

UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ
FACULTADES DE CIENCIAS QUÍMICAS, INGENIERÍA, MEDICINA
Y CIENCIAS SOCIALES Y HUMANIDADES
PROGRAMA MULTIDISCIPLINARIO DE POSGRADO EN CIENCIAS AMBIENTALES
AND
TH KÖLN - UNIVERSITY OF APPLIED SCIENCES
FACULTY SPATIAL DEVELOPMENT AND INFRASTRUCTURE SYSTEMS
INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS

Food Policies In Mexico: An Analysis From The Food System Perspective

THESIS TO OBTAIN THE DEGREE OF
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DEGREE AWARDED BY UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ
AND
MASTER OF SCIENCE
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DEGREE AWARDED BY TH KÖLN - UNIVERSITY OF APPLIED SCIENCES

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**LA MAESTRÍA EN CIENCIAS AMBIENTALES RECIBE APOYO A TRAVÉS DEL PROGRAMA NACIONAL DE
POSGRADOS (PNPC - CONAHCYT)**



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**FOOD POLICIES IN MEXICO: AN ANALYSIS FROM THE FOOD SYSTEM
PERSPECTIVE**

Mariana Santillan Calzada; 2024

Keywords: *Food security, Food systems, Social Development, Policies, Mexico.*

In recent years, governments worldwide have set out to ensure food security. However, despite the efforts and resources invested, food for all has not been ensured. In the Mexican context, several strategies, programmes and public policies have taken place in the last 30 years; however, the problem has evolved from an issue of lack of food to one of excess caloric intake, promoting chronic diseases such as diabetes and hypertension, a consequence of the generalisation of overweight and obesity in the population. The problem is complex, and action is required from a whole food system perspective, based on public policies that intervene effectively, promoting healthy lifestyles and strengthening the economy and the equitable distribution of wealth. This study focuses on analysing the problem of food insecurity in Mexico from a food systems perspective, as well as analysing public policies from 1982 to 2024, their evolution and changes in approach, as well as their design and coverage in terms of food security and food improvements. The results of this study show that Mexican public policies have not been effective in ensuring food security for all, nor have they been transversal or consistently applied as a long-term project. In conclusion, Mexican public policies must act in a preventive manner, ensure continuity despite changes in government, and take a food system and human rights perspective.

LAS POLÍTICAS ALIMENTARIAS EN MÉXICO: UN ANÁLISIS DESDE LA PERSPECTIVA DEL SISTEMA ALIMENTARIO

Mariana Santillan Calzada; 2024

PALABRAS CLAVES: *Food security, Food systems, Social Development, Policies, Mexico.*

En los últimos años, los gobiernos de todo el mundo se han propuesto asegurar la seguridad alimentaria para su población. Sin embargo, a pesar de los esfuerzos y recursos invertidos, no se ha asegurado la alimentación para todos. En el contexto mexicano, en los últimos 30 años varias estrategias, programas y política públicas han tenido lugar. Sin embargo, el problema de la malnutrición en México ha evolucionado, de ser un problema de carencia de alimentación a uno de exceso de ingesta calórica, promoviendo enfermedades crónicas como la diabetes e hipertensión consecuencia de la generalización de sobrepeso y obesidad en la población. El problema es complejo y se requiere tomar medidas desde el punto de vista del sistema alimentario completo a partir de políticas públicas que intervengan de manera efectiva, promoviendo los estilos de vida saludables y fortaleciendo la economía y la distribución equitativa de la riqueza. Este estudio se enfoca en analizar desde la perspectiva de los sistemas alimentarios el problema de la inseguridad alimentaria en México, así como analizar las políticas públicas a partir de 1982 al 2024, su evolución y cambios de enfoque, al igual que el diseño y cobertura que tuvieron en cuanto a la seguridad alimentaria y las mejoras a la alimentación. Los resultados de este estudio arrojan que las políticas públicas mexicanas no han sido efectivas para asegurar la seguridad alimentaria de todos, asimismo, no han sido transversales ni aplicadas de manera consistente como un proyecto de largo plazo. Como conclusión las políticas públicas mexicanas deben actuar de manera preventiva, procurar la continuación a pesar de los cambios de gobierno, y tomar una perspectiva desde el sistema alimentario y los derechos humanos.

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Abbreviations and Acronyms

BANXICO	Bank of Mexico
BMI	Body Mass Index
CONASUPO	National Company for Popular Subsistence
CONEVAL	National Council for The Evaluation Of Social Development Policy
COPLAMAR	General Coordination of the National Plan for Deprived Areas and Marginalised Groups
DICONSA	Commercial Distributor and Promoter Conasupo, S. A. de C. V.
EBIA	Brazilian Food Insecurity Scale
ELCSA	Latin American and Caribbean Food Security Scale
ENSANUT	National Health and Nutrition Survey
ENSA	National Health Survey
ENSE	National Seroepidemiological Survey
ENN	National Nutrition Survey
EMSA	Mexican Scale of Food Security
FAO	Food and Agriculture Organization
GFSI	Global Food Security Index
HFIAS	Household Food Insecurity Access Scale
HFSSM	US Household Food Security Supplement Module
IMSS	Mexican Institute of Social Insurance
INAI	Mexican National Institute for Access to Information
LICONSA	Industrialised Milk Conasupo S.A. de C.V.
NAFTA	North American Trade Agreement
NDP	National Development Plan
OPORTUNIDADES	Human Development Programme
PESA	Special Programme for Food Security
PROCAMPO	Programme of Direct Support to the Countryside
PROGRESA	Education, Health, and Food Programme
PRONAL	National Food Programme
PRONASOL	Program of National Solidarity
SAM	Mexican Food System
SDG	Sustainable Development Goals
SEDESOL	Ministry of Social Development
SEGALMEX	Food Security Mexico
SINHAMBRE	National Campaign Against Hunger

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1. Introduction

The right to food appeared in the international system in the late 1940s; thus, before 1948, food had not been conceived as a universal human right and the circumstances emerging from the Second World War motivated the international community to start working on this issue (Latorre and Sarmiento, 2022). Objective two of the Sustainable Development Goals (SDG) aims to eliminate hunger by 2030, emphasizing the achievement of food security (United Nations General Assembly, 2015). Food security is defined as the physical, social, and economic access to safe, nutritious, and healthy food that meets dietary and nutritional requirements, supporting a healthy and active lifestyle (FAO, 2001). It also is recognized as the availability, access, utilization, and stability dimensions (Clapp *et al.*, 2022; FAO, 2001). To ensure food security, food systems must provide quality, affordable, sustainable, and inclusive food, making healthy diets more affordable than unhealthy ones (Beddington *et al.*, 2012; FAO *et al.*, 2022).

Despite the progress made, the goal of the 2030 agenda will not be reached (Hendriks *et al.*, 2023). Since 2021, the global state of food security has deteriorated because of the pandemic of COVID-19 (FAO *et al.*, 2022). Although there have been improvements in indicators such as stunted growth in children under 6 months; the rates of anaemia in women and obesity have worsened (FAO *et al.*, 2022). Food insecurity is the opposite of food security and has disproportionately affected low- and middle-income countries (FAO *et al.*, 2022). Additionally, food insecurity affects women and men differently, with 31.9% of women and 27.6% of men experiencing some degree of food insecurity in 2021 (FAO *et al.*, 2022). The global socio-political contexts have impacted progress in food security exacerbating economic inequalities (Abay *et al.*, 2023; FAO *et al.*, 2022). The increasing frequency of extreme weather events has also affected food systems amplifying their fragility (Beddington *et al.*, 2012; FAO *et al.*, 2022). The relevance of the food system relies on its connection to the health and nutrition of the population (FAO, 2019). Higher-income households tend to have a more varied diet than lower-income households (Abay *et al.*, 2023).

The sole increase in agricultural production to achieve food security jeopardizes environmental sustainability (Beddington *et al.*, 2012; Farooq *et al.*, 2019). Pesticide use in agriculture has increased food availability but also led to hazardous residues affecting human health (Farooq *et al.*, 2019). Sustainable agriculture, encompassing economic stability, social stability, and ecological or environmental sustainability, is crucial for food security (Farooq *et al.*, 2019; Lichtfouse *et al.*, 2009; Ronald, 2011; Smith *et al.*, 2017). Public policies, intentional and causal actions executed to address public issues, must ensure food security as it involves the human right to food and health (Aguilar Astorga, 2017).

Food systems consist of three elements: food supply chains encompassing all stages from production to consumption, food environments representing the physical, economic, political, and sociocultural context of the food system with consumers and consumer behaviour influenced by personal preferences (FAO, 2019). Current public policies have favoured lowering prices of low-nutrient and high-energy foods, often undermining food security goals (FAO *et al.*, 2022). Governments need to invest in

improving food security and nutrition (FAO *et al.*, 2022). Public policies should consider the participation of producers and consumers. Unfortunately, explicit efforts in public policy to achieve food security goals are scarce, mainly because policies are often designed independently with specific objectives (FAO *et al.*, 2022).

Malnutrition is a highly complex issue, requiring consideration of economic, social, political, cultural, and environmental factors, not just biological and technical aspects (López Salazar and Sandoval Godoy, 2018). Exposure to stressful environments can also contribute to obesity, these stressful factors can be stress, lifestyle, urban design and exposure to pollutants that intervene with the metabolic processes promoting lipid accumulation (Martínez-Esquivel *et al.*, 2022). Various strategies, including market liberalisation, social support, and humanitarian aid, are proposed to achieve food security, but the focus should extend beyond merely meeting food needs and include food some degree of self-sufficiency (Camberos Castro, 2000).

In Mexico, the liberalisation of the agricultural sector in 1994 led to the concentration of agricultural production in a limited group of corporations, impacting local economies and causing the abandonment of agricultural lands and rural areas (López Salazar and Sandoval Godoy, 2018). Mexico needs to establish a framework ensuring adequate income and social security, particularly for vulnerable populations (López Salazar and Sandoval Godoy, 2018); considering that despite sufficient caloric intake, the quality of calorie consumption in Mexico is a concern (FAO, 2019) that leads the population to dietary health problems. According to the National Health and Nutrition Survey (ENSANUT) in 2021, 60.8% of households in Mexico had experienced some level of food insecurity. Urban-rural disparities are evident, with 71% of rural households facing food insecurity compared to 53.5% in metropolitan households and 66.4% in urban households. Additionally, 72.4% of the population aged 20 or older in 2021 is overweight or obese, 32.1% have high blood cholesterol levels, 15.8% have diabetes, and 69.8% often consume sugary beverages (Shamah-Levy *et al.*, 2022). National public policies often neglect the urban-rural link in the food system (FAO, 2019). Legislation on the food system is fragmented, leading to duplicated efforts, contradictory decisions, and inefficient use of economic resources (FAO, 2019). Food Security needs to be considered an urgent topic and prioritized in the public policies agenda (Lara De la Calleja *et al.*, 2017).

Mechanisms should be designed to link poverty alleviation programs with those focused on access and distribution of quality food, requiring a national model of food security with interdisciplinary and transdisciplinary approaches and regional and global policy intervention instruments (López Salazar and Sandoval Godoy, 2018).

2. Justification

The Sustainable Development Goals established in 2015 represent an effort to take action to improve living conditions and prospects for the global population. Objectives one and two emphasize the need to eradicate poverty and hunger worldwide. Poor nutrition is linked to poverty and health; to promote food security governments must ensure access to nutritious, sufficient, and quality food through public policies.

According to the UN, since 2015, the percentage of the population in food poverty has been increasing. In 2020, 8.9% of the global population suffered from hunger, totalling 690 million people worldwide; if this trend continues, achieving the goal of ending hunger by 2030 will be impossible (UN, n.d.).

While Mexico has been an active participant in shaping the 2030 agenda, data from the National Council for the Evaluation of Social Development Policy (CONEVAL) in 2020 revealed that 43.9% of the Mexican population was in poverty, with 35.4% in moderate poverty and 8.5% in extreme poverty. Additionally, only 22.5% of the population had access to nutritious and quality food.

According to the National Health and Nutrition Survey (ENSANUT), in 2018, 55.5% of households in Mexico experienced some level of food insecurity. By 2021, this figure increased to 60.8% of households facing some level of food insecurity. Despite the efforts, material, and human resources, it has not been possible to achieve the goal of ending hunger. Given that public policies in Mexico are enacted every six years and, in most cases, they lack continuity from one period to another; there is a need to implement an analysis of established public policies to assess their impact on food security.

In recent years, Mexico has been through various economic changes. In 1982, during Miguel de la Madrid's presidency term, the neoliberal economic system was formally established. Another crucial moment for Mexico was the implementation of the North American Free Trade Agreement (NAFTA), which allowed Mexico to import and export goods to the North American region. These changes had positive and negative impacts on the Mexican food system. This study aims to analyse the food system policies in Mexico from a food system perspective taking into consideration the economic changes and context.

3. Theoretical Framework and Literature Review

3.1. Food Security

Food security is part of fundamental human rights, it is linked to the right to food, water, sanitation, and to be free of discrimination (Hendriks *et al.*, 2023). Campbell (1991) defined food security as access to food for an active healthy life. Following FAO (2001) food security is “*A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*” (p. 49). The definition of food security implies that diets should provide sufficient energy, nutritional quality, and safety (Campbell, 1991). Food security needs to be seen as a prerequisite for societal development (King *et al.*, 2017), and a way to obtain global peace (Mehrabi *et al.*, 2022). Food security is based on four dimensions, which are availability, access, utilization, and stability (Clapp *et al.*, 2022; FAO, 2001). Availability refers to addressing the supply, it is determined by food production, stock levels and trade; access refers to economic and physical access to food, mainly regarding prices; utilization refers to food quality, safety, and regional use of the food; and finally, stability applies to all other three dimensions, which means they need to be always present (FAO, 2008).

Mehrabi *et al.* (2022) suggested that sustainability and agency should be included as dimensions of food security; the first one focused on the interconnection between the food systems, technical, social, economic, and environmental aspects to ensure food security in the future; on the other hand, including agency into the dimensions would address inequalities and power imbalances by providing control and governance to food security actors.

Food security also has effects on the mental well-being of the people, and a subjective nature, to be food secure people must feel food secure; instability of prices affects people’s perception of their food security (Timmer, 2012). Other important effects of food security are related to hunger and malnutrition, which are also related to inequalities and power dynamics (Clapp *et al.*, 2022). It is necessary to establish a whole-system approach for policies, research, monitoring, and evaluation of the food systems; setting action plans that are context-tailored to fit specific cultural, economic, and social preferences, and manage trade-offs and externalities at all levels (Hendriks *et al.*, 2023). There should also be discussions with all stakeholders in policy-making and evaluation processes and strengthen collaboration with private and public sectors and research (Hendriks *et al.*, 2023).

3.2. Food Insecurity, Poverty and Health

On the other hand, food insecurity is the lack of food security; Campbell (1991) defines it as the time when the ability to obtain nutritious, personally acceptable, and socially acceptable ways is uncertain or limited. Hunger is also compared to food insecurity; however, this last one does not carry the same connotation; hunger can be defined as the painful sensation coming from lack of food, which could or not be the result of food

insecurity (Campbell, 1991). Additionally, food insecurity can also exist without hunger (Adams *et al.*, 2003).

Underlying an important fact is the link between food insecurity and poverty. Poverty can be defined from two different approaches; the biological approach identifies poverty as the means of survival and work efficiency, starvation and minimal nutritional requirements are part of the poverty concept, while the second one is based on the means of inequality (Sen, 1981). Poverty is a matter of deprivation, and the biological approach relates to the absolute core of deprivation, starvation (Sen, 1981). One important challenge is to analyse how poverty interacts with food insecurity, health, and well-being (Olson, 1999).

Food insecurity can also lead to malnutrition, in industrialised countries it can lead to more complex problems, simultaneous under and over-nutrition, being obese, or having a high BMI, while undernourished of micronutrients (Adams *et al.*, 2003; Campbell, 1991; Olson, 1999); this issue needs to be addressed and take part of the political agenda by trying to fix inequities (Weiss and Smith, 2004). This problem can be explained due to food insecurity affecting the variety and quality of food consumed, which results in ingesting high-calorie and low-priced foods (Adams *et al.*, 2003). Food insecurity can also affect people's health by increasing the risk of having metabolic diseases such as diabetes and other chronic diseases (Laraia, 2013).

Food insecurity affects genres, ages, and ethnicities to different degrees, women from food-insecure households face additional challenges when they are food insecure (Adams *et al.*, 2003; Laraia *et al.*, 2006). Pregnant women with food insecurity face higher levels of stress, anxiety, and depression, and lower scores on self-esteem and mastery than those food-secure or marginally food-secure (Laraia *et al.*, 2006). Policies looking to address the complex hunger problem need to take into consideration the differences and links and understand the causes and priorities of action, mainly rooted in governance deficiencies (von Braun, 2018).

Food insecurity is integrated into the following aspects qualitative, quality and variety of the food; quantitative, having enough and sufficient food; psychological, food deprivation causes anxiety and fear, affecting mental well-being; and social-normative, the individual compares and analyses its situation based on the normative or accepted social norms (Campbell, 1991). Other two important aspects are the involuntariness of food limitation and the periodicity or duration of this limitation (Campbell, 1991).

The Latin American region is characterized by having a great number of resources and potential unutilized indigenous crops; however, food insecurity in the region is still a problem (de Jaramillo *et al.*, 2023). To address this problem, social and natural sciences need to collaborate to develop sustainable food systems; the use of new technologies and innovation to improve the production and productivity of the crops and complemented by policies and actions tailored to the needs of the specific region and to promote equity (de Jaramillo *et al.*, 2023).

Food security in Mexico has multiple challenges: rapid urban development without proper planning, which led to unbalanced socio-economic development; precarious economic stability, with a high percentage of its population living in poverty and lacking secure and consistent access to food; and the agricultural sector affected by climate

change, environmental degradation, increase of pest and diseases, low productivity of most agricultural production units and farmers' poverty (Acosta Acosta, 2017).

3.3. Food Security Measurement Tools

Even if there exist multiple indicators and indexes, food security is difficult to measure. Challenges in determining the level of food security are deciding *what* to measure, the dimension of food security and components, and *how* the type of methodology to be used (Manikas *et al.*, 2023). To comply with the definition of food security, the ideal food security indicator should be able to capture all food security dimensions at the individual level (Manikas *et al.*, 2023). Indicators would measure only one food security dimension or multiple dimensions, factors contributing to food security or food security outcomes, be quantitative or qualitative, be for national or global level or household or individual level; however, the majority focus on the accessibility dimension at household level (Manikas *et al.*, 2023). There is also the situation where most international agencies use their own indicators and methodologies (Manikas *et al.*, 2023).

Indicators should be used as complementary, since most of them by themselves won't give the whole picture of food security (Manikas *et al.*, 2023). It is also important to consider that to measure the stability dimension, food security needs to be measured ideally in real-time, or yearly, to generate consistent overtime data and monitor progress (Manikas *et al.*, 2023).

3.3.1. Global Food Security Index

The Global Food Security Index (GFSI) is an index that measures the level of food security on a national level, (Maricic *et al.*, 2016). It was constructed by the Economist Impact and financed by the Corteva Agriscience, and it is yearly updated (The Economist Newspaper, 2022). GFSI is a composite indicator, which can measure all four dimensions of food security (Manikas *et al.*, 2023). This index focuses on contributing factors and measures the conditions for enabling the environment of food security instead of the actual level of food security (Thomas *et al.*, 2017). However, according to Maricic *et al.* (2016), the weights that were used to measure food security are subjective because they consider a greater weight to affordability over other dimensions. In 2022, the Economist Impact made changes to it by adding new criteria and weights (The Economist Newspaper, 2022), the GFSI divides its indicators into four dimensions, affordability, availability, quality and safety, and sustainability and adaptation (Table 1).

Table 1. GFSI criteria and weights

Criteria	Weight from total
1) AFFORDABILITY	30.00%
1.1) Change in average food costs	7.15%
1.2) Proportion of population under global poverty line	5.77%
1.3) Inequality-adjusted income index	5.08%
1.4) Agricultural trade	5.77%

1.5) Food safety net programmes	6.23%
2) AVAILABILITY	25.00%
2.1) Access to agricultural inputs	2.93%
2.2) Agricultural research and development	2.93%
2.3) Farm infrastructure	2.25%
2.4) Volatility of agricultural production	2.82%
2.5) Food loss	2.82%
2.6) Supply chain infrastructure	2.48%
2.7) Sufficiency of supply	2.93%
2.8) Political and social barriers to access	2.70%
2.9) Food security and access policy commitments	3.15%
3) QUALITY AND SAFETY	22.50%
3.1) Dietary diversity	4.39%
3.2) Nutritional standards	4.57%
3.3) Micronutrient availability	4.39%
3.4) Protein quality	4.57%
3.5) Food safety	4.57%
4) SUSTAINABILITY AND ADAPTATION	22.50%
4.1) Exposure	3.83%
4.2) Water	3.71%
4.3) Land	3.71%
4.4) Oceans, rivers and lakes	3.49%
4.5) Political commitment to adaptation	4.28%
4.6) Disaster risk management	3.49%

Source: Elaborated with information from The Economist Newspaper (2022)

3.3.2. FAO Reports measurement tools

The Food and Agriculture Organization (FAO) is an agency of the United Nations, its goal is to achieve food security (FAO, 2024). FAO yearly releases a food security report using multiple indicators. One of those indicators is the Prevalence of undernourishment (PoU) which estimates the percentage of the population with habitual insufficient food consumption, this indicator is used to measure the progress of target 2.1 of the SDG (FAO *et al.*, 2023). The data used to calculate this indicator is data on real GDP per capita, income Gini coefficient, real food consumer price index (CPI), poverty headcount, crude birth rate and total population (FAO *et al.*, 2023).

