Article

Socio-economic conditions of corn producers in the municipalities of Villaflores and La Trinitaria, Chiapas, Mexico

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Abstract

In Mexico, the agricultural sector has a complex structure in economic and social terms, which is reflected in socioeconomic imbalances in various areas of the country. This has resulted in rural producers considering as a means of subsistence, various systems of production and diversification of non-agricultural activities, in order to increase income, have greater opportunities for development and progress options in improving quality of life. The objective of this research was to determine the socioeconomic conditions in which the corn producers of the municipalities of Villaflores and La Trinitaria, Chiapas are located, in order to establish differentiated public policies that contribute to improving income and satisfying needs basics of the actors under study. Methodologically, stratified proportional affixation sampling and multivariate cluster analysis were applied using hierarchical and Wards clustering methods. The results determined the difference between the groups of the municipalities, which were: age and schooling of the producers, income from sales of production and non-agricultural activities, destination of the income they receive, access to health services, spaces and materials of the housing, and basic services. It is concluded that it is necessary to strengthen socio-economic policy and promote initiatives as a fundamental part of the regional rural development policy, so that it remains balanced in the social and economic spheres and ensures a decent standard of living for the inhabitants of rural communities.

Keywords: differentiated public policies, income, quality of life, regional rural development.

Reception date: July 2019
Acceptance date: September 2019

Introduction

In Mexico, the agricultural sector has a complex structure in economic and social terms, which is reflected in socioeconomic imbalances in various areas of the country. This has resulted in rural producers considering as a means of subsistence, various systems of production and diversification of non-agricultural activities, in order to increase income, have greater opportunities for development and options for progress in improving the quality of life in the rural environment.

In this sense, there are supports granted by the federal government for the rural sector, through programs oriented to agricultural production and social aspects, created to help growth and strengthen the country's economy. However, it should be noted that, according to various studies, the programs do not contribute to the economic development of rural areas. According to Bazan *et al*. (2011), the neoliberal model, economic crises and social co-responsibility, as well as the fact that the programs became mechanisms of political manipulation, practices of cacicazgo and corruption by those responsible for their implementation, not they have contributed to the achievement of government programs and have encouraged the slowdown of development.

A clear example is shown in the creation of the National Solidarity Program (Pronasol) in 1988, in a context of economic crisis and growing social demand exceeded in the response capacity of the institutions (Palacios, 2007). Similarly, in 1992 the Ministry of Social Development (Sedesol) was born, whose main objective was to combat poverty among farmers, indigenous people and settlers in marginalized urban areas.

According to Rodríguez and Moctezuma (2008), the reality in which producers live, not only in Mexico, but at the Latin American level, has been worsening the living conditions of rural residents with lower incomes. In this regard, the initiatives implemented have not guaranteed access to social rights based on access and improvement of housing, provision of basic services, free education, increased health and employment coverage, and increased entry.

Hence, this research work focused on determining the socioeconomic conditions in which corn producers are currently located in the municipalities of Villaflores and La Trinitaria, Chiapas. The above, as a way of referencing the essential peculiarities in the economic and social aspect of agricultural producers in the region; in order to establish differentiated public policies that contribute to improving the income and satisfaction of the basic needs of the actors under study.

Materials and methods

The research focused on a quantitative analysis, to group corn producers from the municipalities of Villaflores and La Trinitaria, Chiapas. Once agglomerated, the variables were analyzed with respect to the socioeconomic conditions in which the target population is currently located.

In the first instance, the variables were established taking into account the 2018 Social Policy Evaluation Report of the National Council for the Evaluation of Social Development Policy (Coneval). Hence, the variables to be considered were age, literacy and schooling of the producer, average annual income from sales of production and non-agricultural activities, food, access to credit, health services, social security, quality and housing spaces and services basic of it.

