



Food Sustainability and Market Imperfections in Small-Scale Andean Farms

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Abstract

Small-scale agriculture is an essential pillar of the food supply in urban markets. Additionally, the family farming system involves food production, which is used for self-consumption to feed the family, and earn an income. Farmers' limitations reduce families' access to resources such as credit, information, or markets. The threats that affect farmers include low farm income and the risk of weakening the household farm structure. However, small farmers provide more than 40% of the food for local markets, which demonstrates their importance in the food system of many countries within Latin America. This paper analyzes the family system of the Food Production Network (BIOVIDA), which operates in Cayambe, a city in the Ecuadorian Andes. Composed essentially of women farmers, this network uses some strategies to diversify agro-food techniques and empower women in an area where men typically occupy leadership positions. This study collects data from farmers' surveys, interviews, and non-participatory observation. In this way, we observe that agriculture production has become part of the base of family welfare and food sustainability. The conclusions indicate that strengthening the socio-productive organization generates revenue and increases the capacities of farmers, despite market imperfections.

Keywords: self-consumption; subsistence farming; women organization; non-separability model, food supply, Ecuador.

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1. Introduction

The short circuits that exist within agriculture are of great importance to the chain of production and food supply [1]. Agricultural productive capacity promotes product diversity and guarantees that families can feed themselves, as well as creating a way of obtaining an income to finance the educational and economic development of family members [2,3]. According to Lang and Barling, food sustainability corresponds to a multiple criteria system that forms the basis of social, environmental, and economic development [4]. In this context, small-scale agriculture plays a very important role in the regulation of ecosystems within the food supply [5]. In addition, in the face of cultural and social changes in developing countries, some responsibilities within agriculture largely fall to women, as heads of the household [6]. This process entails analyzing the attitudes of women farmers to the limitations that are proposed within the market, which in this case provides the products and services necessary for agriculture [7,8]. The presence of these market failures reduces the possibility of continuing to work within agriculture, with negative effects on the income and food supply of farmers [8–10].

This process of local development also points to examples in the management of resources, as well as their contribution to food sustainability. If the contribution is established as a whole, the overall contribution makes it possible to benefit the well-being of societies [11]. According to Wiggins, Kirsten, and Llambí, with regards to the evolution of small-scale agriculture in developing culture, the current efforts of policy-makers are moving from a traditional and low-productivity perspective towards seeing agriculture as an instrument that can reduce poverty through efficient and dynamic changes in agricultural structures [3]. The aim is to produce enough food of high enough quality to meet the demands of rural families. In addition, this strategy aims to keep the supply of food at affordable prices in the local markets [4,12,13].

The described model, which is applicable to the economic analysis of subsistence production systems, has been used by Louhichi, and Gomez y Paloma in small-scale farms in Sierra Leone a case study which used a bio-economic model to evaluate food self-consumption reduction due to market constraints [12]. Taylor, Dyer and Yúnez-Naude determine in their evaluation of Direct Field Support Program (PROCAMPO) in Mexico the importance of improve farmers' abilities for increase food supply and family farming well-fare [14]. In Bolivia, in the Andean region, it is possible to observe results from farm collectives as well as improvements in the technical ability of these farms to produce more food [15]. In addition, Wiig demonstrates that women farmers are more effective at making decisions that increase their welfare [16]. The results obtained show us that the processes of family agriculture react positively when adapted to market failures. In this way, they strengthen their food production capacity. Thus, family well-being is complemented by the incomes of trade and self-produced food [17].

On the other hand, constraints present in the small-farming production model have a direct relation to farmers' income [18]. Therefore, market failures or imperfections are defined as the non-efficient way of organizing the production or allocation of goods and services to consumers [8]. In some cases of heterogeneous structure, weak policy or allocation of resources via the market reduces the participation of small farmers, as well as their access to resources, such as land, water, or credit. Furthermore, the behavior of farmers is oriented towards maximizing

their welfare, whether financially or within the family [4,19].

This article approaches this subject by using an analysis of the effects on farmers' behavior and the non-separability model described by de Janvry and Sadoulet. In this way, we analyze the attitudes of the farmers in relation to the effects caused by market failures in the rural sector of the Ecuadorian Andes. In this context, the attitude of the farmer is defined as the behavior that occurs when facing market failures, where decisions as a producer and a consumer are fulfilled under a condition of non-separability, so that the amount of food they can produce is limited by resource constraints [19]. We can observe that part of the production is designated to feed the family nucleus, another part is destined for seed, and the excess is destined for trade in the local markets. While this food system is not a condition sine qua non for meeting farmers, some variables are observed in this research, in addition to the characteristics in which this condition occurs [20,21].