Another indicator used to measure target 2.1 is the Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FAO *et al.*, 2023). The indicator can be disaggregated by sex and degree of population, this is possible when the data is collected from individuals via service providers (FAO *et al.*, 2023). Arising from the pandemic of COVID-19, and the war in Ukraine, various of these indicators had to be recalibrated to better reflect the global socio-political context (FAO *et al.*, 2023). FAO also considers the cost and affordability of a healthy diet as indicators; this information is provided to FAO with the help of the World Bank Data Group (FAO *et al.*, 2023).

3.3.3. Latin American and Caribbean Food Security Scale (ELCSA)

The Latin American and Caribbean Food Security Scale (Escala Latinoamericana y Caribeña de Seguridad Alimentaria, ELCSA) is a tool used to measure food security, specifically in Latin American and Caribbean regions (FAO, 2012). It was developed by the Scientific Committee of ELCSA, the Regional FAO office and the programme CE-FAO; by using previous experiences and based on the instruments: US Household Food Security Supplement Module (HFSSM); Household Food Insecurity Access Scale (HFIAS), the Brazilian Food Insecurity Scale (EBIA), and the Lorenzana Scale, validated and applied in Colombia (FAO, 2012).

ELCSA is a food security indicator based on food insecurity experience at the household level; it was first applied in Haiti, and later in Mexico with good applicability results, statistical validity, and fast data collection (FAO, 2012). The ELCSA questions (Table 2.) are related to the quantity and quality of food consumed by people, children, and adults, during food scarcity and the strategies developed during this time (FAO, 2012). Even if ELCSA is considered a fast and easy-to-apply tool for food security measurement, it needs previous qualitative validation in the country and applicators' training (FAO, 2012).

Table 2. Questionnaire ELCSA

#	Question	Dimension
1	In the last 3 months, due to lack of money or other resources, did you ever worry about food running out in your household?	Worry (Home)
2	In the last 3 months, due to lack of money or other resources, did your household ever run out of food?	Food Quantity (Household)
3	In the last 3 months, due to lack of money or other resources, have you ever stopped eating healthy in your household?	Quantity and Quality of Food (Household)
4	In the past 3 months, due to lack of money or other resources, have you or any adult in your household ever had a diet based on a small variety of foods?	Food quality (adults)
5	In the last 3 months, due to lack of money or other resources, have you or any adult in your household ever missed breakfast, lunch, or dinner?	Amount of food (adults)
6	In the past 3 months, due to lack of money or other resources, have you or any adult in your household ever eaten less than you should have?	Amount of food (adults)
7	In the past 3 months, due to lack of money or other resources, have you or any adult in your household ever felt hungry but not eaten?	Hunger (adults)
8	In the last 3 months, due to lack of money or other resources, have you or any adult in your household ever eaten once a day or stopped eating for an entire day?	Hunger (adults)
9	In the past 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household ever stopped eating healthy*?	Quantity and Quality (under 18 years old)
10	In the last 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household ever had a diet based on a small variety of foods?	Food quality (under 18 years of age)
11	In the last 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household ever missed breakfast, lunch, or dinner?	Quantity (under 18 years old)

12	In the last 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household ever eaten less than they should?	Quantity (under 18 years old)
13	In the last 3 months, due to lack of money or other resources, have you ever had to decrease the amount served at meals to anyone under the age of 18 in your household?	Quantity (under 18 years old)
14	In the last 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household ever felt hungry but not eaten?	Hunger (under 18 years old)
15	In the last 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household ever eaten only once a day or stopped eating for an entire day?	Hunger (under 18 years old)

Source: Elaborated with information of FAO (2012)

3.3.4. The National Council for the Evaluation of Social Development Policy Food Security Measurement Tool.

The National Council for the Evaluation of Social Development Policy (Comité Directivo del Consejo Nacional de Evaluación de la Política de Desarrollo Social, CONEVAL) of Mexico is an institution created to regulate and coordinate the evaluation of social development policies and programmes implemented by public agencies and to establish guidelines and criteria for the definition, identification, and measurement of poverty (CONEVAL, 2019). CONEVAL measures multidimensional poverty using 9 indicators: income per capita; average educational lag in the household; access to health services; access to social security; quality and space of housing; access to basic services in housing; access to nutritious and quality food; degree of social cohesion; and degree of accessibility to paved roads (CONEVAL, 2019).

Nowadays, CONEVAL measures food security from the rights perspective and takes into consideration the following aspects: availability, access, consumption, biological utilization and nutritional state (CONEVAL, 2018a). To measure access to nutritious and quality food, a questionnaire of 12 questions based on ELCSA is applied by household (CONEVAL, 2019), this scale is named the Mexican Scale of Food Security (Escala Mexicana de Seguridad Alimentaria, EMSA), both ELCSA and EMSA comply with the statistic requirements that make them valid to measure food security (Villagómez-Ornelas *et al.*, 2014). Households are divided into those having members of less than 18 years old, and those with only adults (CONEVAL, 2019). Based on the information received, households can be classified into levels of food insecurity: severe, moderate, mild, and food secure. CONEVAL also collects information related to food diversity based on the Food Consumption Analysis of the United Nations (CONEVAL, 2019).

3.3.5. National Health and Nutrition Survey

In 1986, the first government survey on food and health was called the National Health Survey (Encuesta Nacional de Salud, ENSA), followed in 1988 by the National Seroepidemiological Survey (Encuesta Nacional Seroepidemiológica, ENSE) and the National Nutrition Survey (Encuesta Nacional de Nutrición, ENN); in 1994, a second ENSA

survey was performed (Ortiz-Pérez and Bravo-García, 2022). During this period, all three surveys were performed individually until 2006, in this year, the first survey considering both health and nutrition was performed (Ortiz-Pérez and Bravo-García, 2022).

The National Health and Nutrition Survey (Encuesta Nacional de Salud y Nutrición, ENSANUT) is another important tool to generate food and health data in Mexico; it is a national probabilistic survey (Shamah-Levy *et al.*, 2022). It provides key indicators of health, nutrition, its determinants, and health system performance, it serves to improve the national policies, strategies, and programmes at the national and regional levels (Shamah-Levy *et al.*, 2022). To obtain information regarding food security, ENSANUT applies the 15 questions of the survey ELCSA; the households are later classified into severe, moderate, and mild food insecurity, and food security (Shamah-Levy *et al.*, 2022).

3.4. Food Systems

Unlike hunger, food insecurity and food security can be applied to individuals, as well as to households, communities, and nations; that is why food security directly points to aspects of the food systems (Campbell, 1991). Food systems consider the entire range of actors and their value-adding interactions; it is made from the different sub-systems, such as food production, distribution, market, waste, consumers, and other important systems like health, energy, trade, etc (FAO, 2018; von Braun *et al.*, 2021). Food systems can be applied at different scales, such as global, regional, national, and local; any change needs to maintain its uniqueness, traditions, cultures, economic structures, and ecologies of locations (von Braun *et al.*, 2023). Food systems need to be analysed holistically, considering all its elements and relationships and integrating all stakeholders at global, national, and local levels, as well as the other systems that interact with the food system (FAO, 2018; von Braun *et al.*, 2021).

A sustainable food system is a food system that contributes to food security and nutrition; it takes into consideration the three pillars of sustainability, economic, social, and environmental (FAO, 2018; von Braun *et al.*, 2021). Food systems worldwide must be changed to be more productive and inclusive, providing nutritious and safe food (FAO, 2018; Hendriks *et al.*, 2023). An important part of food security, especially in the context of globalization, is food safety which also is needed to reach Sustainable Development Goals (King *et al.*, 2017). Food safety is necessary to accomplish the supply of healthy and nutritious food; however, the food systems should work with food security and not against it; and accommodate the needs of the country, developing or developed economies, focusing on small farmers' needs (King *et al.*, 2017). On the other hand, food safety does not guarantee the adequate consumption of nutritious foods to avoid malnutrition (von Braun *et al.*, 2021).

Markets play an essential role in food security by mediating on food resource access; however, they can also provoke risks by increasing vulnerabilities in the supply chain, such as loss of food sovereignty, redundancy, and interruption of trade (Mehrabi *et al.*, 2022).

For an in-depth understanding of the food system, it is needed to analyse the linkages within the core system, the governance mechanisms that drive the stakeholders'

behaviours, and the root causes that could improve the performance of the system (FAO, 2018). It is necessary to identify and define the boundaries of the system and understand the connections between other systems (von Braun *et al.*, 2021).

According to von Braun *et al.* (2021), food systems should help to boost environmental production, promote equitable livelihoods, and value distribution; ensure safe and nutritious food; shift to sustainable consumption patterns; and build resilience. Addressing food safety, malnutrition, poverty, and inequality in food systems through food system transformation will help to improve health, social, economic, ecological and development related to the SDG.

3.4.1. Food Systems Modelling

Food security modelling has various alternatives, one is defining the models and concepts to be used, market openness, needs, imports, and exports (Figure 1); other important factors are determining food shortage, prices of agricultural goods and costs of production, paying capacity and population growth; considering the determination of the boundaries of our model (Evgeny, 2015). However, the complex nature of food systems and food security, modelling and analysis need to be made from a holistic point of view of the social-natural interactions (Rivers *et al.*, 2018), contemplating not only food security but also underlying problems such as poverty and inequality (Müller *et al.*, 2020).

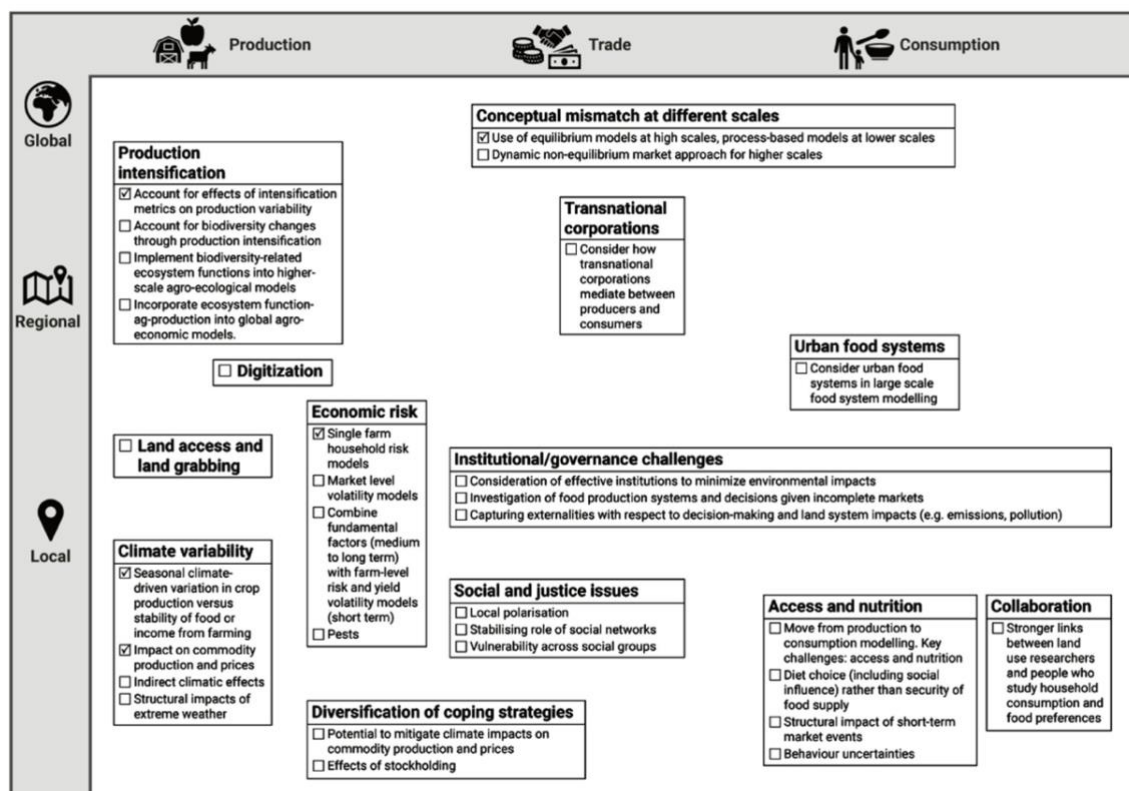


Figure 1. Aspects of food security modelling (Source: Müller *et al.*, 2020)

Modelling is also important for better understanding complex problems, such as food security, and as a tool for decision-making (Müller *et al.*, 2020). In the case of specific households, and vulnerable populations such as aged people and children, it should also

be considered the vulnerability and coping capacity of the population in food insecurity (Dickinson *et al.*, 2022).

3.5. Food Policies and Geopolitization of Food

Due to various factors, such as the lack of water and land resources, climate change, and environmental degradation, food production has decreased; on top of that, consumerism has increased food demand in quantity and quality (Hosseini *et al.*, 2023). Climate change has affected the distribution and availability of resources necessary for food production and increased natural hazards, such as droughts (Hosseini *et al.*, 2023). The rural population has migrated to urban areas, which has also affected the capacity to produce food (Hosseini *et al.*, 2023); both urban and rural food insecurity need to be addressed at the same time, by applying short- and long-term policies for each specific context (von Braun, 2018).

Food is considered a geopolitical phenomenon because of its great importance in affecting relationships between countries; food is also a strategic factor that could be used for power and as a political tool (Hosseini *et al.*, 2023). It also spans different disciplines, not only agriculture and health but also political and economic sciences, among others (von Braun *et al.*, 2023). Some strategies that countries need to take to ensure long-term security for their citizens are the development of sustainable agriculture, overseas cultivation, sustainable food supply from abroad, water import, minimization of food waste and diet modification (Hosseini *et al.*, 2023).

Governments should also choose the best strategy considering their natural, human, political, economic, military, and technological potentials; and the global context and conditions affecting food security (Hosseini *et al.*, 2023). As a result of globalization food security has become a global concern, and interdependence between countries has increased (Hosseini *et al.*, 2023).

Policies to deal with the challenge of food insecurity need to take advantage of innovation, introducing change behaviour policies or nutrition-specific interventions (von Braun, 2018). To deal with food security problems, policies have been focused on isolated interventions, rather than focusing on systemic interventions for long-term solutions to improve resilience (Mehrabi *et al.*, 2022), considering inequalities and discrimination (von Braun, 2018). To face the difficulties of food insecurity, short-term actions such as assistance programs and long-term strategies to improve livelihoods need to be taken (Ivers and Cullen, 2011).

Assistance programs are necessary to especially address the undernourishment of children (von Braun, 2018). Food insecurity is known to promote unhealthy lifestyles, this supports the need to apply food security policies to promote healthy lifestyles in addition to access to food (Maia *et al.*, 2023).

Policies to reduce food price volatility need to be applied, such as integration into markets by connecting value chains and eliminating trade barriers, political and non-tariff (von Braun, 2018). It is also necessary when applying those measures to improve farmers' productivity and training so that they can enter and compete in markets; these strategies can be focused on intensification, diversification, and coping strategies; and

integrating bottom-top and top-down approaches and innovations (von Braun, 2018). Considering that worldwide most poor people reside on small farms, addressing their needs would reduce poverty and food insecurity (von Braun, 2018). According to von Braun *et al.* (2023), seven priorities are necessary to be addressed to manage food problems (Table 3).

Table 3 The seven priorities to end hunger

Priority	Description
1. End Hunger and Improve Diets	To improve diets and end hunger by using research and development to increase food supply and sustainability of the food systems, use social programs and increase income and nutritious components to diets, and generate behavioural changes to reduce waste and food loss and increase consumption of healthy foods.
2. De-risk Food Systems	In the globalization context, food systems have increased their complexity, which makes them more vulnerable to risks, this needs to be addressed by political and economic actions.
3. Protect Equality and Rights	To protect equality and rights, inequalities and poverty associated with gender, ethnicity and age need to be addressed, identifying causes and empowering vulnerable people.
4. Boost Bioscience	To boost bioscience through developing sustainable agriculture to restore the environment.
5. Protect Resources	To protect biodiversity and genetic resources.
6. Sustain Aquatic Foods	To sustain aquatic foods by better integrating them into the food systems and promoting sustainable harvesting of aquatic foods.
7. Harness Technology	To harness technology, to make technology more easily accessible, cheaper, and easy to use by farmers.

Source: Elaborated with information from von Braun (2023)

3.6. Historical Context for Mexican Food Security

Mexico is considered the origin of the “Green Revolution”, starting in 1940 the Green Revolution was financed and supervised by the Rockefeller Foundation; it promoted the use of high-intensity and inputs agriculture, the use of modified seeds, fertilizers, pesticides, and agricultural machinery (Sonnenfeld, 1992). In the fifth annual conference 1949 of the Food and Agriculture Organization, it was recommended to increase agriculture, formulate food and agriculture policies, and increase the number of technicians and services under technical assistance with a focus on the production and consumption of domestic and nutritious foods (International Organization, 1950).

Thanks to this agricultural intensification, Mexico, which imported food in 1940, met its food requirements in 1965 (Sonnenfeld, 1992). Before the Green Revolution, Mexico underwent an agricultural transformation; during the presidency of Lázaro Cárdenas (1934-1940), the agrarian reform produced the division of agricultural land, created ejidos and smallholders (Sonnenfeld, 1992). The policies following Cárdenas gradually shifted from supporting small rain-fed and commercial agriculture to large-scale agri-business only (Sonnenfeld, 1992). Food consumption patterns changed, Mexicans ate more meat

and wheat; food agri-business increased the production of fruits and luxurious products and reduced the production of basic grains (Sonnenfeld, 1992).

However, the benefits of the Green Revolution did not reduce inequality; the policies in the 1970s neglected the smallholders of rain-fed basic food grains, people could not afford the new technologies to increase production, and prices were kept low, migration to urban areas and the U.S. increased, and landholdings were sold or divided as families grew (Sonnenfeld, 1992). Industrial agriculture also caused important environmental impacts, such as overuse, desertification, and deforestation; contamination by heavy metals and pesticides; depletion of groundwater; and pollution (Sonnenfeld, 1992).

The first introduction of the term food security in the policy context was in the early 1970s, from that moment on it has used the concept of the four dimensions (Clapp *et al.*, 2022). During these years, food security was focused on insufficient food supply and providing enough food was the way of solving the food insecurity problem (Luna, 1997). The policy of agricultural trade liberalisation took place in the United States; the prices of agricultural goods, such as grains and oil seeds, favoured American agriculture (Josling, 1984). Until the 1970s, Mexico was self-sufficient in basic grains, mainly corn; however, the changes in the production structure increased the level of basic grain imports; and fruits, vegetables, livestock, and husbandry feed replaced the basic grain production (Luna, 1997). It was in 1974, at the conference of the Food and Agriculture Organization that the term Food security was first used, considering food a human right and a responsibility for the governments to ensure it (FAO, 1974).

In the 1980s, the Mexican government subsidised agricultural production with 80% irrigation, 40% fertilizers and 50% pesticides, promoting environmental pollution; during droughts, agricultural producers would obtain preferential access to irrigation (Abler and Pick, 1993). In 1982, a financial crisis caused stagnation and an economic crisis in Mexico; the annual rate of inflation reached 160% deteriorating the standard of living of the population (Alvarez Bejar *et al.*, 1993). During 1982 and 1983, the attractiveness of food prices led Mexico, Brazil, and Argentina to buy food from the United States (Josling, 1984).

The reduction of the agricultural sector subsidies in the 1980s until their dismantling in 1991 (Abler and Pick, 1993) was promoted by the adoption of a global economy model (Lara De la Calleja *et al.*, 2017). The industrialised model of food production had different impacts; people benefited from lower prices due to an intense competence in the markets, better food safety standards and transformation of products that were considered waste, the cities were the most benefited by these changes; however, the countryside was affected by migration; increasing female participation in farming activities and the production of tropical fruits and vegetables (de la Vega-Leinert, 2019); and lowering the production of basic grains (de la Vega-Leinert, 2019; Luna, 1997).

Food security was also affected during this period, the undernourished population in Mexico went from 35.3 million in 1980 to 41.1 million in 1990 (Luna, 1997). Meat, eggs and milk consumption increased, but the consumption of foods like fat, sugar, salt, and industrialised food increased as well (de la Vega-Leinert, 2019). During the period from 1988 to 1991, Mexico established multiple strategies to cope with the crisis that started in 1982 (Alvarez Bejar *et al.*, 1993).

In 1992, before the entry into force of the North American Trade Agreement (NAFTA), various analyses were made on the impact on trade and impact; however, those analyses relied on models that failed to predict the outcomes of NAFTA (De Janvry *et al.*, 1995). The Mexican government implemented the PROCAMPO programme, whose objective was to provide transfer income to farmers' households and compensate for the agreement's effects; before the agricultural sector received multiple subsidies offered by CONASUPO (De Janvry *et al.*, 1995).

From the American point of view, NAFTA implied transferring the horticultural production to Mexico, which inferred two problems, the first one being risks to food safety by pesticide residues on Mexican produce exported to the U.S.; a second problem was the poisoning of Mexican workers by those same pesticides (Abler and Pick, 1993). Those concerns were not unfounded, Mexican food safety policy was not completely developed and the few regulations that existed were systematically ignored (Abler and Pick, 1993). The intensification of Mexican agriculture due to better prices caused impacts on the environment; however, the risk was low for the United States, and even beneficial, but not for Mexico (Abler and Pick, 1993). The political implications of NAFTA for Mexico were thought to help lower inflation due to increased competition, increase access to the foreign market, attract private foreign investors, restore confidence, re-ignite economic growth, and create new jobs (Poitras and Robinson, 1994)

In 1994, NAFTA entered into force, trade barriers were eliminated, and other products were slowly liberalized (Abler and Pick, 1993). That same year, in December 1994, the Mexican peso crisis affected the expected impacts of the agreement, thus the CONASUPO support nominal rate went from 67% to -20% because of devaluation (De Janvry *et al.*, 1995).

