Social and Economic Development and Change in Four Guatemalan Villages: Infrastructure, Services, and Livelihoods

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1. Introduction

In 1969–77, a multidisciplinary research team based at the Institute of Nutrition of Central America and Panama (INCAP) carried out a longitudinal nutritional and health intervention study in rural Guatemala. The goal of the INCAP Longitudinal Study (1969–77) was to determine the effects of undernutrition in-utero and during early childhood on subsequent health and behavioral development of children (Read and Habicht 1992). In deciding where to situate the intervention, the original investigators sought study villages that were similar along certain dimensions, several of which were viewed as essential to the success of the study. For example, a decision to distribute the nutritional supplement at central feeding stations in each village meant that the settlements had to be relatively compact in order for all residents to have reasonable access. To facilitate psychometric testing, the population had to be Spanish speaking. To allow frequent visits by the research team, access was necessary—therefore, distance to INCAP headquarters in Guatemala City was considered. Finally, investigators took into account population size and distribution, to ensure statistical power in the analyses (Habicht and Martorell 1992). After an exhaustive search in which 300 villages were investigated, two pairs of villages were chosen based on these and other criteria (see Table 1). Two smaller villages, San Juan and Espíritu Santo, had approximately 500 inhabitants each in 1967, and two larger ones, Santo Domingo and Conacaste, 900. The investigators randomly assigned a nutritional supplement across village pairs; San Juan and Conacaste received atole, a high calorie, high-protein drink; Espíritu Santo and Santo Domingo received fresco, a low calorie, no-protein drink (Habicht and Martorell 1992).
<table>
<thead>
<tr>
<th>Area</th>
<th>Criteria</th>
</tr>
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<tbody>
<tr>
<td>Ethnicity</td>
<td>100% Spanish speaking, <em>Ladino</em> heritage</td>
</tr>
<tr>
<td>Population</td>
<td>500–1000</td>
</tr>
<tr>
<td>Birth rate</td>
<td>35–41 / 1000 live births annually</td>
</tr>
<tr>
<td>Death rate</td>
<td>14–18 / 1000 annually</td>
</tr>
<tr>
<td>Age distribution</td>
<td>Birth–6 years: 14–30%</td>
</tr>
<tr>
<td></td>
<td>Birth–15 years: 35–50%</td>
</tr>
<tr>
<td></td>
<td>16–45 years: 40–45%</td>
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<tr>
<td></td>
<td>55 years +: 5–10%</td>
</tr>
<tr>
<td>Family composition</td>
<td>Average 5 members per nuclear family</td>
</tr>
<tr>
<td>Population mobility</td>
<td>80% or more born in area</td>
</tr>
<tr>
<td></td>
<td>2% or less annual migration</td>
</tr>
<tr>
<td>Social isolation</td>
<td>50–150 km from Guatemala City</td>
</tr>
<tr>
<td></td>
<td>10 km or more from other selected villages</td>
</tr>
<tr>
<td></td>
<td>Under jurisdiction of different municipalities.</td>
</tr>
<tr>
<td>Transportation</td>
<td>Accessible by 4-wheel drive vehicles</td>
</tr>
<tr>
<td>Compactness of nuclear settlement</td>
<td>80% of homes within 1-km radius from village research center</td>
</tr>
<tr>
<td>Annual income</td>
<td>US $200±$50 per nuclear family</td>
</tr>
<tr>
<td>Education level</td>
<td>30% literacy among population eight years old and older</td>
</tr>
<tr>
<td>Basic foods</td>
<td>Maize and beans</td>
</tr>
<tr>
<td>Health and Nutrition</td>
<td>High levels of malnutrition and gastrointestinal and respiratory disorders</td>
</tr>
<tr>
<td></td>
<td>No previous or planned public health interventions</td>
</tr>
</tbody>
</table>

Source: Adapted from Habicht and Martorell (1992).
These villages have been the locus of several subsequent studies assessing the longer-term effects of exposure to these supplements. The 1988–89 Follow Up Study explored whether improved nutrition in early childhood enhances human capital in adolescence and adulthood (Martorell and Rivera 1992). In the late 1990s, there were a series of further longitudinal studies on subpopulations in the villages, assessing the role of early childhood nutrition on the prevalence of cardiovascular risk factors and on outcomes related to childbearing (Torun et al. 2002; Hruschka et al. 2003). In 2002–04, INCAP and collaborators again collected information on the INCAP Longitudinal Study (1969–77) sample, under the Human Capital Study (2002–04) (Grajeda et al. 2005); the majority of that sample still lives in the original four villages. As subjects were then 25–40 years old, these data allow a more complete test of whether better childhood nutrition improves adult economic productivity through greater accumulation of human capital (Martorell et al. 2005).

