Essay

Food security and family farming in Mexico

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Abstract

Food security and hunger, linked to rural poverty, in Mexico are among the greatest challenges since they include large sectors of the population, which are exacerbated by the COVID-19 pandemic. The objective of this essay is to analyze the food security of family farming and rural poverty in Mexico. A systemic analytical framework was developed, which considered the food crisis, food security, agriculture and the agricultural development modality followed by Mexico. Family farming was addressed through the stratification developed by SAGARPA and FAO, as well as the conditions of marginalization and income poverty. According to the analysis, with the neoliberal model, Mexico specialized agricultural production towards export crops and agricultural growth, production that increased in recent years, achieving a surplus agri-food balance, which means food availability, but not food security for people in extremely rural poverty. It is concluded that there is a close relationship between rural poverty and food security, the latter linked to social inequality in income distribution, among other inequalities, which generates a circle of low income-poverty-food insecurity that occurs and reproduces socially in family farming. The strengthening of assets, agri-food production and income in family farming are fundamental for overcoming rural poverty and building a more equitable society.

Keywords: agri-food production, rural poverty, social inequality.

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Hunger and poverty have deepened in recent decades on the planet, in 2019 it was estimated that 2 billion people did not manage to regularly access safe, nutritious and sufficient foods; a condition that was deepened by the coronavirus pandemic (COVID-19), which can add between 83 and 132 million people to the total number of undernourished people in 2020 (FAO *et al*., 2020).

Hunger has manifested itself most strongly during the food crises of recent decades, which prompted the response of the Food and Agriculture Organization of the United Nations (FAO). Since the food crisis of 1972, FAO proposed definitions of food security as a basis for the design of food strategies of the member states of the organization, but the measures undertaken have been insufficient to solve the food issue, which shows the complexity of the problem related to social, economic, political and environmental factors.

The food crisis of 2007 and 2008 showed that the rural and urban poor are the most vulnerable sectors to access food, which accentuated poverty in Latin America and the Caribbean (CEPAL, 2009). In Mexico, the consequences were the exacerbation of hunger and greater rural poverty; in 2006, people in conditions of food poverty were close to 10 million, in 2008 13.3 million and in 2012 13.6 million, 59% of the Mexican population with this deprivation (CONEVAL, 2014).

There is a close relationship between rural poverty and food security. People who do not have income or crops do not have access to foods, despite their eventual availability, a condition that is exacerbated by fluctuating supply and rising prices, as occurs during the food crisis, generating a circle of low income-poverty-food insecurity, which occurs and reproduces socially and economically.

This essay analyzes the food security of family farming and rural poverty in Mexico, in the context of the food crises of recent decades and the COVID-19 pandemic. A systemic analytical framework was developed considering the food crisis, food security, agriculture and the agricultural development modality followed by Mexico. The analysis of family farming was carried out through the stratification developed by SAGARPA and FAO, as well as the conditions of marginalization and income poverty. Based on the analysis, some lines of action are proposed for a path of agricultural and rural development of family farming.

Crisis, food security and agriculture

Access to foods by the inhabitants of the planet, in recent decades, has faced successive crises, after the unprecedented boom of agriculture since the post-war period, which basically succeeded in meeting food needs, based on the green revolution. However, despite the dynamism of agriculture, from the 1970s, humanity, but especially the rural and urban poor, faced food crises, the most recent in 2007 and 2008.

The food crisis of 1972-1974 manifested itself in the increase in agricultural prices and the decrease in food reserves, which was characterized as a crisis of scarcity. The crisis was followed by an agricultural oversupply, with the consequent decrease in prices and replenishment of inventories (Schejtman, 1988). In context of the crisis, in 1974, there was a

call for the World Food Conference, which defined food security as a matter of supply, considering the availability of food at the aggregate level. The proposals were oriented towards the promotion of food production and storage, with the aim of overcoming food insecurity, eradicating hunger and malnutrition within a decade (World Food Summit, 1996), an objective that was not achieved.

The World Food Summit, convened by FAO (1996), promoted by the permanence of food insecurity and the capacity of agriculture to produce food, adopted a rights-based approach to food security. Food security was defined 'when all people have at all times physical and economic access to sufficient safe and nutritious foods to meet their food needs and food preferences, in order to lead an active and healthy life' (World Food Summit, 1996).