In the years 1995-1996, the global world cereal prices increased, which caused fear of repeating the food crisis of 1974; the global increase in prices was attributed to climate volatility all around the globe (International Food Policy Research Institute, 1995). The governments of poor and developing countries were called to respond by creating assistance programs for the poor instead of implementing national food policies that could intervene with national food prices (International Food Policy Research Institute, 1995).

In January 2007, the increase in the corn and import corn price caused an increase in tortillas' prices, also called *tortillazo*, which caused mobilizations from different sectors all around Mexico for about a month (Simmons, 2016). This problem is known to be caused by the increase in international demand and the reduction of tariff barriers coinciding with the implementation of the last stages of NAFTA; the free market and NAFTA were perceived as responsible for this crisis (Simmons, 2016). The call from the political governing party was that tortillas and corn should be the exception to free markets (Simmons, 2016). This crisis suggested that the premise of the consumer benefitting from low prices as a result of free trade was unreliable (Simmons, 2016).

In 2008, the food prices crisis put the issue of food security on the international and national political agenda; it also evidenced market failures and the need to set solid global governance and rethinking a new development paradigm (Urquía-Fernández, 2014). It was also this year that NAFTA completely opened the Mexican market to grain imports (Echánove Huacuja, 2013). NAFTA's effects on the Mexican economy have also

been positive; positioning Mexico as the second largest exporter to the U.S. and the Mexican industrial sector has flourished favouring its economic development (De La Calle, 2016). However, it has promoted the concentration of wealth in the top deciles and the lack of actions aimed at improving food production and the nutritional conditions of the Mexican population (Torres Torres, 2010).

This phenomenon occurring since the 80s led to a negative transformation of the food consumption pattern, which translates into nutritional and social deterioration, increasing the consumption of highly processed and poorly nutritious foods (Torres Torres, 2010). Mexican obese and overweight population has increased since the 1990s, changing the traditional diet rich in grains such as corn (*Zea mays*) and legumes like beans (*Phaseolus vulgaris*) (Ramírez Mayans *et al.*, 2003), which are also an important part of the traditional agricultural production system in Mexico known as milpa. The culture of industrialized, processed, and fast food has increased the consumption of food high in energy but deficient in some essential nutrients; leading to a population with double malnutrition problems, overweight but undernourished (Ramírez Mayans *et al.*, 2003).

Nowadays, under the climate change context, market uncertainty is exacerbated by the effects of war and policy responses (Mehrabi *et al.*, 2022). Climate change also affects hunger and malnutrition as a result of uneven power dynamics (Clapp *et al.*, 2022). Likewise, the COVID-19 pandemic has triggered a recession, which especially poor people have suffered and impacted their food security (de Jaramillo *et al.*, 2023). The industrial food security system is not sustainable, because it disconnects the consumer from the product, the mode of production, and the producers, while it disarticulates local and regional food circuits and jeopardises the food security of marginalised populations and countries, impacting the environment (de la Vega-Leinert, 2019).

4. Research Questions and Objectives

4.1. Research Questions

- What is and was the food security status and conditions during the modern period in Mexico (1982 to 2024)?
- How have food security policies contributed to food security in Mexico?
- How had food security policies and their objectives changed over time in Mexico?
- What impacts did public policies have on food security in Mexico in the period 1982 to 2024 from a food system perspective?

4.2. Objectives

General objective:

To describe and analyse the Mexican food security public policies from 1982 to 2024, and their impact on food security, from the food system perspective.

Specific objectives:

- To identify food security elements, actors, and their interactions, from the food system perspective in Mexico, as well as the causes and symptoms of food insecurity.
- To identify the food security public policies per presidential term, their objectives, and indicators.
- To analyse the impact of public policies on food security, their adequacy, and continuity and evolution through the period 1982 to 2024.

5. Methodology

A mixed-methods study was used (Artés and Rodríguez-Sánchez, 2022; Pino Montoya, 2017) following the methodology proposed by (Curcio Curcio, 2007) consisting of three stages (Figure 2), The policies were evaluated by six-year terms, from 1982 to 2024.

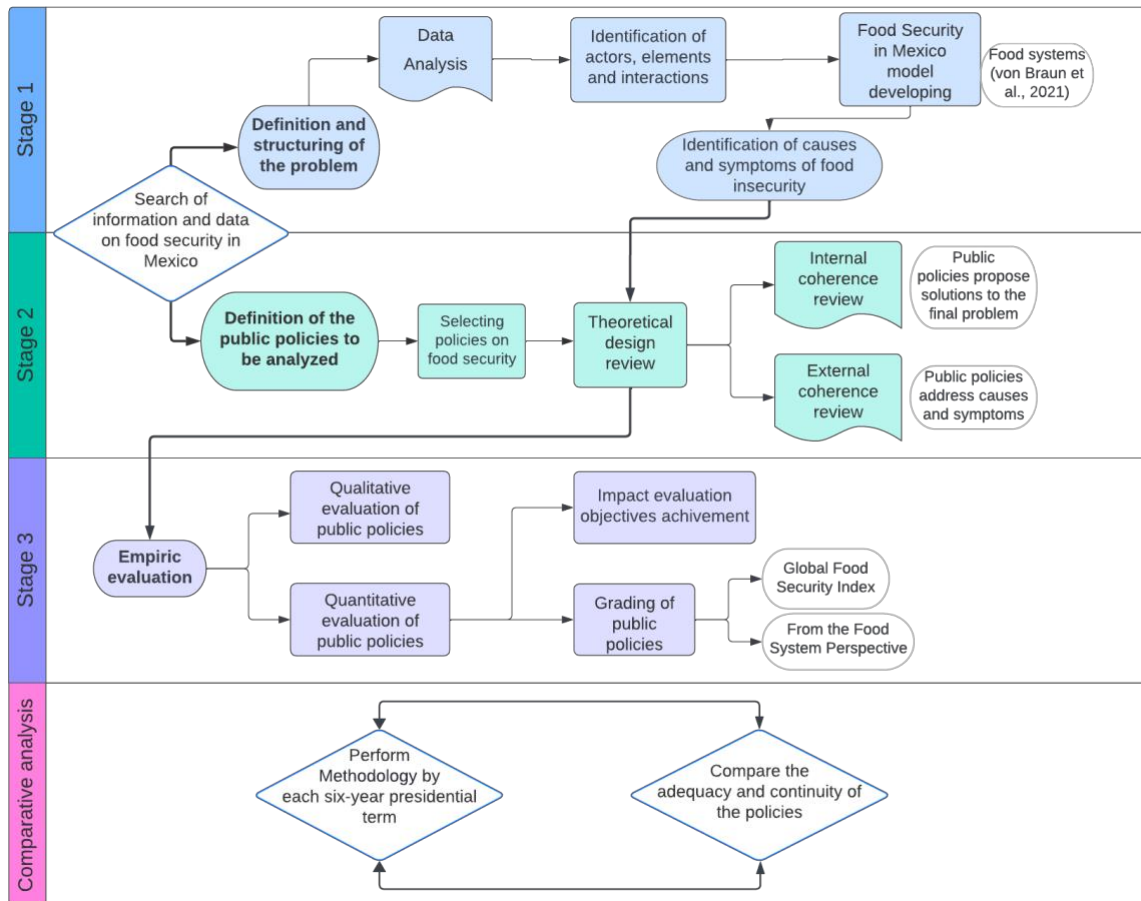


Figure 2. Flow chart of the Food Security Policies Analysis

5.1. Stage 1: Definition and Structuring of the Public Problem

The first stage consisted of identifying the elements that constitute the problem of food insecurity in Mexico to develop a food security model. Official databases related to the main food insecurity issues were searched, such as poverty, extreme poverty, diseases associated with poor nutrition, basic food baskets and agricultural statistics, and the historical context. Official information not found in the public domain was requested to the Mexican National Institute for Access to Information (Instituto Nacional de Acceso a la Información, INAI) via their web platform. Based on the gathered information and the model proposed by Müller *et al.* (2020), von Braun *et al.* (2021) and the sustainability model, a model of the food systems in Mexico was constructed to identify the elements, and their interactions (Meadows, 2008).

5.2. Stage 2: Definition of Public Policies

National Development Plans for each presidential period and Policies targeting improvements in food and/or nutrition (food security) were selected. According to Graglia (2004), public policies are projects and activities a state designs and manages through government and administration to meet a specific society's needs, in our study case, food security is the societal need to guarantee the right to food. To select the most applicable policies to food security, the criteria defined by Meny and Thoenig, (1992) were taken into consideration, which include the following criteria:

1. Comprise a set of concrete measures.
2. Involve decisions and resource allocation methods.
3. Encompass a general framework of action conceived by a decision-maker.
4. Have a specific target audience.
5. Include defined goals or objectives.

The theoretical design of these policies was reviewed by analysing the coherence of identified public policies. This aimed to compare public policy with the reference framework ("ought to be") and the food system model created in Stage 1. Objectives and actions to achieve improvements in the components of food security were identified. The internal coherence of public policy, ensuring it proposes a solution to the final problem, and external coherence, meaning it addresses the causes and symptoms of the problem, were reviewed, contrasting them with the Development National Plan and food security laws, regulations and other legal instruments of each period.

5.3. Stage 3: Analysis of the Food Security Policies

Both qualitative and quantitative evaluations of public policies were conducted. The official indicators, objectives, and results were assessed to analyse the policies' impact. A simplified multicriteria analysis approach was used to determine the public policies' food security dimensions (Abanda *et al.*, 2022; Department for Communities and Local Government, 2009). The indicators used to evaluate food security were the 2022 Global Food Security Index, which assesses the conditions to achieve food security, and the indicators and weights (Table 4) created based on the food system model (Annex 1) created in Stage 1. For both indicators, a binomial score was used, 1 representing the policies considered the indicator and 0 representing the lack of consideration of said indicator.

Table 4 Mexican Food System Indicators

Indicators	Weight %
1) Availability	25.00%
Food Supply	3.13%
Agricultural Productivity	3.13%
Food Self-sufficiency of Strategic Basic Foods	3.13%

Food Distribution and Trade	3.13%
Short Circuit Chains	3.13%
Urban Agriculture	3.13%
Access to agriculture inputs	3.13%
Sustainable Agriculture	3.13%
2) Access	30.00%
Justice, impartiality and fairness	4.29%
Wellbeing and Health	4.29%
Sufficient Income	4.29%
Decent Employment	4.29%
Programs for Income and Food Transfers	4.29%
Auto consumption of food production	4.29%
Food prices stability	4.29%
3) Utilization	22.50%
Food Waste Reduction	3.75%
Traditional Diets	3.75%
Healthy and Unhealthy Diets Awareness	3.75%
Nutritious Food Supply	3.75%
Food Safety	3.75%
Access to drinking and clean water	3.75%
4) Stability	22.50%
Continuity of Successful Policies	2.50%
Continuous Evaluation and Adjustment	2.50%
People Participation and Agency	2.50%
Corruption	2.50%
Crime and violence	2.50%
National Research and Technology on Agriculture and Health	2.50%
Environment Protection	2.50%
Climate adaptation and mitigation	2.50%
Collaboration between involved government agencies	2.50%
TOTAL	100.00%

Source: Own elaboration

For each presidential term, the described process was repeated. Finally, the analysed policies were compared regarding their adequacy and continuity.

6. Results

6.1. Key Features of Food Policies in Mexico

According to articles 4th, 3rd paragraph, and article 27th, fraction XX, of the Political Constitution of the United Mexican States approved in 1917 and reformed in 2011, all people have the right to food that is nutritious, enough and of quality, the State must guarantee it, as well as enough food supply, and the integral and sustainable rural development. The importance of food security in Mexico lies in the fact that it is a necessary condition for achieving sustainable development that guarantees the population the basic conditions of well-being that are contemplated as fundamental rights in the Political Constitution of the United Mexican States (Acosta Acosta, 2017) and multiple international agreements which Mexico has signed and ratified (Annex II).

It is important to highlight that the Mexican government has had mainly presidential power, which means that the power is placed primarily in the president's hands, and coalitions and pacts are made between new and old presidents to ensure the selected political agenda is still running (Poitras and Robinson, 1994); considering this, the analysis of food policies was made under the context of each 6-year presidential term (Figure 3). Taking this into account, multiple programs and strategies have been taken place in Mexico to ensure the right to food. In Mexico, the institutions responsible for the implementation of the food policies are the Ministry of Social Development (Secretaría de Desarrollo Social, SEDESOL), the Ministry of Health (Secretaría de Salud) and the Ministry of Agriculture (Secretaría de Agricultura, before named as Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación).

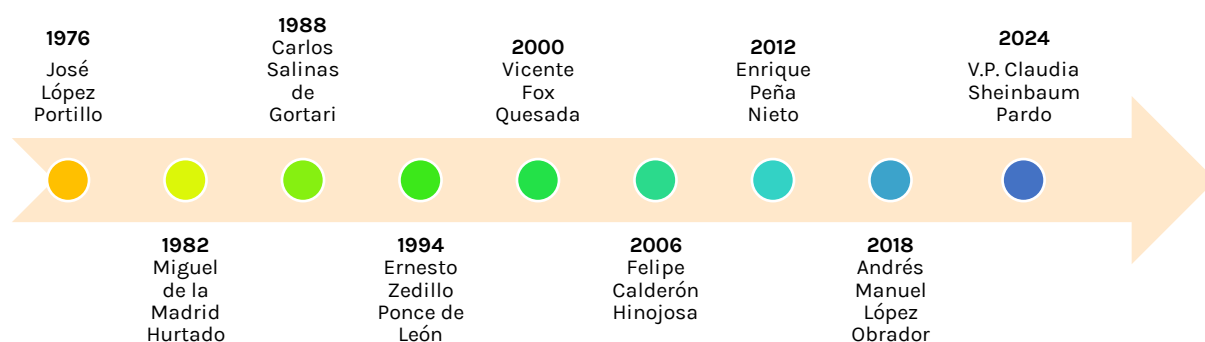


Figure 3. Mexican Presidents by six-year presidential term, from 1976 to 2024.

6.1.1. Mexican Food Security Policies from 1982 to 1988

The National Development Plan (NDP) 1983-1988 directly considered in section 7.3 the importance of food and nutrition in the objectives of the government, it included the effects of unequal development of agriculture, which promoted technical agriculture, pig industry and poultry over traditional agriculture.

In order to address the political concerns related to food security, the NDP considered the implementation of the National Food Programme (Programa Nacional Alimentario,

PRONAL), whose general objective is to ensure food sovereignty and to reach the full potential of the population, it also considered the improvement of nutrition, especially of poor people, and fair food distribution, on the short term it aimed to improve people income, ensure food availability at low cost and promote national food production; promote nutritious food products and the diversity of diets by education programs. It considered food production as a whole: production, distribution, market, and consumption. Also considering the participation of producers and consumers and promoting scientific and technological research on production and nutrition, taking into consideration the farmers' context.

6.1.2. Mexican Food Security Policies from 1988 to 1994

The National Development Plan 1989-1994 aimed to democratise Mexico, grow the economy, and broaden the horizons of well-being for all, thereby strengthening sovereignty and placing Mexico at the forefront of nations. It also considered decentralisation and participation of federal, state and municipal institutions, and resources for the general improvement of the population. It had the following objectives:

- Defending Mexico's sovereignty and promoting its interests in the world.
- The expansion of democratic life.
- Economic recovery with price stability.
- The productive improvement of the population's standard of living.

The 4th objective, in section 5.3 Economic improvement, considers the improvement of agricultural productivity and fisheries to improve the livelihoods of fishermen and the comprehensive development of farmers and all people. It also takes into consideration the need to improve food sovereignty and to reduce rural deterioration, which provoked the worsening of livelihoods and increase of food imports; as well as to reinforce social assistance in the rural areas, increase research and modernise agricultural equipment and techniques. In the above-mentioned objective, section 6.2.4, food and supply, the food policies considered food supply by improving the distribution and commercialization channels.

The National Solidarity Programme (Programa Nacional Solidaridad, PRONASOL) was based on the 1977 programme COPLAMAR, but it improved by being more specific on the objective population (CONEVAL, 2010). PRONASOL had as its objectives to provide social services, and infrastructure and to mitigate poverty; the programme proposed the self-coordination of communities to improve their conditions, instead of an approach focused on human rights (Maldonado Valera, 2013). PRONASOL was divided into three areas: social well-being, production, also known as PROCAMPO, and regional development (Martínez Flores and Benavides Rincón, 2018). Social well-being PRONASOL established subsidies, direct money and food and food complements transfers and health services; Production PRONASOL established loans for agricultural financing; and the regional development PRONASOL established the creation of infrastructure. The Solidarity Committee was jointly responsible for programming and budgeting, as well as for the execution of the work; only actions that had the participation and acceptance of the assembly that had elected the respective committee were incorporated into the

programme (Martínez Flores and Benavides Rincón, 2018). It considered the creation of participation committees through which the population could participate in the creation and execution of the activities (Martínez Flores and Benavides Rincón, 2018).

6.1.3. Mexican Food Security Policies from 1994 to 2000

The National Development Plan 1995-2000 aimed to promote the sovereignty of Mexico, understanding sovereignty as the promotion of international and free trade, stability of the regional and global economy, migration, environment protection and combating drug trafficking and terrorism. The NDP aims for the effective protection of human rights, the timely and impartial application of the law and access to justice. Related to food security, the NDP considers the increase in the productivity of rural areas and overcoming extreme poverty; as well as the direct food supply to people living in extreme poverty.

The Education, Health, and Food Programme (Programa de Educación, Salud y Alimentación, PROGRESA) 1999-2001, was a special federal program that had as its objective to support families in extreme poverty to improve their well-being through the improvement of education, health and food opportunities. The Ministry of Social Development coordinated the programme but also considered contributions from the Health and Education Ministries. This program had five objectives:

- To substantially improve the education, health and nutrition conditions of families living in extreme poverty through sufficient and quality educational and health care services and food aid.
- To integrate education and health actions so that children and young people's school performance is not affected by illness, malnutrition or the need to carry out work that makes it difficult for them to attend school.
- To ensure parents have sufficient means and resources for their children to complete basic education.
- To promote responsibility and active participation of parents and all family members to improve education, health and nutrition for children and young people.
- To promote community participation and support in Progresas's actions so that educational and health services benefit all families in the localities where it operates, as well as joining the efforts and initiatives of the community in actions related or complementary to the Programme.

To contribute to food security the program considered support to improve the food consumption and nutritional status of members of low-income families, which translates into food supply for families. It was a program focused on low-income families, and the selection of the beneficiaries was made through multiple procedures that included approval of the community. The support was directed to the mothers and promoted participation and involvement to keep receiving the support. It also considered the surveillance of children's and women's nutrition and health, and education on health and food subjects.

6.1.4. Mexican Food Security Policies from 2000 to 2006

The National Development Plan 2001-2006, in sections 5, 6, and 7, propose different objectives and strategies. Section 5 refers to the Area of social and human development; section 6 refers to the area of growth with quality, and section 7 refers to the area of order and respect. Food security and agricultural systems are not directly considered in this National Plan; however, sections 5, social aspects, and 6, economic aspects, are intuitively linked to food security. In its annexe, the elaboration of food production and supply programmes is considered.

The Human Development Programme (Programa de Desarrollo Humano Oportunidades, OPORTUNIDADES) is a Federal Program for social and human development, under the coordination of the Social Development Ministry, and contributions from the Health and Education Ministries, it aims to support families living in extreme poverty to expand and improve education, health and nutrition opportunities that raise the capacities of their members to achieve better levels of well-being. Program OPORTUNIDADES is the direct successor of the Program PROGRESA, it considers six objectives:

- To improve the levels of education and well-being of Mexicans.
- To increase equity and equality of opportunities.
- To promote education to develop personal capacities and individual and collective initiative.
- To strengthen social cohesion and capital.
- To achieve social and human development in harmony with nature.
- To expand governmental response capacity to foster citizen confidence in institutions.

Food security is not explicitly mentioned, however, it is considered in its specific objectives, for the nutrition and care of kids during the stages of gestation and growth, it considers the delivery of food supplements, medical health surveillance and the promotion of information for good nutrition and self-care; to promote active participation and responsibility of parents and families; and to help families to participate in economic, social, and political life. In its food component, the programme considers direct income transfers to families, for kids and pregnant and breastfeeding women.

In November 2005, an effort was made to create the first food security-related policy, nevertheless, the initiative was never turned into a law. The Planning Law Initiative for Agri-Food and Nutritional Sovereignty and Security; this initiative aimed to establish institutions and mechanisms for planning and enhancing food security and sovereignty by establishing similar conditions for Mexican producers to those of the countries with which Mexico has free trade agreements and to reduce asymmetries in competitiveness and for the benefit of food sovereignty. This law initiative considered food as a human right and took into consideration the need to ensure the appropriate conditions for the production and distribution of food.

6.1.5. Mexican Food Security Policies from 2006 to 2012

The National Development Plan 2007-2012 considers sustainable human development as its governing principle, and it has five guiding principles: rule of law and security; competitive and job-creating economy; equality of opportunity; environmental sustainability; and effective democracy and responsible foreign policy. Guiding principles are transversal and consider the economy, politics, society, and environment. Food security is directly related to Principle 2, objective 8, which aims to supply internal markets with nutritious, healthy and accessible food; Strategy 8.1 focuses on food quality and 8.2 focuses on food availability and accessibility; Principle 3, objective 1, strategy 1.1 and 1.3 focuses on accessibility so that families could access nutritious and quality food; finally, Principle 3, objective 15, strategies 15.4, 17.9, 18.2, and 20.1 focuses on health and nutritious food by direct income and in-kind support.

During this six-year presidential term, the program OPORTUNIDADES was still carried out. The program in its food component aimed to direct income transfers and in-kind support to families, for kids and pregnant and breastfeeding women. However, the program also has education and health components to improve the economic conditions of families in extreme poverty.