The sampling used for the research work was stratified; because, in this type of sampling the population is divided into strata and tends to be more accurate than in comparison to simple random sampling. Therefore, according to Vivanco (2005), in order to determine the size of the sampling strata, they were assigned according to the membership stratum, particularly, taking into account the criterion of the concentration of 80% of corn producers in the localities belonging to the municipalities of Villaflores and La Trinitaria, Chiapas.

Subsequently, based on the Proagro Productivo registry of beneficiaries of the 2017 agricultural cycle, the sample size was calculated based on the stratification of the population of each municipality. In this sense, for the municipality of Villaflores the population stratification included six selected locations, being: Villaflores, Jesús María Garza, Villa Hidalgo, Cuauhtémoc, Domingo Chanona and 16 de septiembre. And for the municipality of La Trinitaria, five communities were determined: La Esperanza, Santa Rita, Trinitaria, Tziscao and El Progreso (Table 1).

Table 1. Stratification of the towns of the municipality of Villaflores and La Trinitaria, Chiapas.

Municipality	Stratum	Location	Ni	Total
Villaflores	1	Villaflores	212	844
	2	Jesus Maria Garza	189	
	3	Villa Hidalgo	174	
	4	Cuauhtémoc	97	
	5	Domingo Chanona	93	
	6	16 de Septiembre	79	
La Trinitaria	1	La Esperanza	236	992
	2	Santa Rita	235	
	3	Trinitaria	232	
	4	Tzicao	157	
	5	El Progreso	132	

Elaboration with data of the Register of Beneficiaries of Proagro Productivo (2017).

As for the number of strata or localities to consider, Kish (1972) establishes a range of 3 to 10 strata as a reference, since the advantage offered by the grouping of elements is distorted. Regarding the affixation used for stratified sampling, proportional affixation was determined, since the size of each stratum in the sample is proportional to the size of the corresponding stratum of the population. According to Vivanco (2005), this affixation has the advantage that a self-weighted sample is generated characterized by the same fraction of sampling in all strata.

Subsequently, the following statistical formula representing stratified sampling proportional affixation was applied (Vivanco, 2005):

Total sample size.

$$n = \frac{\Sigma_{i=1}^{l} N_i P Q_i}{NE + \frac{1}{N}\Sigma_{i=1}^{l} N_i P Q_i} \qquad E = \frac{d^2}{Z_{1-\alpha/2}^{\ 2}}$$

Size of each stratum

$$n_i = n\left(\frac{N_i}{\Sigma_{i=1}^{l} N_i}\right) = n\left(\frac{N_i}{N}\right) = n(W_i)$$

The percentage of confidence for this investigation is 95% and an accuracy error of 10%. Where: N= population size is 844 producers for the municipality of Villaflores and 992 producers corresponding to the municipality of La Trinitaria; N_i= size of the population of the stratum; P_i= expected proportion of 20%; Q_i= 1-P_i (1-0.2=0.8); *d*= absolute error or accuracy of 10%; $Z_{1-\alpha/2}$= 95% confidence level, therefore $Z_{1-\alpha/2}$= 1.962; NE= product of the population size by the estimation error; n= total sample size; and ni= size of each stratum.

Then, the sample size n estimated in the case of the municipality of Villaflores and La Trintiaria, was 57 and 58 surveys, respectively; which represents the total target population of the study area. In another tenor, to determine the size of each stratum it was by means of the corresponding formula on proportional affixation, obtaining the sample for each stratum as shown in Table 2.

Table 2. Sample size by stratum of the towns of the municipalities of Villaflores and La Trinitaria, Chiapas.