In 2007, international food prices increased with immediate effects on timely and sufficient access, leading to a new food crisis. Paradoxically, the crisis emerged during a sustained growth in agricultural production, because although world agricultural production tended to stagnate between the 1960s and the 1980s, it increased from the following decades. For example, in Latin America, agricultural production grew by more than 50% between 2000 and 2012 (FAO, 2012).

The origin of the food crisis of 2007 was identified as a problem of supply and demand (FAO, 2008), another explanation was to link it to financial speculation and energy crisis, which affected agricultural markets and the significant increase in prices (Rubio, 2008; Acuña *et al*., 2010). Interpretations of the food crisis show the complexity of the problem, linked to market, energy, financial and political factors, to which environmental factors would be added. The crisis highlighted the meagre results of food policies and international trade.

According to the OECD-FAO Agricultural Outlook 2020-2029, during the 2020s, global agricultural production is expected to increase, attributable to productivity, by about 15% by 2029. For their part, nominal prices of agricultural basic products will increase by only 1% per year over the same period.

It is considered that the prices of agricultural basic products will be lower than in the 2006-2008 and 2013-2014 periods, but higher than prices in the early 2000s (OCDE and FAO, 2020). The eventual stability of production and prices in the 2020s augurs well for food availability, which, although promising, is not enough for the most vulnerable sectors, in conditions of poverty, to access these, motivated by lack of income or not obtaining production for self-consumption. The growing problem of hunger on the planet shows that it is not only a matter of agri-food production or availability. In the last century, global agri-food production was sufficient to feed the planet, but more than 800 million suffered from hunger (FAO, 2001).

Agri-food production and its changes are directly related to the processes of technical-scientific reorganization of capitalism, whose greatest expression has been the green revolution, which strengthened industrial agriculture. Undoubtedly, the green revolution due to the results in the increase of production contributed to food security, but it is questioned by the environmental problems and the social inequality it generates (Pearse, 1980; Shiva, 2016).

The environmental consequences of agriculture are observed in: a) the deterioration and pollution of soils and water; b) deforestation and biodiversity loss; and c) greenhouse gas emissions from the application of agrochemicals in highly specialized production systems. Agriculture contributes directly and indirectly to greenhouse gas emissions, they are estimated to represent 21% of total global emissions (FAO, 2016), which contribute to climate change. Agri-food production is also a strategic challenge to meet the growing demand for food on the planet. According to projections of FAO (2018), which considers three scenarios for food security and nutrition, a population of 10 billion people by 2050, income distribution, technology and climate change, global agricultural production will have to increase between 40% and 54%.

Agriculture and food dependence in Mexico

The condition and dynamics of family farming is linked to the modality of development followed by the country in the last fifty years and the role of the Mexican State in agricultural and rural development. In Mexico, agriculture played a central role in the import-substitution model that favored industrial growth, through the production of foods and raw materials that satisfied the domestic market and exports, which allowed resources to be transferred to the industrialization of the country (Reyes *et al*., 1974). During this stage, agriculture had an annual growth of 6% and contributed 46.4% of the country's exports. This phase ended towards the end of the 1960s together with the decline of the import-substitution model, reducing its economic importance.

From the 1970s, Mexican agriculture began a gradual process of change in production, towards crops demanded by the international market, moving away from the production of basic foods and raw materials for domestic consumption. Crops, such as sorghum, destined for industrial inputs boomed, to the detriment of traditional staple crops such as rice, beans, corn and wheat (Barkin and Suárez, 1985; Sanderson, 1990).

The modality of agricultural development was strengthened by the policies of structural adjustment, through deregulation and privatization of the economy, initiated towards the end of the 1980s. In the agricultural sector, reforms were made, which eliminated services and instruments of agricultural development, among them credit, technical assistance, commercialization and support prices, spending and investment decreased drastically (Ramírez *et al*., 1995). International agricultural trade was deregulated with the elimination of import permits and the reduction of tariffs, a process that was strengthened with the North American Free Trade Agreement (NAFTA) that entered into force in 1994, strengthening agricultural production for export.