6.1.6. Mexican Food Security Policies from 2012 to 2018

The National Development Plan 2013-2018 considers food security and hunger issues in various document sections. Section II, inclusive Mexico is a section where social issues are addressed and diagnosed, it considers poverty and extreme poverty as important causes of hunger and it considers that the use of assistance programs has not had the impact expected, and the need to promote entrepreneurial thinking and culture in the population as the means to improve social wellbeing. Section IV, Prosperous Mexico, considers that the low development of the agricultural sector is linked to limited inversion, use of technologies, access to financing, and its unequal development between regions. Pointing to the strategy to improve the sector conditions as the focus on productivity, profitability, and competitiveness, through modern economic development and the investment in the development of physical, human, and technological capital.

The National Campaign Against Hunger (Cruzada Nacional Contra el Hambre, SINHAMBRE) was a strategy for inclusion and well-being, that considered the coordinated effort of multiple governmental institutions, such as the Secretariat for Social Development, which was the presiding agency, and social and private sectors. It was focused on people living in conditions of extreme multidimensional poverty and lacking access to food in 400 municipalities. It had the following objectives:

- Zero hunger from adequate food and nutrition for people living in extreme multidimensional poverty and food deprivation.
- Eliminate acute child malnutrition and improve child weight and height indicators.
- Increase food production and the income of farmers and small agricultural producers.

- Minimise post-harvest and food losses during storage, transport, distribution, and marketing.
- Promoting community participation in hunger eradication.

The National Campaign Against Hunger also considered the joint effort of multiple programmes (Table 5), by national and international agencies.

Table 5. Main Programs of the National Campaign Against Hunger		
Ministry	Programme	Food Security Dimension
Ministry of Finance and Public Credit	Agricultural Insurance Subsidy Programme	Availability
	Support Programme for Agricultural Insurance Funds	Access
	Indigenous School Shelter Programmes	
	Programme of Basic Infrastructure for the Care of Indigenous Peoples	
	Regional Indigenous Funds Programme	
	Productive Organisation Programme for Indigenous Women	
	Alternative Tourism in Indigenous Areas Programme	
	Coordination Programme to Support Indigenous Production	
	Weather Contingency Insurance Programme	
	Management and Conservation of Natural Resources in Indigenous Areas	
	Liquid Guarantee Programme	
	Comprehensive training, capacity building and consultancy programme for producers and rural financial intermediaries.	
	Incorporation and Operation of Credit Promotion Units	
Reducing the Cost of Access to Credit		
Programme that channels support for the promotion of the agricultural, forestry, fishing, and rural sectors.		
Strengthening Banking Infrastructure		
Supporting Financial Inclusion and Bankarisation		
Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food	PROCAMPO Productive	Availability
	Risk Prevention and Management Programme	Access
	Programme for Capacity Development, Technological Innovation and Rural Extensionism	
	Natural Resources Sustainability Programme	
Ministry of Communications and Transport	Equipment and infrastructure investment support programme	
	Temporary Employment Programme	Access
Ministry of Economy	Microfinance Fund for Rural Women	Access
	Programme for the promotion of the social economy	
	National Micro-entrepreneur Finance Programme	
Ministry of Public Education	Human Development Programme OPORTUNIDADES	Access
	Scholarship Programme to Support Basic Education for Young Mothers and Pregnant Girls	

		Full-Time Schools Programme Scholarship programme	
Ministry of Health	of	Programme of Attention to Families and Vulnerable Population Health Caravans 21st Century Health Insurance Popular Insurance Prevention of obesity	Access Utilization
Ministry of Labour and Social Welfare	of	Employment Support Programme Programme of Attention to Situations of Occupational Contingency Productivity Support Programme	Access
Secretariat of Agrarian Reform	of	Women in Agriculture Programme Fund for the Support of Productive Projects in Agrarian Nuclei Young Rural Entrepreneur and Land Fund	Availability Access
Ministry of Environment and Natural Resources	of	Conservation for Sustainable Development Programme Temporary Employment Programme Drinking Water, Sewerage and Sanitation in Urban Areas Programme Programme for the Construction and Rehabilitation of Drinking Water Supply and Sanitation Systems in Rural Areas Programme for the Rehabilitation, Modernisation and Equipment of Irrigation Districts ProÁrbol. - Forest Protection, Forestry Development and Payment for Environmental Services Programme for the Modernisation and Technification of Irrigation Units Wastewater Treatment Programme Programme to encourage the organisational development of River Basin Councils Improving Water Efficiency in Agricultural Areas Promoting the Conservation and Sustainable Use of Wildlife	Access Sustainability*
Ministry of Social Development	of	Social Milk Supply Programme run by Liconsa, S.A. de C.V. Rural Supply Programme run by Diconsa, S.A. de C.V. Productive Options Programme National Fund for the Promotion of Crafts (Artesanías) Dignified Housing Programme 3 x 1 Programme for Migrants Temporary Employment Programme Human Development Programme OPORTUNIDADES Rural Housing Programme Food Support Programme Childcare programme to support working mothers Senior Citizens' Pension Priority Area Development Programme	Access

		National milk procurement programme run by LICONSA, S. A. de C. V.	
Ministry of Public Security		Payment of child support by federal inmates in state government custody	Access

Source: Own elaboration with information of SEGOB, n.d.

The Social Development Sector Programme 2013-2018 (Programa Sectorial de Desarrollo Social 2013-2018) was administered by the Ministry of Social Development. Its main objective was to assist the population living in poverty to reduce social deprivation and encourage the improvement of their income to help guarantee the exercise of social rights. This program has six objectives, from which the first objective is the one more strongly linked to food security: strengthen the effective fulfilment of social rights that enhance the capabilities of people living in poverty, through actions that have a positive impact on food, health, and education. Using this objective, basic food supply and direct income transfer actions were carried out.

The National Campaign was later complemented by the National Program Mexico without Hunger 2014-2018, it intended to better direct actions, and it expanded the action area to the whole country. This social policy aimed for the eradication of clientelist culture and bureaucratic immobility, decentralisation, the commitment of citizens to participate in the management of the state and the defence of rights, and the coordination of institutional programmes to generate synergies and take advantage of the added value of social participation by promoting the empowerment of the people and communities to increase income and to enhance the value of their work. The objectives of this programme were:

- Adequate food and nutrition for people living in extreme multidimensional poverty and lack of access to food.
- To reduce acute and chronic child malnutrition and improve child height and weight indicators.
- To increase food production and the income of farmers and small agricultural producers.
- To minimise post-harvest and food losses during storage, transport, distribution, and marketing.
- To promote economic development and employment in areas with the highest concentration of extreme food poverty.
- To promote community participation in hunger eradication.

6.1.7. Mexican Food Security Policies from 2018 to 2024

The National Development Plan 2019-2024 considers food security in its Social Policy and Economy sections. Both sections address the dimension of availability, increasing agricultural production, and access, by performing direct income transfers to small and medium-sized farmers, improving income in rural areas. Under the “Food self-sufficiency and rural rescue” title, the National Development Plan establishes direct income transfers and technology agricultural training and knowledge transfer to improve production during this period.

The main public programme relating to food security was the Agriculture and Rural Development Sector Programme 2020-2024, with the underlying objective of ending hunger, obtaining food security, improving health, and promoting sustainable agriculture. The program considers a differentiated application, depending on the socioeconomic status of producers and regions focusing on small and medium-sized farmers. The program also focuses on three priority objectives ensure food security:

- To achieve food self-sufficiency through increased production and productivity in agriculture, livestock, and aquaculture fisheries.
- To contribute to the well-being of the rural population by including historically excluded producers in rural and coastal productive activities, taking advantage of the potential of local territories and markets.
- To increase sustainable production practices in the agriculture and aquaculture-fisheries sector in the face of agro-climatic risks.

The Special Concurrent Programme for Sustainable Rural Development 2020-2024 (Programa Especial Concurrente para el Desarrollo Rural Sustentable) pretends to address the structural causes of social inequality, poverty, and inequitable income distribution. It envisions the rural population's well-being as the main priority, by reducing rural poverty, in this manner contributing to food self-sufficiency. It pretends to have a local effect and considers the intervention of multiple Ministries and government institutions, such as Health; Education; Agricultural, City and Territorial Development; and Transport and Communication, among others. This programme has three main objectives:

- To increase the production of food and forest products in rural localities.
- To promote measures that favour the income of the population living in rural areas of Mexico through the diversification of productive activities that promote national development.
- To contribute to the reduction of poverty rates in rural communities.

The Institutional Programme 2020-2024 on Mexican Food Security (Programa Institucional 2020-2024 de Seguridad Alimentaria Mexicana, SEGALMEX), as part of the whole axis of food security programs, focus on the buying, supplying, distributing, and trading of diverse products of basic basket food. To better coordinate food distribution of assistance programs, SEGALMEX coordinates two state-owned companies, Liconsa S.A. de C.V., and Diconsa S.A. de C.V. It also establishes a mechanism for buying products directly from farmers and selling directly to consumers through the already made selling points that Liconsa and Diconsa have. It also sells and distributes inputs for agricultural purposes. The institutional Programme has the following three objectives:

- To improve the income and quality of life of small and medium rural producers, contributing to the production of basic grains and milk and food self-sufficiency.
- To strengthen the social food supply system, emphasising products of quality and high nutritional value, considering regional preferences and customs, through the Basic Food Basket, with the lowest prices and availability in the country's most marginalised and poorest localities.

- To promote the family economy, and healthy and nutritious food, through the supply of quality milk at preferential prices for its beneficiaries, especially children and the elderly.

6.2. Qualitative Evaluation of Mexican Food Policies

6.2.1. Food Security Laws, Regulations and Standards in Mexico

Mexican legal framework has multiple laws, norms and regulations that consider at least one dimension of food security (Annex III). These laws give the Mexican government the necessary legal support and basis to propose different plans, programs, and strategies to ensure food security. Most of the Mexican Laws are solely focused on the utilisation aspect of food security, mainly by promoting food safety and food quality to improve population health. Access is another dimension of food security considered in multiple Mexican Laws, especially those focused on social development. On the other hand, the Law for Sustainable Rural Development, published in 2001, considers access, utilization as well as availability and stability dimensions of food security. In the Mexican legal framework, the first precedent of establishing food rights was in the General Law for Social Development in 2004, which occurred before the Constitutional amendment (CONEVAL, 2018a).

Food right was considered in the Mexican Constitution from the year 2011, reflecting that some food policies and National Development Plans did not explicitly mention this concept before this year. Another important improvement in terms of the utilization dimension of food security is the amendment to Mexican Official Standard NOM-051-SCFI/SSA1-2010. This amendment implemented the use of graphic seals to inform consumers of the ingredient excess to improve the consumers' choices of food.

The last food security law published is the General Law for Adequate and Sustainable Food (*Ley General de la Alimentación Adecuada y Sostenible*), published on 17th April 2024. This new law, which has already entered into force, focuses on food security from the rights perspective, considering the food systems and health problems of the population. The Federal Executive coordinates the cooperation and coordination of different government levels and ministries. It is important to recognise that this law will influence future strategies since it already considers that the National Development Plan shall establish the general axes of the National Food Policy and lay the foundations for the Special Programme of the Agro-Food System in line with the National Food Strategy.

The publication of this law could improve the state of food rights made by CONEVAL (2018), in which the institute considered that the characteristics of the normative elements in force and their degree of operationalization reflect the limited or insufficient scope of institutionalization of the right to food and that they do not provide sufficient legal and programmatic instruments, to allow for the functionality of the constitutional provisions related to the right. It could also improve the coordination through different Ministries and government levels, and the operation of food security programs by introducing regionalisation and a case-by-case approach.

6.2.2. Food Programs in Mexico

Food policies in Mexico had their origin at the beginning of 1900, such as school breakfasts and support for urban consumers, even the National Supply of Milk Programme started under a different name in the 1940s (CONEVAL, 2010). Most of the first food policies focused on supplying enriched food to vulnerable populations at lower prices (CONEVAL, 2010) and from the 1940s onwards the government subsidised agricultural production. From 1982 to date, multiple policies to ensure food security in Mexico have been proposed (Table 6). These programs reflect the different political, economic, and social conditions of each term.

In 1977, the General Coordination of the National Plan for Deprived Areas and Marginalised Groups (Coordinación General del Plan Nacional de Zonas Deprimidas y Grupos Marginados, COPLAMAR) was created, it aimed to channel resources to the population with the lowest living standards (CONEVAL, 2010). In its first stages, it conducted research on levels of marginalisation and carried out research related to poverty issues (CONEVAL, 2010). From the information obtained through COPLAMAR, the Mexican Food System (Sistema Alimentario Nacional, SAM) was created in 1980, which stopped operations in 1982 (CONEVAL, 2010). The SAM was the first Program to consider the food system from production to consumption and was coordinated by the presidency to improve food self-sufficiency (CONEVAL, 2010). Unfortunately, the sharp fall in international oil prices in 1982 reduced foreign exchange earnings to the detriment of the federal budget, which led to the withdrawal of funding for the programme (López Salazar and Gallardo García, 2015).

PRONAL followed the SAM of the previous presidential term. The six-year term of Miguel de la Madrid was marked by stagnation in economic activity on a scale the country had not known for a long time (Pozas Horcasitas, 1992). From the start of the crisis in 1982 until December 1987, a new reformulation of public policy and the role of the Mexican state in the national economy began through the Solidarity Pact (Pozas Horcasitas, 1992). During his presidential term started the liberalisation of the economy and free market in Mexico and set a neoliberal economic agenda (Poitras and Robinson, 1994). Economic liberalisation served as incentives for the private sector; however, little was done to reduce the discomfort of the lower classes (Poitras and Robinson, 1994).

In 1988, amid charges of fraud, Carlos Salinas de Gortari was elected president. President Salinas de Gortari also followed a neoliberal economic agenda and worked on the Agreement in the North American region (NAFTA), positioning Mexico in the economic bloc with the US, and anticipating the tendency seen in Europe and Asia (Poitras and Robinson, 1994). The reduction of the role of the state in the Mexican economy was translated to the selling of multiple state-owned enterprises (Alvarez Bejar *et al.*, 1993).

The adjustment to neoliberal macroeconomics made great impacts on employment, deteriorating the wages and deepening differences across the population (López Salazar and Gallardo García, 2015). To decrease the discontent of the popular classes caused by the new economic model, the PRONASOL was created (Poitras and Robinson, 1994). PRONASOL was critical to obtaining societal support (Alvarez Bejar *et al.*, 1993; Poitras and Robinson, 1994), it also helped to reinforce the position of the ruling political party

(Poitras and Robinson, 1994). PRONASOL strategy was focused on the availability of food through imports without considering the national agricultural sector strengthening (López Salazar and Gallardo García, 2015).

The program was aimed at populations of marginalised conditions; however, the people under vulnerable conditions were more than the program's coverage (Rodríguez Gómez and Patrón Sánchez, 2017). Some advances that this program had over its predecessors were: a better level of decentralization and better-focalized resources (CONEVAL, 2010). However, the program was also criticised because of the inequity in the resources division, some states received the same budget even if they had lower poverty percentages (Martínez Flores and Benavides Rincón, 2018). Another important criticism of the program was its use for electoral purposes, and as a way to obtain the votes of the people benefiting from the program (Martínez Flores and Benavides Rincón, 2018; Poitras and Robinson, 1994).

During the presidential term of Ernesto Cerdillo in 1994 the program PROGRESA was created, its focus was to provide food in the form of school breakfast to children and direct income transfers (López Salazar and Gallardo García, 2015). It promoted the participation of families in training activities and the follow-up of kids and pregnant women's health. Even if the government took into consideration FAO's recommendations, the strategy of direct income transfer had little improvement to Mexico's food security (López Salazar and Gallardo García, 2015).

PROGRESA targeted intergenerational poverty and its causes, considering malnutrition and lack of education, each involved Ministry would intervene to change the situation and break the poverty cycle (CONEVAL, 2018b). The program aimed at families, especially mothers of poor households to promote the participation of women; on the other hand, it put the whole responsibility for the success of the program on women and it also took away value time of the families that were forced to participate in activities to be able to keep the support (Lutz, 2012).

During President Vicente Fox's term, the previous food policy had minimal changes, the program PROGRESA was renamed to OPORTUNIDADES (López Salazar and Gallardo García, 2015), and it aimed to cover 5 million families (Lutz, 2012). It introduced the term microregions to include the local government institutions and society in the decision-making of the policies, as well as to plan, decide on and monitor both proposals and works in the regions; however, Ministries and institutions were unable to effectively coordinate actions (CONEVAL, 2018b).

OPORTUNIDADES also followed the recommendations of FAO and the international cooperation programme Special Programme for Food Security (Programa Especial de Seguridad Alimentaria, PESA), which was an international collaboration between FAO and the Ministry of Agriculture at the time (López Salazar and Gallardo García, 2015). PESA program's objective was to promote agricultural productivity and increase the incomes of small farmers (López Salazar and Gallardo García, 2015).

The next presidential term followed the same strategy but increased its coverage to 6.5 million families (López Salazar and Gallardo García, 2015). In 2007, the price of corn increased which caused massive and organised mobilisations throughout the country, this matched with the full entry into force of the NAFTA (Simmons, 2016). In the second

trimester of 2008, an alimentary crisis happened; the prices of basic foods went up (Torres Torres, 2010). By 2010, the monthly basic food basket cost was 4.2 times the minimum wage (Torres Torres, 2010).

SinHambre, which took place during Enrique Peña's presidential term, was created through a presidential decree in 2013, it aimed to reduce the percentage of people under multidimensional extreme poverty and food access deprivation (CONEVAL, 2018b). It started in 2013 being applied to 400 municipalities and in 2014 it increased to 1012, around 40% of the total number in the country (CONEVAL, 2018b). The Campaign aimed to reduce the percentage of people in multidimensional extreme poverty and lack of access to food (CONEVAL, 2018b). It considered creating multiple coordination instances with the private, social and governmental sectors (CONEVAL, 2018b; Martínez-Flores *et al.*, 2022); and used and promoted already existing programs, for which the population prioritized was covered by the campaign (Martínez Flores and Benavides Rincón, 2018). It considered monitoring mechanisms; however, the data collected could not be used as input to assess the improvement of the programs nor to determine the progress made in each poverty dimension (CONEVAL, 2018b). Even if the program, from the beginning, considered a way to protect human social rights; it did not take the human rights approach of the state's responsibility to ensure food security (Latorre and Sarmiento, 2022).

SEGALMEX's objectives and actions are related to food security and focus on improving production and increasing well-being in rural areas. This change can be noticed from the coordination agency, in this period being the Ministry of Agriculture when most of the other terms the coordinating agency was the Social Development Ministry. At the same time, some of their most recognizable programs, such as those guarantee prices for food production, were already part of the SAM in 1980 (Spalding, 1985). The SAM made strategic use of CONASUPO, a government-owned enterprise, at the time used to artificially increase food prices to promote food production (Spalding, 1985) and distribute food bought under guaranteed prices. This approach has parallels with the use of DICONSA and LICONSA in this programme, both government-owned enterprises. As well as the SAM, SEGALMEX has a food chain approach, promoting governmental intervention in production, transport, and distribution (Spalding, 1985). It's also important to notice that both SEGALMEX and SAM were aimed at small and rain-fed farms instead of focusing on big producers.

There are five approaches that governments take to obtain food security: food availability, income-based, basic needs, entitlement, and sustainable livelihoods (Burchi and De Muro, 2016). For the analysis of the evolution of Mexican food policies (Figure 4), policies were divided into the following approaches: food chain (availability focus), social development (infrastructure and direct transfers), human rights (food security as a state responsibility), and food system (integration of agricultural, health and social systems).

On the other hand, only during Miguel de la Madrid's term did the NDP consider direct actions for food security; other NDPs would indirectly consider food security in sections of Social Development, under poverty mitigation, or Economic Development, under agricultural production.

By analysing the evolution of the food policies (Table 6) is noticeable that the focus of the food security dimension has changed; food chain approaches tend to focus more on availability, while social development approaches tend to focus more on access. Most of the policies analysed were not continued after the six-year presidential term. The case of PROGRESA-OPORTUNIDADES is the only one that was directly continued; however, the policy got each term a smaller budget and the expected results were not achieved (CONEVAL, 2010; Maldonado Valera, 2013).