Municipality	Stratum	Location	Ni	Total
Villaflores	1	Villaflores	14	57
	2	Jesus Maria Garza	13	
	3	Villa Hidalgo	12	
	4	Cuauhtemoc	7	
	5	Domingo Chanona	6	
	6	16 de Septiembre	5	
La Trinitaria	1	La Esperanza	14	58
	2	Santa Rita	14	
	3	Trinitaria	14	
	4	Tzicao	9	
	5	El Progreso	8	

Consecutively, the selection of the producers to be interviewed was randomized by each stratum, for which a constant selection interval was determined. On the other hand, the survey used to collect information was semi-structured, where they were applied uniformly for each of the corn producers. The questions of this one was established closed and open. The survey was divided into sections that contemplated: a) general data of the producer; b) aspects of production; c) socioeconomic aspects; and d) environmental aspects.

Regarding the processing and analysis of the information obtained, the IBM SPSS (Statistical Package for the Social Sciences) v25.0 program was used to establish the socioeconomic conditions in which corn producers predominate in both municipalities. In this sense, to classify the groups of producers in each municipality considering the variables described, the multivariate statistical technique called clusters or cluster analysis was used, using the hierarchical method. This analysis allows grouping elements into homogeneous groups within and heterogeneous with each other, depending on the similarities between them.

Due to the above, it is important to consider that when there are highly correlated variables, it is possible that they have a greater weight due to the formation of the conglomerates (Montanero, 2008). On the other hand, it is required to take into account the correlation matrix before the cluster analysis. In which, the descriptive statistics were obtained as minimum, maximum, mean and standard deviation, to determine the average dispersion of all data points around your group average (not the general average).

In this way, the main elements help to form clusters from a set of uncorrelated data. It also dealt with the Wards grouping method (minimum inertia loss method) which minimizes the variance between each group, the use of Euclidean squared distance and the 18 variables considered to have a significant correlation between some of them. Since it is sought to group variables trying to achieve maximum homogeneity in each group, similar sizes and the greatest difference between them (Bidogeza *et al*., 2009). Subsequently, the clusters that generate less increases in the sum of the distances within each cluster were grouped. And it was determined to obtain three clusters.

Results and discussion

Based on the information obtained from the main variables, the cluster analysis helped to generate three important groups of producers, in relation to the socioeconomic conditions for each of the key municipalities of the study. In this way, the socioeconomic characteristics corresponding to the municipality of Villaflores, Chiapas are presented below in Table 3.

Table 3. Socio-economic characteristics of corn producers in the municipality of Villaflores, Chiapas.

Name of the variable	Group I	Group II	Group III
Percentage over n (sample population size)	68%	23%	9%
Age of the producer (years)	61 to 70	31 to 60	More than 70
Can read and write	Yes	Yes	Yes

Name of the variable	Group I	Group II	Group III
Schooling of the producer (years)	Primary school	High school	Primary school
Average annual income per sale of production ($)	From $10 001 to $15 000	From $10 001 to $15 000	From $5 001 to $10 000
Average annual income by non-agricultural activity ($)	From $5 001 to $10 000	From $35 001 to $45 000	From $1 000 to $5 000
Main destination of the income received by agricultural and non-agricultural income	Food, basic housing services and medical services	Food, basic housing services and medical services	Food
Access to health services (medical care)	Health center or public hospital	Private clinic or hospital	Dr. Simi's clinics
Housing walls (material)	Partition, Brick or Block	Partition, Brick or Block	Adobe
Roof of housing (material)	Wood	Roof tile	Metal Sheet
Housing floor (material)	Cement or firm floor	Cement or firm floor	Ground and cement or firm floor
Housing spaces (quantity)	4	5	3
Electric power	Yes	Yes	Yes
Sewer system	Yes	Yes	Yes
Drinking water	Yes	Yes	Yes
Garbage collection	Yes	Yes	Yes

Elaboration with field data (2018).

Group I: maize producers with ages ranging from 61 to 70 years, can read and write with primary academic level. It comprises 68% of the population (39 farmers in the sample), with relative income of $10 001 to $15 000 pesos for the sale of production, without access to credit, type of independent and own housing, and with access to basic services of it.