Based on the above, the aim of this research is to analyze the behavior of farmers against the availability of resources which are limited by market failures. In this article, a description of alternative routes of agricultural production maintained by the Food Production Network (BIOVIDA) is observed. Likewise, the analysis of advances in the agricultural production of the network is proposed as part of a strategy to strengthen family agriculture. As noted below, NGO efforts are aimed at consolidating small-scale agriculture by reducing the effects of market failures on weak sectors of agriculture [22]. This paper aims to identify the strengths of smallholder agriculture in Ecuador, within the framework of a research project on public agricultural policies.

1.1. The Non-Separability Model

Chiriboga and de Janvry et al. determine the existence of a dual condition in the Ecuadorian agrarian structure [8,23]. The difference in the distribution of resources causes pressure on the decisions of farmers, especially those who have less access to resources [24]. Some of the consequences of this include migrating to urban zones, increasing non-farm labor, and abandoning agriculture for a salary outside the farm [6,25]. Furthermore, other problems can be observed in small farms, such as the over-fragmentation of land, erosion, low technology application, and the overuse of pesticides [26]. Therefore, peasants (young men) lose interest in continuing to work in agriculture [27].

In the family agriculture segment, De Janvry and Sadoulet (2006) assert that policy instruments that do not recognize the heterogeneity of farmers can lead to gaps between farmer groups at the time of policy implementation. In this sense, farmers without access to productive resources will reduce both their participation in the market and their well-being [14,20,28].

In this sense, farmers' behavior leads to overcoming market imperfections according to the change of preferences in production–consumption. This strategy, used by family farming in adverse scenarios, is a characteristic of the non-separability model.

Adapted by the author

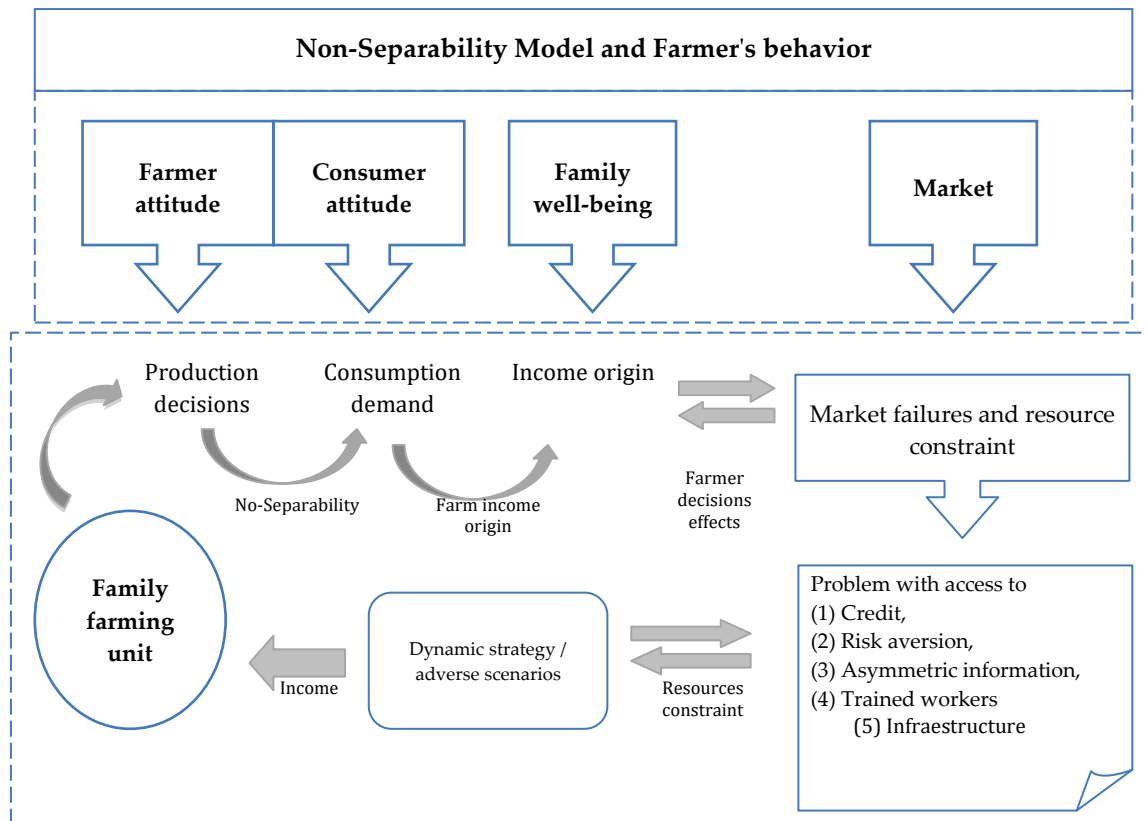


Figure 1: Model of the non-separability of family agriculture, strategies and market imperfections (de Janvry and Sadoulet, 2006).