To unravel the complex pathways through which childhood nutrition affects human capital accumulation and economic productivity, it is important not only to control for individual level characteristics that may affect outcomes of interest, but also for village level characteristics, including village-specific events. In some instances, village characteristics or events are out of the control of individuals and may be considered exogenous factors that condition other outcomes of interest.

In this monograph, we describe each study village’s history, highlighting similarities and differences in their social and economic development over the last 35 years, a period of great change in Guatemala. The study provides a rare picture of the development of infrastructure, services, and livelihoods in rural localities over a long period of time. In addition, by characterizing the environment in which most of the subjects of the original study were raised, we provide context for, and inputs into, analyses using the quantitative longitudinal data collected under the INCAP Longitudinal Study (1969–77), the Follow Up Study (1988–89), and the Human Capital Study (2002–04). We focus on four areas that influence the relationships between nutrition, human capital, and economic productivity:

1) village-level infrastructure;
2) health services;
3) educational services; and
4) livelihood opportunities available to residents.

In a companion article, we describe changes over the same period in the demographic, education, occupational patterns, and wealth of village residents, combining qualitative information with quantitative information from censuses carried out as part of the INCAP studies (Maluccio et al. 2005).

2. Methods

The principal source of information for this monograph is the report, “Changes in the socioeconomic and cultural conditions that affect the formation of human capital and economic productivity,” prepared by Estudio 1360, a social and educational research firm in Guatemala (Estudio 1360 2002). The report updates and complements previous village histories carried out for the INCAP Longitudinal Study (1969–77) (Pivaral 1972)
and the Follow Up Study (1988–89) (Bergeron 1992). A team of anthropologists employed three primary field methods in the four villages in early 2002: 1) unstructured individual interviews; 2) semi-structured individual interviews; and 3) focus group discussions. In addition to the qualitative field methods, Estudio 1360 also collected secondary information from school records in each village.

A total of 38 unstructured interviews were conducted with community leaders, farmers, teachers, younger and older mothers, and traditional birth attendants (TBAs). These informed the design of the instruments for the semi-structured interviews and focus group discussions, both of which recruited respondents stratified by age and occupation. Semi-structured interviews were conducted with a total of 137 village residents. Information was collected about traditional and commercial agriculture, village infrastructure, health and education services, and migration and employment. Lastly, five focus group discussions were conducted in each village, involving six to eight individuals each. The discussions covered topics similar to those covered in the semi-structured interviews. Table 2 shows the distribution of respondents and focus groups across villages. The report presents the data collection instruments (Estudio 1360 2002).

<table>
<thead>
<tr>
<th>Table 2 – Data collection: Number and type of interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method: Subjects/Topic</strong></td>
</tr>
<tr>
<td>Individual interviews</td>
</tr>
<tr>
<td>Open, exploratory</td>
</tr>
<tr>
<td>Young mothers</td>
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<tr>
<td>Older mothers</td>
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<tr>
<td>Maize farmers</td>
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<tr>
<td>Commercial farmers</td>
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<tr>
<td>Employment &amp; migration</td>
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<tr>
<td>Infrastructure</td>
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<tr>
<td>Health providers</td>
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<tr>
<td><strong>Total individual interviews</strong></td>
</tr>
<tr>
<td>Group discussions</td>
</tr>
<tr>
<td>Young mothers</td>
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<tr>
<td>Older mothers</td>
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<tr>
<td>Young farmers</td>
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<td>Older farmers</td>
</tr>
<tr>
<td>Employment &amp; migration</td>
</tr>
<tr>
<td><strong>Total group discussions</strong></td>
</tr>
</tbody>
</table>

Source: Estudio 1360 (2002).
3. The four survey villages

The four survey villages are located in the Department of El Progreso, east of Guatemala City. The inhabitants are of ladino (mixed Spanish-Mayan) heritage, and live in small, compact, rural settlements within about 100 km of Guatemala city (Pivaral 1972). These settlements, originally known as rancherías, were formed around land loaned to ladino peasants in return for their labor on landowners’ farms or haciendas. After the 1944 revolution, peasants gained rights to this land free of labor or rent obligations and gradually were granted legal ownership (Bergeron 1992).