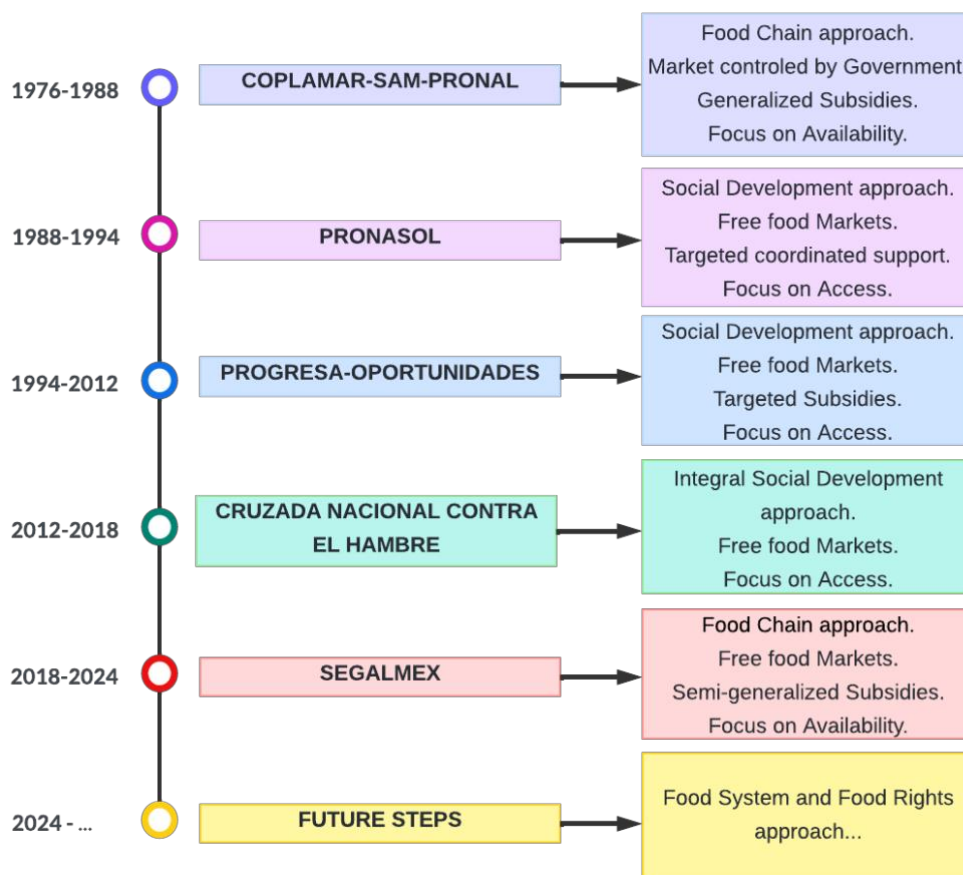


Figure 4. Qualitative Analysis of Food Policies in Mexico

The data considered and obtained for monitoring purposes could not, in most cases, be used for the constant improvement of the programs (Martínez Flores and Benavides Rincón, 2018). This goes hand in hand with the lack of a long-term emphasis on actions and objectives and only focus on the presidential term (Martínez Flores and Benavides Rincón, 2018). Even if the programs considered the coordination with private, social, and government sectors, in most cases the expected coordination was not achieved (CONEVAL, 2018b, 2010). The lack of coordination is a recurrent problem in all policies, and not a new approach for social policies (Martínez Flores and Benavides Rincón, 2018; Martínez-Flores *et al.*, 2022), and is even considered a cause for their failure (FAO, 2019; Martínez Flores and Benavides Rincón, 2018), to improve population conditions, it is necessary to implement a transversal approach to ensure the integrity of public policies and break bureaucratic inertia (Martínez Flores and Benavides Rincón, 2018).

Table 6. Main food security programs from 1977 to 2024 in Mexico

Programmes	President	Presidential term	Objectives	Responsible Ministry	Focus
Plan Nacional para Zonas Deprimidas y Grupos Marginados (Coplamar)	José López Portillo	1976-1982	To mitigate the effects of the first economic crisis of 1977 and the creation of the Mexican Food System.	Presidency	The creation of a National Food System and establishment of Basic Food Baskets.
Compañía Nacional de Subsistencias Populares (Conasupo)					Food self-sufficiency.
Sistema Nacional Alimentario (SAM) 1980-1982					
Programa Nacional de Alimentación (Pronal)	Miguel de la Madrid Hurtado	1982-1988	To improve the nutritional levels of the low-income population in affected regions and social groups, ensuring access to food and protecting their meagre income levels in the face of the crisis.		Subsidies to reduce prices, prices control, and direct intervention at selling points.
Programa Nacional Solidaridad (Pronasol)	Carlos Salinas de Gortari	1988-1994	Combating social marginalisation and extreme poverty, with focus on indigenous people, small farmers from arid zones and inhabitants of poor urban settlements.	Presidency Ministry for Programming and Budgeting Ministry of Social Development	Social welfare, productive support, and regional development
Programa de Apoyos Directos al Campo (PROCAMPO)					
Programa de Educación, Salud y Alimentación (Progresá).	Ernesto Cedillo	1994-2000	To increase productivity, to reduce poverty in rural areas. To promote education, health, food, and housing, for people in extreme poverty, and to provide in-kind support.	Ministry of Social Development	Provide in-kind support to families in extreme poverty.
Programa de Desarrollo Humano Oportunidades	Vicente Fox Quesada	2000-2006	To reduce extreme poverty, marginalisation, and inequality. To Promote access to education, health, and better food, through direct income transfer and in-kind support. To involve families for good nutrition and health.	Ministry of Social Development.	Promote social development through direct income transfer and in-kind support for population
Iniciativa de Ley de Planeación para la Soberanía y Seguridad Agroalimentaria y Nutricional (2005)					

							in vulnerable conditions.
Programa de Desarrollo Humano Oportunidades	Felipe Calderón Hinojosa	2006-2012		To reduce extreme poverty, marginalisation, and inequality. To Promote access to education, health, and better food, through direct income transfer and in-kind support. To involve families for good nutrition and health. Increase the number of beneficiaries of the previous six-year term.	Ministry of Social Development.		Promote social development through direct income transfer and in-kind.
Cruzada Nacional Contra el Hambre	Enrique Peña Nieto	2012-2018		To Improve social development and reduce poverty and extreme poverty. To make more productive, profitability and competitiveness of the agricultural sector. To promote entrepreneurial thinking, research, and possibilities to an innovative agricultural sector.	Ministry of Social Development		Rural welfare by improving access to food and promote entrepreneurial thinking.
Programa Sectorial de Desarrollo Social				To assist the population living in poverty to reduce social deprivation and encourage the improvement of their income to help guarantee the exercise of social rights.			
Programa Nacional México sin Hambre 2014-2018							
Programa Sectorial de Agricultura y Desarrollo Rural 2019-2024	Andrés Manuel López Obrador	2018-2024		To reduce poverty and unequal income distribution in rural areas. To increase field productivity for food self-sufficiency, agricultural, livestock, forestry, fisheries, and aquaculture. To contribute to the wellbeing of rural population.	Ministry of Agriculture		Rural Wellbeing and productivity. Small and medium-sized farmers. Basic grains and foods.
Programa Especial Concurrente para el Desarrollo Rural Sustentable (2020-2024)							
Programa Institucional 2020-2024 de Seguridad Alimentaria Mexicana.							

Source: Own elaboration with information of CONEVAL, 2010; SEGOB, n.d.

6.3. Quantitative Evaluation of Mexican Food Policies

6.3.1. Numbers and indicators on social development and food security in Mexico

Before 1980, studies on Mexican nutrition were scarce; however, they confirmed that the Mexican population had serious malnutrition problems, especially nutrient deficiencies and low weight in children; people used a great part of their wages to buy food, and the diet lacked quality proteins based on international references (CONEVAL, 2010). Malnutrition and low weight were even more extreme in indigenous populations, which presented extreme cases of undernutrition (CONEVAL, 2010).

In 1979, 21.9% of children younger than 5 years old had low weight, in 1989, this percentage lowered to 19% (CONEVAL, 2010). However, the situation for the most vulnerable population didn't improve, in 1989, 22.8% of children in rural areas presented low weight (Ortiz-Pérez and Bravo-García, 2022). By 1999, great advances had been made regarding the low weight of vulnerable populations; nevertheless, people still presented nutrient deficiencies, which could be concluded that people consumed food with higher nutritional energy but not necessarily better quality (Ortiz-Pérez and Bravo-García, 2022).

Low weight and anaemia are still present, especially in vulnerable populations such as kids and pregnant women. The national percentage of low-weight kids under 5 years old compared with the data from the 1980s and 1990s has decreased; 2.8% in 2012, 4.8% in 2018 and 3.7% in 2021 (Shamah-Levy *et al.*, 2022, 2020). On the other hand, kids' obesity and overweight have increased, especially in those ages 5-11 and teens, the latest percentages of ENSANUT 2021 considered that 34.7% of kids of scholar age are overweight or obese and 42.9% of teens (Shamah-Levy *et al.*, 2022).

Considering the data of National Health and Nutrition Survey (Encuesta Nacional de Salud y Nutrición, ENSANUT), Mexico has the highest percentage of adults with obesity and overweight, the national rate in 2021 was 72.4%, in 2018 was 74.8%, 60.7% in 2000, and 62% in 1999 which represents an obvious increase compared to 34.5% in 1988 (Shamah-Levy *et al.*, 2022, 2020). This is observed by the rise of diabetes and hypertension incidence in adults, in 2012 9.2% of adults presented diabetes and 16.6% hypertension, and in 2021 the numbers were 15.8% and 28.45%, respectively (Shamah-Levy *et al.*, 2022); this increases the amount of money the government has to invest in treating this kind of diseases, only in 2022 the Mexican Institute of Social Insurance (Seguro Mexicano del Seguro Social, IMSS) invested \$50619 millions of pesos (€ 2389 million) on treating diabetes, making it the most costly sickness for the institution (IMSS, 2023).

Since 2012, Mexico has implemented a food security index as part of ENSANUT; according to it in 2012, 70% of households were food insecure, this number decreased in 2018 to 55.5% and increased again in 2021 to 60.8%; in this last year, 39.5% of the households received at least one type of social food support (Shamah-Levy *et al.*, 2022); this means that 21.5% of food insecure households did not receive any support. On the other hand, most food-insecure households are in the Centre and South regions (Shamah-Levy *et al.*, 2022, 2020). Another food security aspect that is often overlooked is access to water; according to ENSANUT 2021, 16.3% of households have insecure access to water; however,

this number does not provide enough information regarding the quality, and economic accessibility.

In 1982-1988, the minimum wage had a real loss of 63% compared to 1976. The share of wages in GDP fell from 49.3% in 1976 to 25.9% in 1987 and social development expenditure fell from 6.9% in 1978 to 5.6% of GDP, while health expenditure fell by approximately 30% in the same period (Pozas Horcasitas, 1992). According to data from CONEVAL, in the last years, poverty has had minimum changes, in 2008 44.4% of the population was living in poverty, from which 11% were in extreme poverty, 21.7% had lack of access to food, and 21.9% had educational backwardness (CONEVAL, 2022). By 2018, the percentage improved a little, people in poverty were 41.9%, extreme poverty was 7.5%, lack of access to food 20.4% and educational backwardness was 16.9%. By 2020 the numbers improved again, people in poverty were 36.3%, in extreme poverty 7.1%, lack of access to food 18.2% and educational backwardness 19.4%(CONEVAL, 2022).

Part of the food security problem in Mexico has to do with the low wages, according to data from the Bank of Mexico (Figure 5), the minimum wage in Mexico has stalled from 1996 until 2018 (Banco de México, 2024). On the other hand, even if the minimum wage increased by 2018, the purchasing power is still not around the level it had by the beginning of the 1980s. The minimum wage is important because it needs to cover the population's basic needs.

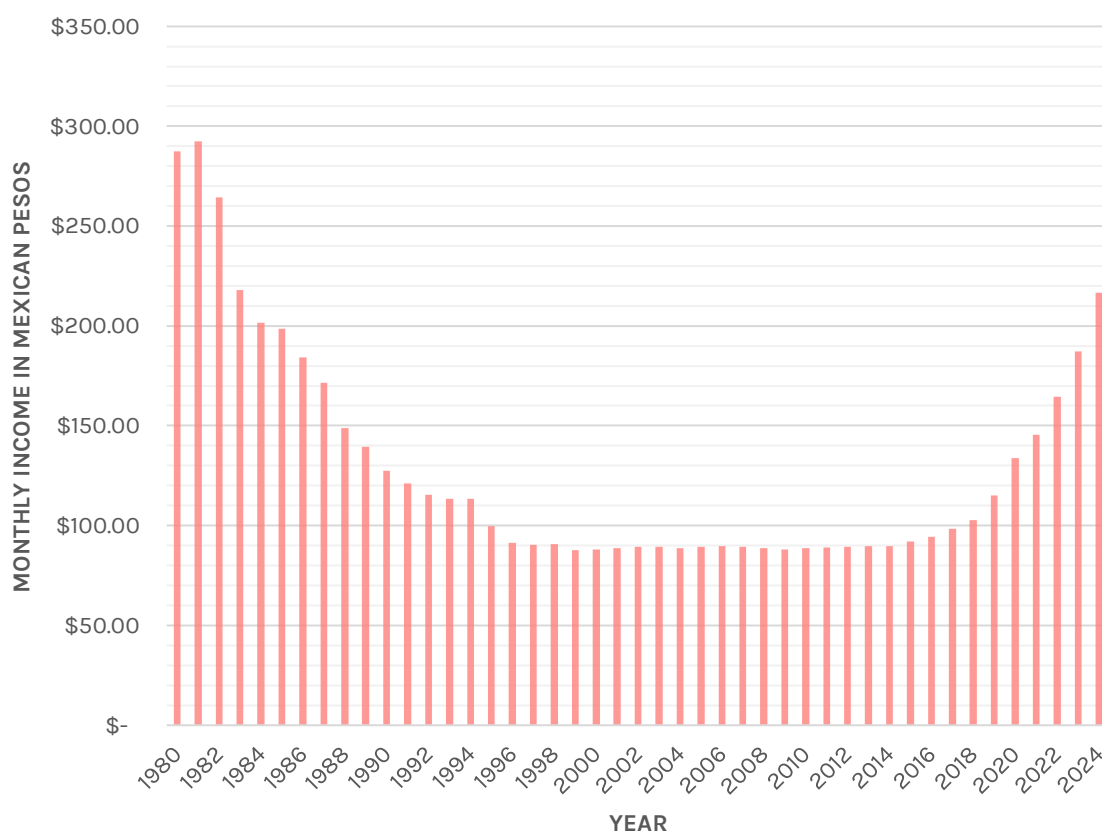


Figure 5. Average Real Minimum Wage in Mexico from 1980 to 2024 (Source: Banco de México, 2024)

In Mexico, alimentary baskets were used by CONEVAL to measure multidimensional poverty; alimentary baskets were a list of products that covered the population's nutritional needs (CONEVAL, 2022). Alimentary baskets represent the amount of monthly income needed to cover a daily diet of 2180 kcal and 68 g of protein in urban areas and 2220 kcal and 65 g of protein in rural areas (INEGI, 2020); however, they included some unhealthy products such as cookies, white bread, sweet bread, grilled chicken and flavoured carbonated beverages. According to the available data from CONEVAL, the basic alimentary basket has increased its price almost 9 times in 29 years (Figure 6).

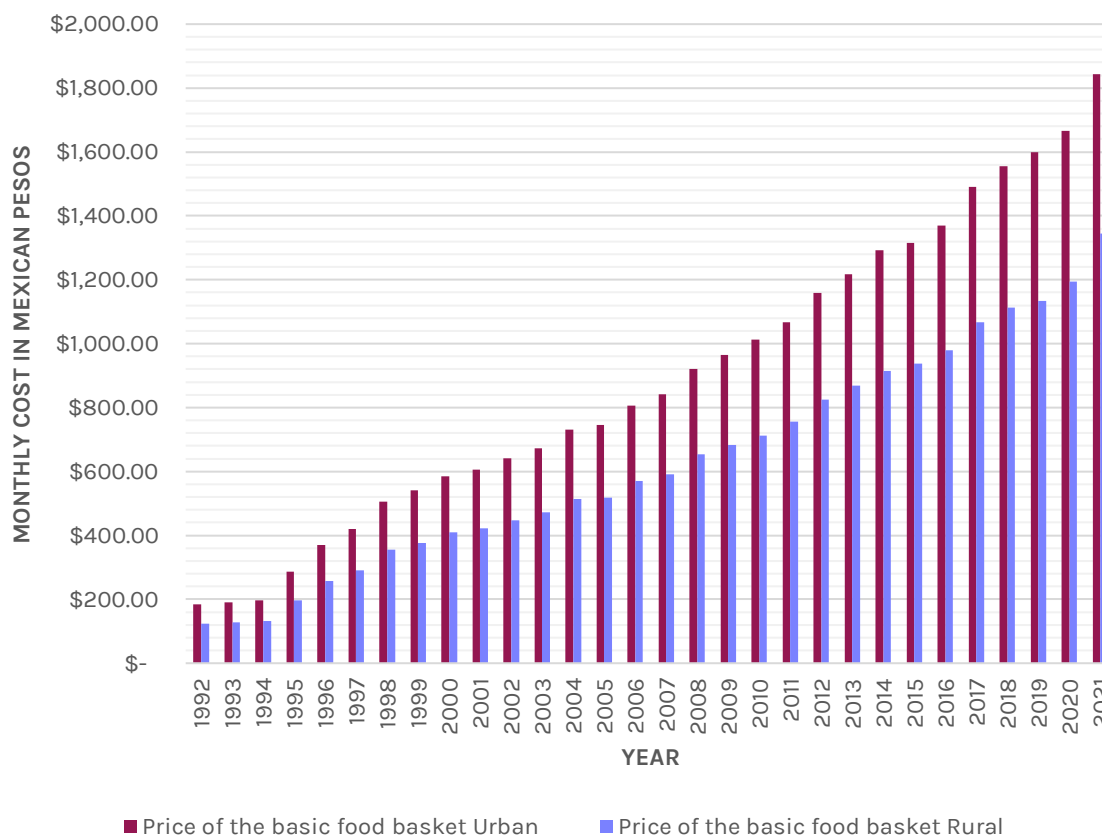


Figure 6. Urban and Rural Basic Food Baskets (Source: CONEVAL, 2022)

Alimentary and non-alimentary baskets were used by CONEVAL to measure multidimensional poverty, classifying it by income into extreme poverty and poverty (INEGI, 2020). Extreme poverty represents an income not enough to cover alimentary baskets, while poverty considers both basic baskets; by generating this information, CONEVAL could determine the rural and urban poverty lines, being these the income needed to cover both alimentary and non-alimentary baskets (CONEVAL, 2022). However, if compared to the minimum monthly wage, it is noticeable that since 1995 and until 2019, the official minimum wage has been lower than the urban poverty line (Figure 7), this means that people earning the official minimum salary could not cover their basic needs according to the alimentary and non-alimentary baskets for one person, forcing them to allocate their budget to their most immediate needs.

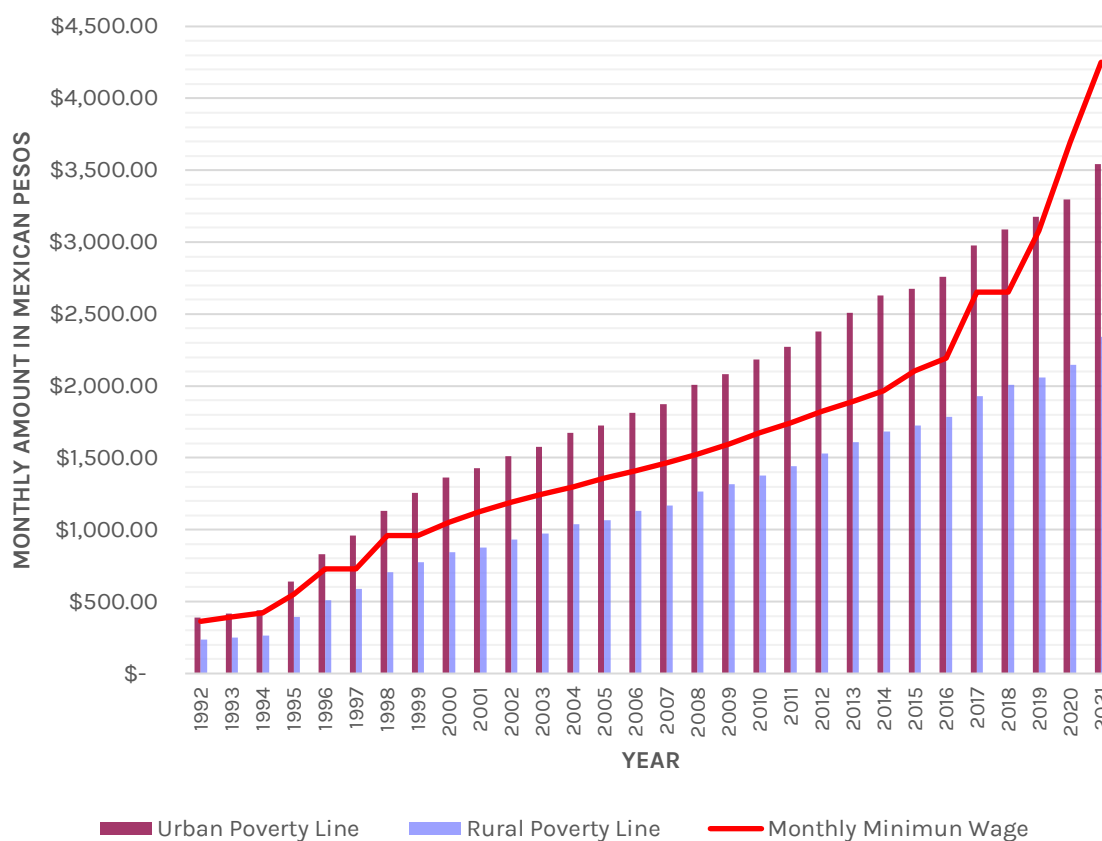


Figure 7. Comparison between minimum monthly wage and poverty lines for December of each year (Source: CONEVAL, 2022; Banco de México, 2024)

6.3.2. GFSI Indicators Analysis of the Mexican Food Policies from 1982 to 2024

Based on the GFSI indicators, the food policies' designs were analysed (Annex IV). The different policies resulted in different overall percentages of food security (Table 7), as well as their focus on the four food security dimensions (Figure 8). The food program with the highest food security coverage percentage was SEGALMEX at 55.76%, following SinHambre at 49.95%, then PRONAL at 34.58%, then OPORTUNIDADES and PROGRESA at 29.93% each, and finally PRONASOL with 24.16%.

