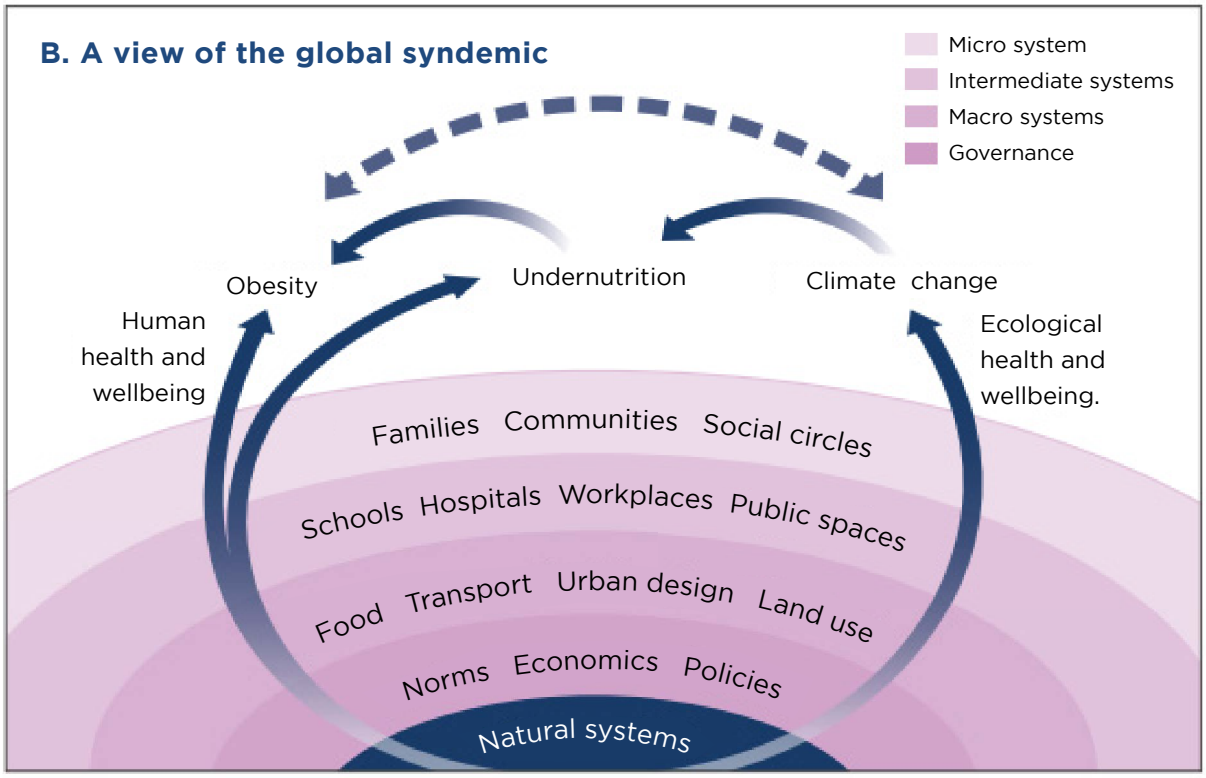

Figure 3. Multiscale view of the global syndemic. **Source:** IDEC (2019), Swinburn et al., 2019.

According to Swinburn et al. (2019), coping with the syndemic requires not only an adequate view of the complexity of food systems, but also an integrated approach that takes into account the system's adaptive capacity to react and respond to tensions, adapting and reestablishing itself, without necessarily incorporating effective changes that contribute to sustainability and social well-being (Figure 3).

In part, this is due to the intrinsic dynamics of the systems' functioning in which the set conforms to a constant and dynamic interaction of multiscale elements and processes, making punctual and linear actions ineffective. In the words of the authors:

> Systems, such as health systems, schools, or families are complex because the inter-relationships are multiple, change over time, and involve several interacting, reinforcing, and balancing causal feedback loops, as well as the fact that non-linear associations exist between causes and effects. Reinforcement of feedback loops leads to virtuous or vicious cycles, depending on the outcome, although balancing feedback loops counteract the directions of change that form the basis of homoeostasis and policy resistance in complex adaptive systems (Swinburn et al., 2019, p. 12).

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Thus, the authors argue that the five feedback loops help to answer why food systems are the way they are, why they need to change, and what makes this change so difficult. By understanding the structured dynamics of each cycle, we can decode the vicious and harmful gears that make up this dimension within the system, thus allowing the perception of potential multiple action solutions to create more virtuous fluxes. Therefore, the five cycles (business, supply and demand, ecological, health and governance) are taken as structuring dimensions for the construction of the literature review.

Each dimension is treated in a specific section, with three subparts: 1) characterization of the elements and processes; 2) contextualization of the current scenario of food systems in Brazil; 3) recommendations on necessary changes for a healthier, more sustainable and equitable outlook. Considering the number of factors in each dimension, priority themes will be listed for deepening and detailing according to the central objectives of this project. Complementarily, we understand that SAN, gender equity, mitigation of climate change and the enhancement of socio-biodiversity are guiding and fundamental principles for a sustainable and equitable transition, so they are perceived as transversal keys to dialogue throughout the review.

With regard to methodology, we opted for a scoping review of the literature, with a critical qualitative perspective. For articles of interest, keywords linked to the topics were searched in the Scielo and Google Scholar databases. The two databases were chosen because they had higher search results compared to other databases. For each dimension, a sequence of keywords related to the theme was listed, with versions in Portuguese and English, totaling 24 word strings in each language. A summary of the total results for each language is presented in the following graphs (Figures 4 and 5), indicating the variation in incidence of the different themes. The search results in Google Scholar were higher than that found in Scielo for all cases.

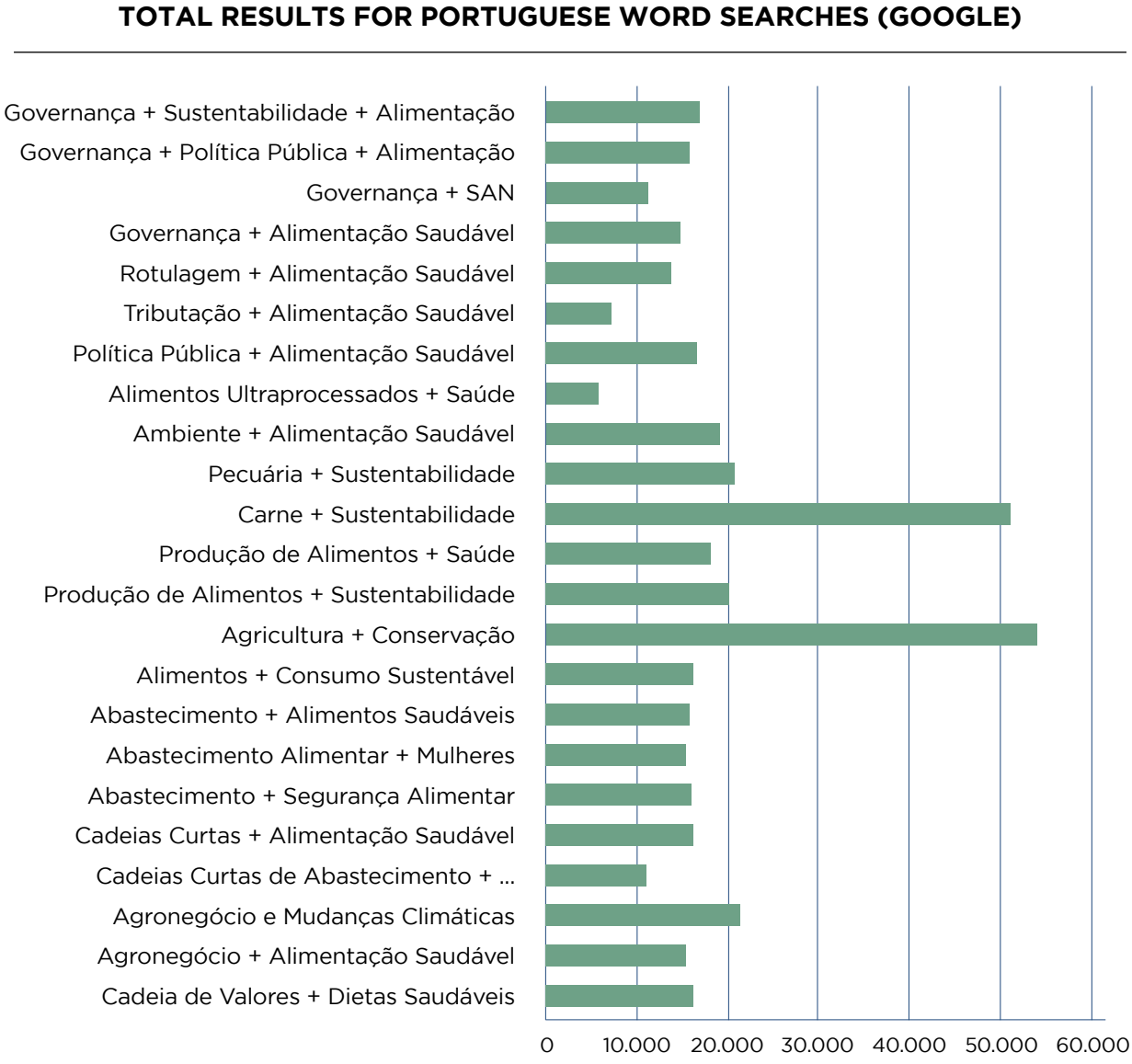

Figure 4. Total results for Portuguese word search. **Source:** author.

The selection and screening processes considered two complementary steps. After obtaining the results of each search, the total number of search result was recorded, and a first selection was done via reading of title, keywords and abstract, with the following inclusion criteria: 1) publication year between 2011 and 2021; 2) scientific articles, books or book chapters; 3) focused on Brazil or at least contemplating the Brazilian reality; 4) connection and relevance to the central theme of the study – transition to a healthy and sustainable food system.

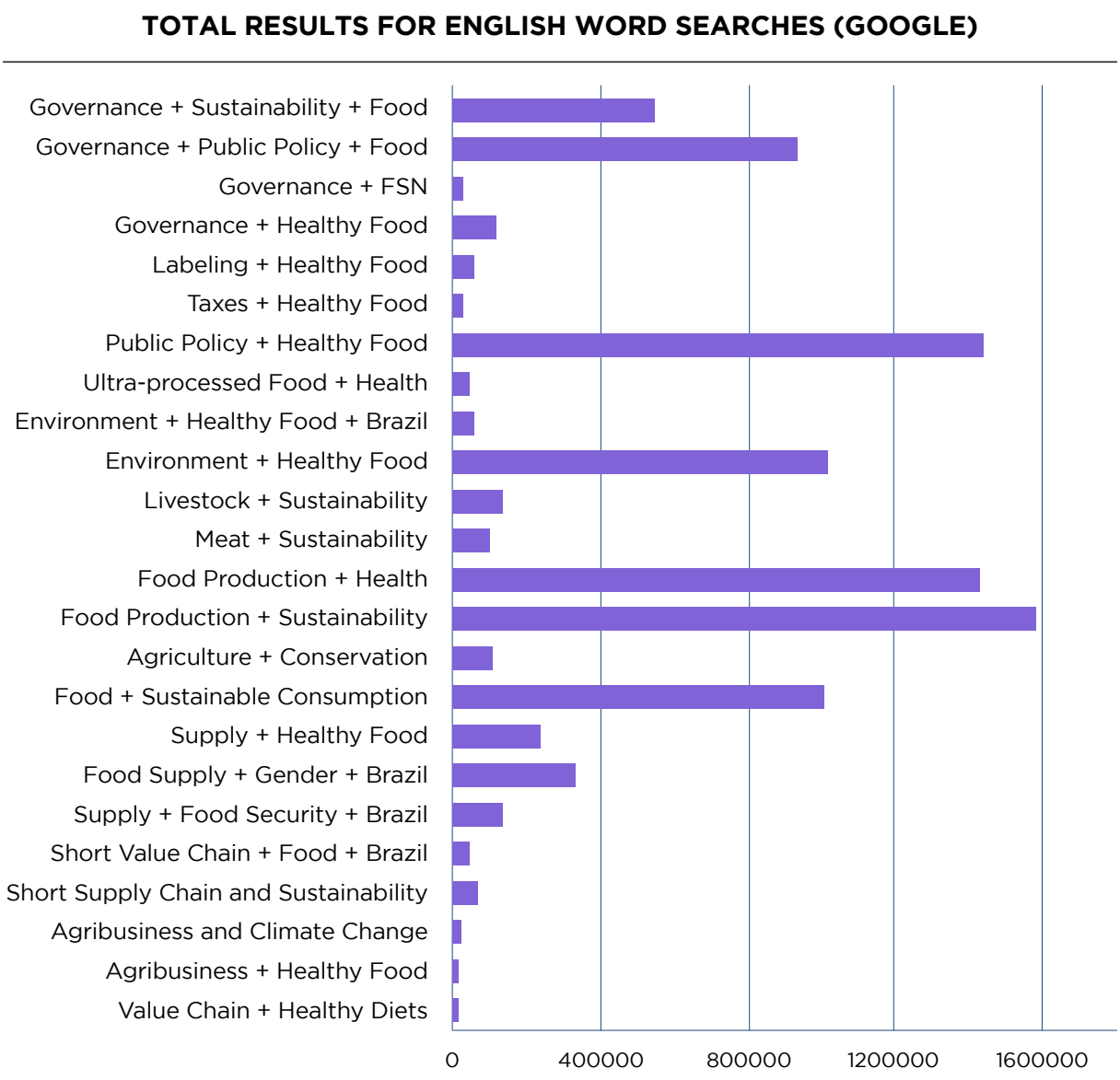

Figure 5. Total results for English word search. **Source:** author.

For searches which generated 40 results, the 20 most cited documents in each database[3] were analyzed. Since the significant number of search results would prevent the review from being carried out in a timely manner, we chose the articles most endorsed by the academic community. Besides the methodology is a scoping review aimed at understanding the breadth of the topic and not a systematic review that considers the tracking and complete identification of all the material found (MARIANO-CARVALHO, 2020). The first selection stage resulted in a total of 189 materials, with variations according to the dimensions in question, as detailed in the table below (Table 1).

3. This procedure was especially necessary when using the Google Scholar database, which has a very broad search, generating results containing articles and books, theses, dissertations, monographs and other related materials, without a filter.

Table 1. Results of the 1st phase of material selection.

Dimension	Keywords in Portuguese	Keywords in English	Total materials selected by dimension
Business	18	12	30
Supply and demand	29	28	57
Ecological	21	15	36
Health	22	15	37
Governance	11	18	29
Total selected materials	101	88	189

Further analysis involved the accurate reading of the included documents and verification of additional inclusion criteria: the quality of the material in terms of clarity of discussion and results; 2) methodological rigor; 3) effective contribution to the study objective. After the second screening stage, 113 materials were selected to compose the literature review. It should be noted that most of the excluded documents were publications in foreign journals that were selected in the first stage but upon careful analysis did not address the Brazilian reality. The results of the selected materials are presented, in a synthetic way, in the following section. Given the extensive period utilized for the analysis of the included literature, recent technical reports were used as complementary information, providing updated data on the Brazilian food system.

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7. THE BRAZILIAN SCENARIO IN RELATION TO THE FEEDBACK LOOPS OF THE GLOBAL SYNDEMIC

According to Swinburn et al. (2019), there are at least five loops (Figure 6) that need to be investigated for an effective implementation of public policies that can mitigate the environmental and health damages caused by food systems: business, supply and demand, ecological, health and governance. These loops are dimensions in which a certain dynamic of activities and processes occur in order to contribute to the structuring and feedback of food systems, which can foster both vicious and virtuous processes in the light of certain principles.