Group II: producers with age between 31 and 60 years, can read and write with secondary school level. It comprises 23% of the population (13 farmers in the sample), with relative income of $10 001 to $15 000 pesos for the sale of production and additional economic perception for non-agricultural activities dating between $35 001 to $45 000 pesos, without access to credit, type of independent and own housing and with access to its basic services.

Group III: maize producers with more than 70 years of age, can read and write with primary school level. It comprises 9% of the population (5 farmers in the sample), with incomes of less than $10 000 pesos for the sale of production, without access to credit, type of independent and own housing, and with access to all basic services of home. Table 4 shows the socioeconomic characteristics of the producers of the municipality of La Trinitaria, Chiapas.

Table 4. Socio-economic characteristics of corn producers in the municipality of La Trinitaria, Chiapas.

Variable name	Group I	Group II	Group III
Percentage over n (sample population size)	31%	48%	21%
Age of the producer (years)	41 to 50	51 to 70	More of 70
Can read and write	Yes	Yes	Yes
Schooling of the producer (years)	Primary school	Primary school	Primary school
Average annual income per sale of production ($)	From $10 001 to $15 000	From $10 001 to $15 000	From $5 001 to $10 000
Average annual income by non-agricultural activity ($)	From $1 000 to $5 000	From $25 001 to $35 000	Zero pesos
Main destination of the income received by agricultural and non-agricultural income	Food, basic housing services and medical services	Food, basic housing services and medical services	Food
Access to health services (medical care)	Not taken care of	Health center or public hospital	Health center or public hospital
Housing walls (material)	Wood	Wood	Adobe
Roof of housing (material)	Metal Sheet	Metal Sheet	Straw, palm or Metal Sheet
Housing floor (material)	Cement or firm floor	Cement or firm floor	Ground and cement or firm floor
Housing spaces (quantity)	2	3	1
Electric power	Yes	Yes	Yes
Sewer system	Not	Not	Not
Drinking water	Yes	Yes	Not
Garbage collection	Not	Yes	Not

Elaboration with field data (2018).

Group I: the age of the producers fluctuated between 41 and 50 years, they know how to read and write and have primary school studies. It comprises 31% of the population (18 farmers in the sample), with relative income of $5 001 to $10 000 pesos for the sale of production, without access to credit, type of independent and own housing, and with access to electricity and drinking water.

Group II: producers aged between 51 and 70 years, can read and write, with primary school level. It comprises 48% of the population (28 farmers in the sample), with relative income of $5 001 to $10 000 pesos for the sale of production and additional economic perception for non-agricultural work that ranges from $25 001 to $35 000 pesos, without access to credit, type of independent and own housing and with access to most basic services.

Group III: the age of corn producers with more than 70 years, they know how to read and write and have an elementary academic degree. It comprises 21% of the population (12 farmers in the sample), with income of $5 001 to $10 000 pesos for the sale of production, without access to credit, independent and own type of housing, and only have electricity. With regard to the main components that determined the difference between the groups of the municipality are: age and schooling of the producers, the income from sales of production and non-agricultural activities, the destination of the income they receive, access to health services, spaces and housing materials and basic services.

Regarding age and schooling, in the first instance it should be noted that in the municipality of Villaflores, group II has a lower age than in comparison to groups I and III. This implies that this group has a higher level of education and greater possibilities of engaging in some additional non-agricultural activities or work such as: commercial businesses (shop, informal commerce, nixtamal mills) or provision of services (maquila, carpentry, masonry, blacksmithing, etc).

On the other hand, for the municipality of La Trinitaria, it is reflected that in the three groups the age differs, but they have the same primary school level. Hence, group II is the one with the highest percentage of the population shown, and in which even having primary school studies and an age ranging from 51 to 70 years, they generate income from raising or exploiting livestock. In contrast, the youngest group I of the three groups, their economic perceptions are lower than the other groups, given their limited level of studies to pursue a specialized trade.