In the above scenario, between 1980 and 2015, agricultural production in Mexico increased by 117%; the yield by 67% and the cultivated area by 23% (Sosa-Baldivia *et al*., 2017). For their part, agricultural exports, for 2019, amounted to 17.840 billion dollars, mainly concentrated in tropical fruits, avocado, citrus, strawberries, legumes and fresh vegetables, which contributed 68.9% of exports. Conversely, imports of foods and raw materials increased; in the last two decades they almost tripled, going from 4.8805 billion dollars in 2000 to 13.2154 billion dollars in 2019. Agricultural imports, in 2019, are mainly corn (24.1%), soybeans (16.6%), wheat (8.6%), milk and its derivatives (7.7%) and rice (2.6%), which represent 59.6% of imports (BANXICO, 2020).

Since the 1990s, the structure of agricultural exports shows a change in the country's role in the international division of labor, with the participation of crops with high value and demand in the international market and dependence on cereal imports. The trade balance went from being negative in the 2000-2014 period to being positive from 2015, for 2019 it was 4.6241 billion dollars (BANXICO, 2020).

Despite the economic dynamism of the agricultural sector, the country does not have food self-sufficiency. The coefficient of agricultural self-sufficiency (which measures the percentage of national consumption of basic grains covered by national production) in recent years deepened, going from 76% in 2013 to 64.4% in 2018. While in the coefficient of livestock self-sufficiency (percentage of national consumption covered by the country's production) went from 86.4% to 85.8% during the same period (Presidencia de la República, 2020). During the last decades, food imports increased, with the consequent food dependence (Rubio, 2015), particularly in basic grains such as rice, beans, corn and wheat (Valencia *et al*., 2019).

With the implementation of policies of structural adjustment, a new model of 'neoliberal' agricultural development was consolidated, characterized by the specialization in the production of export-oriented products, food dependence and a growing influence of agri-food transnationals companies in Mexico (González-Estrada, 2016). This model has mainly benefited the productive sector that is linked to international trade. In Mexico, the agricultural sector is dominated by a small and select number of entrepreneurs who represent 8.7% of the 5.3 million rural economic units (REUs) of the country and generate 74.2% of the sector's sales (SAGARPA and FAO, 2012).

Family farming in Mexico

The notion of family farming has been addressed from different perspectives and interpretations, heir to the discussion on the peasant economy and social differentiation. It was from the 2000s that the use of the notion of family farming became widespread, expanding studies on its condition and characterization, but there is no consensus on its definition, Garner and Campos (2014) report 36 definitions, among which are normative definitions and operational typologies of family farming.

Family farming, in recent decades, was not granted economic and social viability, in addition to considering that pluriactivity was called to constitute the engine of productive transformations and overcoming rural poverty. The food crisis of 2007-2008 reconsidered with greater vigor the possibility of family farming, in an uncertain context and after a positioning in the modality of agricultural development that opted for the deregulation of trade. In this context, the debate on the possibility of a new phase of development of family farming and the formulation of public policies to promote food production and the overcoming of rural poverty was deepened (Schneider, 2014). In the previous sense, the productive relevance of family farming, which represents 81% of agricultural farms in Latin America and the Caribbean, has been documented (FAO and BID, 2007).

In the case of Mexico, SAGARPA and FAO (2012) developed a typology of rural economic units (REUs), which is used in the present document to identify the social and economic condition, especially of their economic income, considering the central elements of their conceptualization: a) their organization based on family labor and the relationship with the productive unit (Shanin, 1976); b) their productive rationality and relationship with the market (GalesKi, 1977); and c) the income strategy, which considers agricultural and non-agricultural income (Carmagnani, 2008).

The typology reports between 5.3 and 5.4 million rural economic units (REUs), which according to the stratification criteria. The stratification criterion of REUs was the value of sales, considering 'that it allows to determine the economic size of REUs based on their own performance' (SAGARPA and FAO, 2012). They were classified into five strata (S). S1, subsistence family farming without links to the market, 1.2 million REUs (22.4%); S2, subsistence family farming with links to the market, 2.7 million (50.6%); S3, in transition, 442 thousand (8.3%). As a whole, family farming represents 81.3% of the REUs existing in the country. The remaining 18.7% corresponds to corporate farming, considered in the stratification as S4 corporate with fragile profitability (9.9%), S5, thriving corporate (8.4%) and S6 dynamic corporate (0.3%). Tables 1 and 2 show social and income characteristics of family farming.