View of the 5 feedback cycles of the global syndemic

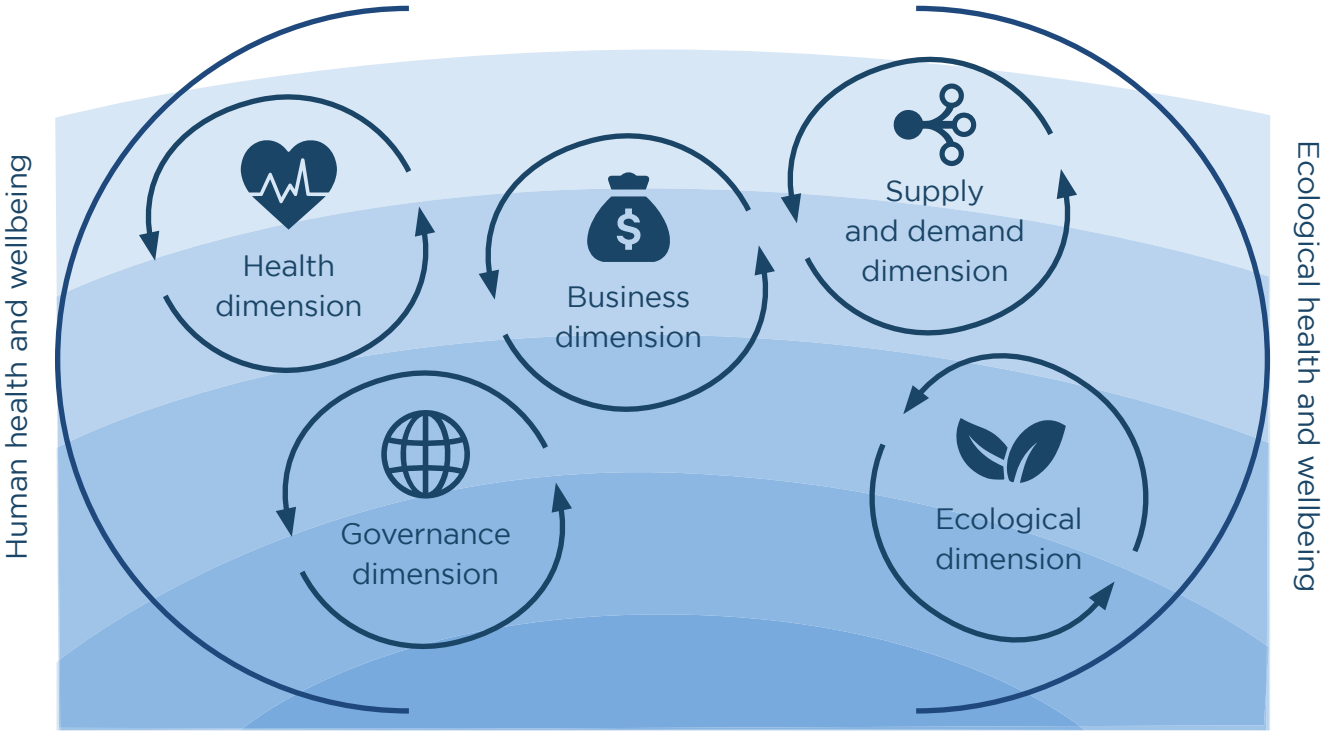


Figure 6. Global syndemic feedback loops. **Source:** adapted from Swinburn et al. (2019).

Understanding how these dynamics work is key to decoding the gears that contribute to the maintenance of political inertia which keeps the hegemonic food system unshakable. According to the authors, political inertia is the joint combination of inadequate political leadership, strong counter pressure from the corporate and commercial sector, and the weak role of civil society in demanding effective change (SWINBURN et al., 2019). Thus, understanding how the interactions of the constituent elements and processes occur in each of these dimensions would also allow us to understand how this inertia materializes, contributing to nutrition and strengthening of the food system as a whole.

Having insights into how these five feedback loops conform in the country is essential for decoding the vicious key of each loop, in order to present transition proposals that are more adequate and beneficial for human and environmental needs. The details of each loop are presented below, followed by how they are structured in Brazil today based on the literature review and the recommendations of more beneficial processes found in the literature. After characterizing the five dimensions, the national legal frameworks mentioned in the literature as relevant for the transition to healthy and sustainable food systems are listed.

7.1 BUSINESS DIMENSION

This dimension has as its central focus the creation of food-related goods and services and is historically driven mainly by enterprises oriented towards profit and commercial competitiveness (SWINBURN et al., 2019). This process is highly linked to value chains, that is, the set of activities that articulate a product from its production to its final distribution and sale.

By having financial profit as the constitution of this chain of activities, companies seek to increase product value at each stage, using different strategies, from food processing to commercial practices of market concentration (including the exploitation of workers), and the use of actions often classified as environmental and social externalities (SWINBURN et al., 2019). It is a highly predatory model of resources, which has contributed to the growth of social inequalities and precarious health, as it is responsible for the dissemination of proven novice foods, such as ultra-processed foods. This logic that perceives and interacts with food exclusively as a commodity was fundamental in the creation, diffused production and commercialization of products that have undermined human health, such as tobacco, alcohol and sugary drinks (SWINBURN et al., 2019).

Commodity production and international corporate dominance are central challenges of this dimension. The key to transition lies in creating new business models that have economic prosperity and social inclusion as central principles, and activities that can help restore health and environmental sustainability (SWINBURN et al., 2019). In a way, it means creating a paradigm shift from value chains to supply chains anchored in social needs. In this dimension, therefore, the structuring of food supply chains aiming at the social inclusion of marginalized groups and the promotion of SAN are of special interest.

7.1.1 THE BRAZILIAN SCENARIO IN THIS DIMENSION

Among the studies analyzed, there is a certain consensus that the main problem of this dimension is the Brazilian agrifood system being hegemonically oriented towards the production of agricultural commodities for sale on the international market through long supply chains. This system is anchored in profit and productivity, agricultural and field technification, producing foods of low nutritional quality, high environmental impact and worsening of social inequality due to precarious living conditions in rural areas. Among the results of our research, we found reflection articles and a literature review discussing the topic.

Triches (2020) reflects on sustainable diets in relation to environmental impacts, arguing in favor of a direct correlation between food systems, obesity and malnutrition. According to her, as the current system reduces product diversity, it reduces the supply of unprocessed food and increases items with high energy density, which when continuously consumed, tend to lead to a deficiency of certain nutrients, concomitant with excessive prevalence of others. The author argues that the role of agribusiness and meat production in the country is illogical since there is a dependence on the financial contribution to the economy, but at the same time, their socio-environmental impact is unsustainable.

Martinelli and Cavalli (2019) point out that the agrifood model was mainly boosted after the second half of the last century, intensifying land concentration in the country, socioeconomic disparity and rural exodus[4]. The authors highlight the production of cattle, cotton, corn and soy as the most detrimental, the latter two being mostly cultivated in recent years with pesticides and transgenic seeds, resulting in the loss of biodiversity and contamination of native varieties. (MARTINELLI; CAVALLI, 2019).

4. For more details, see: ALVES, ER de A.; SOUZA, G. da S.; MARRA, R. Êxodo e sua contribuição à urbanização de 1950 a 2010, Revista de Política Agrícola, XX, n. 2, Apr./May/Jun. 2011.

Reardon et al. (2019) discuss the rapid transformation of value chains in developing countries through technological and institutional innovations driven by companies in search of mutual benefits. In the case of Brazil, the authors throw light on the joint action of Nestlé and Parmalat in the 1980´s to invest heavily in dairy chain through technology transfer and innovation: a) foreign investment for the processing of large-scale dairy products; b) strategic partnerships with supermarkets in full expansion, reducing transaction costs; and c) dissemination of ultra-high temperature (UHT) milk technology, enabling storage at room temperature in vacuum packaging (created by Tetra Pak) for facile processing, transport and mass storage (REARDON et al., 2019). These changes affected both producers and consumers, as they caused the expansion of dairy farms, the exclusion of small- scale farmers who were unable to adapt to the system, the installation of peri-urban dairy production stations and the increase in the consumption of UHT milk in Brazil – the rates went from 10% to 90% during the 1990s (REARDON et al., 2019).

Ribeiro, Jaime and Ventura (2020) question the reductionist and business vision of the so-called Codex Alimentarius (a set of sanitary regulations and phytosanitary measures adopted in international trade), which takes little account of the multidimensionality of food, leading to the breach of principles of food safety, for instance, regulation of genetically modified foods. In turn, Gomes Jr. and Junior (2015) discuss the implications of agribusiness on food sovereignty in terms of production and food trade . Eighty percent (80%) of the volume of food sold by the retail sector is dominated by large supermarket chains, thus they make rules which are stern and coercive to suppliers, consequently establishing an oligopoly of self-service and placing a high coercive pressure on traditional or small-sized establishments.

Pereira et al. (2020) analyze the influence of the political scenario after the election of President Jair Bolsonaro. The launch of a series of stimulus measures for the expansion of agriculture, especially in the Amazon, caused changes in land use and a consequent increase in emissions of GHG. In a review of en-

vironmental data related to agricultural production in the biome, the authors emphasize a vicious cycle in national politics in which interest groups fund certain candidates, aimed at gaining privileges to implement desired projects when they come into power, despite their environmental and social impacts (PEREIRA et al., 2020). From a legal perspective, Budó, França and Da Veiga Dias (2021) discuss how federal parliamentarians represent the agricultural industry during their term of office, not only supporting the continuity of the impacts already mentioned, but also creating a context of denial regarding the responsibility of the sector as a generator of socio-environmental damage. In relation to green criminology, the authors emphasize the need for social visibility of the problems and crimes propagated, arguing that concealing the impacts helps in the constant legal immunization of the sector (BUDÓ, FRANÇA; DA VEIGA DIAS, 2021).

The second block of publications refers to research results that had specific territories as an empirical focus. Correa et al. (2020) evaluate the implications of the agribusiness production model in relation to self-sufficiency in Mato Grosso (currently one of the main strategic production regions), considering different cultivars in a matrix of indicators for food sovereignty. A high inequality in the use of the territory in terms of cultivation was found, being that there was a great disparity in the production of commodities (98% of the territory is dedicated to the production of soy, cotton, sugarcane, corn and sunflower) compared to varieties of vegetables, fruits and vegetables, culminating in food imports from other regions of the country (CORRÊA et al., 2020). Small local food cultivation (2% of the territory) faces expansion problems due to the lack of public policies to encourage family production, adversities in obtaining land, social and political pressure for the transition of crops and the adoption of technological packages (CORRÊA et al., 2020). The authors conclude that local food security is impaired due to the intense use of pesticides, a mean of 10 to 20 liters of pesticides per hectare in the studied region, a value that increases by 28 liters per hectare for cotton and 17.7 liters per hectare for soybeans (CORRÊA et al., 2020).

Da Silva and De Sousa (2018) assess the impacts of installing a Monsanto company factory in the municipality of Petrolina (PE) as of 2013, for the production of transgenic corn seeds and reproduction in a 60-hectare cultivation area. The findings of the study indicate a strong dissemination of transgenic seed use throughout the region (both in rural and urban areas), affecting the local production of maize and native seeds. Concomitantly, the offer of transgenic corn in food retail has increased to the detriment of local corn offered in local family farmers markets (DA SILVA; DE SOUSA, 2018). Representatives of the latter justify the non-adoption of the crop due to the high cost of seeds without the prospect of use in the new season (DA SILVA; DE SOUSA, 2018).

Ventura, Fernández-García and Andrade (2013) provided an analysis of the social technologies developed and adopted to mitigate climate change in 143 municipalities in the semi-arid region of Bahia. The authors emphasize that Bahia represents 40% of the total territorial area of the Brazilian semiarid region, which according to international evidence tends to be one of the most impacted by climate change in Brazil[5]. Of the 27 social technologies analyzed, most (16) were directly related to agriculture, which were followed by actions on water resources (15), with 12 technologies acting simultaneously on both themes (VENTURA; FERNÁNDEZ-GARCÍA; ANDRADE, 2013). Of the 23 positive practices adopted to mitigate climate phenomena, we present only those that directly affect food production, namely: changes in cultivation areas, planting date and the varieties used; qualification in land management; improving energy efficiency in irrigation systems; greater processing of natural food for conservation and value addition; management of organic waste for composting and CH4 emission reduction; reduction of fires; adequate extraction and use of agroforestry resources. With regards to the institutions involved in the development and implementation of social technologies, the vast majority are civil society organizations and the minority are public bodies, indicating the need for increased participation of the State (VENTURA; FERNÁNDEZ-GARCÍA. ANDRADE, 2013).

Angelotti, Signor and Giongo (2015) study the mitigation of future changes in the semi-arid climate through sustainable development technologies, reaffirming the aforementioned impacts and highlighting the role of educational and research institutions in the proposal of public policies that help local actors to qualify the processes of the regional economy. Miranda Pereira, Machado and Schmidt (2019) assess the decision behind the agroecological transition of a Cooperative in southern Brazil, the author found that the decision was motivated by the quest for better health conditions, improvements in food and higher in-

5. The data are based on climate models that indicate an increase of up to 4ºC in the region, strong reductions in the flow of the watershed, changes in precipitation pattern with lower incidence of rainfall parallel to periods of more intense droughts and vegetation modifications.

come. The main challenges faced are the lack of experience and information, indicating that the performance of the Technical Assistance and Rural Extension Company of Rio Grande do Sul (EMATER/RS) has been essential in this regard.

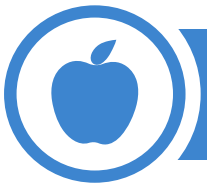
To complement this information, we include a report on the Brazilian food chain by Belik (2020), which outlines the production relationships that sustain the food system. Among the results, the author shows that Brazil has a relevant role in the world economy as a food exporter, but only 10% of its agricultural production is destined for export, therefore 90% of production in Brazil is consumed by the domestic market. Despite this, the construction of production chains and the action of the State have historically prioritized the international market, a posture that generates a series of implications that negatively affect the country, especially the population's SAN. We will highlight three factors discussed in this study.

First, by prioritizing agricultural production to the international market, the State allows the subjection of food prices to international trading rules, including the formation of prices susceptible to fluctuations in currencies of other countries and dollar exchange rate. Thus, when the foreign market is paying better for a given product, the tendency is that Brazilian producers prefer to sell to other countries, seeking greater economic return, but reducing the domestic availability of food and making food scarcer and more expensive for Brazilians (BELIK, 2020).

Finally, the material provides detailed data on the concentration of food distribution chain, revealing that 92.9% of food retail in the country is dominated by supermarkets, leaving only 7.1% for other businesses, such as butcher shops, grocery stores, greengrocery stores and street markets (BELIK, 2020). In addition, the supermarket sector itself is highly concentrated – of the future earnings of 330.4 billion BRL declared by the Brazilian Supermarket Association (Abras) in 2018, 41.7% are restricted to three large groups: Carrefour, Grupo Pão de Açúcar and Walmart/Big (BELIK, 2020). Even though supermarkets sell other products, 80% of their revenues are from food sales; thus, the formation of prices also ends up being defined by this segment, negatively affecting consumers and other businesses that are unable to compete economically (BELIK, 2020).

Given the relevance that most articles give to family farming, we present the most recent data on the composition of this category in Brazil based on the Agriculture Census[6]. Among agricultural establishments, family farming is responsible for the majority of establishments (77%, or 3.9 million) and is the main source of employment in the countryside (67% of the employed population), equivalent to 10.1 million of

people. Family farming is responsible for a relevant part of the domestic food market, being the main horticulture producer and accounting for 60.1% of the Gross Production Value. Further, it is an important producer of fruits and other staple foods such as cassava and is responsible for 70% of national production. With regard to meat production, 78% and 73%, respectively of goat and sheep farming are undertaken by family farmers. However, family farming accounts for 23% of the areas occupied by agricultural establishments in Brazil, indicating the high concentration of land ownership (CENSO AGRO, 2019).



7.1.2 RECOMMENDATIONS FOR A HEALTHIER, MORE SUSTAINABLE AND EQUITABLE OUTLOOK

The recommendations identified in the literature include: the centrality of the domestic food market must be increased; more legislative measures must be put in place to counter business monopoly in the food sector; small and medium-scale family farming should be valued and encouraged; there should be greater product diversification and State's role as market regulator must be reinforced. To a large extent, focusing on one of the aforementioned recommendations tends to positively contribute to the others, creating a supply logic focused on the needs of the Brazilian population, with social inclusion, less environmental impact and greater prosperity and economic equity.