Due to the village selection procedure for the INCAP Longitudinal Study (1969–77), villages were similar at the outset, except for some small (but statistically significant) differences in socioeconomic indicators including male occupations fertility rates, and literacy rates (Engle et al. 1992). When the villages were selected in 1967, the primary income for most households in all four was subsistence agriculture—almost all were tenant farmers or small landowners. The two most important crops, and staples of the local diet, were maize and beans, though often complemented by other crops such as tomatoes or sorghum. Fewer than 10% of the homes in each village had water in their homes (including wells in the compound) with nearly everyone collecting water from unprotected, open water sources, such as springs or rivers. No homes had latrines nor were there any sewage drainage systems. There was no electricity. All houses were constructed of modest materials readily available in the village, and most people prepared food in a separate room or in an area outside of the home. Most owned their
homes as well as the plot of land on which the home was built, though ownership of other assets was rare (Habicht and Martorell 1992).

Despite many similarities at the outset, there were also some important initial differences across the villages which have been associated with diverging patterns of socioeconomic change. Below we examine the two most salient initial conditions that were different across villages: agricultural potential and location (and transportation links).

### 3.1 Agricultural potential of the villages

The first difference among villages was, and remains, their agro-ecological environments. El Progreso is one of the hottest and driest departments in Guatemala. Its rainy season is from May to October, and this governs the agricultural production cycle (Pivaral 1972). El Progreso can be divided into two ecological areas that differ in temperature, rainfall patterns, and quality of soil: the highlands of the Motagua valley and the lowlands along the Motagua River (Bergeron 1992).

Three of the study villages (Conacaste and San Juan in the municipality of Sanarate and Santo Domingo in San Antonio La Paz) are located in the cooler, wetter highlands, where the soil is shallow and less fertile. Historically, these lands have been used primarily for subsistence production. The three highland villages themselves also differ in terms of agricultural potential. Conacaste is on a plateau in the upper Motagua valley, giving it greater (commercial) agricultural potential than either Santo Domingo or San Juan—the latter two are nestled among steep hills, with shallow rocky soil prone to erosion (Bergeron 1992).

The fourth village, Espíritu Santo (in the municipality of El Jícaro), is found in the warmer, drier lowlands where the soils are deep and rich, and the land is flat and amenable to mechanization and irrigation. In contrast to the highland villages, the high agricultural potential of the lowlands has long attracted capital investment in commercial farming and improvements to infrastructure. In the lower Motagua region, wealthier farmers have dominated the most productive alluvial lands leaving most villagers from Espíritu Santo to engage in subsistence production on marginal lands or engage in agricultural wage labor (and at times sharecrop) on wealthier farmers’ lands.

### 3.2 Village location (and transportation links)

A second important difference among villages is location, in particular distance from the villages to their municipal capital and the Atlantic coast highway that leads to Guatemala City. The three mountain villages are 4–8 km from their municipal capitals (Conacaste and San Juan are 6 and 8 km from Sanarate and Santo Domingo is 4 km from San Antonio La Paz), whereas Espíritu Santo is only 1 km away from its municipal seat, El Jícaro. All four villages are near, but not on, the Atlantic coast highway. Santo Domingo is the closest to the highway, only 2 km away, while until 1998 Espíritu Santo was the farthest. Conacaste and San Juan are 4 and 9 km from the Atlantic coast highway, respectively. In addition to being closest to the highway, Santo Domingo also is closest to Guatemala City (36 km), a feature that has influenced its development; Espíritu Santo is the farthest away (102 km) and the others are around 60 km away (Bergeron 1992).
These initial differences in agricultural potential and location have been associated with different quality and timing of village infrastructure development, for example roads, transportation, and services, and therefore with villager’s mobility and access to livelihood opportunities. Differences in location and villager mobility also are associated with differential access to health and schooling services and trends in migration and employment.