Figure 1 above describes the farmer's attitude in scenarios that compromise family well-being. Farmers are working to revitalize their strategies to overcome market failures by allocating enough food resources to subsist, reducing the amount destined to commercialization and therefore their income [29]. This condition of the non-separability of family farms identifies the factors that affect welfare [20]. In this sense, restrictions that are considered as direct factors on the behavior of small farmers are assumed, such as (1) price variation; (2) credit restrictions; (3) distance to shopping centers; (4) work under risky conditions; and (5) access to resources for production [20,30,40].

1.2. Structure of Small-Scale Farms

The agricultural model present in Ecuador is characterized by being extensive, as well as promoting an agriculture of capitalist accumulation [31]. The use of agrochemicals for food production is a method that is part of the technological tools for increasing productivity and has been applied since the green-revolution [32]. This production model has been able to position itself by the preponderance of an unequal agrarian structure in terms of access to resources such as land, water, credit, or information. These four pillars are included into a process of unequal allocation and access in the market, named as market failures [12].

The agrarian structure in Ecuador, as in many other developing countries, is composed of groups with different access to resources [33]. On the one hand, an agro-export group is designated as the driver of the source of

economy and labor, and on the other hand, small and medium-sized agriculture concentrates on the consolidation of a self-sufficient food system, along with better incomes for farmers [4]. Therefore, the vision with which the policy instruments are structured requires the implementation of heterogeneous criteria to complement farmers' capacities in a dynamic economic environment towards their well-being [11].

In Ecuador, the efforts of policy-makers and allied institutions seek to expand the availability of food sustainability in local markets. These strategies are designed to guarantee the sovereignty and food availability of each territory [35]. In practice, access to trade and markets is in the hands of intermediaries. Small farmers are limited to trade their produce according to the price and conditions of intermediaries [24,36]. In this way, more and more peasants must combine agriculture and non-agricultural temporary wage labor to obtain sufficient resources to meet the needs of their family. Non-farm labor is related to farm flowers or seasonal farms. In response, family farming has evolved by diversifying its income and food production. However, the formation of networks and associations between peasants is part of the strategy proposed by policy-makers to strengthen small-scale agriculture. [15,37].

2. Materials and Methods

The approach in this paper is carried out around a case study, with a mixed methodological design of sequential exploratory strategy, for the analysis of quantitative and qualitative information. Non-participatory observation (1), interviews (2), and surveys (3) were used to obtain information between April and June in 2013.

(a) The initial process of this work required time and individual meetings to gradually develop the bonds of trust. Indeed, it was possible to participate in assemblies, as well as planning meetings, and work within the farms and the space of commercialization.

(b) Interviews were made with the leaders of BIOVIDA.

(c) Survey contribution was voluntary of each farmer, representing the eight communities that shape the network. The sample reached 30% of the total number of members of the network. The questionnaire used was based on the Survey of Living Conditions form prepared by the National Institute of Statistics and Censuses (INEC) in 2011 [42]. The instrument was composed of open and closed questions in four blocks: (1) Conditions of life; (2) Agricultural production; (3) Trade; and (4) Food consumption. The fieldwork comprised a total of 54 surveys. Lastly, data was used to analyze the perspective of members of the network of their capacities and living conditions.

2.1. Case Study

This research is carried out in the Cayambe canton, located 70 km north of the capital Quito, in the province of Pichincha, in the central northern region of the Ecuadorian Andes. This area has a predominantly rural population (>65%) [38]. Agriculture in the area is characterized by raising livestock, milk production, minor species such as guinea pigs and poultry, vegetables, and processed products with low added value, such as flour and dry grains [41]. Farms annexed to the network are located in sectors with little access to productive

resources. However, they provide more than 40% of the food for urban markets. In many cases, the sale price does not correspond to production costs of the farms, which is a factor that reduces farming continuity.

This paper describes the activities carried out by the farmers' network. In this sense, the present work delves into the activities carried out by the women farmers of Cayambe through the BIOVIDA network, supported by a Non-Government Organization (NGO), the Foundation for Alternative Development (SEDAL). In this sense, BIOVIDA works in the high Andean zone, which is formed by more than 260 farmers, distributed in eight different communities, with diverse characteristics in terms of access to resources and living conditions [39]. The production model is based on organic crops (vegetables, fruits, cereals) and some processed food. Agricultural production has been enhanced by the network, through training and strengthening the skills of farmers [40].