To a large extent, the literature indicates the strengthening of short supply chains as a strategy which simultaneously promotes greater social and productive inclusion for family farmers and increases the supply of healthy and sustainable food to the population, with less environmental impact (SCARABELOT, SCHNEIDER, 2012; GOMES JR; JUNIOR, 2015; SCHNEIDER; FERRARI, 2015; PREISS; MARQUES, 2015; POZZEBON, RAMBO, GAZOLLA; 2018; PREISS; VASCONCELL It is argued that, unlike long supply chains, where there is no contact between producers and consumers, short supply chains act to resocialize and reterritorialize food throughout its process (from production to consumption)

6. It is based on the legal definition of family farming described in Decree No. 9,064, of May 31, 2017.

benefiting farmers through beneficial production and commercial conditions, greater added values and greater inclusion and autonomy in the markets (SCHNEIDER; FERRARI, 2015; PREISS, 2019).

To a large extent, the literature indicates the strengthening of short supply chains as a strategy capable of simultaneously generating greater social and productive inclusion for family farmers and increasing the supply of healthy and sustainable food to the population, with less environmental impact (SCARABELOT, SCHNEIDER, 2012; GOMES JR; JUNIOR, 2015; SCHNEIDER; FERRARI, 2015; PREISS; MARQUES, 2015; POZZEBON, RAMBO, GAZOLLA; 2018; PREISS; VASCONCELLOS; SCHNEIDER, 2018; PREISS, 2019; DE SOUZA AMARAL; 2020; BELIK , 2020). It is argued that, unlike long supply chains, in which there is no contact between those who produce and those who consume, short supply chains act to resocialize and reterritorialize food throughout its process (from production to consumption) which provide farmers with beneficial production, better commercial conditions, greater added value, greater insertion and autonomy on the market. (SCHNEIDER; FERRARI, 2015; PREISS, 2019).

More broadly, the evidence indicates that short chains contribute to the maintenance of cultural and regional foods, the organization of producers in networks and cooperatives, allowing for a greater capacity for negotiation. A smaller environmental footprint is a feature of short chains associated with being centered in medium to small-scale production and working in close circuits, which reduces the distance traveled by food between production and consumption. Also, they are the main market for the sale of agroecological produce (SCARABELOT, SCHNEIDER, 2012; SCHNEIDER; FERRARI, 2015; PREISS; MARQUES, 2015; DAROLT ET AL., 2016; PREISS, 2019). With regard to benefits to the population, consumers engaged in these supply dynamics tend to find organic and agroecological foods at affordable prices, often develop healthier eating habits (greater diversification of diets, increased consumption of vegetables and fruits, higher frequency of meal preparation, expansion of knowledge about local and seasonal foods) and in many cases begin to act politically in favor of food security and sovereignty, and defense of agroecological family farming (PREISS; MARQUES, 2015; PREISS, 2019). The literature also indicates that, short supply chains stimulate territorial dynamics, especially job creation and income for family farmers and traditional communities, as well as the provision of other services (handicrafts, local tourism, environmental services, etc.) thus generating a broader dynamic of sustainable rural development (SCARABELOT, SCHNEIDER, 2012; SANTOS; CHALUB-MARTINS, 2012; SCHNEIDER; FERRARI, 2015; DAROLT et al., 2016; PREISS; VASCONCELLOS; SCHNEIDER , 2018; AGUIAR; DELGROSSI; THOMÉ, 2018; DE SOUZA AMARAL, 2020).

Among the limiting factors for the expansion of short supply chains, the following are mentioned: 1) the lack of specific public policies that help family farmers interested in entrepreneurship (technical assistance, credit, training); 2) a sanitary legislation that is very inhospitable to the production conditions feasible with family farming (artisanal processing, on a small or medium scale), especially concerning products of animal origin and culturally rooted; 3) the absence of a tax policy that benefits local production, processing and consumption; 4) consumers lack information on the functioning of agriculture and local production; 5) the competitive pressure from the business and corporate agrifood trade; 6) the high cost of certification for organic foods, especially through auditing (SCARABELOT, SCHNEIDER, 2012; SCHNEIDER; FERRARI, 2015; DAROLT et al., 2016; POZZEBON, RAMBO, GAZOLLA; 2018; PREISS; VASCONCELLOS; SCHNEIDER , 2018; AGUIAR; DELGROSSI; THOMÉ, 2018; PREISS, 2019; BELIK, 2020; DE SOUZA AMARAL, 2020).

A group of studies highlight the great importance that the Food Acquisition Program (PAA) and the National School Feeding Program (PNAE) have had in promoting the agroecological production of family farming, helping create regionalized markets, supplying food to the vulnerable population and the expansion of food security and nutrition (PREISS; VASCONCELLOS; SCHNEIDER, 2018; CAVALLI, 2019; BELIK, 2020; GAZZOLA, 2019).

Regarding other themes, Martinelli and Cavalli (2019) draw attention to the need for greater regulation of the food industry with regard to processing, labeling and advertising, warning that the relations between representatives of the sector and the State often become an obstacle to the qualified offer of healthy and sustainable food to the population. The concentration of large international corporations in retail must be diluted or at least controlled due to the high impact it generates on small businesses, family farmers and agroecological production (GOMES JR. and JUNIOR, 2015; JÚNIOR; PINTO; LEDA; 2016; MARTINELLI; CAVALLI, 2019; GAZZOLA, 2019; BELIK, 2020).

Considering the cross-cutting themes of this study, it is noteworthy that none of the included articles focused on issues of gender equity in the food chain.

7.2 SUPPLY AND DEMAND DIMENSION

This dimension focuses on the feedback dynamics between supply and demand and how this determines consumption practices. The factors that establish food consumption patterns involve a range of complexities that intersect, from socioeconomic contexts (purchasing power, education, culture, lifestyles, etc.), to political and legal constraints that facilitate or restrict access to food, as well as the efficiency of the market in meeting demands of the population or arousing the desires of the same. Beyond the discussion on sensitive and symbolic processes involving food, Swinburn et al. (2019) draw attention to how the food industry has exploited the biological, psychological, social and economic vulnerabilities of individuals, often helping to create highly influential food environments. This process ends up being facilitated by the absence of government measures to oversee or control these practices, such as regulations on the marketing of unhealthy foods and beverages, front-of-pack warning labels, tax policies and consumer protection laws (SWINBURN et al., 2019).

On the other hand, there is a wide debate in the literature about the increasing cost of healthy eating, making the adoption of healthy and nutritious diets with diverse, fresh and ecological foods to become a privilege for a few. This elitist privilege of having adequate and healthy food is exactly the opposite of what we should aim for society, since healthy and adequate food is an internationally recognized human right. Thus, the absence of government measures to help popularize access to healthy foods also contributes to the intensification of malnutrition and obesity pandemics (SWINBURN et al., 2019). Therefore, focusing on the interaction factors between supply and demand is crucial for fighting hunger and food insecurity.

Balancing such issues with climate change requires a greater commitment. Among the many examples that can be cited, we present meat consumption. There is an apparent international consensus on the need to reduce meat consumption globally due to its production impact on the environment. Also, there

are arguments that meat is a mediating factor for health problems. However, meat (especially red and quality meat) is still regarded as nutritious food, with high social and symbolic value in different cultures, an element which must be factored in the multidimensional perspective of SAN. In practical terms, meat is gradually becoming a luxury item on the table of most Brazilian families due to its price. How can we urge these families to reduce what they really never had? As a central point of interest in this dimension, we will discuss the different strategies and conditions for access to food in the country.

7.2.1 THE BRAZILIAN SCENARIO IN THIS DIMENSION

The results of the literature review can be grouped into two main aspects. The first is centered on evaluating the role of State actions in making the supply of the population viable, with special emphasis on the vulnerable public. The second involves studies that discuss the supply strategies accessible to the general population and their impacts on health.

Belik (2012) analyzes the Zero Hunger Program[7] comparing the original proposal developed by Instituto Cidadania in 2001 (Figure 5), its application by the Lula government and associated impacts until 2012. The author highlights how the initial design was based on national studies and the role of civil society in the 1980s and 1990s, covering all dimensions of SAN, integrating agricultural production, supply and food as themes articulated with structural policies, programs for specific audiences and actions at the local level (BELIK, 2012). With regard to the implementation of the program, the positive results indicate a significant reduction in poverty and empowerment of consumption in the low-income class in parallel with the decline in food insecurity in the country (BELIK, 2012). In spite of this, Belik points out that the elements in the original proposal, related to supply, food and nutrition education and urban agriculture could have been better articulated for a full SAN service.

7. In the original, Programa Fome Zero.

STRUCTURAL POLICIES

- Income and employment generation
- Universal social security
- Family farming incentive
- School grant and minimum income

SPECIFIC POLICIES

- Food stamp program
- Donation of emergency basic food baskets
- Maintenance of security stock
- Food security and quality
- Expansion of PAT
- Combat infant and maternal malnutrition
- Education for food consumption and food education

LOCAL POLICIES

RURAL AREAS

- Support family farming
- Support production for self-consumption

SMALL AND MEDIUM TOWNS

- Food banks
- Partnerships with retailers,
- Modernization of supply equipments
- New relationships with supermarkets
- Urban agriculture

METROPOLIS

- Popular restaurants
- Food banks
- Partnerships with retailers
- Modernization of supply equipments
- New relationships with supermarket chains.

Figure 5 – Original proposal of the Zero Hunger Program. **Source:** Instituto Cidadania (2001) apud Belik (2012).

The food and nutrition security policies implemented by the Lula government are also analyzed by Chmielewska and Souza (2011), who emphasize the relevance of the Bolsa Família[8] program in reducing poverty and increasing the ability of vulnerable families to purchase food. The authors point out the positive effects of the program on SAN, among which the following stand out: the reduction of hunger and food insecurity in the country; stable food access; increase in the quantity and variety of food; improvements in health care of beneficiary pregnant women and positive evolution of the nutrition status of preschool-age children.

The authors also emphasize how a variety of actions were combined in order to value family farming as a key group in supplying food to the population, being a priority supplier for the PAA and PNAE programs (CHMIELEWSKA; SOUZA, 2011). Both programs had a high impact, as they allowed social inclusion through access to institutional markets, fostering local production and encouraging agroecological transition, by offering a premium value for these products (CHMIELEWSKA; SOUZA, 2011). PNAE also played a key role in reducing hunger among school-age children, contributing to the biopsychosocial development and performance of students, promoting healthy eating habits, in addition to giving nutritionists a greater responsibility as players in the execution of the program (CHMIELEWSKA; SOUZA, 2011).

Maluf et al. (2015) argue about the potential of institutional programs as strategies to develop nutrition-sensitive agriculture and the fulfillment of food sovereignty and SAN. These programs direct agricultural production aimed at increasing the availability of unprocessed agroecological foods and promoting agrobiodiversity with sustainable practices. The authors counter this strategy as more effective than crop biofortification programs (such as the BioFORT program of EMBRAPA), which are developed with no interconnection with other complementary SAN actions. Further, there is corporate control over the seed market, causing a reduction in the productive autonomy of family farmers, increased dependence on transgenic technologies and high use of agrochemicals (MALUF et al., 2015).

Taveira et al. (2019) problematize how family farming has been contemporarily driven to seek multiple strategies that complicate the growth of varieties for self-consumption while meeting market demands. Thus, a better dialogue between academics and producers is required for knowledge combination and the creation of innovation mechanisms suited to the context of small and medium-scale production and distinct agriculture crops. Lang and Barling (2012), indicated the existence of the right to food in the Brazilian Constitution as a positive step, when it comes to diversity of perspectives about SAN for the creation of a sustainable food system.

8. Bolsa Família was a federal government income transfer program, under conditionalities, instituted in the Lula government by Provisional Measure 132, of October 20, 2003.

Grisa et al. (2017) conduct a comparative analysis of the impact of institutional changes on the implementation of PAA, based on case studies in the states of Rio Grande do Sul and Rio Grande do Norte. They indicate that the program made an important contribution to the associative process of family farming and improved diet quality and quantity. It is noteworthy that, after the institutional changes in 2006 (new purchase modalities, promotion of local family farming and the use of resources from the Ministry of Agrarian Development - MDA), there was a national and international consolidation of PAA between 2010 and 2012 as an innovative proposal to promote healthy eating and local consumption (GRISA et al., 2017). However, as of 2013, the application of resources began to reduce, in parallel with the construction of more rigid rules and inspection, affecting the performance of the program and making it less flexible to the demands of family farming (GRISA et al., 2017). Such processes affected the studied regions (Rio Grande do Sul and Rio Grande do Norte), causing shutdown and discontinuity of the actions. This posed a challenge to families in the search of new markets. Further, there was a build-up of tension in the institutional environment (GRISA et al., 2017).

Siliprandi and Cintrão (2011) investigated the participation of women in Brazil as providers of PAA[9], verifying that the direct presence of women farmers is low - on average 23% - with variations between states and regions, as well as between modalities and products. The authors point out that although female farmers play a relevant role in production, their participation in PAA tends to be associated with the national identification number (CPF) of men (SILIPRANDI; CINTRÃO, 2011). In spite of the program's proposal of offering conditions that meet the needs of women (deliveries in installments, constancy, orders in small quantities and in different modalities), it adheres to the reinforcement of a homogeneous perspective of the family unit production similar to other agricultural policies. In fact, the program does not factor in gender distinctions, resulting in the lower participation of female farmers (SILIPRANDI; CINTRÃO, 2011).

The studies of Kroth, Geremia, Mussio (2020) and Saraiva et al. (2013) provide complementary information about PNAE. They define PNAE as a public policy aligned with the principles of SAN, sustainability and health, improving schoolchildren´s food environment, fostering social and productive inclusion of local family farming and facilitating agroecological transition processes and regional economic development. Rossetti, Da Silva, Winnie (2016) analyze the purchase of regional foods for PNAE, warning that some food items may be inappropriate and unhealthy for schoolchildren (sausages and canned foods). The authors also assessed the bottlenecks of implementing the program in different locations, with special emphasis on the following issues: lack of documentation on the part of family farmers; lack of physical and logistical structure; sanitary standards incompatible with the reality of family agribusiness (ROSSETTI; DA SILVA; WINNIE, 2016).

9. The data is based on 2008.

Dias and Oliveira (2019) analyzed the implementation of PNAE in state public schools in RN (2011 and 2013), and concluded that despite the state having attained a total average of 26.2% of its resources from family farming products, the performance of the Regional School Feeding Boards (DRAEs) is quite diverse and conflicting. This observation suggests that the ability of each management to deal with bureaucratic procedures is essential for the effectiveness of the program.

Triches (2015) also focuses on the school feeding program, but within the municipality of Dois Irmãos (RS). Before the national policy, the municipality had put in place actions to promote sustainable food, which earned it national and international recognition in 2005 with the Efficient School Meal Manager Award through the Fome Zero NGO and the Ministry of Education. The municipal actions were triggered by the discovery of overweight and body dissatisfaction, respectively, in 17% and 70% of schoolchildren aged 8 to 10 years (TRICHES, 2015). To reverse the causes, several integrated measures were taken to restructure the food environment in schools, such as: changing food suppliers, prioritizing local family farming; construction of municipal and school gardens with the organic production of vegetables and fruits; change in menu to introduce whole and local produce; regulation of the types of food brought from home and participation in Pedagogical Rural tourism in properties located in the municipality, helping the children to have a closer experience and knowledge about food production. The innovative actions contributed synergistically and positively to the improvement of health conditions and food education of the schoolchildren (TRICHES, 2015).

Considering service to socially vulnerable families, Belik, Cunha and Costa (2012) discussed the relevance of Food Banks supported by the Zero Hunger Program, combined with complementary strategies for tax exemption on industrialized products (IPI) of certain categories and subsequent linkage to PAA. The data indicate that in 2011 there were approximately 200 Food Banks under implementation in the country supported by the then Ministry of Social Development, Supply Centers and Social Service for Commerce (SESC), serving hundreds of thousands of people daily through food donations, which consequently reduced food waste in Brazil (BELIK; CUNHA; COSTA, 2012).

Henz and Porpino (2017) addressed food loss and waste based on the review of the national literature. From the review, around 30 related bills had been discussed in the Brazilian Congress since 1997, but there are no expectations of their approval in the short term. The authors emphasized that government food security policies implemented sin-

ce the beginning of this century have had a positive impact on reducing losses. However, educational campaigns among the population must be conducted to advance in this area as well as the establishment of public-private partnerships (HENZ; PORPINO, 2017).