4. Infrastructure

4.1 Roads

*Roads*: When study teams first visited the villages in the late 1960s, all were connected to the nearest highway or town by dirt access roads of varying quality. Espíritu Santo, having benefited from external investment by agribusiness and large landowners, was the only village with a longstanding, high-quality, all-weather (albeit dirt) access road (1 km to El Jicaro), though Santo Domingo’s dirt access road (2 km to the Atlantic coast highway) was also reliable throughout the 1960s. By contrast, the 2 km dirt access road connecting San Juan to the Sansare-Sanarate road (itself a dirt road at the time) was of poor quality, not passable by four-wheel-drive vehicles after a heavy rain. Likewise, the 4 km dirt access road connecting Conacaste to the Atlantic coast highway, constructed in the late 1960s, flooded easily.

Even though Espíritu Santo seems to have been the best connected by road to the outside world, this access was via the municipal capital El Jicaro, to the neighboring departmental capitals of El Progreso and Zacapa. Seasonal flooding of the Motagua River (which was shallow enough to be traversed in a vehicle during the dry season) impeded more direct access from El Jicaro to the Atlantic coast highway and thus Guatemala City. Villagers wanting to cross the river to the highway usually had to travel a 20 km route through the nearby town of El Rancho. This changed in 1998, when a...
bridge over the Motagua River was constructed, connecting El Jicaro to the highway and making access to the capital from Espiritu Santo much easier.

The other three villages also benefited from improvements in access to the Atlantic coast highway over time. In Santo Domingo, in the mid-1980s, the 2 km dirt road to the highway was replaced by an all-weather road. In Conacaste, although the route to the highway remains a dirt road, the establishment of an agricultural cooperative in the village in 1978 motivated and financed regular maintenance. In 1994, governmental funds were used to widen and grade the road. No improvements, apart from intermittent maintenance, have been made to the access road between San Juan and the Sansare-Sanarate road; indeed, it still can become impassable during the rainy season. When the government paved the Sansare-Sanarate road in 1996, however, it enabled easier access from San Juan to Sanarate and the Atlantic coast highway.

By 2002, all of the villages except San Juan had paved at least their main village streets. As with access roads, Espiritu Santo was the first of the villages to pave its central streets, in the 1990s. Santo Domingo paved its main road in the mid-1990s and more recently some secondary village streets. Finally, since 2000, Conacaste has paved virtually all of its streets, widened and improved the main road through town, and installed a roadside sewage system.

4.2 Transportation

Walking or riding horses down trails was the principal mode of transportation to the main roads or towns in all four villages during the 1960s. Once residents of the three mountain villages reached either the Atlantic coast highway or an important town on foot, they could catch a bus to Guatemala City. During the 1970s, those walking from Espiritu Santo to El Jicaro could catch a bus to Zacapa. When able to cross the Motagua River, they could also catch buses to Guatemala City on the Atlantic coast highway. Another form of transportation during the 1960s was the Atlantic coast train, which ran nearby the towns of Espiritu Santo, Santo Domingo, and San Juan. Inhabitants from these three towns indicated that they could go by train to Guatemala City, although it is not clear how far they had to travel to reach the train stations. By the 1980s, however, the train was no longer running.

The transition from traveling on foot to vehicles occurred in the 1980s in Espiritu Santo, Conacaste and Santo Domingo, but not until the mid-1990s in San Juan. During the 1980s in Espiritu Santo and Conacaste, small private vehicles known as ruleteros or fleteros would carry people and goods to points of interest on demand and for a fee: to El Jicaro and the departmental capital El Progreso from Espiritu Santo, and to the Atlantic coast highway and Sanarate from Conacaste. Upgrading the Conacaste access road in 1994 brought about two significant improvements in transportation: regular ruletero service between Conacaste and Sanarate every half hour, and direct bus service from Conacaste to Guatemala City. Little changed in Espiritu Santo during the 1990s, likely because it is only 1 km from El Jicaro and therefore already enjoyed all the transport services available there.

With the conversion from a simple dirt road to an all-weather access road in the mid-1980s, daily bus service to Guatemala City began in Santo Domingo. In the 1990s, this became hourly service, and a ruletero began offering rides to the Atlantic coast highway.
where people could catch any of numerous buses traveling up and down the Atlantic coast highway to and from Guatemala City. Indeed, many residents of Santo Domingo now run their errands in Guatemala City rather than any of the closer large towns, perhaps taking advantage of lower prices.