Table 1. Strata of REUs of family farming in Mexico.

Strata	REUs	Area (ha)		Women	Men	They speak an indigenous language	No schooling	Average annual sales revenue ($)
		Total average	Agricultural average					
S1. Subsistence family farming without links to the market	1192 029	3.5	2.8	425 611	766 418	427 024	339 896	-
S2. Subsistence family farming with links to the market	2 696 735	8.8	5	684 907	2 011 828	716 533	611 643	17 205
S3. In transition	442 370	32.3	10.6	89 352	353 018	40 940	69 794	73 931

Elaborated with information from SAGARPA-FAO. Diagnosis of the rural and fishing sector: identification of the problems of the agricultural and fishing sector of Mexico 2012.

Table 2. Structure of income by stratum of family farming REUs in Mexico.

Source of income (%)	S1	S2	S3
Value of self-consumption (agricultural, livestock, fisheries, aquaculture and forestry)	30.1	14.8	3.4
Income from sales (agricultural, livestock, fisheries, aquaculture, forestry and processed)	0	45.9	73.9
Income from sales of non-agricultural rural activities (NARAs)	0	3.4	7.6
Supports from family members living outside the country	4.6	3.2	1.7
Supports from relatives in the interior of the country	7.4	3.1	0.6
Occupation outside the REU	16.5	9	3.9
Other income from rent and/or other property	4.4	0.5	0.6
Other income	8.9	3.7	0.8
Income from government supports	28	16.4	7.7
Total	100	100	100

Elaborated with information from SAGARPA-FAO. Diagnosis of the rural and fishing sector: identification of the problems of the agricultural and fishing sector of Mexico 2012.

From the stratification and conceptualization of family farming, the following elements of its social and economic condition are identified: the permanence of family farming and its social heterogeneity, despite the structural conditions generated by neoliberalism, where stratum II is the most numerous. It includes small farms but differentiated by the size of the agricultural area. Family farming has an important ethnic and women's presence in its management and without schooling. A process of feminization of family farming can be affirmed.

Family farming keeps different productive rationalities and income strategies. The value generated from self-consumption is present in the three strata, but it is especially significant in the S1 of subsistence farming, contributing to the food security of families. Strata I and II obtain income mainly from wage labor or non-agricultural activities, which contrasts with stratum III, which derives its main income from agricultural activities. However, the diversity in the structure of income of family farming shows that non-agricultural income is not exclusive to subsistence family farming but extends even to consolidated family farming.

Family farming is pluriactive, households, based on their members, undertake actions to diversify economic income, a dynamic linked to the diversification of the rural economy and insertion in labor markets at the national or foreign level. Family labor is one of the main assets to face the limitations of capital and productive means. These relationships allow indicating that economic activities are integral and complementary, that they adjust in accordance with the sociodemographic conditions of the family, resources, territory and market.

The income from supports from relatives, the country and abroad is higher in S1, decreasing in the following strata. These transfers or supports are indicative of the functioning of family farming, which establishes relations of cooperation and solidarity of its members in its income strategy. The income from government transfers stands out, of greater importance in S1, decreasing in the subsequent strata. Despite the relevance of income from government transfers, they are not sufficient to overcome poverty, as will be pointed out later, playing a role of containment of poverty.

Based on the typology of family farming, it is identified that they are forms of production between subsistence and mercantile production, that they coexist under market relations, with the production of use and exchange values, with which they combine or articulate different economic rationalities.

Table 3 shows the poverty condition of the family farming strata due to income in their food, capability and patrimonial dimension, according to the CONEVAL criteria. Income poverty compares people's incomes with the monetary values of different lines of food, capabilities and patrimony: 'food poverty: incapability to obtain a basic food basket, even if all income available in the household was used to buy only the goods in that basket. Capability poverty: insufficient available income to acquire the value of the food basket and make the necessary expenses in health and education, even using the total income of households only for these purposes. Patrimony poverty: insufficient available income to acquire the food basket, as well

as to make the necessary expenses in health, clothing, housing, transportation and education, although the entire household income was used exclusively for the acquisition of these goods and services' (CONEVAL, 2010).