Silva and Curioni (2013) studied the prevalence of INSAN among beneficiaries of municipal programs to combat hunger in Petrópolis (RJ). They found the prevalence of INSAN was 42.9% among families who ate at Popular restaurants and 72.2% among beneficiaries of the Cesta Cheia food program (Família Feliz). In addition, a number of characteristics were associated with a higher incidence of INSAN at the municipal level: higher number of residents in household, the presence of individuals under 20 years, low family income, head of families being black and lack of home ownership (SILVA; CURIONI, 2013).

With regard to the supply strategies available to the population in general, Wegner and Belik (2012) problematize the closure of the National System of Supply Centers and its consequent transfer of shareholding control. In fact, the intense inflow of foreign capital into the Brazilian supermarket sector has transformed these national centers into fruit and vegetable wholesalers who depend on private distribution centers, in turn, the latter competing with or replacing the former. This new dynamic fragilizes the articulation between wholesalers, producers and retail, impairing the supply of safe fruits and vegetables with accessible prices (WEGNER; BELIK, 2012). The authors argue that these centers should be managed by the State in order to contribute to SAN and serve as a food safety control in the supply chain. By not investing in a national policy for the qualification of CEASAS and the control of supermarket expansion, the State allows these processes to be monopolized by the private sector (WEGNER; BELIK, 2012).

Lopes, Menezes and Araújo (2017) study the access of the population of Belo Horizonte (MG) to fruits and vegetables and discovered that there is a high concentration of establishments that offer these foods in privileged regions while peripheral areas have limited access. In the city of São Paulo, Duran et al. (2013) conducted a similar study using a different methodology. The work points to a greater presence of bars and fast-food restaurants in low-income neighborhoods while the incidence of supermarkets, markets offering fruit and vegetables and full-service restaurants were higher in high-income neighborhoods with medium and medium-sized families.

Also in São Paulo, Mondini et al. (2012) evaluate the impact of food price evolution between 1980 and 2009, showing that ultra-processed foods had their prices reduced compared to an expressive group of healthy foods (fruits, vegetables, vegetables, breads, rice, beans, oil, sugar and beef), hence is a limitation for the adoption of a healthy diet. Oliveira (2012) assessed how the prices of the main food items in the basic food basket in Porto Alegre (RS)[10] are impacted by the Minimum Agricultural Price Guarantee Policy, rural credit and the in-

10. The analysis considered the period from January 2005 to April 2011.

direct tax burden. They concluded that the final price of the foods is excessive, which represents an access problem, especially for the vulnerable or less-favored economic classes.

Preiss et al. (2021) conduct a study centered on family farmers market in the Vale do Rio Pardo (RS) region, indicating that these supply dynamics are highly beneficial to the population, especially maintaining the influx of fresh food at affordable prices, contributing to a healthy population. The authors show the need for local public policies that help in the transition from the tobacco production to basic foods, as well as the State's action to expand family farmers market, whether in the still unserved municipalities, or in the peripheral areas of the cities that comprise the region (PREISS et al., 2021).

Gomes-Júnior, Pinto and Leda (2016) carried out a historical review of the role of supermarket expansion and ultra-processed food consumption in urban growth and industrialization in Brazil. Both were considered key factors in food transition and reduction in the quality of diets in Brazil.

Santos et al. (2014) conducted a case study of the Mossoró Agroecological open market (RN). They found that agroecology has allowed farming families to have greater socioeconomic and environmental sustainability, with a decent income and permanency in the countryside.

David and Guivant (2020) analyzed enterprises that offer organic food in the South and Southeast of Brazil through subscriptions (food basket) with home delivery, thus merging direct purchases from regional producers, CEASAS distributors and processed food suppliers. The use of digital technologies is an essential tool which allows this interface with consumers. Among the limits for the expansion of this type of business, the authors identify: lack of certain products due producer preference to supply supermarkets; climate impacts on fresh products; high demand for organic products with restricted availability (e.g. sugar, coffee or frozen meats) and issues of trust with suppliers regarding the guarantee of organic compliance (DAVID; GUIVANT, 2020).

Preiss, Marques and Wiskerke (2015) research supply dynamics built on the collaboration between family farmers and urban consumers. The authors argue that these forms of marketing are socially inclusive and ecologically appropriate, as they allow the population to have regular access to organic products at fair prices, while providing farmers with a stable income, fostering processes of food democracy. Portilho, Castañeda and Castro (2011) reflect on the politicization of consumption in its ethical, political and ideological dimensions in relation to actions that originate from the institutional sphere and increasingly permeate into the private and daily life of individuals, being marked by changes in the global systems and increased awareness of food risks. The study reviewed the theoretical approaches on the subject and recommended the need for a Brazilian research agenda that can better explain how the phenomenon manifests through networks of producers and consumers, purchasing collectives and boycott actions, and the extent to which such actions influence public and business policies (PORTILHO; CASTAÑEDA; CASTRO, 2011).

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Silva, Lima Filho and Freire (2015) assess the purchase intention of consumers regarding environmentally sustainable beef in Campo Grande (MS). They observed that the level of perception and knowledge of environmental problems has a strong influence on consumer behavior, with education being a major awareness factor. Yet, data indicate that the population's interest in this type of food is still low.

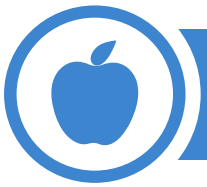
Three studies problematize gender issues in national food supply. Siliprandi (2012) addressed the connections between the invisibility of women's work in food in relation to SAN, arguing that the ways in which women act in production processes (cultivation, small animal husbandry, seed preservation, species acclimatization, use of medicinal plants and knowledge diffusion) and food distribution (marketing oriented by the solidarity and feminist economy) are devalued for being interpreted as "complementary activities" of the "main" activities under the responsibility of men.

In turn, Gomes-Junior and Andrade (2013) analyzed the contribution of women in the construction of food sovereignty, consolidating the theme as a political and narrative dispute facing patriarchal perspectives of homogenizing and unsustainable developmentalism. The authors emphasize that despite the historical invisibility of women´s role, which tend to be associated with processes of social reproduction (and less with production and commercialization), their role as political subjects in feminist organizations such as the Peasant Women's Movement, the Interstate Movement of Quebradeiras de Coco Babaçu, has helped women affirm their identity and interests, thus dissolving traditional roles

and creating models of family production that respect their autonomy (GOMES-JUNIOR; ANDRADE, 2013) .

Felker-Kantor and Wood (2012) interpreted data of an official survey conducted in the country and problematized the fact that food insecurity is greater among families headed by women, being even more aggravated when it involves the presence of children or adolescents. However, the presence of women in the household reduces INSAN, suggesting that the spending patterns of women generate a greater positive effect on the well-being of children and other family members. Therefore, studies that can provide insights into such issues are needed, in addition to the expansion of public policies with a gender focus (FELKER-KANTOR; WOOD, 2012).

Again, we include updated data from the study by Belik (2020) to better characterize how social inequality in Brazil affects the population's supply and access conditions. When we analyze monthly income per capita, there are two extremes: 2.7% of the population earn more than 25 minimum wages, while 24% (16.5 million families) earn up to 2 minimum wages (BELIK, 2020). The situation is aggravated by the fact that in this last category, the average monthly expenditure on food is equivalent to the commitment of 26% of their savings, while the richest spend only 5% of their resources on food (BELIK, 2020).



7.2.2 RECOMMENDATIONS FOR A HEALTHIER, MORE SUSTAINABLE AND EQUITABLE OUTLOOK

The studies are consensual in defending the necessary action of the State in reducing social inequalities, promotion of the human right to food, regulation and control of the private sector. Different authors emphasize the relevance of public policies implemented since 2003 because they present a multidisciplinary approach to food issues, and have been effective in qualifying SAN conditions of the population and solving, albeit in part, historical problems such as hunger and poverty (BELIK, 2012 CHMIELEWSKA; SOUZA, 2011; MALUF et al., 2015; HENZ; PORPINO,

2017). To meet SAN, public supply policies must have dialogues with different sectors, in order to integrate actions in health, urban planning, social assistance, agriculture, among other sectors, for improved access to healthy food, in particular for the most vulnerable public in both social and economic terms (BELIK, 2012; DURAN et al., 2013; TRICHES, 2015; LOPES; MENEZES; ARAÚJO, 2017)

Different authors defend the creation of new food supply policies in Brazil that prioritize family farming products, small and medium-sized retail, short-circuit sales channels. They also support dynamics that foster the direct collaboration between farmers and consumers (responsible consumption groups, open markets, etc.) and the revitalization of sale channels such as municipal markets and Supply Centers (GOMES-JÚNIOR; PINTO; LEDA, 2016; SILVA FILHO; GOMES-JÚNIOR, 2020; PREISS, MARQUES; WISKERKE, 2015; PREISS et a l., 2021). Belik, Cunha, Costa (2012) emphasized the importance of Food Banks in the reduction of food waste, with a possible great contribution to SAN by enabling donations to families in social vulnerability. In this process, the central role of the State is to qualify the Food Bank services (large structures in large cities), in order to facilitate collaborative and complementary work with the networks already structured by the civil society. In addition, Wegner and Belik (2012) support a coordinated public action at different scales (federal, state and municipal) for the creation of an interconnected public supply system, which encourages programs for the modernization and qualification of CEASAS management team, as well as the implementation of regulation regarding the private distribution of food.

Although PNAE has made important contributions through its continuity, the observed improvement and reinforcement were mediated by actions such as: a) increase (from the current 30% to 100%) in the minimum application of resources from FNDE towards food acquisition from agriculture family; b) the use of all FNDE resources in this modality; c) the elaboration of a PNAE technical training plan for federated entities, involving all individuals responsible for the operationalization of the program (nutritionists, purchasing sectors, legal department of the prefecture, lunch ladies, teachers, health professionals); d) formation of Rural Technical Assistance teams (ATER) specialized in promoting the preparation of school meals; e) creation of intersectoral management committees to deal with issues at the local level (similar to a CAISAN); and f) greater land tenure regularization (CHMIELEWSKA; SOUZA, 2011; SARAIVA et al., 2013; RO SSETTI; DA SILVA; WINNIE; 2016; KROTH; GEREMIA; MUSSIO, 2020). With regard to PAA, Grisa et al. (2017) proposed the need to rescue the original principles of PAA, so that it is strengthened again and provides an institutional environment more consistent with the specificities of family farming and local social contexts.

Belik; Wedge; Costa (2012), Mondini et al. (2012) and Oliveira (2012) defend the need to rethink taxation policies in order to facilitate access to basic and healthy foods. It is also essential to cre-

ate mechanisms that control the expansion of supermarkets, as well as their influence on price formation and food distribution (WEGNER; BELIK, 2012; GOMES-JÚNIOR; PINTO; LEDA, 2016).

It is argued that these actions promote a more equitable distribution of establishments that offer healthy foods such as fruits and vegetables, covering the entire population, but with special attention to areas with a higher incidence of low-income and vulnerable families (DURAN et al. 2013; LOPES; MENEZES; ARAÚJO, 2017; PREISS et al., 2021). Greater attention should be paid to gender issues that permeate conditions of access to nutritious food, food supply and production policies (SILIPRANDI; CINTRÃO, 2011; SILIPRANDI, 2012; FELKER-KANTOR; WOOD, 2012; GOMES-JUNIOR; ANDRADE, 2013). Information and education campaigns are essential for the population to understand the need to change consumption habits, prioritizing healthy and sustainable foods (SILVA; LIMA FILHO; FREIRE, 2015; PREISS et al., 2021). Finally, it is suggested that more studies need to be conducted on the issue of politicization of consumption and food activism in Brazil, with the objective of understanding how actions mobilized by individuals and collectives can affect the food system, policies and business actions (PORTILHO; CASTAÑEDA; CASTRO, 2011; PREISS, MARQUES; WISKERKE, 2015; PREISS et al., 2021).

7.3 ECOLOGICAL DIMENSION

In this dimension, we discuss the evidence of environmental damage that the hegemonic food system imposes on ecosystems. Intensive food production, high dependence on fossil fuels and large-scale international distribution are some of the elements that exemplify the predatory use of natural resources and the high levels of pollution placing the food system at the root of climate change (SWINBURN et al., 2019). The extent and intensity with which resources such as soil and water have been exploited and concomitantly degraded by chemical pollution are among the main causes of greenhouse gas emissions and the reduction of biodiversity, including edible species. Deforestation of native forests and the imbalance in the ecological structure of the main Brazilian biomes have been mostly driven by the expansion of commodity production.

Considering that there are no linear processes in nature, the sector most affected by climate change is agriculture, which, in recent years, has been increasingly pressured and modified by phenomena such as the increase in the planet's average temperature, changes in precipitation patterns with increased frequency of droughts and floods, and the intensification of extreme weather events. The effects on human health cannot be disregarded either, since quality of life is gradually reduced by the intensity of generalized pollution, especially in cities, but, unfortunately, with increasing rates also felt in the countryside. The serious effects of pesticide on health have been widely documented and evidenced in the scientific literature, among which are: poisoning, different types of cancer, malformations, birth defects, spontaneous abortions, premature and stillbirths, neurodegenerative disorders such as Parkinson's and Alzheimer's, solid tumors and endocrine disruptions that can lead to obesity and diabetes.

Therefore, accelerating the transition to ecological production systems that guarantee quality food and allow the regeneration of natural resources is the fundamental problem of this dimension. Given Brazil's shameful international prominence in the use of pesticides and the need to use food production methods that preserve our biomes, these two themes will be discussed profoundly in this dimension.

7.3.1 THE BRAZILIAN SCENARIO IN THIS DIMENSION

The results of the literature review are composed of theoretical articles and empirical research in different fields of knowledge, which hold discussions on the impacts of different productive and administrative practices of conventional systems on the environment in the light of small to medium-scale agricultural practices. Pereira, Franceschini and Priore (2021) carry out a systematic literature review based on the Prisma method to assess the impacts of different agricultural production systems on food quality and the promotion of SAN. From their review, foods produced by systems based on ecology have positive impacts on health, presenting consumption safety and superior nutritional quality when compared to those produced with conventional systems (PEREIRA; FRANCESCHINI; PRIORE, 2021).

Della Giustina and De Andrade Franco (2014) also reflect on the impacts of different models of agricultural development on the natural environment, but with a focus on the state of Goiás. The adopted models were unsustainable, as they promoted the fragmentation of forest areas and the destruction of natural habitats, disrupting important wildlife populations. The authors emphasize how this transformation was promoted by the State aiming at expanding the agricultural frontier in the region, through a set of actions: the implementation of the Vargas government's interiorization policy (first half of the 20th century); support for agronomic research focused on adapting varieties to the Cerrado for large-scale production; the dissemination of specific technologies (correction of soil acidity, chemical fertilization, use of genetically modified seeds and pesticides) and the installation of teaching and research institutions (DELLA GIUSTINA; DE ANDRADE FRANCO, 2014). In turn, Bonini, Pessoa and Gomes Júnior (2013) discuss the advancement of the agricultural frontier in the Amazon, with the State being the promoter of a development model that devalues the local socio-biodiversity and seeks the maximum exploitation of resources. Although this makes the region a relevant economic pole, it is faced with high social inequality and environmental devastation.

Underwood et al. (2011, p. 412) analyze how organic agriculture and conventional agriculture differ in relation to impact on biodiversity and ecosystem services. They highlight the meta-analysis of Araújo, Santos and Monteiro (2008) which measured microbial biomass and biological activity through different management practices. The findings demonstrate that organic agriculture improved soil quality, qualifying microbial biomass and biological activities, possibly due to the use of organic fertilizer instead of pesticides. The study also shows that no-till practices, pasture rotation and organic agriculture improved soil quality. On the contrary, overgrazing, pesticide use and fires greatly disrupted the microbiota of the soil (ARAÚJO; SANTOS; MONTEIRO, 2008).