San Juan was the last of the villages to benefit from regular transportation service. While pickup trucks were available for hire from San Juan to Sanarate during the 1980s, villagers did not commonly travel in motorized transport to the highway or to Sanarate until the 1990s, when minibuses started running between San Juan and Sanarate approximately every 90 minutes. With the paving of the Sansare-Sanarate highway in 1996, buses directly to Guatemala City began servicing this highway. Thus residents could catch direct transport to Guatemala City after reaching the entrance of the access road.

4.3 Utilities: Water, Electricity, and Telephone

Water: In the 1960s and 1970s, the villages only had public water sources including natural springs, wells, and open water. In San Juan, Conacaste, and Espíritu Santo, these sources were within 1 km of the village. In Santo Domingo, the main source for water before the study was a natural spring 6 km away, though in 1964 a system to carry the spring water by gravity to public taps in town was installed. In all of the villages, women typically washed clothes and bathed at the water source, and then carried water home for domestic use. Water was abundant in all of the villages except for Conacaste, where it was often depleted by the end of the dry season. The 1976 earthquake destroyed the pipes bringing water to Santo Domingo, interrupting water service for a few years.

Espíritu Santo and San Juan were the first of the four villages to install pipes bringing water into each home. This occurred in 1978 in Espíritu Santo, and sometime during the 1970s in San Juan. Conacaste installed within home water systems in 1981, with most homes near the center of town receiving their own water tap. In the early 1990s, Santo Domingo was the last village to receive within home water service.

San Juan’s household water service was the shortest lived of all the water systems—it started to deteriorate with the collapse of the market for manioc in 1980 (described below), and by 1987 water service was irregular, such that less than 1% of the population claimed to have in-home piped water in the 1987 census. In 2002, households in San Juan were receiving water in their homes only once approximately every 20 days. A similar, though less sharp, decline in the quality of water service occurred in Conacaste; in the early 1990s water supply was regular with only a few interruptions during the dry season. In 2002, however, households in Conacaste were receiving water only once a week within their homes. Among the four villages in 2002, the water situation in Espíritu Santo and Santo Domingo was superior, with household taps receiving water once every four days.

Electricity: San Juan and Espíritu Santo were also the first villages to receive electricity, both in 1973. In Espíritu Santo, large landowners (from outside of the village) helped underwrite its installation. In San Juan, it was installed in response to the need for small electric mills to produce starch from the manioc being grown. The electrical system in San Juan was enlarged and improved to include household and public lighting in 1985.
Both Santo Domingo and Conacaste received electricity with the improvement of their access roads in the mid-1980s. Service has since expanded to virtually all homes.

**Telephone**: Conacaste was the first to get a public telephone, in the mid-1980s. San Juan and Espíritu Santo followed, with the former receiving one and the latter seven, in the early 1990s. As in the rest of Guatemala, there was an influx of personal cellular phones during the late 1990s, partly displacing public telephone service. While Santo Domingo never received a public telephone, the village now has a public cellular phone and in the other villages many cell phone owners rent out phone services. In 2001, private companies installed public prepaid card telephones around Conacaste’s main square.

### 4.4 Summary of infrastructure in the four villages

The municipality of El Jicaro has taken advantage historically of its high agricultural potential by taxing tobacco sales in the region. This, in turn, allowed it to invest more heavily in infrastructure and community development projects than other municipalities—Espíritu Santo, as a neighbor of the municipal capital, appears to have benefited indirectly from these investments. Additionally, the large landholders in the lowland region traditionally engaged in philanthropic activities benefiting the communities where their employees lived. As a result, Espíritu Santo had the most developed infrastructure of the four villages, at least until the 1990s. Along with San Juan, it was the first village to install within home piped water and electricity, and the first to pave its central road. Until 1998, however, it had the poorest access to the Atlantic Coast Highway and thus Guatemala City.

During the 1970s and 1980s, Conacaste had a modest, well-maintained infrastructure, due in large part to the success of the local cooperative and commercial farming. It has also been the beneficiary of national and international aid aimed at improved infrastructure, in part because it was severely affected by the 1976 earthquake, but also because some important national figures born and raised there have directed development funds to the village (Bergeron 1992). By 2002, it can be said that Conacaste had surpassed Espíritu Santo in the level of its infrastructure, with improvement of village roads and a roadside sewage system, though it still suffered from sporadic water availability.

With the exception of the manioc boom years, San Juan has had the weakest infrastructure and has been the least connected to other towns. Water availability here is currently the worst of the four villages, and the access road is poorly maintained and can still become impassable during the rainy season. Santo Domingo, despite its proximity and easy access to the capital, was the last to receive within home water and electricity.