The three dimensions of poverty are critical for strata I and II and present in stratum III. The income obtained by family farming, in strata I and II, is not sufficient to achieve a food basket, nor to meet the necessary expenses in health, education, clothing, housing. In Mexico, 61.9% of REUs have net income below the welfare line (SAGARPA and FAO, 2012). The income strategies of family farming, based on the combination of agricultural and non-agricultural activities, are insufficient to overcome income poverty.

Table 3. Types of poverty by stratum of family farming in Mexico.

Type of poverty (%)	S1	S2	S3
In food poverty	80.1	82.6	34.5
In capability poverty	83.5	86.8	40
In patrimony poverty	91.1	94.7	63.8

Elaborated with information from SAGARPA and FAO. Diagnosis of the rural and fishing sector: identification of the problems of the agricultural and fishing sector of Mexico 2012.

Table 4 shows the degree of marginalization. The National Population Council (CONAPO, for its acronym in Spanish) defined marginalization as a 'structural process in relation to the socio-economic development achieved by our country' (CONAPO and CONAGUA, 1993). CONAPO 'identified four dimensions of marginalization: education, housing, monetary income and an effect from the spatial location'. The summary measure of marginalization was called the marginalization index. Based on the index, a stratification is defined, which considers very high marginalization, high marginalization, medium marginalization, low marginalization and very low marginalization (CONAPO, 2016).

Of the strata of family farming, which are very high and high in strata I and II. Family farming is trapped in a condition of marginalization that further limits the possibility of overcoming rural poverty. The social marginalization of subsistence family farming and with greater indigenous presence is located in the states of Guerrero, Chiapas, Oaxaca (very high marginalization), Veracruz, Puebla, San Luis Potosí, Yucatán, Michoacán, Hidalgo and Campeche (high marginalization) (CONAPO, 2016).

Table 4. Degree of marginalization of the localities where REUs are located by stratum in Mexico.

Degree of marginalization	S1 (%)	S2 (%)	S3 (%)
Very high	16.4	13.4	4.6
High	52	51.4	40.5
Medium	14.4	16.3	22.1
Low	12.7	13.2	22.5
Very low	4.5	5.7	10.3
Total	100	100	100

Elaborated with information from SAGARPA and FAO. Diagnosis of the rural and fishing sector: identification of the problems of the agricultural and fishing sector of Mexico 2012.

Food poverty is rooted in social inequality, specifically in the social structure in which family farming is, where they do not have the income to acquire foods or do not obtain crops. The distribution of income is one of the most significant dimensions of social inequality, but not the only one, it is linked to other inequalities such as land and resources for production, the availability of natural and financial resources and asymmetric relations with the market. A situation that is exacerbated by marginalization and geographical factors (among which the communication routes, infrastructure and the endowment of natural resources stand out).

The social inequality of family farming is not only explained by the attributes of families and resources, whose condition and measurement are expressed in income poverty in its three dimensions: food, capabilities and patrimony, but by the relationships and structural conditions in which it is. This is how conditions, relationships and structures cause rural poverty and other discriminations such as gender and ethnic discrimination to be maintained and perpetuated. Recent information on the stratification of family farming and its poverty situation is not available to identify the food challenge it faces, but information on rural poverty, defined and measured in a multidimensional, extreme and moderate way, allows an approximation to the validity of the problem.

From a demographic perspective, between 2008 and 2018, rural poverty in Mexico has decreased in relative terms, going from 62.5% to 55.3%, but, in absolute terms, it increased, going from 16.2 million to 17 million people in the same period. In 2018, the rural population was 30.7 million people (CONEVAL, 2020a). Extreme poverty (it is considered when a person's income is so low that they cannot afford to acquire foods and at least three or more of the six social deprivations within the social deprivation index) represented 16.4% in 2018, while the deprivation due to access to food was 25.8% (people who have a moderate or severe degree of food insecurity), about 7.9 million people, being the third deprivation after the deprivation due to access to social security. The evolution of the deprivation due to access to food shows an erratic and cyclical behavior, without a clear tendency to decrease, it was 32.6% in 2008 and increased to 33.6% in 2010, in the context of the food crisis, it decreases to 30.9% in 2012, increasing to 32.1% in 2014, to again decrease to 24.7% in 2016, but it increases to 25.8% in 2018 (CONEVAL, 2020a).