Rigotto, Vasconcelos and Rocha (2014) discuss the production and use of pesticides in Brazil as an important public health problem. The authors highlight Brazil as the world's largest consumer since 2008, with an expansion of 190% in the use of these products during the first decade of the 21st century, a pace twice as fast as the global market. The authors point out the role of some organizations in combating the use of pesticides and the establishment of the National Policy on Agroecology and Organic Production, in particular, the National Forum to Combat the Effects of Pesticides, the Permanent Campaign Against Pesticides and for Life, the National Council for Food Safety (Consea), Brazilian Association of Public Health (ABRASCO), the National Coordination of Agroecology (ANA) and the Brazilian Association of Agroecology (ABA) (RIGOTTO; VASCONCELOS; ROCHA, 2014). Based on literature review, Souza et al. (2012) analyze the controversies related to organic foods compared to conventional ones. They found that the former stands out for their low toxicity, greater durability and nutrient content, thus their consumption supports ecological transition processes, the gradual detoxification of soils and waters, the promotion of diverse agriculture and sustainable local

development. The authors emphasize the relevance of further comparative research on the nutritional advantages of different forms of production so that persistent controversies in the literature can be resolved (SOUZA et al., 2012).

Pereira, López and Dal Soglio (2017) discuss the relevance of the conservation of creole seeds by family farmers, through knowledge building strategies and promotion of food sovereignty, productive autonomy and genetic diversity. The authors mentioned a record of actions to rescue, maintain and use native germplasm in more than 30 municipalities in Rio Grande do Sul State and around 220 experiences in Paraíba State, which involves the participation of family farmers, rural technical assistance institutions, academia, civil society organizations and the Catholic Church (PEREIRA; LÓPEZ; DAL SOGLIO, 2017). These varieties are particularly relevant for mitigating climate change, as they are developed according to local environmental conditions and therefore tend to have greater resilience to adverse phenomena, such as prolonged droughts and floods (PEREIRA; LÓPEZ; DAL SOGLIO, 2017). Similarly, Campos and Dal Soglio (2020) discuss theoretical references that elucidate the conservation of native seeds and their associated practices not only as essential characteristics of agroecology, but also as an opposition to the hegemonic and corporate model of agriculture, which appropriates genetic resources for private profit.

Azevedo and Pelicioni (2011) analyze the conceptual approaches in the fields of Agroecology and Health Promotion and argue that despite both having common theoretical interfaces, they are research areas that have had little to no dialogue, which impairs the implementation of projects characterized by intersectoral health promotion practices combined with sustainable development.

Chiodi, Marques and Muradian (2018) analyze the social categories and proportion of resources allocated to them by the Payment for Environmental Services (PSA) program linked to the management of water resources, under the Water Producer Program of the National Water Agency (ANA). The program in question focuses on the control of diffuse pollution in watersheds through actions to improve water quality and reduce soil erosion, where small rural landowners are key actors in the planning, execution and monitoring of sustainable production practices and water management (CHIODI; MARQUES; MURADIAN, 2018). Among the beneficiaries, four profiles are identified: a) 40% are family farmers who have lived and worked on the rural property since childhood, depending totally on income from agricultural activities; b) 18.2% are pluriactivity farmers, individuals who reside on rural property, have a self-consumption production and undergo some commercialization, but their main income comes from non-agricultural activities (day laborers, contractors, civil servants and salaried workers); c) 19.5% are rural residents who are not involved in any agricultural activity; d) 22.1% are non-rural dwellers - wealthy urban families who own the rural property as an asset and use it for leisure or other purposes (CHIODI; MARQUES; MURADIAN, 2018). The data indicate that the urban families and non-residents received, on average, the best payments, followed by family farmers. Therefore, the redistribution of policy resources did not prioritize those who most depend on land and State actions, thus failing to act

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with a perspective of environmental and socio economic justice (CHIODI; MARQUES; MURADIAN, 2018). Even so, the authors emphasize that the resources transferred to family farmers had high positive effects on the income of these families (CHIODI; MARQUES; MURADIAN, 2018).

Scarano and Silva (2018) assess Brazil's progress in meeting targets related to the production, consumption and international trade of food in the Global Strategy for Plant Conservation (GSPC) of the United Nations Convention on Biological Diversity (CBD). Specifically, they focus on goal number 6 (to have at least 75% of land destined for production sustainably managed by 2020) and 11 (to ensure that by 2020 no wild flora species will be threatened by international trade). The authors report that despite the country having a set of innovative policies in relation to agricultural sustainability, the success so far is variable, as many actions are not being effectively applied. In positive terms, there has been a significant reduction in both the conversion of habitats in favor of agricultural expansion and a decrease in illegal timber trade, but the extent of land dedicated to agriculture, pasture or forestry is still high, especially in the biomes of the Cerrado and the Amazon. The number of species threatened by the illegal exploitation of resources in the Amazon and the Atlantic Forest is concerning (SCARANO; SILVA, 2018).

Belik (2020) stresses that although Brazil is the world's largest beef exporter, exporting twice as much as the world's second largest exporter (Australia), recent data indicate that beef consumption in the country is 4 times higher than the external demand, therefore production mainly serves the domestic market.

Data shows that this sector has the highest growth rate among food production and most utilizes natural resources, causing deforestation of native vegetation areas for pasture, increasing grain production for animal consumption, strong water pollution and intense GHG emissions (BELIK, 2020).

Silva, Alves and Barcellos (2016) analyze key actors in the Rio Grande do Sul State beef industry and how they have been involved with responsible and sustainable practices based on different criteria and dimensions. The study shows that from the interviewees' perception, the environmental issue and ecological practices are related to the maintenance of business over time, an indication of an economic bias. The authors reveal that there is no synchronic narrative between the different actors, demonstrating the need for better articulation so that the actions generate an increase in business and qualify its position in the chain (SILVA; ALVES; BARCELLOS, 2016).

In relation to meat, Gruba, De Souza Dutra and De Melo Stock (2013) investigate actions of socio-economic or environmental sustainability mobilized by producers linked to COOPERALIANÇA in the State of Paraná. From the findings, actions of environmental sustainability (correct waste handling, water distribution for animals in troughs and compliance with government laws and regulations) are limited to those necessary to comply with legislation, without the need for extensive voluntary actions (GRUBA; DE SOUZA DUTRA; DE MELO STOCK, 2013).

Claudino (2014) analyzes the construction of narratives and practices linked to sustainability in Brazilian cattle ranching. The author reports the coexistence of different segments in which different power relations and subjectivities are mobilized to relate cattle raising to the environment, being these elements fundamental for the definition and the classification of what is understood socially as "sustainable" systems and producers. Among the strongest aspects, Claudino (2014) highlights the argument that the most sustainable way of raising cattle is linked to the integration systems of monocultures with commercial species (Crop-Livestock; Livestock-Forest; Crop-Livestock-Forest) that seek productive and economic efficiency combined with the reduction of emission. In this case, there is an emphasis on the repercussions of economic entrepreneurship on the socio-environment crisis, thus payment for environmental services and remuneration for carbon credits are the main incentives for reducing GHG emissions. Another aspect defends the strengthening of family livestock and traditional communities in autochthonous farming systems through the collective management of natural resources, the maintenance of biodiversity, together with the promotion of autonomy and income for the social actors involved. According to the author, understanding such narratives and processes is essential because, in addition to discursive processes, they deal with ethical and normative aspects that guide the actors' practices and the formulation of public policies for the sector (CLAUDINO, 2014).

Litre and Bursztyn (2015) assess the perceptions and adaptation strategies of family farmers living in the Pampa biome in relation to climatic and socioeconomic risks. Ranchers easily perceive the economic and institutional risks that directly threaten their family nucleus and the viability of their activities in the short term, tending to make strategic decisions ba-

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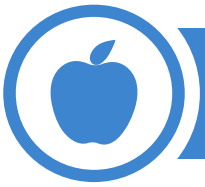
sed on their personal experience and available non-scientific data. In parallel, strategy policies for the adaptation of target actors to global changes are developed in a hypothetical way, thus rarely applied by the target population (LITRE; BURSZTYN, 2015).

Stoll-Kleemann and O'riordan (2015) address the challenges of sustainable diets and the growing consumption of animal products worldwide, considering the high environmental and social degradation that this industry causes, having impacts on food safety and personal health, as well as increase in social inequality. Estimates of consumption in Brazil and the impact of the industry on natural resources in 2014 are presented, with special emphasis on the extension of land dedicated to the production of forage for animal consumption to the detriment of areas for the cultivation of food for direct human consumption. Soy monoculture is especially problematic because it helps to further aggravate the unequal land distribution in the country (Stoll-KLEEMANN; O'RIORDAN, 2015).

Among actions taken in favor of climate change at the state level, the Climate Observatory report (2019) highlights the Produce, Conserve and Include (PCI) strategy announced in 2015 by the Mato Grosso government with the promise of eliminating illegal deforestation by 2025, through increased agricultural efficiency. However, the state´s emissions suggest that a strong intensification of activities is necessary in order to meet the goal on time (OBSERVATÓRIO DO CLIMA, 2019). At the federal level, light is thrown on the credit available in the Crop Plan since 2010 for the execution of the Low Carbon Emission Agricultural Program (ABC), which proposed a set of technologies to reduce GHG emissions, such as: carrying out direct planting; recovery of degraded pasture areas; the integrated management of farming, livestock and forest areas, and the adequate management of animal waste. On average, the amount transferred corresponds to 2% of the total resource over the last nine years, with a recovery target of 30 million hectares by 2030. In fact, data from the Ministry

of the Environment indicate that only 10.4 million hectares of pastures were recovered between 2010 and 2017 (OBSERVATÓRIO DO CLIMA, 2019).

According to the Climate Observatory, so far, there is little information from the government concerning monitoring methodology used or indicators that support the announced data, hence impairing the verification of the ABC Program´s effectiveness and released data. The authors also warn that Brazil has been highly negligent regarding the commitment it assumed in reducing GHG emissions, as despite the National Policy on Climate Change (PNMC) having been regulated in 2010, there is no evidence of a drop in Brazilian emissions (OBSERVATÓRIO DO CLIMA, 2019). In addition to not complying with national policy, the country also does not respect the target proposed in the Paris Agreement (actions should start in 2020), a context that has become even more unfeasible with the dismantling of federal actions on the climate during the Bolsonaro government (OBSERVATÓRIO DO CLIMA, 2019).



7.3.2 RECOMMENDATIONS FOR A HEALTHIER, MORE SUSTAINABLE AND EQUITABLE OUTLOOK

The recommendations focus on different areas of action. Pereira, Franceschini and Priore (2021) emphasize the need for information that can effectively contribute to the strengthening of sustainable agrifood systems, supporting the construction of intersectoral public policies to promote health and SAN. Della Giustina and De Andrade Franco (2014) advocate the creation of new full protection conservation units to protect the Cerrado areas, as well as the promotion of ecological agricultural practices. Bonini, Pessoa and Gomes Júnior (2013), on the other hand, defend agrarian reform and related policies as necessary measures to reverse environmental degradation and social inequality in the Amazon.

Encouraging comparative research between conventional production and sustainable production practices is necessary for two reasons. First, to highlight the impacts of different systems on the environment, human health or the economy (SOUZA et al., 2012; CAMPOS; DAL SOGLIO, 2020). Second, because of the need for policies that guarantee the reduction or elimination of the use of pesticides in agricultural production as essential me-

asures for the preservation of natural resources and human health (RIGOTTO; VASCONCELOS; ROCHA, 2014)

Pereira, López and Dal Soglio (2017) emphasize the importance of collaboration between farmers and mediators (technicians, researchers and civil society organizations) for the success of land-based conservation programs, as well as the structuring of public policies that encourage research and conservation practices. In a convergent perspective, Litre and Bursztyn (2015) indicate the need for dialogue between the scientific community, public policy makers and family farmers for the elaboration of effective and realistic actions for mitigation and adaptation to climate and socioeconomic changes.

In relation to the role of the scientific community, Stoll-Kleemann and O'riordan (2015) argue that researchers should not only act in the construction of knowledge about food transitions and climate change, but they should apply their scientific findings in practical actions, serving as a reference for colleagues, students and society in general. The authors discuss the need to break entrenched cultural habits that hinder the advancement of healthier and more sustainable policies and lifestyles (STOLL-KLEEMANN; O'RIORDAN, 2015).

In order for the beef industry to adopt more sustainable practices, it is recommended that greater regulations and public policies be instituted to guide measures to reduce environmental impact (SILVA; ALVES; BARCELLOS, 2016; GRUBA; DE SOUZA DUTRA; DE MELO STOCK, 2013). Claudino (2014) warns that the construction of public policies in the sector are guided by ethical and normative perceptions rather than what sustainable livestock farming should truly be.

Chiodi, Marques and Muradian (2018) recommend that the resources of payment programs for environmental services (PES) linked to water resources management should consider the socioeconomic and productive heterogeneity of beneficiary actors, through criteria that ensure the promotion of environmental services and a dynamic of redistributive economy beneficial to families more dependent on agricultural activities. Azevedo and Pelicioni (2011) recommend joint actions between Agroecology and Health Promotion as a strategy to strengthen SAN, sustainability and health in view of the repercussions of the agrifood system on the population's living conditions.

Finally, it is crucial and urgent that Brazil takes effective actions to meet targets and agreements in favor of climate change mitigation via recycling programs that already exist and complying with agreements signed at the international level (SCARANO; SILVA; 2018; OBSERVATÓRIO DO CLIMATE, 2019). The Climate Observatory (2019) emphasizes that it is imperative that the Brazilian government expand public investment in actions to reduce GHG and general mitigation of climate change. Also, the government must be more transparent in relation to the source of data and monitoring methods utilized as evidence of the country's progress on the subject.

7.4 HEALTH DIMENSION

According to Swinburn et al. (2019), the food system played a key role in the qualification of human health in the last century. However, it is currently at the heart of the global epidemic of chronic diseases and obesity. For centuries, food shortage was the biggest food-related problem, but solutions based on technological advances and the development of the food industry have made it possible to practice an increasingly intense agricultural production, specialized and directed towards processed foods. This setting leads to the so-called double malnutrition, a state of malnutrition and hunger, with people suffering from the lack of nutrients, concomitant with ailment due to excessive consumption of foods containing sugar, fat and salt. The same scenario has caused the adoption of inadequate diets to culminate in diet-related chronic non-communicable diseases (NCDs) – cardiovascular problems, cancer, diabetes and obesity, for example) - diseases among the main causes of death in almost all Latin American countries.

Another factor is the focus of food systems on specialized and highly commercial varieties, resulting in increased specialized production of 12 varieties of vegetables and 14 species of animal, which form the base of all diets worldwide. Brazil has seen an exponential increase in sugarcane and soy production, in contrast to the reduction of essential foods in the Brazilian diet, such as beans and rice. Thus, there is a decre-

ase in the diversity of food produced, with consequent effects on health, since an adequate diet must include a varied composition of macro and micronutrients. In other words, the qualification of diets involves not only access to and use of food, but also the population's appropriation of healthy and adequate nutritional references.

Using the internationally recognized Dietary Guidelines for the Brazilian Population launched by the Ministry of Health (2014), we will discuss measures that shape the food environment of Brazilian families and how they have facilitated (or not) the implementation of nutrition references in the daily lives of the population.

7.4.1 THE BRAZILIAN SCENARIO IN THIS DIMENSION

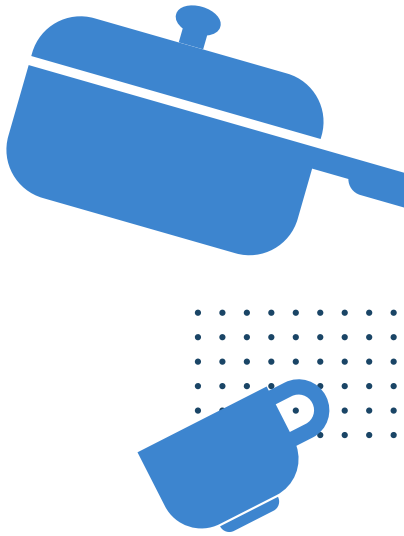
The search included studies centered on the analysis of public policies on the subject, intersectoral actions, school environments, the consumption of different types of foods and impact on health, ability to read and interpret labels, and supply of commercial establishments. Vasconcelos et al. (2019) carry out a historical analysis of public policies on food and nutrition in Brazil between 2003 and 2018. They concluded this period was marked by the expansion and improvement of actions, especially during the Lula and Dilma administrations, but presented setbacks in the Temer government due to systematic budget cuts. The authors emphasize that during the Lula administration and the first term of Dilma, there was a prioritization of actions to combat hunger and poverty, with emphasis on the Bolsa Família program, which benefited 86,349,796 families (VASCONCELOS et al., 2019). As of 2014, the administration of Dilma was marked by actions that emphasize healthy eating in response to the progressive increase in NCDs, being noteworthy the National Pact for Healthy Eating launched in 2015. Despite this, early signs of fragilization of public policies on food and nutrition were eminent. The situation was further aggravated in Temer's administration through processes of institutional disruption, budget cuts and setbacks in rights acquired in previous periods. Reduced investment in different programs is evident in the data presented in Table 2, one can see reductions of 60% to 100% in different programs. According to the authors, the setbacks in recent years regarding the budget of SAN policies indicate a breach of the State's responsibilities under the Federal Constitution.