### 5. Health services

The healthcare sector in Guatemala is characterized by duplication and fragmentation. The two main providers of healthcare are the Ministry of Public Health and Social Action (MSPAS), previously the Ministry of Health (MoH), and the Guatemalan Social Security Institute (IGSS). MSPAS is the largest actor in the sector, and is responsible for

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1 Table 10 (page 65) presents a chronology of infrastructure provision in the four villages (Estudio 1360 2002).
providing free preventive and curative care for all Guatemalans. It runs health posts in rural villages and health clinics and public hospitals in larger towns and municipal capitals (World Bank 2003).

IGSS, on the other hand, provides health services to eligible formal sector workers and their families. It does this via a network of facilities, clinics, and hospitals that are separate from those run by MSPAS, and only serves a very small percentage of the population. Only 3% of those in the lowest two quintiles of the per capita expenditure distribution is eligible, whereas 18% of those in the highest quintile is eligible. Coverage is higher in urban (15%) versus rural (5%) areas (World Bank 2003).

Lastly, private providers, including traditional healers, private clinicians, private hospitals, and national and international non-governmental organizations (NGOs), play a small, but growing role in healthcare. While NGOs and traditional healers tend to be inexpensive, other private providers often are not. Only a small percentage of Guatemalans can afford private insurance, though a larger proportion self-insure by paying directly for care as needed. The patterns and levels of private insurance coverage are similar to those of IGSS eligibility (World Bank 2003).

5.1 Healthcare within the villages

Access to health clinics: The INCAP project founded the first local health clinics in the four villages. Before the project, villagers treated ailments with home remedies, visited village healers, or traveled to the nearest MoH healthcare center, located in their municipal capital. Before 1969, nearly 80% of diarrheal diseases (and similar percentages for colds and parasites) were treated with home remedies—few sought professional care (Pivaral 1972). With the exception of Espíritu Santo, where residents had access to (low-quality) governmental health services in nearby El Jicaro, the level of infant mortality was high, especially from vaccine-preventable diseases like tetanus (Rose et al. 1992).

With the introduction of village health clinics, both the supply and demand for healthcare services increased dramatically in the four villages. The MoH constructed a health post in San Juan in 1972, which INCAP subsequently used as its clinic. The other INCAP clinics were housed in the best available structures: a plywood shack in Santo Domingo and INCAP project headquarters in Espíritu Santo and Conacaste. INCAP medical staff offered free medical care, medicine, and vaccines to everyone, regardless of participation in the study. In addition, transportation to the hospital was provided when necessary. Villagers, accustomed to the arduous trips, long lines, unfriendly service, and unavailability of medication associated with public health clinics elsewhere, were pleased and thankful to INCAP. They came to understand the effects that good medical care could have on child survival and quality of life.

When the project closed, the INCAP-run health clinics were handed over to the government, with the MoH sending nurse-aids to continue to provide healthcare in each village. The level of this care, however, was inferior. The nurse-aids were not as skilled as the INCAP physicians and nurses, no transportation to hospitals was provided, and medicines were either unavailable or expensive. In the early 1980s, MoH built rural health posts in three of the four villages: Espíritu Santo in 1980; Conacaste in 1981; and a second one in San Juan in 1982. Neglected in the early 1980s, Santo Domingo was
the last of the villages to get a health post in 1985. The MoH health clinics in all four villages encountered similar problems: lack of maintenance, old equipment, and insufficient medications. The health posts in Espíritu Santo and Santo Domingo often have been short-staffed, whereas those in San Juan and Conacaste have been staffed relatively well, with the participation of final-year medical students and rural health technicians (TSR), as well as community volunteers. See Estudio 1360 (2002) for further details on staffing over time.

Currently, all four health posts provide birth control, pre-natal check-ups and supplements, and immunizations. Although the mandate for health posts includes provision of primary care, the village health posts are unable to provide these services reliably; therefore residents often turn to other providers, such as local TBAs and healers or more distant health clinics.