For our analysis, we selected eight food types: meat, milk, fruit, vegetables, cereals, eggs, potatoes, and grains. Part of the production is destined for self-consumption, the rest for commercialization. To evaluate how the quantity produced influenced the availability of food, the consumption relationship was established on days per week. This perception allows for measuring the difference between previous consumption (recorded before becoming a member of the network) and current consumption.

Fieldwork was carried out in eight communities, seven of which are part of the Cayambe canton and one of which belongs to the parish of El Quinche, near the city of Quito. The communities that participated in the survey were: San Vicente, Paquistanacia, Cariacu, Unión y Vida, Santa Rosa, Buena Esperanza, Flor Andina, and Cuniburo. A total of 260 farmers are part of the BIOVIDA network, most of them women, with an average age of 42 years, who combine domestic tasks with agricultural work (see Table 1).

Table 1: Characteristics of farmers' ages and education levels (Source: Survey 2013).

Community	Average age		Instruction			
	(years)	(%)	N/A	Primary	High school	Higher education
San Vicente	45	33	33	33	-	
Flor Andina	41	-	66	33	-	
Cariacu	46	10	90	-	-	
Buena Esperanza	45	15	85	-	-	
Santa Rosa	46	-	90	10	-	
Paquiestancia	39	15	44	33	5	
Cuniburo	44	-	80	20	-	

Elaborated by the author

The producers have been in the network for less than 2 years, and for them, agriculture is a second source of

income. The network is characterized by 80% women in primary studies. Family labor represents around 92% in these communities. There is access to water irrigation in 84% of the farms. Another characteristic indicates that the farmers share the plots, many of which border the houses. The characteristics of the agricultural structure indicate a range of surface area between 0.2 and 4 hectares. The size of the surface varies by community. Most have on average an extension, between 1 and 1.5 ha. However, it also shows a concentration in the segment between 0.2 and 1.2 hectares (50.84%). The agricultural products are traded once a week and they must be transported between 5 and 15 km from the farms to the nearest market [42]. The production data and characteristics are shown in Table 2.

Table 2: Economic production data in communities of BIOVIDA (Source: Survey 2013).

Community	Surveys	Average area (ha)	Average income (\$/month)	Last loan amount (\$/year)
San Vicente	5	0.37	82.00	1000.00
Flor Andina	12	4.75	397.27	4188.89
Cariacu	5	1.70	162.00	750.00
Buena Esperanza	4	0.39	297.50	3500.00
Santa Rosa	9	1.35	147.78	1600.00
Paquistancia	12	3.17	384.17	3222.22
Cuniburo	6	0.95	160.50	366.67

Elaborated by the author

The scenario in which agriculture develops presents a socio-productive structure that is gradually weakened by emigration and the little income that is generated by agriculture [15].

The network proposes a system of collective work through the frequent participation of peasants gathered in groups, in a territory, and in a particular activity. This facilitates the distribution of tasks, resulting in (1) reducing the time it takes to accomplish tasks, (2) sharing cultivation techniques, and (3) strengthening the organization [42].

The structure of the network is formed on three levels. The most important decisions are made in the General Assembly, where all the members of the network converge.

At the territorial level, there is small nuclei called the basic organization (OB), which has one representation of the farmers (A – B - C), according to each community.

For the coordination of the OB, there is a president of the network who has the task of coordinating the tasks of organization and its participation in fairs. The president also acts as a representative to the cooperating institutions allied to the network (see Figure 2).