Table 2 - Percentage of budget reduction in programs and goals of the National Plan for Food Security and Nutrition, 2014-2018

Program/Goals	LOA (2014)	LOA (2018)	Reduction (%)
Distribution of food baskets to traditional peoples and specific populations	R$ 82 million	R$ 27,4 million	67
Bolsa Verde Program	R$ 106,2 million	-	100
Support for the sustainable development of quilombola, indigenous and other traditional communities	R$ 6 million	-	100
Rural Technical Assistance (ATER)	R$ 630 million	R$ 185,4 million	71
Social and Environmental Technical Assistance Program for Agrarian Reform (ARES)	R$ 357 million	R$ 19 million	94
Productive inclusion of women	R$ 32,5 million	R$ 3,6 million	89
Food Acquisition Program	R$ 1,3 billion	R$ 431 million	67
Water for All Program - Cisterns	R$ 248,8 million	R$ 40,8 million	94
International Humanitarian Cooperation	R$ 38,4 million	R$ 6,3 million	84

Source: adapted from Vasconcelos et al. (2019). LOA - Annual Budget Law.

Gonçalves, Campos and Sarti (2011) verify whether the user population of the Popular Restaurant Program of the Ministry of Social Development and Fight against Hunger (MDS) is in accordance with the specification of the policy, which prioritize socioeconomically vulnerable people in urban centers. The results show that 60% of the users were between 20 and 60 years old, however the percentage of the population served by the program (at national and regional levels) does not exceed 0.3% of the target population (GONÇALVES; CAMPOS; SARTI, 2011).



Alves and Jaime (2014) reflect on the potential of intersectoral actions between the Unified Health System (SUS) and the National Policy on Food and Nutrition security (PNSAN) for better health conditions of the population. They reported limited dialogue between the different social control councils involved, especially Consea and the National Health Council (CNS) as one of the challenges. In this sense, the authors emphasize that greater recognition of the role of the Intersectoral Commission on Food and Nutrition (CIAN) of the CNS could act as a relevant space for joint articulation (ALVES; JAIME, 2014). The intersectoriality of policies was also the subject of investigation of Dias et al. (2019), however with emphasis on health and education areas of the NutriSUS strategy based on a city in Rio de Janeiro State. The study identified several challenges related to the different and disputed conceptions about the effectiveness of supplementation as a preventive health strategy, as well as other approaches to promoting healthy eating. In order to prevent such differences from impeding the operation of the program in schools, the actors involved established action agreements (DIAS et al., 2019).

Paiva et al. (2019) analyze the contemporary use of the expression "healthy and adequate" in Brazilian public policies for SAN due to transition in the perception of food, previously centered on nutrients and presently incorporating an expanded understanding that takes into account sociocultural and affective issues of eating, and environmental sustainability.

Based on official documents published by different Confederate entities between March 20 and July 30, 2020, Gurgel et al. (2020) investigate the strategies implemented by the Brazilian government to promote the Human Right to Adequate and Healthy Food during the Covid-19 pandemic, a period characterized by high social vulnerability. The study indicates that although the actions taken[11] were relevant, they were limited and insufficient to ensure SAN, being mainly focused on food distribution and guarantee of a minimum income (GURGEL et al., 2020).

11. The following actions are mentioned: Emergency Basic Income (Union); Food Acquisition Program (PAA) and emergency financial aid (states); emergency food donation programs (states and municipalities); adaptation of the National School Feeding Program (PNAE), the national Food Acquisition Program (PAA).

Sawaya et al. (2018) discuss the relevance and difficulties of working with the family nucleus of the low-income populations as a key element of the DHAA. They reported that income instability affects the direct purchase of food and conditions for food preparation at home (for example, due to the lack of appliances and resources to purchase gas), promoting a high tendency to consume ultra-processed foods and beverages (snacks, cookies, soft drinks, sweets, cakes, sausages). The condition is worsened by advertisements that transmit a false sense of social inclusion associated with ultra-processed food consumption. The authors emphasize the need to strategically target women due to their prominent role in family activities related to care and food consumption coupled with the high incidence of them being the head of single-parent families with greater risk of food insecurity (SWAYA et al., 2018).

Bortolini et al. (2019) reports how the Brazilian food guidelines were elaborated collectively through multiple processes with different actors, including: creation of a management committee and a political monitoring committee; public call for contributions from researchers and health professionals; workshops with strategic actors; activities in all states for reflection and mobilization for contribution from public consultation. In turn, Monteiro et al. (2015) analyze the information contained in the 2014 Dietary Guidelines for the Brazilian Population. They concluded that the publication addresses food issues in a complex way, taking into consideration cultural, socioeconomic, environmental, biological and behavioral dimensions of families, thus going beyond nutritional elements. The authors argue that the material provides clear guidelines that tackle comprehensive health and disease prevention, highlighting the benefits of a diet rich in unprocessed and minimally processed foods, as well as meals prepared at home and shared in the family nucleus. A prominent content is the recommendations on the reduction and elimination of ultra-processed and ready-to-eat foods and beverages, given their harmfulness to health. (MONTEIRO et al., 2015).

Two international studies recognize the quality of the 2014 Dietary Guidelines for the Brazilian Population. Fabri et al. (2021) analyze the dietary guidelines of 90 countries based on sustainability and approach to symbolic issues involving food. The Brazilian guide was cited as being one of the few to address both themes. Scrinis and Parker (2016) positively cited the material, due to the use of the NOVA classification and for providing data that help consumers to interpret labels and make more appropriate choices.

In a literature review, Gonçalves, Elias and Da Silva (2020) identify studies in Brazil that address the food environment as a health promotion strategy, especially obesity prevention. From the findings, the national academic production is still quite incipient and recent, since the articles found were normative, written with foreign perspectives and had little connection with the Brazilian reality (GONÇALVES; ELIAS; DA SILVA, 2020).

By conducting a systematic review of the evidence between food consumption and cardiometabolic factors in adults and the elderly, Santos et al. (2020) found that the consumption of ultra-processed products is positively linked to arterial hypertension, metabolic syndrome, overweight and obesity, thus having an unfavorable impact on the health of the population. The study adds that in the field of nutritional epidemiology, NOVA food classification stands out as a fundamental instrument to assess the effects of food processing on health outcomes (SANTOS et al., 2020).

Also, with regard to consumption habits, Claro et al. (2016) investigate the prices of different foods groups not recommended for a healthy diet, based on the 2008-2009 Household Budget Survey. The results indicate that unprocessed foods and culinary ingredients were cheaper when compared to other groups, especially dry grains such as rice and beans. However, fresh foods such as meat, milk, fruits and vegetables had higher values than ultra-processed products (CLARO et al., 2016). From the same database (POF 2008–2009) Canella et al. (2014) analyze the availability of industrialized and ultra-processed products in Brazilian households versus the prevalence of overweight and obesity, indicating that the intake of these products contributed between 15.4% (lower quartile) to 39.4% (upper quartile) to total daily calories. The study found a positive relationship between the availability of ultra-processed products at home with average BMI and the prevalence of overweight and obesity for all age groups analyzed (CANELLA et al, 2014).

Bielemann et al. (2015) assessed the consumption of ultra-processed foods and its impact on nutrient intake in young adults of the city of Pelotas (RS). They report that this type of food accounted for 51.2% of total calories ingested by the study participants. From profile analysis, the youths were mostly women with a normal weight, highly educated and with high income. In associative terms, the consumption of ultra-processed foods

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was negatively related to the intake of carbohydrates, proteins and dietary fiber and positively linked to cholesterol, sodium, iron and calcium intake (BIELEMANN et al., 2015).

Correa et al. (2018) research the potential association between environmental availability of food and the prevalence of overweight or obesity among children aged between 7 and 14 years in Florianópolis (SC). From a sample of 2,195 individuals, the study reveals a positive correlation between the presence of restaurants, public markets and fruit trees near the homes of overweight and obese children, (CORRÊA et al., 2018).

Based on the NOVA classification, Barbosa et al. (2020) investigates the household availability of food in relation to SAN in Tocantins, after evaluating 95 households over 30 days. The authors found a total prevalence of 55.79% of INSAN among the participants. Working conditions, income and education were taken as factors influencing the SAN conditions of families and access to food in adequate quantity and quality (BARBOSA et al., 2020). The study showed that although unprocessed and ultra-processed foods were mostly present in households, there was a positive correlation between INSAN and the presence of milk, animal fat, canned foods and cheese bread. This could mean that despite the classification of some of these families as SAN based on the EBIA criteria, they did not have access to food with good nutritional quality. The study also reveals a higher incidence of overweight among individuals with INSAN, which may be related to the previously mentioned foods, especially whole and farm milk, which are rich in saturated fats. In parallel, in households with higher INSAN, there was greater availability of ultra-processed products, with their consumption being greater than that of unprocessed and minimally processed foods (BARBOSA et al, 2020).

Two studies assess Brazilian schools from different perspectives. Carmo et al. (2018) conduct a survey with public and private institutions in order to characterize the food environment. The study sample was 1,247 schools (81.09% were public and 18.91% private) from 124 municipalities in different states[12]. The results indicate that the supply of food was significantly higher (98.1%) in public schools due to PNAE, compared to private schools with a higher incidence of internal sales of food and beverages, mainly industrialized and ultra-processed (Carmo et al., 2018). The number of street vendors in the vicinity

12. At the time of the study, 10 of the 26 Brazilian states had some legal provision (ordinance, resolution, decree, or law) with guidelines on the marketing of food in the school environment.

of public schools (41.32%) and private ones (47.75%) demonstrate that private schools have a greater obesogenic environment. Geographically, institutions located in the North Region had a less qualified food environment when compared to the South and Northeast regions (CARMO et al., 2018).

Albuquerque et al. (2014) explored the perceptions of students about the school environment in public institutions in Ceilândia (DF) and found that students are able to recognize the parameters of adequate and healthy eating, as well as identify factors that motivate beneficial choices. From the opinion of the students, it was inferred that decision-makers and educators of the schools did not establish a support structure to assist in healthy food decision (ALBUQUERQUE et al., 2014).

Two surveys address the issue of food labeling. Cavada et al. (2012) evaluate supermarket consumers in Pelotas (RS) as regards reading product labels. They found that 48.13% read labels and use it as a reference to define judicious food choices. The study show that most respondents understand and interpret label information well, although it is necessary to note that the study sample was composed of young women with a high level of education (CAVADA et al., 2012). Gonçalves et al. (2015) with similar research goals, investigate consumers in the city of São Vicente (SP). In their study, 54.28% of respondents read food labels and 52.86% declare that the information on the label influence their purchase decision. The study also indicates that 90% of the participants interpret the expiration date as the most relevant label information and 48.57% believed that that fat content was the most important information on the nutritional table (GONÇALVES et al., 2015). On the other hand, 84.28% of the participants did not understand label information and 51.43% did not trust label information.

Considering the increasing international trend of eating outside the home, Santos et al. (2011) assess how pay-by-weight restaurants affect the health of individuals. They conclude that given the characteristics of these establishments (available food diversity), they can act as a potentially healthy environment, even though health depends on the effective choice of individuals. Horta et al. (2021) verify food characteristics and marketing strategies used by two delivery applications in Belo Horizonte (MG). They discovered a higher offer of ultra-processed beverages (78%) when compared to water and natural juices, and the same occurred for ultra-processed meals, which is 70% of the total menu. The use of images and discounts were highly utilized for ultra-processed beverages, sandwi-

ches, ice cream, candies and packaged snacks, while this strategy was rarely used when offering fruits and vegetables (HORTA et al., 2021).

In view of the priority themes of this dimension, it is important to note that tax strategies for the promotion of healthy eating were not investigated by any study. The few articles identified were international studies, especially Portuguese studies on taxation in the European Union and some monographs and dissertations on Mexico and Chile, the vast majority in the field of law.

7.4.2 RECOMMENDATIONS FOR A HEALTHIER, MORE SUSTAINABLE AND EQUITABLE OUTLOOK

The recommendations vary according to the different themes covered in the previous section. Vasconcelos et al. (2019) argue that mobilization of national and international actors and instruments is necessary to guarantee the Brazilian population the human right to adequate food, seeking to control and reverse the current political setbacks (VASCONCELOS et al., 2019; GURGEL et al., 2020). Bortolini et al. (2019) emphasize that government institutions can be strengthened, guaranteeing social participation in decision-making processes aimed at the prevalence of interests of the civil society concerning public health. The authors also highlight that the construction of guidelines for the promotion of healthy eating and the prevention diet-related problems can be transparent, and with the participation and collaboration of multiple actors and social sectors (BORTOLINI et al., 2019).

Gonçalves, Campos and Sarti (2011) indicate the need for additional 44,864 restaurants under the Popular Restaurant Program in order to supply food to the insecure population (72,004,996 people, according to 2011 data). The authors also recommend mechanisms to monitor the implementation of actions and the served population, as well as the integration of the program with other SAN programs in order to better serve the target public (GONÇALVES; CAMPOS; SARTI, 2011).

In order to have greater intersectorality between health, education and SAN policies, it is suggested that this element should also be present in the action planning process, so that the objectives and strategies are aligned in an integrated manner, with clear conceptions of concepts and perspectives. This allows the implemented programs to be monitored and evaluated based on a multidisciplinary perspective (ALVES; JAIME, 2014; DIAS et al., 2019).

Sawaya et al. (2018) defend the need for SAN public policies to prioritize the family nucleus in services rendered by DHAA actions, especially for publics that are in precarious socioeconomic conditions. For this population to be better served, two strategies are recommended: a) the "active search" method, where the executing agent goes out to find families in need; b) the relational approach for recovery and nutrition education, with special attention to women (SWAYA et al., 2018). Bielemann et al. (2015) propose the expansion of policies that improve the socioeconomic conditions of families as a way to guarantee SAN, as well as the elaboration of actions that promote the consumption of regional foods and local production.

Carmo et al. (2018) recommend the elaboration of public policies for the qualification of the school food environment considering the offer of meals and all factors that affect student´s food consumption, namely: the presence of food and beverage vending machines; advertisements of processed foods; existence of a well-structured cafeteria inside school premises and the presence of street vendors in school vicinity. The authors also propose a national legislation that restricts the sale and marketing of ultra-processed foods in public and private schools, higher scrutiny and nutritional education of schoolchildren (CARMO et al., 2018). Albuquerque et al. (2014) cautions that educators and health professionals involved in school activities should include students in the development of actions to improve the food environment.

Considering that the consumption of ultra-processed foods is harmful to health, different authors advocate actions that facilitate the population's access to unprocessed and minimally processed foods, promoting the adoption of more appropriate eating habits (CANELLA et al., 2014; BIELEMANN et al., 2015; CLARO et al., 2016; SANTOS et al.; 2020; BARBOSA et al.; 2020).

Canella et al. (2014) argue that the reduction of overweight and obesity rates will only occur if measures are taken to control the production and consumption of ultra-processed products.

It is recommended to increase nutrition education programs and actions to disseminate the Dietary Guidelines for the Brazilian Population among the society in general, caregivers and health professionals (SANTOS et al.; 2011; MONTEIRO et al; 2015; SCRINIS; PARKER, 2016; SAWAYA et al., 2018; BORTOLINI et al., 2019; FABRI et al., 2021). Gonçalves et al. (2015) recommend education and communication actions that can help the population understand food label information.

Santos et al. (2011) emphasize the important role of nutritionists in guiding restaurants to set up healthy menus so that these places can be healthy eating environments. Finally, Gonçalves, Elias and Da Silva (2020) highlight the need for national surveys on the relationship between food environment, food systems and diet quality, being relevant for the strengthening of knowledge in this field and serves as a basis for public policies to promote adequate and healthy food.