Traditional birth attendants, birthing centers, and healers: TBAs provide prenatal care, prenatal massages, and help with delivery. Expectant mothers in all four villages have long used them, though less so in recent years. MoH and the health post trained TBAs, but they also occasionally receive support and materials from NGOs. One important difference across villages is the extent to which TBAs were and are integrated with the health post. In Espíritu Santo, MoH trained the TBAs in the early 1970s. Since then, however, they have received only intermittent training, and have had very little communication or coordination with the village health post. In San Juan, eight TBAs used to coordinate closely with the health post's nurse-aid, but no longer do so. In Conacaste and Santo Domingo, on the other hand, TBAs have coordinated closely with the health post nurse-aids.

Since the 1980s there have been birthing centers run by TBAs, typically in or next to their homes. Pregnant women typically can walk to the center, where they can stay for a couple of days to give birth and receive post-natal care. Both Espíritu Santo and Santo Domingo have birthing centers, with costs in 2002 varying, from around Q50–100 ($6–13 at current exchange rates) in Espíritu Santo to Q175 ($22) in Santo Domingo, for 2-day stays. People from San Juan visit a birthing center in Sanarate, where the cost is Q150 ($19) for a 3-day stay. Birthing centers were not mentioned in the Conacaste interviews.

Finally, informants in Espíritu Santo and Conacaste mentioned using traditional healers. In Espíritu Santo, the TBAs are also considered to be healers for child folk diseases, especially those related to diarrhea.

Pharmacies and drugstores: The only drugstores in the villages in the 1990s were those started by INCAP in 1992, to try to satisfy the demand for medicines at lower than retail cost. In each village, INCAP set up a revolving fund, provided essential drugs, located suppliers, and trained local managers. All the village drugstores failed in 1999, however, when INCAP ceased to manage the logistics of supplying drugs. In part, it appears that low profit margins discouraged local managers from maintaining the businesses. Finally, in the late 1990s, a chain of generic discount drugstores opened nationwide and state pharmacies were established in larger towns to sell drugs at subsidized prices. In conjunction with improved transportation, these developments made affordable

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2 See Pivaral (1972) for further description of folk illnesses common to the study area in the 1960s.
medicine more available to villagers. During the Human Capital Study (2002–04) the village drugstores were re-instated, but only for the duration of the project.

5.2 Healthcare outside the villages

Public healthcare centers and hospitals: Residents of all four villages seek care at larger, better staffed, and better equipped healthcare centers in municipal and departmental capitals when the local health post is closed or they perceive it cannot or has not addressed their needs. If they visit governmental healthcare centers, the services are free. Residents of all four villages report, however, that personnel from the larger centers treat them poorly and often turn them away, with the argument that they should be attended at their local health posts. Villagers also occasionally use private physicians and clinics, for which they must pay. In this way, proximity to municipal and departmental capitals or Guatemala City, as well as the mobility provided by transportation services, all influence the type of healthcare available to villagers.

Villagers from Espíritu Santo often travel the 1 km to the healthcare center in El Jicaró. If they are turned away, there are other public options in Zacapa. Residents of San Juan and Conacaste report that there has been a small healthcare center in Sanarate since the beginning of the study, in 1969, staffed by one doctor who also has a private practice in town. In 1994, it was enlarged and a maternity ward was built. Santo Domingo is served by the healthcare center in San Antonio La Paz. Villagers, however, prefer to attend healthcare centers on the outskirts of Guatemala City, where the quality of care is perceived to be better.

The government hospital of El Progreso is in the municipal capital. The municipal hospital in Zacapa is perceived to provide better care; therefore residents of Espíritu Santo often go there for services, though they risk being turned away as they are not residents of Zacapa. Likewise, villagers from Santo Domingo perceive the hospitals in Guatemala City to provide better care, and often prefer them to the El Progreso hospital.

IGSS: Many villagers from Conacaste and Santo Domingo are employees of Cementos Progreso—as such, they and their families enjoy benefits of the national health insurance system, IGSS. They have access to an IGSS clinic at the factory; in addition, they are provided with private health insurance.

Private physicians and hospitals: Villagers from Espíritu Santo have access to two private physicians in El Jicaró. Both were charging approximately Q25 ($3) per consultation in 2002. Residents of Espíritu Santo at times also travel as far as Zacapa or Sanarate for a private consultation. People from the three, mountain villages typically travel to Sanarate if they want to see a private physician. In addition to the doctor staffing the health center, three other private doctors opened clinics in 1994. These clinics have since grown into small-scale hospitals providing specialized care and diagnostic exams. While the price for a consultation in 2002 was more expensive here than in El Jicaró (Q30–50 or $4–6 per visit), it remains less expensive than consultations in Guatemala City, possibly explaining in part why even residents from Santo Domingo generally go to Sanarate for private consultations.