Table 7. Coverage Percentage for Food Security based on the GFIS

Dimension	Weight	Segalme x 2018-2024	SIN HAMBRE 2012-2018	Oportuni dades 2006-2012	Progresa 1994-2000	Pronasol 1988-1994	Pronal 1982-1988
1) Availability	25.00%	19.14%	10.59%	0.00%	0.00%	7.66%	16.33%
2) Affordability	30.00%	18.69%	17.77%	12.00%	6.23%	17.77%	24.92%
3) Quality And Safety	22.50%	17.93%	18.11%	17.93%	17.93%	9.15%	13.54%
4) Sustainability And Adaptation	22.50%	0.00%	3.49%	0.00%	0.00%	0.00%	0.00%
TOTAL	100%	55.76%	49.95%	29.93%	24.16%	34.58%	54.79%

On the other hand, considering their dimension focus (Figure 8), all food policies had at least considered the dimensions of affordability and quality, this evidence that the importance of economic access to food was considered in all policies during their design phase as well as the nutritional aspect of the food.

For the availability dimension, SEGALMEX had the highest coverage percentage, followed by PRONAL, SinHambre and PRONASOL. Programs OPORTUNIDADES and PROGRESA did not cover this dimension, mainly by their focus on social development strategies, which consisted of direct food and income transfers to the program beneficiaries, instead of promoting agricultural national production or ensuring supply and distribution by imports.

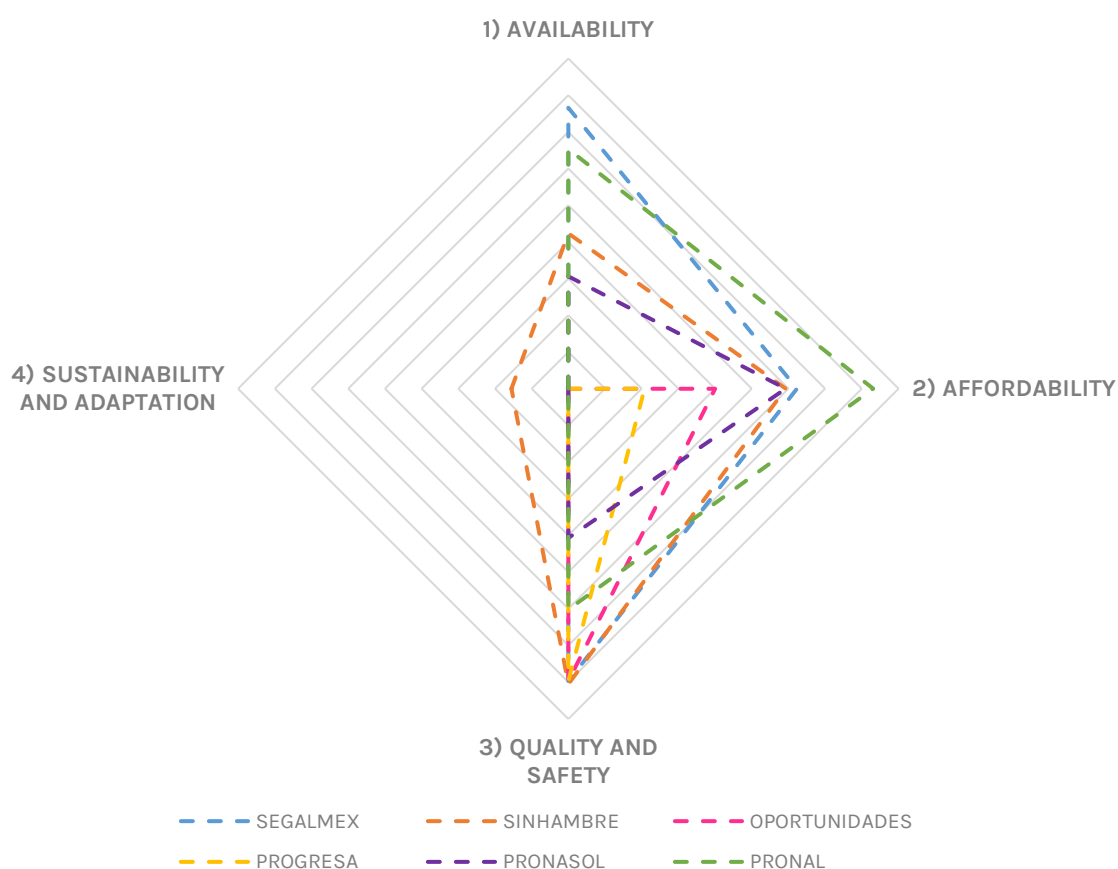


Figure 8. Global Food Security Index Analysis of Mexican Food Policies

All programs covered the affordability dimension, PRONAL had the highest, followed by SEGALMEX, then PRONASOL, SinHambre, OPORTUNIDADES and finally PROGRESA.

All programs covered the quality and safety dimension: SinHambre the highest, then SEGALMEX, OPORTUNIDADES, PROGRESA, then PRONAL and finally PRONASOL. This dimension was mainly considered when proposing education on nutritious food or their focus on food safety.

Finally, sustainability and adaptation dimensions were not considered in the design of food policies, only contemplated by SinHambre under the indicator risk management; mostly because the indicators used for this dimension are more related to climate and environmental systems often not considered outside the specific ecological policies.

6.3.3. Food System Indicators Analysis of the Mexican Food Policies from 1982 to 2024

Based on the Food system model in Mexico generated in step 1 (Annex I), the food policies' designs were analysed (Annex V), and percentage coverage of food security was obtained (Table 8). Food security had a higher coverage percentage in SEGALMEX with 65.71%, then SinHambre at 55.27%, then PRONAL at 40.89%, followed by PROGRESA at 24.73%, OPORTUNIDADES at 21.61% and PRONASOL at 19.82%.

Table 8. Coverage Percentage for Food Security Based on Mexican Food System Indicators

Dimension	Weight	Segalmex 2018-2024	SIN HAMBRE 2012- 2018	Oportunida des 2006-2012	Progres a 1994-2000	Pronasol 1988- 1994	Pronal 1982- 1988
1) Availability	25.00%	15.63%	12.50%	0.00%	3.13%	6.25%	18.75%
2) Access	30.00%	25.71%	17.14%	12.86%	12.86%	8.57%	17.14%
3) Utilization	22.50%	11.25%	15.00%	3.75%	3.75%	0.00%	0.00%
4) Stability	22.50%	12.50%	7.50%	7.50%	7.50%	5.00%	7.50%
TOTAL	100%	65.71%	55.27%	21.61%	24.73%	19.82%	40.89%

Based on the food security dimension, the Mexican food policies analysed showed different results (Figure 9). Considering the overall coverage, SEGALMEX has better results in each dimension, followed by SinHambre, and finally PROGRESA, these programs considered in their design all food security dimensions.

Availability axis considered that Mexico needs to cover its basic food needs through national production, instead of solely relying on imports, as well as promoting sustainable agriculture. PRONAL had the highest coverage, followed by SEGALMEX, this can be explained due to the food chain focus of those programs, then SinHambre, PRONASOL and PROGRESA, OPORTUNIDADES did not consider directly in its design the availability dimension of food security.

For the access dimension, it was considered to promote justice and decent salaries, and to avoid prices instability, income and food direct transfers are also considered but not as the main way to ensure access dimension. The highest coverage by design was SEGALMEX, Followed by PRONAL and SinHambre, OPORTUNIDADES and PROGRESA and PRONASOL.

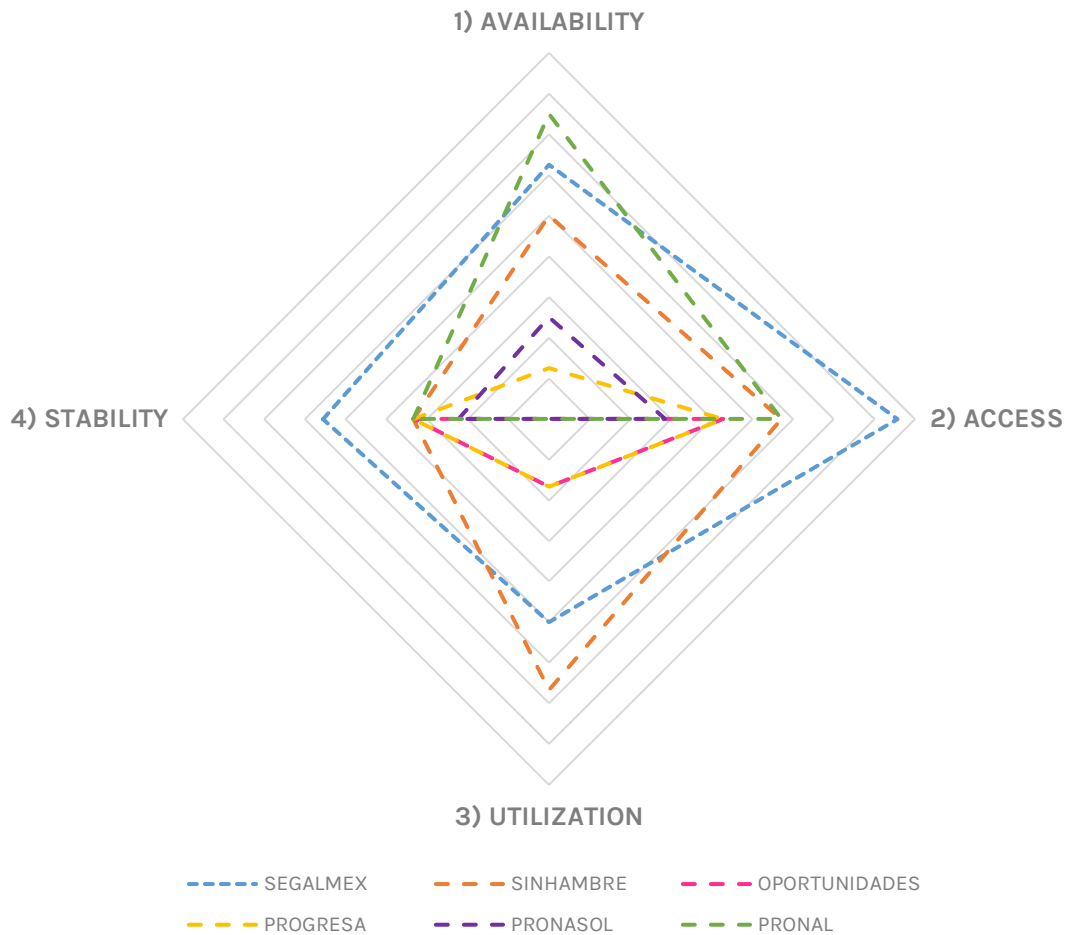


Figure 9. Food System Perspective Analysis of Mexican Food Policies

In the utilisation dimension, food safety, education on nutrition and promotion of healthy lifestyles were considered among others. SinHambre had the highest percentage, followed by SEGALMEX, OPORTUNIDADES and PROGRESA have the same coverage; PRONAL and PRONASOL did not consider in their design the utilisation dimension of food security.

Finally, stability, this indicator has proposed considering the conditions needed for food security to be maintained over time. SEGALMEX had the highest percentage, followed by SinHambre, PRONAL, PROGRESA and OPORTUNIDADES, and the least was PRONASOL.

7. Discussion

For the research period, the Mexican government did not define general and continuous food security policies, programs, or dependencies to follow up. Depending on the government in power the objectives and priorities were changed. It has multiple isolated programs and dependencies that work in a disjointed way, which does not allow for focus on priority issues such as food security and sovereignty, causing poor targeting of programmes, ill-conceived strategies, and duplication of programmes (López Salazar and Gallardo García, 2015).

The dismantling of the national farmers' base and the growth of rural migration; the loss of food self-sufficiency and increased dependence on food imports accompanied by low levels of growth in the national economy; the fall in wages and purchasing power; the contraction in the level of employment; the rise in poverty; and a permanent food vulnerability have led to a deterioration of the internal food security (Torres and Rojas, 2020; Torres Torres and Rojas Martínez, 2022).

Even if different aspects of food security have improved, the institute CONEVAL (2018) identifies that food insecurity is still an issue, especially for those population groups considered vulnerable. The tendency of low-weight food insecurity had a swift of symptoms; nowadays, food insecurity is generalized through the Mexican population as overweight and obesity caused by insufficient economic access to nutritious and good quality food (CONEVAL, 2010). This contributes to other metabolic sicknesses such as diabetes and hypertension, causing expenses to the Mexican health system. Indigenous population still presents higher percentages of undernutrition than the non-indigenous population; on top of that, the information gathered has not been representative, making the real issue even more concerning (CONEVAL, 2010). The Indigenous population is often food insecure due to their low income, food deprivation and poor dietary diversity; they lack safe drinking water and depend on government support for their livelihoods, affecting mainly women of reproductive age and the elderly (González-Martell *et al.*, 2019).

In Latin America, policies should aim to promote equitable access and strengthen research and development of technologies; as well as enhance the link between public and private research and development systems and agricultural extension and dissemination of knowledge among the population involved in food production (de Jaramillo *et al.*, 2023). Since the 80s, various structural changes have been made; however, the results were not effective in diminishing poverty resulting in insufficient, unstable, and exclusionary economic growth (López Salazar and Gallardo García, 2015). The most obvious manifestation of the crisis is precisely the deterioration of the population's living standards (Pozas Horcasitas, 1992).

We need to consider that since 1980 Mexico has been through a structural economic crisis that has favoured the income concentration in the three highest deciles limiting access to food and increasing poverty levels; the lowest deciles have been forced to lower the quality, quantity, and diversity of their food (Torres Torres, 2010). The instability of food prices does not allow the population to take advantage of the flexibility of supply offered by distribution companies in open economies, and it favours the purchase of processed and nutrient-poor foods (Torres Torres, 2010). For the last 30 years, the

minimum wage has lost its buying power; limiting the access of the poorest to food in quality, quantity, and diversity (Torres Torres, 2010). This is also translated as a loss of food security reflecting a failure to treat poverty (Torres Torres and Rojas Martínez, 2022). Food insecurity is directly linked to poverty and actions need to be transversal across the different elements and systems composing the Mexican food system.

Mexico's food policies have not had a human rights approach and food prices tend to increase at a faster pace than salaries; in this light, food prices had not yet been considered a public good. Politic action needs to influence the food systems by stabilising the prices with low economic effects and the participation of the lower-income people (Timmer, 2012). In Mexico, health systems and social systems are often overlooked in the design of food programs and policies. Since the reform of Article 4th of the Mexican constitution in 2011, the Mexican population has the possibility to demand the right to food and the Mexican government is forced to do everything necessary to ensure access to that right (CONEVAL, 2018a); nevertheless, this has not been reflected in the design of the analysed programs.

Food security has had different approaches to Mexican policies, one of those being access; however, access to food is not enough to measure food security, it needs to include other basic needs such as access to education, health, and community life (Burchi and De Muro, 2016). As above mentioned, one of the main aspects of food security is the economic or physical access to food; some aspects of the programs analysed focused on income transfers by enhancing social development such as education or health and the direct monetary transfer (Rodríguez Gómez and Patrón Sánchez, 2017). However, these policies have not been effective in reducing poverty; this result could be attributed to the low public budget destined for these policies (Rodríguez Gómez and Patrón Sánchez, 2017).

To improve their effectiveness, it is necessary to increase the public budget destined for policies, increase coverage of certain vulnerable groups so that these groups can be fully covered, and assess the cost-effectiveness of policies (Rodríguez Gómez and Patrón Sánchez, 2017). Nevertheless, income transfers cannot be the only means to reduce poverty; other strategies such as improvement of salaries and better jobs need to be considered too (Rodríguez Gómez and Patrón Sánchez, 2017). During crises, the policies of structural adjustment usually focus on reducing governmental expenses to promote national economic growth and access to international credit (Barquera *et al.*, 2001) causing the reduction of expenditure on government programs, which has also been a reason for unfruitful attempts to obtain food security. From the food system perspective, food security can only be ensured through transversal actions; food systems consider not only the food production chains but also the other systems involved in food security (von Braun *et al.*, 2021).

On the other hand, food security policies in Mexico have gone from generalised coverage to targeted coverage. Whereas policymakers should concentrate efforts on those with a low capability of being food secure (Burchi and De Muro, 2016), the mechanisms to promote participation and avoid corruption must be clear, and the coverage and budget enough to promote real changes. It is needed to clarify the priorities and objectives of food policy in Mexico so that its continuity can be guaranteed (Barquera *et al.*, 2001). One of the few attempts of the Mexican government to establish a food system was SAM,

which was greatly affected by corruption (Barquera *et al.*, 2001). On the other hand, various food security programs have been criticized for being a way to coerce the vote and citizen participation during electoral periods by the governing party (López Salazar and Gallardo García, 2015).

Another often associated cause of the inefficiency of the Mexican food policies is social participation and institutional coordination. However, social policies have already included by design people's participation and governmental coordination. Nevertheless, policies have not achieved the proper level of coordination and people participation needed; this can be explained by the bureaucratic inertia institutions usually maintain (Martínez Flores and Benavides Rincón, 2018). On the other hand, food security policies have not been able to address urban and rural food security issues at the same time. It is important to establish policies that support agricultural production and to eliminate the negative influence of organised crime (Acosta Acosta, 2017).

The food industry and the government have played a role in transforming the diet of Mexicans; considering that the way poor people ate was incorrect the government made diverse biopolitics to improve, homogenise the national consumption register and increase the volume of processed food transactions (Lutz, 2012). According to Lutz (2012), food support programmes in Mexico have a deep class bias, as well as strong economic interests. Under the idea that industrialised foods were good, hygienic, and healthy; the government could effectively change Mexicans' diet and food preferences by providing industrialised foods through different assistance policies (Lutz, 2012).

To better understand the importance of food in the Mexican context, the increase in prices of corn caused mass mobilizations in 2007 (Simmons, 2016). No other basic food is intersected with national belonging as corn for Mexican People and a representation of *lo mexicano*, it needs to be understood that corn is critical for the livelihood and well-being of this country (Simmons, 2016). Price increases should be seen as a material impact, as the tradition and national identity and belonging (Simmons, 2016).

Mexican policies need to consider malnutrition as a health problem, establish preventive rather than corrective measures, and promote the traditional diet by correcting its deficiencies, instead of importing dietary patterns from other cultures (Ramírez Mayans *et al.*, 2003). Access to basic needs does not ensure food security, it is important to collect information on religious beliefs and local food habits (Burchi and De Muro, 2016). In Mexico's case, traditional foods have not been properly considered in the objectives of food policies. Population's buying patterns should be also considered when designing food policies. In open economies, just as in Mexico, the consumers decide which product to buy depending on the marketing strategies; sometimes they buy a single brand or known product (Torres Torres, 2010).

An important discussion over food security in Mexico is self-sufficiency; considering that food security depends on each country's context, food self-sufficiency is justifiable even if the economic arguments are in favour of international trade; however, it is necessary to establish it clearly (Luna, 1997). Not only physical aspects need to be considered when formulating food security policies, but also people's psychology. For example, for people to be food secure they need to feel food secure, food price stability needs to be considered a public good to ensure the people's perception (Timmer, 2012).

None of the food policies analysed directly coped with the root causes of food insecurity in Mexico, which are poverty and marginalisation, and consisted of isolated efforts. Most of the programs were focused on objectives and strategies in the short term, only during the presidential period (Martínez Flores and Benavides Rincón, 2018) instead of establishing actions that could impact in the long run and livelihoods of people. Mexican economy had not been stable enough to allow the continuity of policies, the fragility of the Mexican economy is made obvious through the constant budget cuts that most programs experienced in every financial crisis (Torres Torres, 2010).

Food security assistance programmes should be considered only temporary measures to alleviate access problems; they have not been able to counter food insecurity in certain regions even if they have had important effects on marginalised populations (Torres and Rojas, 2020); employment, education and proper salaries are not consistently improved throughout the years.

Mexican food security policies need to be preventive and contextualized to the traditions and needs of the community, considering that assistance policies have not been sufficient as a preventive strategy to reduce malnutrition, underweight, overweight and obesity (González-Martell *et al.*, 2019). Food security needs to be of national importance; policies related to it need to be based on internal economic development and better wealth distribution (Torres and Rojas, 2020). It is needed to improve the living conditions of marginalised populations in rural and urban areas and provide enough sources of employment.

8. Conclusions

Food security programs are barely considered in the analysed National Development Plans (NDP), being the one from 1983-1988 the only one directly referring to a Food Plan, the rest of NDPs consider food security under two bigger schemes, Social Development and Economic Development. However, focusing on only one limits the possibility of action by competent authorities. One of the most repeated criticisms of Mexican Food Security Policies is the lack of real coordination between social, private and government sectors, but also between Government Ministries and Agencies at all levels; however, coordination had been repetitively mentioned in the policies design, which means that the main problem is in the execution of the policies.

Food security needs to be considered not only as food availability or energy balance but also as a social development issue. It is needed a combination of policies, rural and agricultural, health and social, to improve rural and small farmers' conditions, urban population access and lifestyles, reducing poverty and promoting an economic system change. This is not an easy job, it implies the coordination of the agricultural, health, social and economic systems, and governmental institutions; as well as ensuring the continuity of the programs regardless of government changes, financial crises or budgetary cuts.

These programs need to focus on the fair distribution of wealth, benefiting those in most need, and establishing agricultural systems which improve small farmers' access to financing, tools and training to ensure food production and improve their livelihoods, also considering the traditional and sustainable methods of production. As these systems are dependent on environmental conditions, the capacity to respond to climatic trends and hazards must be considered, and promote small circuit distribution, sustainable agriculture and urban agriculture.

One important aspect of the evolution of food security policies is precisely the transition from a food chain to a more social development approach. Due to the publication of the General Law on Adequate and Sustainable Food in 2024, a new approach to food security in policies is expected, with a focus on food systems and human rights; this law will also provide a better base to develop food policies and improve indicators that in the end could serve as input for improvement and continuity of policies.

Lessons from previous policies and their results should be learnt, such as increasing the evaluation and monitoring, adaptability to specific contexts, changes and adaptation capacity of the policies; better and more frequent indicators are needed to provide enough information for changes and modifications of policies. This can be improved by top-down and bottom-up political capacity building and coordination of the actors involved.

