Child nutrition in Mexico under conventional and organic agriculture

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The La Frailesca region is part of the southern Mexican state of Chiapas, with altitudes between 600 m and 2000 m. Maize is the dominant crop; farmers in the valley also grow vegetables and keep cattle, while those in the highlands grow coffee. Farming activities in Chiapas are both subsistence- and market-oriented, and the region has received strong support from the local and the federal government, particularly for agricultural development (this includes support for the maize sector and also encouraging farmers to diversify into other crops). Partly as a result of this support, levels of poverty in La Frailesca are lower than in other parts of Chiapas, although enormous social inequalities remain.

Photo: Adriana Ríos

Taking a blood sample to measure haemoglobin levels in the children of tomato producers.

Switching to organic coffee production

Farmers in La Frailesca began growing coffee at the end of the nineteenth century. Over the following decades, the production process was driven by technological changes, including the use of pesticides. In 1990, Mexico's *Instituto de Historia Natural y Ecología* (INHE) declared parts of the higher altitude levels of La Frailesca as a protected natural area. In the mid-1990s, INHE identified coffee-growing areas outside the protected area, but within the same watershed, as a source of chemical pollution. Subsequently, at the end of the 1990s, Conservation International, an international NGO, joined forces with *El Colegio de la Frontera Sur* (a local research centre) to work with coffee producers to switch to organic production.

The team established Farmer Field Schools, modifying the FFS format to help farmers learn about market demand and product requirements. Extension agents assisted coffee producers to make the changes, notably by providing technical advice, assistance in organising and the establishment of links to the buyers of organic coffee. Farmers' motivation to participate was largely economic rather than driven by health concerns: farmers wished to secure higher coffee prices by reaching niche organic markets in the developed world.

Based on qualitative and quantitative work, we looked at how this switch to organic production has impacted on health and child nutrition. We also looked at the reasons behind farmers' decisions to make the switch in this high-altitude region. We compared the health of 8-14 year olds in the organic coffee region with those in a more highly-intensive tomato-growing area where farmers use large amounts of agricultural chemicals.

Nutritional status of 8-14 year olds

The health and nutritional condition of children aged 8-14 in the coffee-growing region was evaluated and compared to similar-aged children in the tomato-growing areas. Three variables were tested:

- Actual state of nutrition measured by body mass index;
- Severity of anaemia (determined from blood samples); and
- Past state of nutrition or chronic malnutrition assessed by measuring "stunting" (height-for-age index).

A large number of children were assessed for all three variables: 95 in the tomato-growing areas and 62 in the organic coffee zones. In addition, through focus group meetings and semi-structured interviews with coffee and tomato producers, the team was able to explore farmers' perceptions and understandings of changes in health and nutrition over the last five to eight years.

Figure 1 summaries some of the results found. We saw that levels of chronic malnutrition are significantly higher in the organic coffee areas than in the tomato-growing area, but levels of anaemia (a common nutritional condition usually caused by lack of iron in the diet) are lower, as well as the number of children with below normal body mass index. This suggests that 8-14 year old children in the coffee areas suffered from chronic malnutrition in their early years, but that more recently there has been an improvement in their nutritional state. In contrast, the results suggest that 8-14 year olds in the tomato growing area did not suffer from chronic malnutrition in the past, but their diets have become less healthy in recent years. Today, the proportion of children with a low body mass index and anaemia are higher in the tomato-growing areas than in the organic coffee-growing areas. This again suggests that children's diets in the tomato-growing area have got worse in terms of nutrition in the last few years.

During focus group meetings, organic coffee producers confirmed that the switch to organic coffee has had a beneficial impact on farmers' health. Firstly, by changing to organic agriculture, farmers have become more aware of health issues and health risks associated with the use of pesticides and herbicides. Secondly, increased income from the sale of organic coffee has enabled farmers to diversify food intake, which in turn has alleviated health and nutrition problems. Farmers cited the higher prices commanded by organic coffee and greater awareness of health and nutrition issues as reasons for being able to purchase other foods and improve their diets. Farmers also pointed out that the period of chronic malnutrition of the children included in the sample coincided with the period when

Silmar and Higinia Velasco

Silmar Velasco lives with his wife, Higinia, and their four children in the village of Plan de la Libertad. In the past he grew maize, beans and conventional coffee. He now receives higher prices for his organic coffee and has been able to invest in improving his house (e.g. putting in a concrete floor). Some of the improvements have been funded through a credit scheme established by the organic producers' organisation that he is a member of. Silmar also says that through the local coffee-growers organisations he has forged contacts with other coffee growers and is learning more about "the wider world".