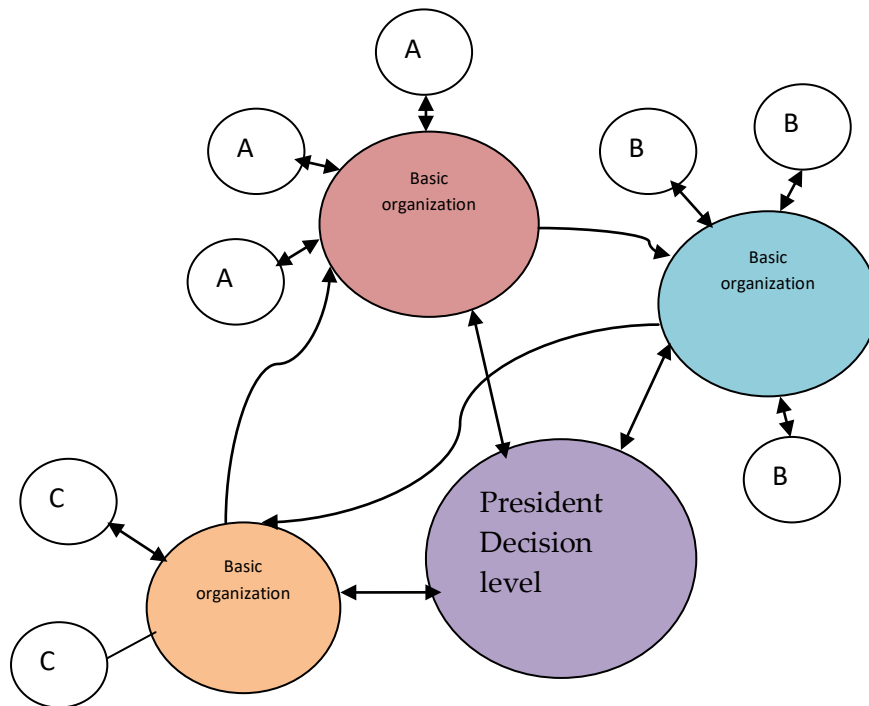


Figure 2: Structure of the BIOVIDA network with the decision level in yellow color with the two levels of production: Basic organization (OB) and farmers of each community (A, B, and C).

The network maintains permanent meetings with representatives of the OB. The most relevant activities, notifications, and events that affect the members of the network are registered. The head of each OB has the responsibility to inform and coordinate with the members of each organization the resolutions taken in the directory of BIOVIDA. At another level, extended meetings are held, where OB members attend technical training and leadership activities. Likewise, every six months, the assembly takes an appointment to review the prices of the products that are marketed, as well as problems that must be considered by all members.

The network improves the ability to produce through technical instructions to all members. The training is in small groups of farmers of the same location. This method has facilitated the production of composting and fertilizers. The course is carried out by a promoter who has participated in external training and delivers a replica of what has been learned to the OB. The materials are purchased together in such a way that it allows them to reduce costs. The workforce is composed of families and when more labor is required, the OB provides support. Thus, participation resembles the “minga”, giving in payment “chicha” and bread to the “mingueros”.

In relation to the commercialization, the network establishes a parallel system to the local markets, so they implement a trading space that is open twice a week. This is characterized by bringing retail directly to the consumer. The network maintains a list of fixed prices for six months, which are in the same range as the local market prices in order to be competitive. There is a permanent functional organization subject to regulations and sanctions for the proper functioning of the network, delivering penalties such as the suspension of trade activities. The organization, on the other hand, encourages new farmers to join the network by disseminating its

achievements, for example (1) improving the family food base, (2) contributing new income to the family, and 3) restructuring the family by having more time to spend at home.

3. Results

The strengthening of the network in the lives of women farmers has led to a resilient attitude among farmers. This return to agriculture from those who migrated to non-farm labor has certainly contributed to the food sustainability of families. This was described in a testimony: "I used to have to leave my children in order to go to work because I had a job in a flower farm, so each month I paid for some things to eat. Now my children eat healthily and I spend with them at home..." (A3, interview, 5 May, 2013). The testimony collected was supplemented by the experience in which her children were sick. Now she keeps them in her care, they are healthy and she saves money by not buying food, which she now produces herself. In addition, farmers highlighted the importance of agriculture, such as it being a source of economic income: "... I used to work in the Cayambe hospital, until I got a new job; now I'm here with my products at the fair. ..." (A1, interview, May 14, 2013).

On the other hand, survey results indicate that 85% of the network members were women between the ages of 40 and 55. In many cases, the limitation of work due to age and lack of education has meant that agriculture and small businesses installed in their homes were their sources of income. This particularity motivated us to understand their own perception of their living conditions, particularly regarding how agriculture influences this in its current situation.

In respect to this, it can be observed that of the total number of surveys, the level considered between satisfied and very satisfied reaches about 87%. Therefore, through agriculture, women farmers had increased their positive attitude and motivation since they were actively participating in productive activities, generating income, and caring for the family (see Table 3).

Table 3: Perception of living conditions and education based. Surveys' results.