The instability of Mexican politics and the lack of capacity to act and adapt to financial crises have caused, on several occasions, the budget of social programmes to be cut, thus causing the ineffectiveness of actions. The root causes of food insecurity,

marginalisation, low wages, and lack of education have been effectively detected, but have not been effectively and forcefully addressed. A congruent development of social programmes is needed, without the actions of national and international economic elites determining the rejection or acceptance of policies. The economy must be strengthened to cope with international macroeconomic variations and to avoid excessive increases in food and basic food baskets above the minimum wage. The support of the population is also required to promote the continuity of policies that benefit them.

Food security must be addressed from a food system perspective, considering the subsystems that constitute it, from the production capacity of the countryside to the capacity of the health systems. It is necessary to promote the research capacity of institutions to strengthen studies on the Mexican population's nutrition and health, also considering their genetic variations. Health systems should promote healthy diets and lifestyles to contribute to a preventive food security policy. Farming systems must produce enough healthy, quality food, and strengthen distribution and storage systems to reach hard-to-reach areas, as well as strengthen the capacity of small-scale producers without neglecting traditional production systems and traditional foods. Social and economic systems must enable people to lead healthy and economically sufficient lifestyles in rural and urban areas.

9. Study limitations

This research, however, is subject to limitations related to information. Regarding the data produced by different institutions and through different methodologies were not consistent in making comparisons between policies and their results. To face this limitation, the potential impact of policies was not evaluated outside their design.

A second limitation was the lack of access to programs and policies which were not made public or contained in the National Journal. To face this limitation, second-source information related to the programs not found was reviewed and used as a basis for this study; especially for those programs dated before 1990. Related to this limitation is the lack of a food security index for Mexico before 2012; therefore, limiting the comparability of food security results.

Another limitation was related to the research design and the food security concept; because this term was proposed in 1996 most policies before that date would not cover the whole scope of food security making it biased towards more modern policies. To face this limitation, the policies analysed were not only focused on food security but also on social development promoting food access. Finally, the results of this study only reflect the analysis of the policies assessed; however, considering that food insecurity is a transversal issue, other policies not assessed in this study could provide and establish actions for food security in different dimensions.

10. References

- Abanda, F.H., Chia, E.L., Enongene, K.E., Manjia, M.B., Fobissie, K., Pettang, U.J.M.N., Pettang, C., 2022. A systematic review of the application of multi-criteria decision-making in evaluating Nationally Determined Contribution projects. *Decision Analytics Journal* 5. <https://doi.org/10.1016/j.dajour.2022.100140>
- Abay, K.A., Breisinger, C., Glauber, J., Kurdi, S., Laborde, D., Siddig, K., 2023. The Russia-Ukraine war: Implications for global and regional food security and potential policy responses. *Glob Food Sec* 36. <https://doi.org/10.1016/j.gfs.2023.100675>
- Abler, D.G., Pick, D., 1993. NAFTA, Agriculture, and the Environment in Mexico. *Am J Agric Econ* 75, 794–798.
- Acosta Acosta, A.G., 2017. La Seguridad Alimentaria en México y su Problemática en el Contexto del Desarrollo. Instituto de Investigaciones Estratégicas de la Armada de México DA 2.
- Adams, E.J., Grummer-Strawn, L., Chavez, G., 2003. Food Insecurity Is Associated with Increased Risk of Obesity in California Women. *J. Nutr* 133, 1070–1074.
- Aguilar Astorga, C.R., 2017. Evaluación de políticas públicas, Una aproximación, 1st ed. Universidad Autónoma Metropolitana, Mexico.
- Alvarez Bejar, A., Mendoza Pichardo, G., Uggen, J.F., 1993. Mexico 1988-1991: A Successful Economic Adjustment Program? *Lat Am Perspect* 2, 32–45.
- Artés, J., Rodríguez-Sánchez, B., 2022. Métodos de evaluación de las políticas públicas. *Papeles de Economía Española* 18–29.
- Banco de México, 2024. Sistema de Información Económica. Salarios Mínimos. [WWW Document]. Banco de México. URL <https://www.banxico.org.mx/SieInternet/consultarDirectorioInternetAction.do?sector=10&accion=consultarCuadroAnalitico&idCuadro=CA601&locale=es> (accessed 6.28.24).
- Barquera, S., Rivera-Dommarco, J., Gasca-García, A., 2001. Políticas y programas de Alimentación y Nutrición en Mexico. *Salud Pública México* 43, 464–477.
- Beddington, J.R., Asaduzzaman, M., Clark, M.E., Fernández, A., Guillou, M., Jahn, M.M., Erda, L., Mamo, T., Van Bo, N., Nobre, C.A., Scholes, R., Sharma, R., Wakhungu, J., 2012. Achieving food security in the face of climate change: final report from the Commission on Sustainable Agriculture and Climate Change. Copenhagen.
- Burchi, F., De Muro, P., 2016. From food availability to nutritional capabilities: Advancing food security analysis. *Food Policy* 60, 10–19. <https://doi.org/10.1016/j.foodpol.2015.03.008>
- Camberos Castro, M., 2000. La seguridad alimentaria de México en el año 2030. *Ciencia Ergo Sum* 7, 49–55.
- Campbell, C.C., 1991. Food Insecurity: A Nutritional Outcome or a Predictor Variable? *J. Nutr* 121, 408–415.

- Clapp, J., Moseley, W.G., Burlingame, B., Termine, P., 2022. Viewpoint: The case for a six-dimensional food security framework. *Food Policy* 106. <https://doi.org/10.1016/j.foodpol.2021.102164>
- CONEVAL, 2022. Medición de la Pobreza [WWW Document]. CONEVAL. URL https://www.coneval.org.mx/Medicion/MP/Paginas/Pobreza_2022.aspx (accessed 6.28.24).
- CONEVAL, 2019. Metodología para la medición multidimensional de la pobreza en México. Consejo Nacional de Evaluación de la Política de Desarrollo Social, Mexico City.
- CONEVAL, 2018a. Estudio Diagnóstico del Derecho a la Alimentación Nutritiva y de Calidad 2018. Mexico City.
- CONEVAL, 2018b. 40 años de estrategias de coordinación interinstitucional para la política de desarrollo social en México. Mexico City.
- CONEVAL, 2010. Informe de evolución histórica de la situación nutricional de la población y los programas de alimentación, nutrición y abasto en México. Mexico City.
- Curcio Curcio, P., 2007. Metodología para la evaluación de políticas públicas de salud Methodology to evaluate public health policies. *Politeia* 30, 59–85.
- Daniela González-Martell, A., Cilia-López, V.G., Aradillas-García, C., Castañeda-Díaz De León, A., De La Cruz-Gutiérrez, A., Zúñiga-Bañuelos, J., García-Aguilar, N., González-Cortés, C., Díaz Barriga-Martínez, F., 2019. La seguridad alimentaria y nutricional en una comunidad indígena de México. *Rev Esp Nutr Comunitaria* 25.
- De Janvry, A., Sadoulet, E., Davis, B., 1995. NAFTA's Impact on Mexico: Rural Household-Level Effects, *American Journal of Agricultural Economics*.
- de Jaramillo, E.H., Trigo, E.J., Campos, R., 2023. The Role of Science, Technology and Innovation for Transforming Food Systems in Latin America and the Caribbean, in: von Braun, J., Afsana, K., Fresco, L.O., Hassan, M.H.A. (Eds.), *Science and Innovations for Food Systems Transformation*. Springer International Publishing, Cham, pp. 737–749. <https://doi.org/10.1007/978-3-031-15703-5>
- De La Calle, L., 2016. Mexico's Strategic Comparative Advantage in International Trade: At the Crossroads of NAFTA, the Pacific Alliance, TPP, and TTIP. German Marshall Fund of the United States.
- de la Vega-Leinert, A.C., 2019. Ciudades y consumo de bienes agrícolas. Transformaciones del consumo alimentario en el contexto de cambios en el comercio agrícola y las cadenas comerciales. *Estud Demogr Urbanos Col Mex* 30, 213–220. <https://doi.org/10.2307/26545011>
- Department for Communities and Local Government, 2009. Multi-criteria analysis: a manual. Communities and Local Government Publications.
- Dickinson, A., Wills, W., Kapetanaki, A.B., Ikioda, F., Godfrey-Smythe, A., Halliday, S.V., 2022. Food security and food practices in later life: A new model of

- vulnerability. *Ageing Soc* 42, 2180–2205.
<https://doi.org/10.1017/S0144686X20002020>
- Echánove Huacuja, F., 2013. Agricultural policy and the feed industry in Mexico. *Mex Stud* 29, 61–84. <https://doi.org/10.1525/msem.2013.29.1.61>
- Evgeny, A.K., 2015. Food Security Modelling. *Biosci Biotechnol Res Asia* 12, 773–781.
<https://doi.org/10.13005/bbra/2095>
- FAO, 2024. About FAO [WWW Document]. <https://www.fao.org/about/about-fao/en>.
 URL <https://www.fao.org/about/about-fao/en> (accessed 4.20.24).
- FAO, 2019. El sistema alimentario en México - Oportunidades para el campo mexicano en la Agenda 2030 de Desarrollo Sostenible. Ciudad de México.
- FAO, 2018. Sustainable food systems Concept and framework.
- FAO, 2012. Escala Latinoamericana y Caribeña de Seguridad Alimentaria (ELCSA) - Manual de uso y aplicación. FAO, Rome.
- FAO, 2008. An Introduction to the Basic Concepts of Food Security [WWW Document]. URL www.foodsec.org/docs/concepts_guide.pdf (accessed 3.21.24).
- FAO, 2001. Food Insecurity in the World Food insecurity: when people live with hunger and fear starvation. Rome.
- FAO, 1992. International Conference on Nutrition. Rome.
- FAO, 1974. REPORT OF THE WORLD FOOD CONFERENCE. Rome.
- FAO, n.d. World Food Summit [WWW Document]. URL <https://www.fao.org/4/w3613e/w3613e00.htm> (accessed 5.12.24).
- FAO, IFAD, UNICEF, WFP, WHO, 2023. The State of Food Security and Nutrition in the World 2023. Urbanization, agrifood systems transformation and healthy diets across the rural–urban continuum., The State of Food Security and Nutrition in the World 2023. FAO; IFAD; UNICEF; WFP; WHO;
<https://doi.org/10.4060/cc3017en>
- FAO, IFAD, UNICEF, WFP, WHO, 2022. The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable., The State of Food Security and Nutrition in the World 2022. FAO, Rome. <https://doi.org/10.4060/cc0639en>
- Farooq, M., Rehman, A., Pisante, M., 2019. Innovations in sustainable agriculture, in: Farooq, M., Pisante, M. (Eds.), *Innovations in Sustainable Agriculture*. Springer International Publishing, pp. 3–24. <https://doi.org/10.1007/978-3-030-23169-9>
- Graglia, E., 2004. Diseño y gestión de políticas públicas: hacia un modelo relacional., 1st ed. EDUCC, Córdoba, Argentina.
- Hendriks, S., Soussana, J.-F., Cole, M., Kambugu, A., Zilberman, D., 2023. Ensuring Access to Safe and Nutritious Food for All Through the Transformation of Food Systems, in: von Braun, J., Afsana, K., Fresco, L.O., Hassan, M.H.A. (Eds.), *Science and Innovations for Food Systems Transformation*. Springer International Publishing, Cham, pp. 31–58. <https://doi.org/10.1007/978-3-031-15703-5>

- Hosseini, S.M., Qhalibaf, M.B., Moussavi Neghabi, S.M., Hosseini, S.A., 2023. Developing a model of strategies for enhancing food security against the phenomenon of food geopolitization. *Environ Dev Sustain*. <https://doi.org/10.1007/s10668-023-02979-7>
- IMSS, 2023. ¿Cuánto cuesta la diabetes? [WWW Document]. Instituto Mexicano del Seguro Social. URL <https://www.gob.mx/imss/articulos/cuanto-cuesta-la-diabetes-que-hicimos-zoe-robledo?idiom=es> (accessed 6.28.24).
- INEGI, 2020. Índice de precios al consumidor de la canasta de consumo mínimo: documento metodológico. Aguascalientes Mexico.
- International Food Policy Research Institute, 1995. 1995 Report.
- International Organization, 1950. Fifth FAO Conference.
- Ivers, L.C., Cullen, K.A., 2011. Food insecurity: Special considerations for women. *American Journal of Clinical Nutrition* 94. <https://doi.org/10.3945/ajcn.111.012617>
- Josling, T.E., 1984. Future Directions for Food and Agricultural Trade Policy: Discussion. *Am J Agric Econ* 66, 248–249.
- King, T., Cole, M., Farber, J.M., Eisenbrand, G., Zabarar, D., Fox, E.M., Hill, J.P., 2017. Food safety for food security: Relationship between global megatrends and developments in food safety. *Trends Food Sci Technol* 68, 160–175. <https://doi.org/10.1016/j.tifs.2017.08.014>
- Lara De la Calleja, M.A., Ovando Chico, M.C., Lopez Ruiz, E., 2017. Food Security Model and the Role of Community Empowerment: The Case of a Marginalized Village in Mexico, Tatoxcac, Puebla. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering* 11.
- Laraia, B.A., 2013. Food insecurity and chronic disease. *Advances in Nutrition* 4, 203–212. <https://doi.org/10.3945/an.112.003277>
- Laraia, B.A., Siega-Riz, A.M., Gundersen, C., Dole, N., 2006. Psychosocial Factors and Socioeconomic Indicators Are Associated with Household Food Insecurity among Pregnant Women. *J. Nutr* 136, 177–182.
- Latorre, P.V., Sarmiento, R.B., 2022. The Emergence of the Right to Food: Latin America in the Construction of the International Human Rights Regime. *Revista Derecho del Estado* 359–387. <https://doi.org/10.18601/01229893.n51.11>
- Lichtfouse, E., Navarrete, M., Debaeke, P., Souchère, V., Alberola, C., 2009. Sustainable agriculture, Sustainable Agriculture. Springer Netherlands. <https://doi.org/10.1007/978-90-481-2666-8>
- López Salazar, R., Gallardo García, E.D., 2015. Las políticas alimentarias de México: un análisis de su marco regulatorio. *Estudios Socio-Jurídicos* 17, 11–39. <https://doi.org/10.12804/esj17.01.2014.01>
- López Salazar, R., Sandoval Godoy, S.A., 2018. La seguridad alimentaria en México: el reto inconcluso de reducir la pobreza y el hambre. *Espac Abierto* 27, 125–147.

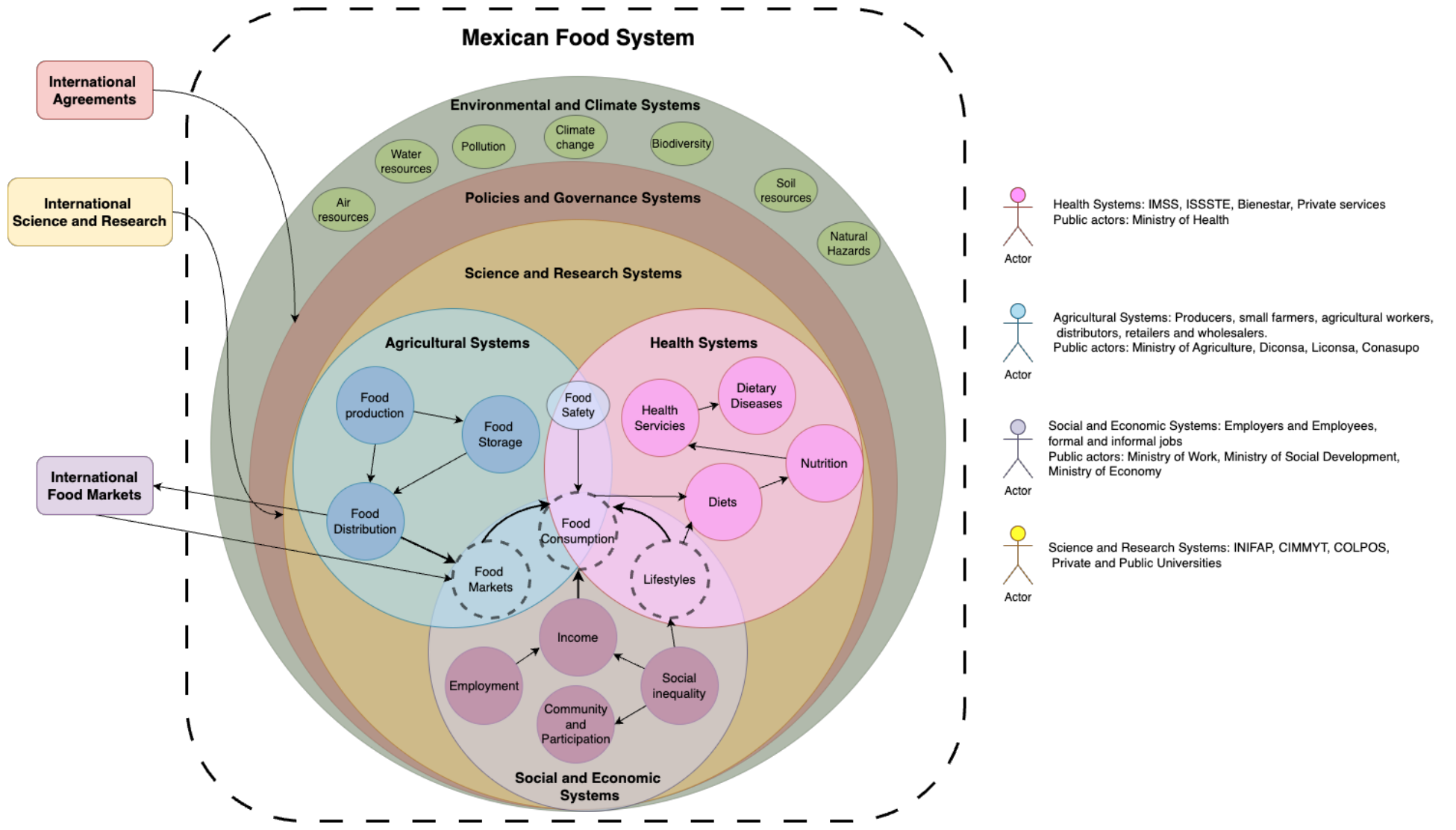
- Luna, S.A., 1997. Seguridad Alimentaria Institucional y una Aplicación a México en el Decenio de los Ochenta. *Trimest Econ* 64, 391-425.
- Lutz, B., 2012. Civilizar al Campesino Pobre: Biopolíticas Alimentarias en México. *Revista Do Centro de Estudos Rurais* 6.
- Maia, I., Oliveira, A., Santos, A.C., 2023. Food insecurity is associated with an unhealthy lifestyle score in middle- and older-aged adults: findings from the EPIPorto cohort. *Food Secur* 15, 661-671. <https://doi.org/10.1007/s12571-023-01366-4>
- Maldonado Valera, C.F., 2013. La construcción de pactos y consensos en materia de política social. El caso de la Ley General de Desarrollo Social de México, 2000-2008. Santiago de Chile.
- Manikas, I., Ali, B.M., Sundarakani, B., 2023. A systematic literature review of indicators measuring food security. *Agric Food Secur* 12. <https://doi.org/10.1186/s40066-023-00415-7>
- Maricic, M., Bulajic, M., Dobrota, M., Jeremic, V., 2016. REDESIGNING THE GLOBAL FOOD SECURITY INDEX: A MULTIVARIATE COMPOSITE I-DISTANCE INDICATOR APPROACH. *Int J Food Agric Econ* 4, 69-86.
- Martínez Flores, B.V., Benavides Rincón, G., 2018. De Pronasol a la Cruzada. ¿Qué hay de nuevo sobre coordinación? *Espiral estudios sobre Estado y sociedad* 25, 73-111. <https://doi.org/10.32870/espiral.v25i71.6179>
- Martínez-Esquivel, A., Trujillo-Silva, D.J., Cilia-López, V.G., 2022. Impact of environmental pollution on the obesogenic environment. *Nutr Rev*. <https://doi.org/10.1093/nutrit/nuac003>
- Meadows, D.H., 2008. *Thinking in systems: a primer*, 1st ed. Earthscan, London UK.
- Mehrabi, Z., Delzeit, R., Ignaciuk, A., Levers, C., Braich, G., Bajaj, K., Amo-Aidoo, A., Anderson, W., Balgah, R.A., Benton, T.G., Chari, M.M., Ellis, E.C., Gahi, N.Z., Gaupp, F., Garibaldi, L.A., Gerber, J.S., Godde, C.M., Grass, I., Heimann, T., Hirons, M., Hoogenboom, G., Jain, M., James, D., Makowski, D., Masamha, B., Meng, S., Monprapussorn, S., Müller, D., Nelson, A., Newlands, N.K., Noack, F., Oronje, M.L., Raymond, C., Reichstein, M., Rieseberg, L.H., Rodriguez-Llanes, J.M., Rosenstock, T., Rowhani, P., Sarhadi, A., Seppelt, R., Sidhu, B.S., Snapp, S., Soma, T., Sparks, A.H., Teh, L., Tigchelaar, M., Vogel, M.M., West, P.C., Wittman, H., You, L., 2022. Research priorities for global food security under extreme events. *One Earth* 5, 756-766. <https://doi.org/10.1016/j.oneear.2022.06.008>
- Meny, I., Thoenig, J.-C., 1992. *Las políticas públicas*, 1st ed. Editorial Ariel, SA, Barcelona.
- Müller, B., Hoffmann, F., Heckeley, T., Müller, C., Hertel, T.W., Polhill, J.G., van Wijk, M., Achterbosch, T., Alexander, P., Brown, C., Kreuer, D., Ewert, F., Ge, J., Millington, J.D.A., Seppelt, R., Verburg, P.H., Webber, H., 2020. Modelling food security: Bridging the gap between the micro and the macro scale. *Global Environmental Change* 63. <https://doi.org/10.1016/j.gloenvcha.2020.102085>