Mexico has consolidated itself as an agri-food exporter, whose trade balance is in surplus, but with food dependence and the paradox of keeping 25.5 million people with food deprivations in 2018 (CONEVAL, 2020a) and rural poverty, especially extreme poverty. While agricultural production is necessary, it is not enough to solve hunger.

Food security, in the normative perspective, which considers in its dimensions the access to foods, is possible if the population has sufficient income for their acquisition, a condition that is not met and is increasingly uncertain for large sectors of the countryside and the city. Achieving food security implies making progress in overcoming inequality and social exclusion, in the redistribution of income and the strengthening of agri-food production.

It is estimated that, because of the COVID-19 pandemic, the population in income poverty will increase between 8.9 and 9.8 million people (CONEVAL, 2020b), which will cause the deepening of hunger. A shift towards food production from family farming is a central element in the

fracturing of the circle of poverty-food insecurity. Agri-food production is a strategic issue for the country due to the scenario of food security for the coming years, food dependence and poverty. These elements must be considered in the formulation and scope of an agricultural and rural development project for family farming, from a rethinking of the role of the Mexican State in development. Public policies are needed that are oriented towards the strengthening of an agri-food system oriented to food sovereignty, which strengthens the right of communities and the country to establish their own pattern of food production and consumption.

Family farming can contribute to the increase of agricultural production, in an inclusive rural development project for the different strata and their territorial diversity, based on the assets they have, tangible and intangible. It is also a possibility to move towards sustainable production in the face of the environmental crisis generated by industrial agriculture, with the depletion of soil and water resources and greenhouse gas (GHG) emission.

In favor of family farming, it is argued about its economic and ecological superiority over medium and large-scale farming (Toledo, 2002; Ploeg, 2013), an advantage that is vital to build and strengthen socially in the face of the conditions of poverty and marginalization in which it is. The recognition and revaluation of family farming in its multifunctional character is a challenge and task for society and the Mexican State.

A rural development path for family farming is necessary, contributing to the strengthening of its assets and the goods necessary for its dynamization. However, agriculture is not enough to achieve rural development and overcome poverty. Public policies and investments under a multisectoral and territorial vision are necessary. The agricultural path of family farming can generate multiple processes and results in the economic, social and environmental development of the territories in which it is, based on local resources and development potentialities. A perspective to advance in the previous direction is the recognition of peasant and indigenous ways of life and culture, to identify and understand the interests of social actors (including rural women and youth), material and intangible assets and their potential for transformation in rural development.

An agricultural development path for family farming is an agronomic challenge, of small farms, considering climate change and deterioration of natural resources, especially land, water, forests and biodiversity, for the design of agroecosystems aimed at improving productivity, with the combination of conventional agriculture and agroecology. Research and innovation are central elements for the productive and economic transformation of family farming, based on the knowledge of the potential of agricultural systems, considering an agricultural development based on classical agronomy oriented to an alternative agriculture that integrates food security, small-scale agriculture and the protection of the agroecosystem (Turrent *et al*., 2005).

The eventual strengthening of family farming will have to be accompanied by investment that allows improving economic income and the full payment of environmental services. In this direction, the issue of territorial development and regional equity is a core aspect, with the transfer of resources and construction of infrastructure for the less favored regions, in conditions of marginalization.

Conclusions

With the neoliberal model, Mexico specialized agricultural production towards export crops and agricultural growth, production that increased in recent years, achieving a surplus agri-food balance, which means food availability, but not food security for people in extreme rural poverty. There is a close relationship between rural poverty and food security, the latter linked to social inequality in income distribution, among other inequalities, which generates a circle of low income-poverty-food insecurity that occurs and reproduces socially in family farming. The strengthening of assets, agri-food production and income in family farming are fundamental for overcoming rural poverty and building a more equitable society.

Family farming, based on its stratification, shows a condition of pluriactivity, ethnicity, feminization, marginalization and income poverty, especially food poverty. Likewise, it keeps different productive rationalities and income strategies, contributing to food security, which, although insufficient, is a reserve of the country's agri-food production.

In Mexico, hunger and poverty will deepen because of the COVID-19 pandemic, agri-food production, in a scenario of growing demand for food on the planet, is a strategic issue for national security. Family farming in agri-food production is central to overcoming poverty and food sovereignty, in a long-term agricultural and rural development strategy, considering its social and territorial diversity.

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