Description	Perception based on results				
	Very satisfied	Satisfied	Not satisfied		
Life satisfaction	26.42%	60.38%	9.43%		
Economic situation	Very good	Good	Same	Worst	
	11.32%	66.04%	15.09%	3.77%	
Level of education of farmers	No studies	Primary	High school	University	
	1.92%	75.00%	19.23%	3.85%	
Education Children	Men	3.85%	13.46%	55.77%	25.00%
	Women	1.92%	9.62%	55.77%	28.85%

In Table 3, the perception of the economic situation shows that around 77% suggest that their situation was better than before they became part of the organic crop production. The answer we received was related to their income, but most importantly, to the supply of food at home. In the case of life satisfaction, 60.38% answered that they are satisfied with their situation. On the other hand, the education level of members of the network was concentrated in primary (75%). However, the superior education of their children reaches 80.77% in the case of men and 84% in women. Thus, the survey presents the farmer’s perception of their economic situation after being part of the network.

Most of the loans were higher than USD\$2000. The payment term varies between 6 to 12 months. In the case of short loans, less than USD\$100, money is obtained from a savings bank. The term is until two months. These lenders reduce the requirements for the application of credits, which differ from the complex formalities of traditional banking. This is how farmers have the liquidity to buy new seeds and tillage tools (see Table 4).

Table 4: Access to loans by credit application, in total values.

		Percentage			
Agriculture Loan		(%)			
Type I credit	Less than \$500	19.18			
Type II credit	More \$500 to \$2000	31.51			
Type III credit	More than \$2000 to \$8000	49.20			
		Savings			
Loan request institution	Banking Coop. saving	Informal lender Conditioned aids			
		bank			
	33.30%	25.90%	74.00%	1.90%	1.90%

Table 4 shows that about 68% of farmers have applied for credit in the past year. Results from the survey showed that the requested credits are concentrated in amounts over USD\$2000 (49.2% of applications). It is important to note that the loan amount did not have any relation to the size of the farm. In this sense, some farmers declared their decision to invest in seed, cattle, or new tools for farming. Farmers use the cash each month to reinvest into production resources. Some producers determined that the extra money was used in the purchase of new livestock units, irrigation hosepipes, and horticultural material. On the other hand, farmers request loans to the formal sector in a percentage equal to 59%, made up of banks and cooperatives. In summary, this question considers all forms of access to credit that the respondent has made. As a result, 74% participated in the savings bank, constituted by the farmers themselves. Formal sectors had increased their participation in small-scale local agriculture by reducing the requirements for productive investment loans.

Farmers with greater debt capacity invested in the purchase of livestock. Income from the sale of milk generates income ranging from USD\$50 to USD\$300 per month for each production unit. In relation to those farmers who do not produce milk, the difference in income was significant, since it established “an additional salary, because years ago we only produced maize and potatoes” (A2, interview, 5 May, 2013). The highest concentration of

milk production is in Paquiestancia because they have favorable conditions for pasture land. This had encouraged many farms to modernize with subsidies from public institutions. In this sense, a dairy processing plant motivates more farmers to have livestock. In addition, the average is 1.4 cows per farmer, similar to the average of small farmers at the national level. We observed a condition where women farmers inherited the tasks of farmers, even those that require the use of strength. Women and children are responsible for carrying out pasture activities. It is common to see farms that are managed by adult women.

The consumption of food is an important component of this research. An analysis of the perspective on this issue is showed in Figure 3. Figure 3a shows the percentage of farmers' perceptions of increased food consumption. It can be observed that there is a tendency to perceive that their food consumption is equal to that which they had before becoming part of the network. However, in the case of vegetables, this percentage shows an increase in consumption, therefore being better than the consumption of vegetables that existed before belonging to the network. On the other hand, Figure 3b shows the number of days per week of food consumption. It highlights the consumption of vegetables, potatoes, cereals, and grains, as well as milk, among the products that exceed five days of consumption per week. Finally, vegetables are a product of daily consumption (seven days/week).