7.5 GOVERNANCE DIMENSION

The dimension refers to the dynamics of how the State, norms and actors interact in the construction and maintenance of food systems. Beyond the set of institutionalized rules or legal frameworks, what is at stake is how the processes, whether formal or informal, influence and govern the relationships between the different actors. Thus, relations between governments, non-governmental Organizations (NGOs), organized civil society movements, multinational corporations and the global capitalist market are included. It is a highly complex and dynamic dimension, which directly and indirectly affects all the themes discussed here, especially because corporate hegemony is maintained in food systems through the materialization of dominant narratives and political forces.

For Swinburn et al. (2019), the power of corporate lobbying repeatedly prevents the formulation of government policies favorable to the society, reinforcing the political inertia that

maintains unhealthy and unsustainable food environments. The authors add that in many countries the governance structures are weak or corrupt, making them even more fragile and influenceable. It is important to point out that the opposite is also a fact, that is, in several countries where the regulatory mechanisms contribute to healthy and adequate food, it took the commitment of political leaders, an example is the labeling of food products in Chile (SWINBURN et al., 2019).

Although academia contributes with scientific evidence whereas civil society organizations act in the favor of an ecological, equitable and prosperous transition, the asymmetry of power between the different sectors makes it difficult for them to be heard. In many national and international processes, these actors are not always invited to the "decision table". In view of this, transparent and accountable governance structures are needed, which include the effective participation of the different actors involved in food systems, free from conflicts of interest and intervention mechanisms that promote power symmetry.

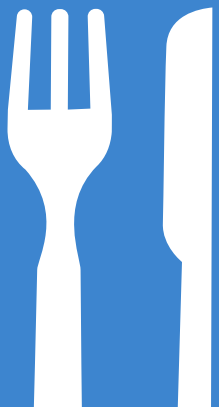
Since 2006, Brazil has had a National System for Food and Nutrition security (SISAN), anchored by the Organic Law on Food and Nutrition security (LOSAN) with one of its principles being a public system aimed at intersectoral and participatory management. On this basis, we will discuss the dynamics of governance proposed in this legislation as a topic of special interest in view of Brazil´s reality at different scales of management (federal, state and municipal).

7.5.1 THE BRAZILIAN SCENARIO IN THIS DIMENSION

In addition to data on the implementation of SAN actions at different scales, the results of the literature review provide information on the historical process behind relevant public policies and evaluations of the intersectoriality of different programs.

Maluf, Burlandy and Prado (2020) emphasize that a "sociopolitical field" began to consolidate in favor of SAN after redemocratization, bringing together academia, social organizations and public managers in Brazil. This process had a high influence on the structuring of a series of public policies launched from 2003, of which hunger and malnutrition are addressed in a multidimensional manner, resulting in the launch of the Zero

Hunger Program by the Federal Government[13], and the establishment of important legal milestones at different frontiers. Among them, the following stand out: a) the creation of the Organic Law on Food and Nutrition security (LOSAN) giving rise to the National System of Food and Nutrition security (SISAN); b) adaptations PNAE for the purchase of food from family farming and c) the reformulation of Consea's attributions as a formal social control body for prompt advisory service to the executive power in the three spheres of government - municipal, state and federal (Maluf, Burlandy; Prado, 2020). The authors also emphasize the fact that the legal definition of food security and nutrition adopted in the country and transformed into law is a concept debated and formulated at the II National Conference on Food Security, reinforcing the importance of collective participation processes (MALUF; BURLANDY; PRADO, 2020). The wording of the SAN concept is:



Food and Nutrition Security is the right of everyone to regular and permanent access to quality food, in sufficient quantity, without compromising access to other essential needs, based on health-promoting food practices that respect cultural diversity and that are environmentally, culturally, economically and socially sustainable. (BRAZIL, 2006)

With a similar perspective, Grisa and Schneider (2014) conducts a historical assessment of public policies for family farming in Brazil and argue that the actions can be characterized in three generations. The first generation comprises a long period of Brazilian history; it begins in the second half of the 1950s and is marked by two agricultural and agrarian perspectives of family farming (GRISA; SCHNEIDER, 2014). On one hand, there were calls for basic reforms and actions that could make the inter-

13. The program in question is part of a proposal prepared by the Instituto Cidadania (non-governmental organization) in the late 1990s, with a broad group of experts and activists in the field, being converted into the government program and implemented by the administration of President Luiz Inácio Lula da Silva (Takagi, 2010; Leão and Maluf, 2012).

nal market more dynamic and generate greater social inclusion; on the other hand, the technological modernization of agriculture was seen as the best form of fostering the development of the country's economy, giving centrality to crop exportation and agro-industrial interest (GRISA; SCHNEIDER, 2014). In the late 1970s, the country's redemocratization gave birth to new social and union movements[14] with strong public presence, exposing the precarious social living conditions of small-scale farmers. Although these mobilizations resulted in legal achievements, the process of economic liberation coupled with the political and financial crisis of the 1980s facilitated international agreements and imports of agricultural products, increasing the fragility of small-scale Brazilian farmers. The legal milestones achieved in this period were the Agricultural Law (1991), the institutionalization of Pronaf (1995), the creation of the Family Farming Insurance (Seaf) (2004), the Family Farming Price Guarantee Program (2006) and the resumption of Technical Assistance and Rural Extension (ATER) (GRISA; SCHNEIDER, 2014).

During the FHC government in the 1990s, a new generation of public policies with emphasis on assistance was inaugurated, extending to the Lula Government and the Zero Hunger Program, for which Bolsa Família was the flagship of actions (GRISA; SCHNEIDER, 2014). Also noteworthy in this period were the creation of the Pronaf Infrastructure and Municipal Services line [linha de Infraestrutura e Serviços Municipais do Pronaf], Pronaf B, School Grant [Bolsa Escola], Food Grant [Bolsa Alimentação], Gas Aid [Auxílio Gás], Green Grant Program [Programa Bolsa Verde], Harvest Guarantee Program [Programa Garantia Safra], Rural Housing Program [Programa de Habitação Rural] and Sustainable Development of Rural Territories Program [Programa Desenvolvimento Sustentável de Territórios Rurais] (created in 2003 to replace Pronaf Infrastructure and Municipal Services, which were abolished in the same year) and the Lands of Citizenship Program [Programa Territórios da Cidadania] (GRISA; SCHNEIDER, 2014). Grisa and Schneider (2014) argue that these policies acted to improve the conditions for social and economic reproduction of family farming, helping the category to interact better in agricultural markets and paving the way for a third generation of public policies focused on the construction of markets oriented towards food security and environmental sustainability.

The third generation went into effect in the 2000s, with the following legal milestones being highlighted: the PAA; Law n. 11,947, which allocates a minimum of 30% of federal resources to the purchase of family farming products via PNAE; the National Program for the Production and Use of Biodiesel [Programa Nacional de Produção e Uso do Biodiesel]; the Minimum Price Guarantee Policy for Sociobiodiversity Products [Política de Garantia de Preços Mínimos para os Produtos da Sociobiodiversidade] (PGPM-Bio). Mechanisms to support agroindustry also stand out (Municipal, State, Federal) Inspection System [Sistema de Inspeção]; Unified Agricultural Health Care System [Siste-

14. Among the social organizations that emerged during the period were the Unified Workers´ Central (CUT) (1983), with a National Department of Rural Workers; the Landless Workers Movement (MST)

ma Unificado de Atenção à Sanidade Agropecuária]), value addition (Identification Seal for family farmers [Selo da Identificação da Participação da Agricultura Familiar], Quilombos do Brasil Seal, Geographical Indications [Indicações Geográficas]) and organic production certification via participatory guarantee systems (GRISA; SCHNEIDER, 2014). It is important to emphasize that, although the characteristics of the generations emerged in different historical periods, they currently coexist in parallel and continue to be active in public arenas (GRISA; SCHNEIDER, 2014). The study also indicated a transformation in the relations between the State and civil society, which shifts from a more challenging and demanding dynamic to a constructive interaction, making civil society a collaborator in the execution and administration of public policies from the 2000s onwards. (GRISA; SCHNEIDER, 2014).

Different articles deal with the repercussions of these actions at the international level. Based on investigations about SAN governance processes in Latin America, Pérez-Escamilla, Shamah-Levy and Candel (2017) highlight the Brazilian experience, which, since 1990, has strived to intergrate different segments of civil society in planning instances and action, especially for Consea. To the authors, these programs created a context of participatory and democratic decision essential for the materialization of a multidimensional perspective linked to the fulfillment of human rights. Another positive contribution that the country makes to the region is the use of EBIA as a monitoring mechanism for the policies in force, as well as SAN conditions of the population at different levels of management (PÉREZ-ESCAMILLA; SHAMAH-LEVY; CANDEL, 2017).

The legal framework of the Brazilian SAN was mentioned by Swinburn et al. (2015) as a positive example of a legal structure that gives civil society a leading role in policy formulation, throwing light on the role of Consea, CAISAN and SAN National Conferences in the governance structure and creation of mechanisms for participation and social control of the State and private sector. According to Candel (2014), SAN governance is both a challenge and a solution, with the Brazilian structure and the allocation of a specific ministry to deal with the portfolio (the former MDS) being a highly positive development.

Siegel and Lima (2020) investigate the extent to which Sustainable Development Goals (SDGs) have been considered in the internal agrifood governance policy of Latin American countries. They conclude that the capacity of the 2030 Agenda to contribute to the inclusion of different actors is widely defined by the nation´s political context, power relations, the availability of resources and the appropriation of civil society and governments on the subject. In the case of Brazil in particular, the authors indicate that at the beginning of the 21st century, different processes placed the country on a high international pedestal as an agricultural power and a relevant case of poverty and hunger reduction, with sustainable use of environmental resources and an admirable institutionalized participa-

tion of civil society in the governance of food systems via thematic councils, all processes strongly aligned with the SDGs (SIEGEL; LIMA, 2020).

However, the intense political transition that began in 2016 resulted in series of setbacks involving the elimination of Ministries, the extinction of Consea and the loss of a set of essential policies in parallel with actions to favor the agribusiness sector (SIEGEL; LIMA, 2020). On the other hand, the results also indicate that the 2030 Agenda created positive opportunities for Brazilian NGOs internationally, facilitating communication with global organizations and the appreciation of materials produced by these institutions (reports, positions, analyses, etc.), thus increasing funding opportunities and visibility of the different perspectives present in the country (SIEGEL; LIMA, 2020). Despite setbacks at the federal level, government actions at the state level continued, with emphasis on the state of Maranhão as the first to form a Subnational ODS Commission, making the challenge for actions in favor of ODSs in Brazil currently linked to activities of civil society and subnational governments (SIEGEL; LIMA, 2020).

In relation to the Brazilian SAN policy in the international scenario, Sarmento et al. (2015) carried out a review of the construction and implementation of the Food and Nutrition Security Strategy of the Community of Portuguese Language Countries (CPLP) with the objective of making SAN a priority element in the political agenda and outlining actions carried out in the period 2008 to 2015. The authors indicate that the collaborative action of the countries was very important in terms of social participation and political influence, contributing to future discussions about the demands of vulnerable groups in regional and international forums. At the same time, this action also helped create cooperation between countries through national organizations and networks – an unprecedented process that strengthens the demands in each country (SARMENTO et al., 2015).

A set of studies addressed the capillarization of policies at different administrative scales. Brandão et al. (2016), for example, published a literature review to identify the contributions about Governance in SAN (Brazil). From the results, the scenario pointed to a decentralized and inclusive process, where the perspectives of different actors were being considered, even though mechanisms were needed to better balance the representation of different territories. Vasconcellos and Moura (2018) investigate the extent to which SISAN decentralization proposal is applied in accordance with the criteria established by law. They conclude that there is a strong performance of all states of the federation against greater fragility at the municipal level, since less than half of the municipalities had an institutional instance dedicated to the subject. The social assistance agencies are the most connected to the leadership of decentralization processes at different scales, although in the municipalities there is also a strong incidence in the health area (VASCONCELLOS; MOURA, 2018). With regard to the development of SAN actions, the authors identified a strong dependence on financial resources from the federal

government, showing that the lack of instability in investments and the insufficiency of solid institutional mechanisms can weaken the implementation of actions and hinder the realization of SISAN objectives (VASCONCELLOS; MOURA, 2018).

Seeking to understand the challenges faced by the municipal management of SISAN in 45 municipalities in RN, De Medeiros et al. (2019) interviewed 651 actors, including public managers and civil society, from 2016 to 2018. They found the following obstacles: difficulties of governance board in collecting information about the policy, lack of understanding of intersectoriality by managers of MapaSAN; inability to establish municipal goals to meet the SAN policy; high turnover in the management team and lack of qualification of employees involved in the implementation of actions resulting in loss of references and information. In addition, the authors report that the audit process and social participation is hampered by the lack of understanding of available resources and the lack of mechanisms for monitoring and mobilizing the population (DE MEDEIROS et al., 2019).

De Araújo Palmeira, De Mattos and Salles-Costa (2020) sought to identify the SAN government actions implemented in Cuité, a small rural municipality in northeastern Brazil, and find a positive context with government initiatives in six areas: food and water supply; social protection; education; rural development; health and food safety. However, they emphasize that most of the actions implemented between 2003 and 2014 were led by the federal government. Although it may indicate a certain dependence of the municipal sphere on the federal sphere, this element was interpreted as positive by the authors, arguing that this political-administrative capillarity becomes beneficial in such a vulnerable place, thus positively act to reduce social inequalities (DE ARAÚJO PALMEIRA; DE MATTOS; SALLES-COSTA, 2020).

PNAE is the focus of analysis of two studies. Sonnino, Torres and Schneider (2014) analyze the key legislation for the functioning of Brazilian school feeding, indicating that recent changes in legislation have created an inclusive governance that helped in the decentralization of social participation and the inclusion of actors who were previously excluded or hardly participated in the process such as producers and consumers. For these authors, the evolution of the national school feeding system has helped to create constant interactions between actors located at different scales and stages of the food system through inclusive governance mechanisms and the mediation of collective bodies (such as School Feeding Councils - CAEs), in a dynamic of administrative and multi-scale decentralization (SONNINO; TORRES; SCHNEIDER, 2014). Despite the legal regulations, the survey reveals that the level of investment in family production is lower than the percentage of budget allocated to conventional products throughout the country. There are significant variations between regions, while the richest municipalities in the South invest up to 37% of resources in family farming, the

territories in the North and Northeast with greater precarious social conditions use smaller percentages of resources (SONNINO; TORRES; SCHNEIDER, 2014).

In turn, Hawkes and colleagues (2016) analyze the PNAE processes to include family farming as a food supplier group and synthesize five lessons to qualify the intersectorality of actions. They are: a) openness to dialogue and willingness to embrace the different perspectives and ideas of the multiple actors involved in the process; b) establishment of partnerships with more powerful sectors in order to achieve goals; c) positioning nutrition and health goals in a multifunctional way, meeting the interests and demands of multiple sectors; d) organization and dissemination of evidence of the beneficial results of intersectoral action; e) openness to the proposition of bold and innovative ideas.

Two studies contribute critical perspectives on conflicts of interest and the negative influence of the private sector on the formulation of public policies. Pereira et al. (2020) argue that there is a vicious cycle of Brazilian institutional politics, in which the financing of electoral campaigns affects the governance of food systems, especially in the face of the actions of the so-called ruralist caucus that drive the expansion of agricultural frontiers and lax of environmental legislation.

Based on the theory of collective action, Mariath and Martins (2020) investigate how the ultra-processed food industry uses its economic power to influence the formulation of public policies, acting especially through associations. The authors emphasize that few studies in Brazil have contributed to this field of knowledge. The case of regulation of food advertising, which culminated in Collegiate Board Resolution No. 24/2010 (discussed by Henriques; Dias; Burlandy, 2014) is one of the few contributions that clarify how the privileged access of lobbyists of the Brazilian Association of Food Industry (ABIA) and the Brazilian Association of Soft Drinks and Non-Alcoholic Beverage Industries (ABIR) influenced the relaxation of regulations and the publication of a lighter wording of the standard (MARIATH; MARTINS, 2020).