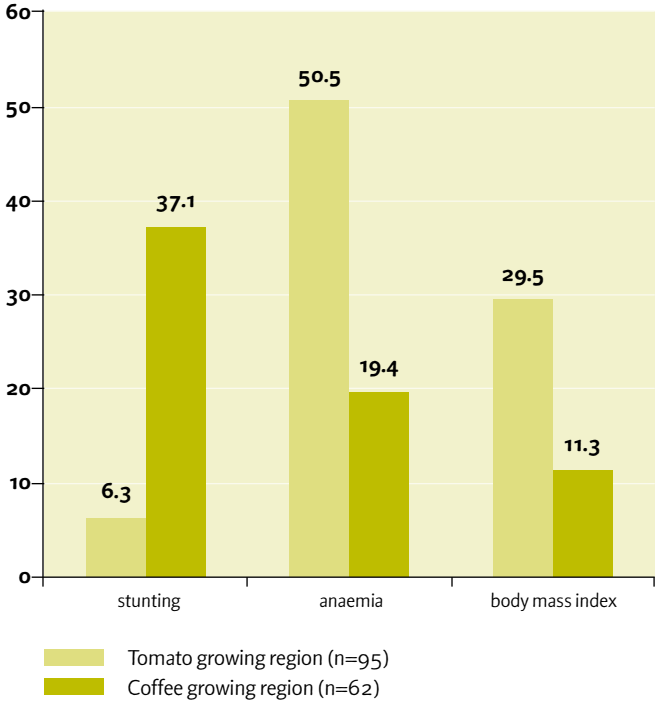
Higinia reports that as soon as her husband started growing and selling organic coffee, she was able to buy food that they had very rarely eaten before. The village is isolated and is only served by a poor road system. In the past she was seldom able to buy cheese and milk, and certainly couldn't store them for any period of time. With a fridge she can now preserve the products for a longer period and her children have a much more varied diet. Higinia comments that if her children want a snack during the day they now have a natural fruit drink, a banana, an egg (all local ingredients) and peanuts that she buys from the market. This contrasts with the snacks that the children in the tomato growing area tend to consume: ice cream and pieces of pork crackling (a popular food in Mexico).

Silmar and Higinia want to share their experience with other farmers and to stress that their involvement in organic agriculture has not only been good for the environment, but it has also enabled them to make positive changes in their lifestyle.

they still produced conventional coffee, and when poverty levels were higher due to the low price paid for their coffee.

Furthermore, coffee producers pointed out that their communities are so isolated compared to villages in the valley that they depend more on home-grown produce than on purchased processed foods. They suggested that this also contributes to the low levels of malnutrition now found in the area: many coffee producers have back-yard poultry and grow small amounts of vegetables for local consumption.

Figure 1. Percentage of children aged 8-14 in the coffee-growing region and tomato-growing region suffering from stunting, anaemia and low body mass index



The situation among the coffee producers contrasts with the more intensive tomato production in the valleys, where health and nutrition problems are increasing even though farmers are wealthier than in the coffee areas. Children in the tomato-growing areas show low levels of stunting (indicating low levels of chronic malnutrition in the past). However, the data on anaemia and body mass index suggest that their diet is contributing to increasingly poor nutritional levels.

Tomato producers explained that the hot and humid conditions favour pest and disease problems, and that the application of pesticides is the only way to ensure production. They reported that tomatoes are a lucrative crop, and that being close to urban centres and a good road network, they are able to sell their produce in nearby vegetable markets. They subsequently tend to purchase processed food items. High levels of anaemia and low body mass index amongst 8-14 year olds in the tomato-growing areas, however, indicate that their diet is not very nutritious.

Economic versus health concerns

The study of organic coffee production suggests that low external input and sustainable agriculture can contribute to the alleviation of nutritional problems, disease and health related issues, even if the motivation to switch to organic production may be driven by economic rather than health concerns. In the case of La Frailesca, the beneficial health impacts were the indirect consequences of a switch to organic agriculture, a change brought about by the economic benefits from selling organic as opposed to conventional coffee.

This work also shows that those with more income do not necessarily consume more nutritious foods. Tomato producers in the valley use large amounts of pesticides and are able to access relatively lucrative vegetable markets. They use the income from the sale of their crop to purchase other food items. In contrast, organic coffee is produced in much more geographically-isolated areas and producers are much more dependent on home-produced foods such as vegetables and back-yard chickens, which arguably provide a more nutritious and healthy diet. ■

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