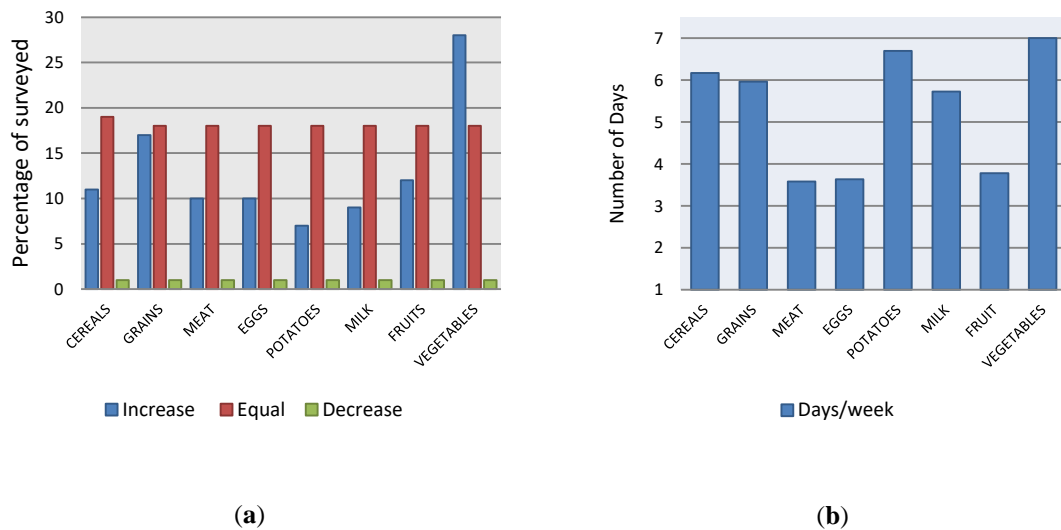


Figure 3: Results from the survey applied to farmers. (a)Indicates the comparative perception between previous and current food availability, and (b) shows the perception of food consumption in days per week from the farms.

Around 95% of the network's food production is sold at the local market, and the unsold residue is exchanged between them, especially products like flour or fruit. Moreover, monthly farm income depends on the farm's size and food production. It was observed that for smaller areas of 0.6 hectares and 1.2 hectares and over, the highest yields were \$166.11 and \$167.07 respectively. For farms between 0.6 and 1.2 hectares, average incomes were lower (\$48.14) to those produced in smaller surfaces of 0.2 hectares (\$75.59). This is explained by the fact that there are specific characteristics that affected farmers' incomes on this surface area (see table 5).

Table 5: Average income and costs by farm size in the BIOVIDA network.

Farm size	Average monthly income (dollar/month)	Average monthly cost (dollar/month)
Has less than 0.2	75.59	33.33
More than 0.2 to 0.6 has	166.11	18.11
More than 0.6 to 1.2 has	48.14	11.32
Greater than 1.2 ha	167.07	59.82

Table 5 shows the income and production costs determined by each farmer at the time of the survey, and refers to each month. The revenues correspond to the sale of products. On the other hand, costs consist of all the costs of procuring materials to produce fertilizers and seeds, and to transport products for sale at the fair. When costs exceed farm incomes, some household and non-farm cash was used to pay agricultural bills. In other cases, the costs of crop production are not included in the costs livestock production, in the reason of take care of the losses and revenue of each activity. It is important to note that the collective work does not request payment, since the interviewees assumed it as part of their unpaid family contribution. Finally, it was observed that farms between 0.2 and 0.6 hectares were more efficient in contrast to other farms.

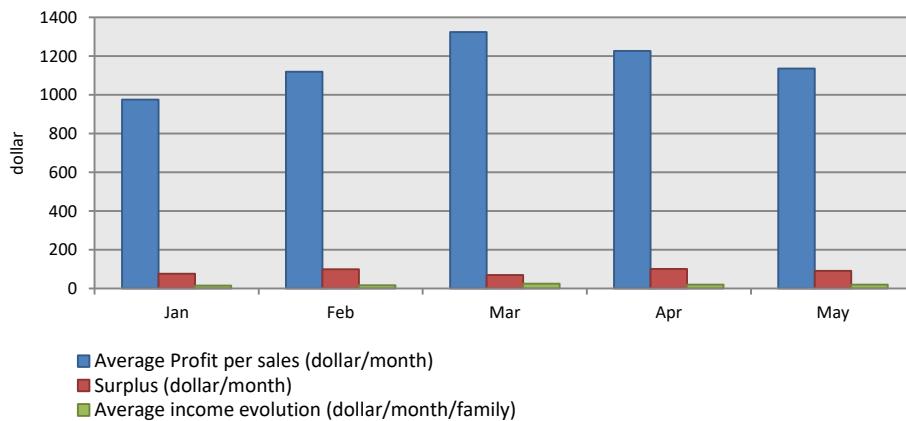


Figure 4: Economic revenue and comparative results of surplus and family profit per month.

In Figure 4, the results indicate that from the month of January there is a high trend in the profits obtained in the market with a significant peak in the month of March. The lack of transportation reduced the participation of some groups in the local market; this factor decreases its total average in April. In May sales fell because some farmers did not sell their products. On the other hand, the percentage of surplus products at the market remains important despite the March peak. If we compare income vs. surplus amounts, we can see that the farmers sold more products, which explains the increase in sales. However, the surplus percentage should be reduced by improving sales techniques and sales space and promoting the fair. The income evolution per family showed that in April participation in almost all OB decreased. Revenue increased in line with the profits, but they could be even higher as more products were put up for sale.