Mariath and Martins (2020) analyze two ongoing regulatory processes that affect the ultra-processed food industry. The first, launched in 2014 by Anvisa with the purpose of chan-

ging the rules for nutritional labeling of industrialized foods, in which a set of associations articulated through the Labeling Network[15] have mobilized several strategies to define a more favorable standard for the sector (the traffic light nutrition labeling model). The second process refers to Decree No. 9394 of May 30, 2018, in which tax benefits provided to soft drink companies operating in the Manaus Free Trade Zone were circumscribed in order to compensate for the decline in the collection of federal funds, due to the impacts of the truck drivers' strike that took place in the same year (MARIATH; MARTINS, 2020). The action was publicly opposed by ABIR, which caused the government to back down, partially restoring the subsidy in favor of the company (MARIATH; MARTINS, 2020).

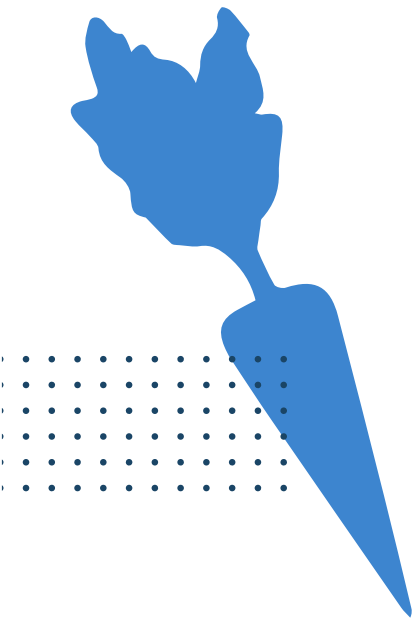
Considering the importance of SAN in its systemic and multi-scale character, Zúñiga-Escobar, Grisa and Coelho-De-Souza (2021) provide an academic contribution, suggesting the use of Public Policy Networks (RPP) as a reference theoretical framework for analyzing the action and interaction of the various actors that act in the governance of the food system. Finally, considering sustainability issues, Joly et al. (2019) emphasize that governance actions in territories directly affect biodiversity, since currently 47% of national lands are managed collectively and publicly, and the other 53% are under private responsibility. Since the Federal Constitution of 1988 came into force, a small recovery of the indigenous Brazilian population has been observed, currently occupying 17% of the country's territory in areas characterized as Indigenous Lands, Quilombola Territories, Extractive Reserves and Sustainable Development Reserves (JOLY et al., 2019). The authors emphasize that guaranteeing the rights of these populations and their participation in the various decision-making instances on public policies are essential for the maintenance of democratic processes and the effective governance of national biodiversity (JOLY et al., 2019).

15. According to **https://www.rederotulagem.com.br**, the network is formed of 21 entities: ABIA – Brazilian Association of Food Industries; ABIR – Brazilian Association of Soft Drinks and Non-Alcoholic Beverage Industries; ABIAD – Brazilian Industry Association of Food for commercial and similar purposes; ABIAM – Brazilian Association of Industry and Commerce of Ingredients and Food Additives; ABICAB – Brazilian Association of Chocolate, Cocoa, Peanut, Candy and Derivatives Industry; ABLV – Brazilian Association of the Long Life Dairy Industry; ABIMAPI – Brazilian Association of Biscuits, Pasta and Industrialized Bread & Cakes Industries; ABIOVE – Brazilian Association of Vegetable Oil Industries; ABIQ – Brazilian Association of Cheese Industries; ABITRIGO – Brazilian Association of the Wheat Industry; APAS – São Paulo Association of Supermarkets; ABPA – Brazilian Association of Animal Protein; ABRAS – Brazilian Association of Supermarkets; ABRE – Brazilian Packaging Association; SIAEG – Union of Food Industries in the State of Goiás; SINDICARNES SP – Union of Meat and Derivatives Industries in the State of SP; SINDILEITE – Union of Dairy and Milk Products Industries of the State of Bahia; Viva Lácteos – Brazilian Dairy Association; UNICA – Sugarcane Industry Union; Firjan – Federation of Industries of the State of Rio de Janeiro and CNI – National Confederation of Industry.

7.5.2 RECOMMENDATIONS FOR A HEALTHIER, MORE SUSTAINABLE AND EQUITABLE OUTLOOK

Based on a considerable number of studies, the legal framework of SAN is a significant social achievement and its proposal is strongly aligned with the multi-scale and multi-sector service of SAN and DHAA. It has a clear process of participatory governance and principles that enable the social control of the State based on democracy exercised by multiple actors in society (CANDEL, 2014; SWINBURN et al., 2015; BRANDÃO et al., 2016; VASCONCELLOS; MOURA, 2018; PÉREZ-ESCAMILLA; SHAMAH-LEVY; CANDEL, 2017; MALUF, BURLANDY; PRADO, 2020). The Brazilian legal framework is also characterized in a multidimensional way, by outlining policies that consider not only the process of consumption and use of food, but also the process and socioeconomic context of food production, with clear proposals for the valorization of family farming and traditional people, and initiatives focused on the sustainability of the food system (GRISA and SCHNEIDER; 2014; JOLY et al.; 2019; SIEGEL and LIMA, 2020; MALUF, BURLANDY; PRADO, 2020).

However, publications that analyze the contemporary scenario, such as that of Siegel and Lima (2020), warn of a serious political setback, where many SAN actions have been weakened with reduced resources, precarious services or even total extinction of highly relevant folders and instances such as the national Consea, hence requiring a strong action by society so that the conquered rights are maintained (SIEGEL; LIMA, 2020). With regard to the implementation of the 2030 Agenda, Siegel and Lima (2020) emphasize that the national political circumstances under which the ODS are being implemented should be understood, in order to ensure that the mechanisms for agenda localization contribute to the combat against structural inequalities and manipulation by private interest groups. For the authors, if there is no clear planning and effective intersectoral action, the achievement of global goals will become malleable according to domestic contexts, subject to the uptakes of agendas and a high risk of aggravating the inequalities experienced in the country with a supposed legitimacy of the international community (SIEGEL; LIMA, 2020).



With regard to the South-South cooperation implemented by the CPLP Food and Nutrition Security Strategy, the recommendations were aimed at tackling the main challenges identified by Sarmento et al. (2015). Among them are: the need for greater support for the institutionalization of national organizations in order to strengthen their action in the legal structures of SAN; the need to raise funds for the maintenance and expansion of the ongoing works; strengthening of the Civil Society Participation Facilitation Mechanism of the CPLP Food Security Council (CONSAN--CPLP); boosting the activities of the working groups, especially those focused on Family Farming; ensuring the understanding and agreement of the complex decision-making structure as a governance system that recognizes national differences and identities.

Different authors recommend the creation of a stable multi-scale financing dynamic for SISAN's actions, generating less dependence on the federal government, as well as strengthening intersectorality, especially at the municipal level (VASCONCELLOS; MOURA, 2018; DE ARAÚJO PALMEIRA; DE MATTOS; SALLES-COSTA, 2020). Vasconcellos and Moura (2018) proposes the structuring of effective decentralization mechanisms focused on facilitating the municipal capillarity of SAN, so that municipalities invest more in actions that prioritize the transition to agroecological and fair food systems, with the consolidation of local agendas that integrate rural and urban dynamics. De Medeiros et al. (2019) suggests continuous training of municipal technicians and managers responsible for the implementation of SAN activities, as well as the construction of municipal operationalization plans for SISAN in order to outline execution indicators that assist in information disclosure and transparency of the actions.

Sonnino, Torres and Schneider (2014) advocate the development of inclusion strategies in the governance of the Brazilian school feeding program for the poor, uneducated, and ethnic and racial minorities. They also consider the regional differences that affect the participation of actors in decision-making bodies - in this case, the creation of mechanisms that allows a regular flow of knowledge and information between policy makers at different levels of management can help in the dissemination of best practices and the expansion of local innovations (SONNINO; TORRES; SCHNEIDER, 2014).

Mariath and Martins (2020) defend the expansion of national research on the influence of companies in the food sector on the process of public decision-making in the country, a process which favors the private sector to the detriment of the constitutional guarantee of the population to health and adequate diet. Finally, Pereira et al. (2020) recommends that the process of financing electoral campaigns be reformulated in order to mitigate private influence in the construction of public policies in the country.

7.6 POLITICAL-NORMATIVE FRAMEWORKS IN THE LITERATURE THAT CONTRIBUTE TO A HEALTHY AND SUSTAINABLE FOOD SYSTEM

The Brazilian political-normative frameworks mentioned in the analyzed literature are listed below, with the potential to facilitate the process of transition to a healthy and sustainable food system. The first section presents the constitutional norms, federal legislation and regulatory norms (including those authored by the National Congress, the Executive Branch or collegiate and intersectorial bodies). The second section highlights some statewide milestones. It is noteworthy that a specific study, aimed at reviewing the national and state legal system, has the potential to provide a more complete list.

7.6.1 POLITICAL-NORMATIVE FRAMEWORKS AT THE FEDERAL LEVEL

Constitutional Amendment	
BRAZIL. Constitution (1988). Constitutional Amendment No. 64, of May 15, 2007. Gives new wording to art. 6 of the Federal Constitution, adding Food and Communication as a social right. Brasília, *Official Gazette of the Union*, 2 Oct, 2007.	2007

Laws	
BRAZIL. Law No. 4,829, of November 5, 1965. Institutionalizes rural credit. *Official Gazette of the Union*, Brasília, 05 Nov, 1965.	1965
BRAZIL. Constitution (1968). Law No. 5537, of November 28, 1968. Creates the National Institute for the Development of Education and Research (INDEP), and other measures. Brasília, *Official Gazette of the Union*, Brasília, Nov. 28, 1968	1968

BRAZIL. Law No. 5.727, of November 4, 1971. Provides for the First National Development Plan (PND), for the period from 1972 to 1974. Brasília, Official *Gazette of the Union*, November 8th. 1971.	1971
BRAZIL. Law No. 6,938, of August 31, 1981. Provides for the National Environmental Policy, its purposes and mechanisms for formulation and application, and other measures. *Official Gazette of the Union*, Brasília, 31 Aug.,1981.	1981
BRAZIL. Law No. 7.661, of May 16, 1988. Establishes the National Coastal Management Plan and other measures. *Official Gazette of the Union*, Brasília, May 18th., 1988.	1988
BRAZIL. Law No. 7,802, of July 11, 1989. Provides for research, experimentation, production, packaging and labeling, transport, storage, commercialization, commercial advertising, use, import, export, final destination of waste and packaging, registration, classification, control, inspection and inspection of pesticides, their components and the like, and other measures. *Official Gazette of the Union*, Brasília, 11 July, 1989.	1989
BRAZIL. Law No. 8069, of July 13, 1990. Provides for the Statute of Children and Adolescents and other measures. *Official Gazette of the Union*. Brasília, July 13, 1990.	1990
BRAZIL. Law 8.171, of January 17, 1991. Provides for agricultural policy. *Official Gazette of the Union*, Brasília, 18 Jan., 1991.	1991
BRAZIL. Law No. 8629, of February 25, 1993. Provides for the regulation of constitutional provisions related to agrarian reform, provided for in Chapter III, Title VII, of the Federal Constitution. *Official Gazette of the Union*, Brasília, 25 Feb., 1993.	1993
BRAZIL. Law 8.742, of December 7, 1993. Provides for the organization of Social Assistance and other measures. Brasília, *Official Gazette of the Union*, 08 Dec., 1993.	1993
BRAZIL. Complementary Law No. 87/96, of September 13, 1996. Provides for the State and Federal District tax on transactions relating to the circulation of goods and on the provision of interstate and intermunicipal transport and communication services, and other provisions. (KANDIR LAW). *Official Gazette of the Union*, Brasília, 16 Sept., 1996.	1996
BRAZIL. Law No. 9533, of December 10, 1997 - Authorizes the Executive Branch to grant financial support to Municipalities that institute programs to guarantee minimum income associated with socio-educational actions. *Official Gazette of the Union*, Brasília, 10 dec.,1997.	1997

BRAZIL. Law n.9433, of January 8, 1997. Establishes the National Water Resources Policy, creates the National Water Resources Management System, regulates item XIX of art. 21 of the Federal Constitution, and amends art. 1 of Law No. 8.001, of March 13, 1990, which amended Law No. 7990, of December 28, 1989. *Official Gazette of the Union*, Brasília, Jan., 1997.	1997
BRAZIL. Law No. 9,782 of January 26, 1999. Defines the National Health Surveillance System, creates the National Health Surveillance Agency, and other measures. *Official Gazette of the Union*, Brasília, 26 Jan., 1999.	1999
BRAZIL. Law No. 9,985, of July 18, 2000. Regulates art. 225, § 1, items I, II, III and VII of the Federal Constitution, establishing the National System of Nature Conservation Units and other measures. *Official Gazette of the Union*. Brasília, July 18, 2000.	2000
BRAZIL, Law No. 10.696, of July 2, 2003. Provides for the renegotiation and extension of debts arising from rural credit operations, and other measures. *Official Gazette of the Union*, Brasília, 03 Jul., 2003.	2003
BRAZIL. Law nº 10.711, of August 5, 2003. Provides for the National System of Seeds and Seedlings and other measures. *Official Gazette of the Union*, Brasília, 06 Aug., 2003.	2003
BRAZIL. Law No. 10,831, of December 23, 2003. Provides for organic agriculture and other measures. *Official Gazette of the Union*, Brasília, 24 Dec., 2003.	2003
BRAZIL. Law no. 10,835, of January 8, 2004. Establishes basic citizenship income and other measures. *Official Gazette of the Union*, Brasília, 08 Jan., 2004.	2004
BRAZIL. Law nº 10836, of January 9, 2004. Creates Bolsa Família Program and other measures. *Official Gazette of the Union*. Brasilia, 09 Jan., 2004.	2004
BRAZIL. Law No. 10,962, of October 11, 2004. Provides for the offer and ways of fixing the prices of products and services for the consumer. Brasília, *Official Gazette of the Union*, 2004.	2004

BRAZIL. Law nº 11.105, of March 24, 2005. Regulates items II, IV and V of § 1 of art. 225 of the Federal Constitution, establishes safety standards and inspection mechanisms for activities involving genetically modified organisms – GMOs and their derivatives, creates the National Biosafety Council – CNBS, restructures the National Technical Biosafety Commission – CTNBio, provides for the National Policy Biosafety – PNB and other measures. *Official Gazette of the Union*, Brasília, March 24th., 2005.	2005
BRAZIL. Law No. 11.326, of July 24, 2006. Establishes the guidelines for the formulation of the National Policy on Family Agriculture and Rural Family Enterprises. *Official Gazette of the Union*, Brasília, July 24th., 2006.	2006
BRAZIL Law No. 11.346, of September 15, 2006. Creates the National Food and Nutrition Security System - SISAN with the vision of ensuring human right to adequate food and other measures. *Official Gazette of the Union*. Brasilia, Sept. 18, 2006.	2006
BRAZIL. Law n°11.428, of December 22, 2006: Provides for the use and protection of native vegetation in the Atlantic Forest Biome and other measures. *Official Gazette of the Union*, Brasília, 22 Dec., 2006.	2006
BRAZIL. Law No. 11,947, of June 16, 2009. Provides for the provision of school meals and the Direct Money Program in school for basic education students. *Official Gazette of the Union*, Brasília, 16 Jun., 2009.	2009
BRAZIL. Law No. 12,187, of December 29, 2009. Establishes the National Policy on Climate Change and other measures. *Official Gazette of the Union*, Brasília, 29 Dec., 2009.	2009
BRAZIL. Law No. 11,947, of June 16, 2009. Provides for the provision of school meals and the Direct Money Program for basic education students. *Official Gazette of the Union*, Brasília, 16 Jun., 2009.	2009
BRAZIL. Law nº 12.188, of January 11, 2010. Institutes the national policy of technical assistance and rural extension for family agriculture and agrarian reform - PNATER and the national program of technical assistance and rural extension in family agriculture and agrarian reform - PRONATER, amends Law no. 8,666, of June 21, 1993, and makes other provisions. *Official Gazette of the Union*, Brasília, 11 Jan., 2010.	2010
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7.6.2 POLITICAL-NORMATIVE FRAMEWORKS AT THE STATE LEVEL

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Minas Gerais state	
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Mato Grosso state	
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Paraíba state	
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Parana state	
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Roraima state	
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