In this way, it is corroborated by what De Janvry and Sadoulet (2001) argues, in regard to the role that education plays and the age to access better possibilities of non-agricultural paid work. In addition, access to education in the region requires strategies where the educational lag is counteracted, which, on occasion, has been transmitted in generations, which impacts capacity development. As Robeyns (2009) indicates, in the absence of opportunities, education helps to strengthen people's well-being and improve access to living conditions. That is, to increase human freedoms in a process that expands personal capacities, since it expands the available alternatives for people to live a full life (Fukuda, 2004).

Additionally, Bernal (2014) emphasizes that education favors the autonomy of people and provides the possibility of self-managing their lives, through the generation of new capacities and personal and social enrichment, allowing to establish new opportunities for well-being and quality of life. Regarding the economic factor, the main economic activity in the study regions is agriculture; in the case of the municipality of Villaflores, group I and II generate an average annual income from the sale of their production from $10 001 to $15000 pesos and group III, less than $10 000 pesos.

This is due to the amount of area harvested and the average yield per hectare. However, it will be equated with the case of the municipality of La Trinitaria, the economic perceptions of the producers are in the three groups between $5 001 and $10 000 pesos per year. Likewise, it was observed that in the municipality of La Trinitaria they have lower income compared to the municipality of Villaflores. The foregoing is due to the fact that the former mostly allocate part of the production to self-consumption and on the contrary, the latter have surplus production that they are destined for sale.

Likewise, regarding the generation of income from non-agricultural jobs, in Villaflores the producers with the highest income are those of group II, derived from the incursion into commercial businesses, or failing that, as service providers of some type of trades such as: blacksmithing, masonry, carpentry, among others.

While, for La Trinitaria, it also turns out that group II producers have the possibility of increasing their economic resources by raising and exploiting livestock. In this way, as Viveros (2010) points out, producers try to articulate consistently between agriculture and livestock. Compared to group III, where they do not generate any type of income under this item, given the limitations in operational knowledge and age.

According to Reardon *et al*. (2001), in the absence of non-agricultural sources of income in poor rural households, the magnitude of the condition of deprivation and poverty would be several times greater than in comparison to diversified producers in income generation. Indeed, as Arias (2009) refers, agricultural production has ceased to be sufficient, so that producers are in need of diversifying their sources of income through multi-activity activities. According to Carvalho and Moesch (2013), the benefits of the diversification of non-agricultural activities in rural areas consist in the increase of economic resources, which encourage economic and social development.

Under this perspective, Cetre (2006) mentions that monetary income is necessary as a welfare reference, in which it allows the acquisition of basic goods and services that contribute to an optimal standard of living. If the income of people were below what they require, it would be at a threshold of socioeconomic deprivation. In this regard, Guzmán *et al*. (2005) indicate that rural families are increasingly incorporated into activities other than agriculture, because they represent an important support to compensate for low agricultural income Hernández and Aguilar (2015). The above, according to Urquia (2014), confirms that there is a heterogeneous panorama in Mexico of major deficiencies such as food, and requires interventions located in certain population groups and in certain regions.

In addition, he adds that the rural economic units whose members are in conditions of poverty, given the lower income levels they count, as well as the rise in food prices; they have poor access to food and a deep precariousness. Some other researchers such as López (2015), show the high food vulnerability that is exposed to the population with lower economic capacity and, therefore, have an impact on food access and food security.

Regarding access to health and social security services, for the two municipalities there are great contrasts. First, in Villaflores, the producers of group I, turn to health centers and public hospitals, group II to private clinics or hospitals, and group III to Dr. Simi's clinics. However, for the municipality of La Trinitaria, both producer group II and III, go to health centers and public hospitals and group I, prefers not to attend. In addition, this last group has an age of less than 50 years, so it considers that a simple disease heals on its own.

In this context, it is clear the example that producers with greater economic possibilities choose to attend private services; while the producers with lower income, resort to medical guidance in public sectors or pharmacies that offer medical service at low cost; or failing that, they do not visit any type of health service. Today, rural communities have access to the program implemented by the federal government to poor municipalities called Seguro Popular.