4. Discussion

This article discusses the behavior of farmers in the presence of market failures. In this sense, the relationship between consumption and production farming is observed, with special attention to the well-being of the farming families. In addition, this paper highlights the role of women farmers and achievements in the BIOVIDA network. Indeed, in this instance, family farming achieves a diversity of food (vegetables, tomatoes, and fruit), where previously only corn was produced. However, it is observed how peasants must alternate their time between salaried work and agriculture to obtain the income necessary to satisfy their needs. On the other hand, there is a qualitative jump in the life expectancy of children and young people, many of them with better education and greater possibilities of obtaining more income in the future. This improvement is related to the level of income that comes from agriculture, the ability to finance education expenses and access to information, as well as the improvement of state services.

On the other hand, crop diversification is applied with the intention of reducing the risk of loss. The network is responsible for promoting the benefits of crop association. In this way, each member owns a variety of fruits, vegetables, grasses, and mainly vegetables, in extensions that do not surpass one hectare. The main reason is to improve family food sustainability. In this sense, the network works strongly to improve the food available for peasant families. Once conversion to a nutritionally adequate diet takes place, marketing is encouraged for the generation of income. In this way, agricultural practice increases the well-being of farming families.

Factors such as access to irrigation water allow crop diversification, risk reduction, and increased yield. This condition does not depend on the network, but of the area in which each community is located. The most relevant case is the community of Cuniburo, which through collective work has built a channel from the thaw to have access to water. This facilitates the growth of pasture for livestock.

Milk production, on the other hand, has a dual purpose. First, it generates a stable weekly income for the farmers and, second, the animals serve as a guarantee to solve economic emergencies. In many farms, we can observe that dairy farming has expanded in the last 12 years, due to state policies to stabilize producer prices.

Some constraints have a major impact on farmers' profit. In particular, unequal access to the city market reduces the ability of farmers to sell their products. In this respect, a group of intermediaries and owners of the places within the market limit the access of new producers. Also, they condition the quantity and the price of the products, marginalizing the commercialization against the small producers. One limitation that exists is the distance from farms to the trading place. Most farms are located in remote areas, and although they do have adequate means of communication, they do not have their own transportation.

The strengthening of the structure of the organizations has improved the ability of producers to access information. In relation to market imperfections, in order to access to credit farmers have generated mechanisms by which they solve their deprivations. One of the most important is the savings bank formed by the farmers voluntarily, with the benefit of access to microcredit.

5. Conclusions

This article shows the effects of a strong organization and farmers' attitudes to overcoming problems of food availability, migration, and poverty. The participation of the NGO SEDAL establishes the empowerment of women farmers; this option gives farmers the opportunity to form a productive organization with autonomy and self-representation. At the same time, public institutions implement actions for protecting the rural market, with special attention given to self-consumption family farming. Thus, the efforts made to improve the planning and management of production at a territorial level help the distribution of farm incomes among small producers. This stage means that the conditions allow rural families develop, and form part of a model of food sustainability.

The efforts that have been made to reinforce the food sustainability of farming families allow for the establishment of a scenario with conditions suitable for promoting small agriculture in relation to market failures. However, this work defines a system in which the capacities of the farmer are strengthened from their participation in the collective organization. Their contribution to the food supply in local and urban markets is a key pillar of food sufficiency. For this, BIOVIDA marks the way to change production, leaving the use of agrochemicals for eco-labeled crops.

The attitudes of farmers to adverse situations allows for a change in behavior to be more efficient and thus improve their capabilities. In this way, results generated by a sustainable production model that increases family well-being based on a healthy diet, and that promotes food sovereignty, are observed within the network. There is a reorganization of family agriculture and higher incomes that allow for the empowerment of women farmers. In addition, the BIOVIDA network has developed a productive agricultural model, even if it develops within an imperfect market scenario. Indeed, farmers show a dynamic attitude and have an ability to adapt easily to adverse conditions. This is how the group of farmers of Cayambe has evolved to solve the problems related to market failures. On the one hand, the network works in a collaborative practice dedicated to organic production. On the other, it modifies the market model to guarantee the incomes of producers, with an emphasis on increasing family benefits.

Finally, it is considered that the constraints that exist in the productive environment caused by market imperfections, such as access to credit, land, and information can be overcome by farmers. The model presented in this paper establishes the importance of institutional participation in small agriculture with the intention of reducing the effects of market failures. Access to credit, trade, and information are part of the first pillar to be solved in heterogeneous scenarios such as that practiced in family agriculture. The second pillar, however, depends on the level of both the organization and empowerment of the members of the collective.

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A1, interview, May 14, 2013

A2, interview May 9, 2013

A3, interview, May 5, 2013