- OEA, n.d. San Salvador Protocol [WWW Document]. URL <https://www.oas.org/es/sadye/inclusion-social/protocolo-ssv/docs/protocolo-san-salvador-es.pdf> (accessed 5.12.24).
- Olson, C.M., 1999. Nutrition and Health Outcomes Associated with Food Insecurity and Hunger. *J. Nutr* 129, 521–524.
- Ortiz-Pérez, H., Bravo-García, E., 2022. Las Encuestas Nacionales de Salud 1986-2021: Instrumento fundamental de la Salud Pública en México. *Boletín sobre COVID-19* 3.
- Pino Montoya, J.W., 2017. Aspectos metodológicos para evaluar una política pública. *RHS-Revista Humanismo y Sociedad* 5, 1–7. <https://doi.org/10.22209/rhs.v5n1a01>
- Poitras, G., Robinson, R., 1994. The Politics of NAFTA in Mexico. *J Inter Am Stud World Aff* 36, 1–35.
- Pozas Horcasitas, R., 1992. El desarrollo de la seguridad social en México. *Rev Mex Sociol* 54, 27–63.
- Ramírez Mayans, J., García Campos, M., Cervantes Bustamante, R., Mata Rivera, N., Zárate Mondragón, F., Mason Cordero Villarreal Espinosa, T.A., Niños México, O., 2003. Transición alimentaria en México. *An Pediatr* 58, 568–73.
- Rivers, L., Sanga, U., Sidibe, A., Wood, A., Paudel, R., Marquart-Pyatt, S.T., Ligmann-Zielinska, A., Olabisi, L.S., Du, E.J., Liverpool-Tasie, S., 2018. Mental models of food security in rural Mali. *Environ Syst Decis* 38, 33–51. <https://doi.org/10.1007/s10669-017-9669-y>
- Rodríguez Gómez, K., Patrón Sánchez, F., 2017. La Efectividad de la Política Social en México. Un análisis de la reducción de la pobreza monetaria después de la operación de los programas que transfieren ingreso. *Gestión y Política Pública* 26, 3–51.
- Ronald, P., 2011. Plant genetics, sustainable agriculture and global food security. *Genetics*. <https://doi.org/10.1534/genetics.111.128553>
- SEGOB, n.d. Diario Oficial de la Federación [WWW Document]. URL <https://www.dof.gob.mx/#gsc.tab=0> (accessed 5.11.24).
- Sen, A., 1981. *Poverty and Famines An Essay on Entitlement and Deprivation*. Oxford University Press, New York.
- Shamah-Levy, T., Romero-Martínez, M., Barrientos-Gutiérrez, T., Cuevas-Nasu, L., Bautista-Arredondo, S., Colchero, M., Gaona-Pineda, E., Lazcano-Ponce, E., Martínez-Barnetche, J., Alpuche-Arana, C., Rivera-Dommarco, J., 2022. Encuesta Nacional de Salud y Nutrición 2021 sobre Covid-19. Resultados nacionales. Cuernavaca Mexico.
- Shamah-Levy, T., Vielma-Orozco, E., Heredia-Hernández, O., Romero-Martínez, M., Mojica-Cuevas, J., Cuevas-Nasu, L., Santaella-Castell, J., Rivera-Dommarco, J., 2020. Encuesta Nacional de Salud y Nutrición 2018-19: Resultados Nacionales. Cuernavaca Mexico.

- Simmons, E.S., 2016. Corn, Markets, and Mobilization in Mexico. *Comp Polit* 48, 413–431.
- Smith, A., Snapp, S., Chikowo, R., Thorne, P., Bekunda, M., Glover, J., 2017. Measuring sustainable intensification in smallholder agroecosystems: A review. *Glob Food Sec.* <https://doi.org/10.1016/j.gfs.2016.11.002>
- Sonnenfeld, D.A., 1992. Mexico's "Green Revolution," 1940-1980: Towards an Environmental History. *Environmental History Review* 16, 28–52.
- Spalding, J., 1985. El Sistema Alimentario Mexicano: Ascenso y Decadencia. *Sociological Studies of the College of Mexico* 3, 315–349.
- The Economist Newspaper, 2022. Global Food Security Index 2022 [WWW Document]. URL <https://impact.economist.com/sustainability/project/food-security-index/> (accessed 4.19.24).
- Thomas, A.-C., D'Hombres, B., Casubolo, C., Saisana, M., Kayitakire, F., 2017. The use of the Global Food Security Index to inform the situation in food insecure countries. <https://doi.org/10.2760/83356>
- Timmer, C.P., 2012. Behavioral dimensions of food security. *Proc Natl Acad Sci U S A* 109, 12315–12320. <https://doi.org/10.1073/pnas.0913213107>
- Torres, F., Rojas, A., 2020. Seguridad alimentaria y sus desequilibrios regionales en México. *Probl Desarro* 51, 57–83. <https://doi.org/10.22201/IIEC.20078951E.2020.201.69521>
- Torres Torres, F., 2010. Rasgos perennes de la crisis alimentaria en México. *Estudios Sociales Número Especial* 18, 127–154.
- Torres Torres, F., Rojas Martínez, A., 2022. La seguridad alimentaria en la encrucijada de las desigualdades regionales de México. *Investigaciones Regionales* 2022, 91–115. <https://doi.org/10.38191/iirr-jorr.22.012>
- UN, n.d. Sustainable Development Goals [WWW Document]. URL <https://www.un.org/sustainabledevelopment/> (accessed 8.4.24).
- UN Economic and Social Council, 1999. General Comment No. 12: The Right to Adequate Food (Art. 11 of the Covenant), UN Committee on Economic, Social and Cultural Rights (CESCR).
- United Nations, n.d. International Covenant on Economic, Social and Cultural Rights [WWW Document]. URL <https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights> (accessed 5.11.24a).
- United Nations, n.d. Universal Declaration of Human Rights [WWW Document]. URL <https://www.un.org/en/about-us/universal-declaration-of-human-rights> (accessed 5.11.24b).
- United Nations General Assembly, 2015. Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 Agenda for Sustainable Development.

- Urquía-Fernández, N., 2014. La Seguridad Alimentaria en México. *Salud Publica Mex* 56.
- Verónica Martínez-Flores, B., De, M., Romo, L., y A., 2022. Entre la esperanza y la desconfianza: la participación en la Cruzada Nacional contra el Hambre. *Espiral Estudios sobre Estado y Sociedad* 29, 157-187.
- Villagómez-Ornelas, P., Hernández-López, P., Carrasco-Enríquez, B., Barrios-Sánchez, K., Pérez-Escamilla, R., Melgar-Quiñónez, H., 2014. Validez estadística de la Escala Mexicana de Seguridad Alimentaria y la Escala Latinoamericana y Caribeña de Seguridad Alimentaria. *Salud Publica Mex* 56.
- von Braun, J., 2018. *Innovations to Overcome the Increasingly Complex Problems of Hunger*. Center for Development Research, University of Bonn.
- von Braun, J., Afsana, K., Fresco, L.O., Hassan, M., Torero, M., 2021. Food system concepts and definitions for science and political action. *Nat Food*.
<https://doi.org/10.1038/s43016-021-00361-2>
- von Braun, J., Afsana, K., Fresco, L.O., Hassan, M.H.A., 2023a. Food Systems: Seven Priorities to End Hunger and Protect the Planet, in: von Braun, J., Afsana, K., O Fresco, L., Hassan, M.H.A. (Eds.), *Science and Innovations for Food Systems Transformation*. Springer International Publishing, Cham, pp. 3-9.
<https://doi.org/10.1007/978-3-031-15703-5>
- von Braun, J., Afsana, K., Fresco, L.O., Hassan, M.H.A., Torero, M., 2023b. Food System Concepts and Definitions for Science and Political Action, in: von Braun, J., Afsana, K., Fresco, L.O., Hassan, M.H.A. (Eds.), *Science and Innovations for Food Systems Transformations*. Springer International Publishing, Cham, pp. 11-17.
<https://doi.org/10.1007/978-3-031-15703-5>
- Weiss, R.I., Smith, J.A., 2004. Legislative Approaches to the Obesity Epidemic. *Public Health Policy* 25, 379-390.

Annex I. Mexican Food System.



Annex II. Non-exhaustive International Instruments for Food Security and Food Security Dimension.

International Instruments	Proclamation Date	Food Security Dimension addressed	Comments
Universal Declaration of Human Rights	10.12.1948	Access	Article 25 of the Universal Declaration of Human Rights (UDHR) explicitly includes as a human right to health and well-being, and food, which is included as a human right.
International Covenant on Economic, Social and Cultural Rights	16.12.1966	Access	Article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) establishes that state parties would ensure health and well-being of people, including food, it also recognizes it as a human right. It also recognizes the right to be free from hunger. States parties are also able to make use of production technology, reform agricultural systems and knowledge dissemination. Taking into consideration problems for equitable food distribution.
San Salvador Protocol	17.11.1988	Availability Access Utilization	Article 12 of the Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights, also known as the San Salvador Protocol, establishes the right to nutritious food, also considers the need of international cooperation to ensure food availability.
World Declaration on Nutrition	1992	Access	The instrument, part of the international conference on nutrition report 1992, recognizes that the problem of hunger was caused by poverty and lack of education, in turn caused by underdevelopment. It also recognizes that globally there was enough food, and unequal distribution caused the real problem; it also recognizes the role of policies and governments in the progress in solving nutrition.
World Food Summit on Food Security and Action Plan	13.12.1996	Availability Access	The instrument focused on the right to food and its relationship with poverty, eradicating poverty could improve food access; and the importance of international cooperation to achieve food security,

		Utilization Stability	promoting trade between nations, as well as acknowledging the importance of all people related to the agricultural, fisheries, and forestry; and indigenous people and their communities to ensure food security.
Covenant on Economic, Social and Cultural Rights. General Comment No. 12	12.05.1999	Availability Access Utilization Stability	This instrument deepens more on the article 11 of the ICESCR, concerning The Right to Adequate Food, it also implies the importance of the right to food since it is necessary to the fulfilment of other human rights, and indicates the necessity to eradicate poverty and the need to achieve social justice, by applying environmental, social, and economic policies. It talks about the adequacy of food, considering the dietary needs and cultural or consumer acceptability, and the need of sustainability for present and future generations.
2030 Agenda for Sustainable Development	25.09.2015	Availability Access Stability	In objective 2 of the 2030 Agenda, food takes an important role, not only considers ending hunger but also achieve food security and improve diets by making them nutritious. Also considers promoting sustainable agriculture and facilitate trade of agricultural goods and eliminate subsidies and market barriers.

Source: Own elaboration with information of (FAO, n.d., 1992; General Comment No. 12: The Right to Adequate Food (Art. 11 of the Covenant), 1999; Resolution Adopted by the General Assembly on 25 September 2015. Transforming Our World: The 2030 Agenda for Sustainable Development, 2015; OEA, n.d.; United Nations, n.d.-a, n.d.-b)

Annex III. Non-exhaustive Mexican Legal Framework for Food Security and Food Security Dimension.

Legal Framework	Latest amendment	Food Security Dimension addressed	Comments
Constitución Política de los Estados Unidos Mexicanos (1917)	22.03.2024	Availability Access Utilization	Art. 4. Establishes the right to food, in quantity and quality necessary, and the responsibility of the state to guarantee it. Art. 27, fraction XX. Establishes the responsibility of the state to guarantee the sufficient and timely supply of basic foods.
Ley de Asistencia Social (2004)	01.04.2024	Access Utilization	Art.12, fraction VIII. Considers the nutritional guidance and supplementary feeding for the poor and people living in marginalised areas as basic social welfare health services.
Ley de Capitalización del PROCAMPO (2001)	31.12.2001	Availability Access	It aims to transfer resources to support the economy of rural producers, early access and the use of future payments per hectare sown as a credit guarantee. To improve the living conditions of the rural population and respond to the imbalances of the international market. The programme will continue for as long as unfavourable conditions remain.
Ley General de Desarrollo Social (2004)	25.06.2018	Access Utilization	Art. 6. Establishes the right to nutritious and quality food, and the no discrimination. Art. 14. Considers a nutritious and quality food as a way to overcoming poverty. Art. 19. Considers social programmes that provide adequate and nutritious food to mother-child and the food supply a priority. Art. 36. Considers an indicator to measure poverty nutritious and quality food access
Ley General de Salud (1984)	26.03.2024	Utilization	Art. 6, Establishes that the National Health system is responsible of developing policies to promote nutritious, sufficient, and quality food that effectively counteracts malnutrition, overweight, obesity and other eating disorders.

			The law also established health education, in this case food education, is an attribute of the Health Ministry.
Ley General de la Alimentación Adecuada y Sostenible (2024)	17.04.2024	Availability Access Utilization Stability	First Mexican Law on food security from the right to food perspective and considering the food system and sustainability, cultural adequacy and acceptance of foods and double malnutrition problem Mexico is facing, also integrating the supply to clean water for food production.
Ley de Desarrollo Rural Sustentable (2001)	12.04.2019	Availability Access Utilization Stability	Art. 3, establishes, in a differentiated manner, food security and food sovereignty. Art. 5 considers a responsibility of the state to guarantee food security and sovereignty, this article also includes the responsibility of the state to diminish the social inequalities in rural areas. Art. 79 refers to providing rural population of income transfers to compensate inequalities. Chapter XVII. Food security and sovereignty. Establishes the responsibility of the state to ensure availability of food, and the strategic foods.
Ley Federal para el Fomento y Protección del Maíz Nativo (2020)	13.04.2020	Utilization	Establishes the protection and promotion of native corn, as national cultural expression.
Ley Federal de Sanidad Vegetal (1994)	11.05.2022	Utilization	Established the system of good agricultural practices, to avoid contamination of agricultural products, measures for food safety.
Ley Federal de Sanidad Animal (2007)	11.05.2022	Utilization	Established the protection of human and animal health, by promoting good practices in husbandry and animal production systems, as well as slaughterhouses.
MODIFICACIÓN a la Norma Oficial Mexicana NOM-051-SCFI/SSA1-2010, Especificaciones generales de etiquetado para alimentos y bebidas	20.03.2020	Utilization	Norm related to labelling of food products, of national or international origin, that are sold in Mexico, for the correct protection of consumer. In which are implemented different measures to inform the population of possible health risks in food.

no alcohólicas preenvasados- Información comercial y sanitaria, publicada el 5 de abril de 2010				
Reglamento de Control Sanitario de Productos y Servicios (1999)	08.09.2022	Utilization		This instrument establishes the control, regulation, and promotion of food safety during the processing, exportation and importation, services, activities, and facilities related to foods.
Reglamento de la Ley General de Desarrollo Social (2006)	28.08.2008	Access		Art. 12, establishes the national programs for development must include a national diagnosis, which would include food.

Source: Own elaboration with information of SEGOB, n.d.

Annex IV. Global Food Security Index Evaluation of Mexican Food Policies.

		2018-2024	2012-2018	2000-2012	1994-2000	1988-1994	1982-1988
	Weight %	Segalmex	SinHambre	Oportunidades	Progresa	Pronasol	Pronal
1) AFFORDABILITY	30.00%	18.69%	17.77%	12.00%	6.23%	17.77%	24.92%
1.1) Change in average food costs	7.15%	7.15%	0.00%	0.00%	0.00%	0.00%	7.15%
1.2) Proportion of population under global poverty line	5.77%	5.8%	5.77%	5.77%	0.00%	5.77%	5.77%
1.3) Inequality-adjusted income index	5.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.4) Agricultural trade	5.77%	5.77%	5.77%	0.00%	0.00%	5.77%	5.77%
1.5) Food safety net programmes	6.23%	0.00%	6.23%	6.23%	6.23%	6.23%	6.23%
2) AVAILABILITY	25.00%	19.14%	10.59%	0.00%	0.00%	7.66%	16.33%
2.1) Access to agricultural inputs	2.93%	2.93%	2.93%	0.00%	0.00%	0.00%	2.93%
2.2) Agricultural research and development	2.93%	2.93%	0.00%	0.00%	0.00%	0.00%	2.93%
2.3) Farm infrastructure	2.25%	2.25%	2.25%	0.00%	0.00%	2.25%	2.25%
2.4) Volatility of agricultural production	2.82%	2.82%	0.00%	0.00%	0.00%	0.00%	2.82%
2.5) Food loss	2.82%	2.82%	0.00%	0.00%	0.00%	0.00%	0.00%
2.6) Supply chain infrastructure	2.48%	2.48%	2.48%	0.00%	0.00%	2.48%	2.48%
2.7) Sufficiency of supply	2.93%	2.93%	2.93%	0.00%	0.00%	2.93%	2.93%
2.8) Political and social barriers to access	2.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2.9) Food security and access policy commitments	3.15%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3) QUALITY AND SAFETY	22.50%	17.93%	18.11%	17.93%	17.93%	9.15%	13.54%
3.1) Dietary diversity	4.39%	4.39%	0.00%	4.39%	4.39%	0.00%	4.39%
3.2) Nutritional standards	4.57%	4.57%	4.57%	4.57%	4.57%	4.57%	4.57%
3.3) Micronutrient availability	4.39%	4.39%	4.39%	4.39%	4.39%	0.00%	0.00%

3.4) Protein quality	4.57%	4.57%	4.57%	4.57%	4.57%	4.57%	4.57%
3.5) Food safety	4.57%	0.00%	4.57%	0.00%	0.00%	0.00%	0.00%
4) SUSTAINABILITY AND ADAPTATION	22.50%	0.00%	3.49%	0.00%	0.00%	0.00%	0.00%
4.1) Exposure	3.83%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.2) Water	3.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.3) Land	3.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.4) Oceans, rivers and lakes	3.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.5) Political commitment to adaptation	4.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.6) Disaster risk management	3.49%	0.00%	3.49%	0.00%	0.00%	0.00%	0.00%
TOTAL	100.00%	55.76%	49.95%	29.93%	24.16%	34.58%	54.79%

Annex V. Food System Perspective Evaluation of Mexican Food Policies.

		2018-2024	2012-2018	2000-2012	1994-2000	1988-1994	1982-1988
	Weight %	Segalmex	SinHambre	Oportunidades	Progresa	Pronasol	Pronal
1) AVAILABILITY	25.00%	15.63%	12.50%	0.00%	3.13%	6.25%	18.75%
1.1) Food Supply	3.13%	3.13%	3.13%	0.00%	3.13%	3.13%	3.13%
1.2) Agricultural Productivity	3.13%	3.13%	3.13%	0.00%	0.00%	3.13%	3.13%
1.3) Food Self-sufficiency of Strategic Basic Foods	3.13%	3.13%	0.00%	0.00%	0.00%	0.00%	3.13%
1.4) Food Distribution and Trade	3.13%	3.13%	3.13%	0.00%	0.00%	0.00%	3.13%
1.5) Short Circuit Chains	3.13%	0.00%	0.00%	0.00%	0.00%	0.00%	3.13%
1.6) Urban Agriculture	3.13%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.7) Access to agriculture inputs	3.13%	3.13%	3.13%	0.00%	0.00%	0.00%	3.13%
1.8) Sustainable Agriculture	3.13%	3.13%	3.13%	0.00%	0.00%	0.00%	0.00%
2) ACCESS	30.00%	25.71%	17.14%	12.86%	12.86%	8.57%	17.14%
2.1) Justice, impartiality and fairness	4.29%	4.29%	4.29%	4.29%	4.29%	0.00%	0.00%
2.2) Wellbeing and Health	4.29%	4.29%	4.29%	4.29%	4.29%	4.29%	4.29%
2.3) Sufficient Income	4.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2.4) Decent Employment	4.29%	4.29%	4.29%	0.00%	0.00%	0.00%	0.00%
2.5) Programs for Income and Food Transfers	4.29%	4.29%	0.00%	4.29%	4.29%	4.29%	4.29%
2.6) Auto consumption of food production	4.29%	4.29%	4.29%	0.00%	0.00%	0.00%	4.29%
2.7) Food prices stability	4.29%	4.29%	0.00%	0.00%	0.00%	0.00%	4.29%
3) UTILIZATION	22.50%	11.25%	15.00%	3.75%	3.75%	0.00%	0.00%

3.1) Food Waste Reduction	3.75%	0.00%	3.75%	0.00%	0.00%	0.00%	0.00%
3.2) Traditional Diets	3.75%	3.75%	0.00%	0.00%	0.00%	0.00%	0.00%
3.3) Healthy and Unhealthy Diets Awareness	3.75%	3.75%	3.75%	3.75%	3.75%	0.00%	0.00%
3.4) Nutritious Food Supply	3.75%	3.75%	3.75%	0.00%	0.00%	0.00%	0.00%
3.5) Food Safety	3.75%	0.00%	3.75%	0.00%	0.00%	0.00%	0.00%
3.6) Access to drinking and clean water	3.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4) STABILITY	22.50%	12.50%	7.50%	7.50%	7.50%	5.00%	7.50%
4.1) Continuity of Successful Policies	2.50%	0.00%	0.00%	2.50%	2.50%	0.00%	0.00%
4.2) Continuous Evaluation and Adjustment	2.50%	2.50%	2.50%	0.00%	0.00%	0.00%	0.00%
4.3) People Participation and Agency	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
4.4) Corruption	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.5) Crime and violence	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.6) National Research and Technology on Agriculture and Health	2.50%	2.50%	0.00%	0.00%	0.00%	0.00%	2.50%
4.7) Environment Protection	2.50%	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%
4.8) Climate adaptation and mitigation	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4.9) Collaboration between involved government agencies	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
TOTAL	100.00%	68.21%	55.27%	24.11%	24.73%	19.82%	43.39%