In this order of ideas, Whagstaff (2002) expresses that poverty and health are interrelated, associated with considerable health care costs, limitations and opportunities that are limited in the income factor, in the low effectiveness of policies focused on this field and in the inability of health services to reach the poor. Derived from the above, according to Pick *et al*. (2011), mention that extreme poverty and poor diet make it impossible for people in rural areas to have opportunities for development in food and health.

On the other hand, Woolcock and Narayan (2000) state that with regard to community factors it is important to consider geographical environmental influences, where reaching a health center is sometimes difficult due to impassable conditions in rural communities. Also, maintaining good health practices and the availability of existing personnel in local health services puts people in rural areas at a disadvantage. Finally, he concludes by indicating that the inequalities of health and utilization of these services largely reflect inequalities with respect to income, location and characteristics of rural households.

With the above, it is inferred that it is necessary to establish or redesign initiatives in the field of the health sector, which help to combat inequality in this area; invest in infrastructure and personnel that attend the health units, to improve health and ensure a decent standard of living for the inhabitants. Regarding the quality and spaces of the house in the area of the municipality of Villaflores, in the first instance it is found that the material of the houses in group I and II, is partitions or block walls, as well as adobe for the group III. Likewise, it is replicated that for the cases of group I and II, the floors are made of cement or firm floor. Contrary to group III, which is land or cement. On the other hand, for the ceilings, each group differs, being these of wood, tile and metal sheets, respectively. Meanwhile, it is envisioned that for the La Trinitaria, groups I and II the houses are made of wood in walls, metal sheets ceilings and cement in floors.

On the other hand, group III is the most disadvantaged, given that the material of their houses is made of adobe, palm and metal sheets, and earth or cement, in the same order for the purposes they were used for. Likewise, in the case of housing spaces, the Villaflores producer groups have larger rooms ranging between 3 and 5, compared to La Trinitaria farmers, where they have 1 to 3 sleeping spaces and a place to cook.

Regarding basic housing services, in Villaflores the three groups have electricity, drainage, drinking water and garbage collection from the public service. While in La Trinitaria there are significant differences. Group II is the one with the greatest services, compared to group I that has electricity and drinking water; as well as only electric power in group III. The latter has a septic tank or toilet and resort to collecting water from the lakes and lagoons of Montebello. Regarding the collection of garbage, group I and III, deposit their solid waste in containers or deposits of the community itself, since they do not have public service for this purpose.

In that way, it coincides with research such as those of Aguilar *et al*. (2018), which indicate that the lack of access to basic services mostly affects the inhabitants of rural communities and a third of the population does not lack access to quality and housing spaces. To conclude, it is observed that deficiency levels persist in this area; therefore, it is essential to focus short and long-term government support to improve housing. In addition, to invest in public infrastructure that helped to universalize the right of basic services considering the particularities that each group of producers in rural populations need.

Conclusions

The cultivation of the land continues to be the guiding axis of the economy as a way of entering the other works complementary to the activity. Similarly, non-agricultural work contributes to complement family income and minimally offset seasonal income fluctuations, but it is not an element that overcomes socioeconomic deficiencies and contributes to the development of rural communities.

In this sense, income is the main component of welfare and multiplier effect on social rights, so it deals with support related to the productive capacity of farmers and the increase in schooling. Likewise, public differences and comprehensive policies are required with the participation of different social actors that benefit the sector through productive alternatives with potential, boost productivity and capacity development, access to food and housing; as well as investment in education, infrastructure and health services, in order to provide greater opportunities for access to social rights and cover specific shortcomings of producers.

In short, it is necessary to strengthen socio-economic policy and promote initiatives and processes as a fundamental part of the regional rural development policy, so that it remains balanced in the social and economic spheres and ensures a decent standard of living for the inhabitants of rural communities.

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