Non-profit (NGO) and charitable organizations: A variety of non-profit and charitable organizations provide healthcare services in the study villages and surrounding region.
Near Espíritu Santo are two small non-profit hospitals: the first established in 1995 in El Rancho and managed by Catholic nuns and the second near Espíritu Santo and run by an NGO in Río Hondo, Zacapa. Both charge nominal fees, though patients must arrive early as lines tend to be long. The Catholic Church also has a small clinic in Sanarate, which charges Q10 ($1) for a consultation.

5.3 Other health related programs

Since the beginning of the INCAP Longitudinal Study (1969–77), various health and nutrition interventions, especially for children, have come into the four study villages through aid organizations. Most significant among them was the large influx of food aid, cash transfers, building material donations, and health center support, immediately following the 1976 earthquake and primarily from PLAN International. More recently, three villages have benefited from food-for-work programs.

The different forms of aid have been present in the villages to a different degree and for different time periods. Food aid appears to have been provided by CARE (in coordination with the government) to all four villages. Espíritu Santo received food aid for about 15 years, from around 1980 until 1995. Conacaste received food aid, from 1976 until 1995 and San Juan from 1978 to 1994. Santo Domingo benefited from food aid for the shortest period of time, six years starting in 1980. The food aid was usually offered through the health posts to lactating women and children under 5 years, and included oil, rice, cracked wheat, dried milk, and occasionally oats and canned meat. Food aid returned to San Juan in 2001 with a Catholic organization, Pro-Mujer, providing food for approximately 250 families.

After the earthquake, PLAN International came on the scene, providing materials to rebuild homes in all four villages and sponsoring children with a monthly stipend in all villages except Santo Domingo. In Espíritu Santo, PLAN International also coordinated with the health post to provide prenatal care and organize health education lectures. PLAN International remained in Santo Domingo the longest, until 1996, and almost as long in Espíritu Santo and Conacaste, until 1994 and 1995 respectively. It stayed in San Juan the shortest period of time, leaving in 1990.

Food-for-work programs have taken place in three of the villages. In the 1980s, Caritas organization provided food-for-work for road construction in Santo Domingo. In 2000, an undetermined organization gave food to households in return for constructing household compost pits in both Santo Domingo and San Juan. In 2001, the government organization for rural development, the Fund for Social Investment (FIS), provided food-for-work for the constructing a sewage system and paving the main roads in Conacaste.

Over time, there have also been a number of other smaller interventions, though in most cases it is difficult to determine precisely their magnitudes or when they occurred. For example, short-term medical missions have provided various medical services from dental care to eye exams, in San Juan. In Conacaste, the (Dutch) Institute of Cultural Affairs (ICA) provided occasional clinics where up to 20 healthcare providers would treat villagers for one to two days.

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3 The focus group field methods were most effective at capturing only the larger interventions.
5.4 Summary of healthcare service in the four villages

At the beginning of the INCAP Longitudinal Study (1969–77), Espíritu Santo had better access to healthcare (even if it was of low quality) in large part because of its proximity to the government provided services available in El Jicaro. This was reflected in lower infant mortality rates recorded from 1959–68, compared to the other three villages. High infant mortality was attributed to preventable childhood diseases (Rose et al. 1992). The introduction of the INCAP healthcare services and improvements in transportation in the other three villages, however, made the availability and quality of healthcare more equal across villages during the study.

After the INCAP Longitudinal Study (1969–77) ended, healthcare infrastructure and personnel were unequally distributed among the four villages. Santo Domingo waited the longest for an MoH health post and had both inadequate and inconsistent staffing throughout the years. The health post in Espíritu Santo also has been understaffed, while those in Conacaste and San Juan have enjoyed until recently adequate and consistent staffing and coordination with TBAs and other community health volunteers.

With improved transportation and availability of private healthcare, villagers are increasingly using services in multiple sectors, including the local health post, private providers, and traditional healers and birth attendants. Only a small percentage of the population in these villages is covered by IGSS, mostly employees of Cementos Progreso from Conacaste and Santo Domingo. Finally, other health related programs, often related to international disaster and food aid, have been active in the villages at different points in time and for varying durations.

6. Education services

6.1 Formal and informal schooling in Guatemala

While coverage is still low, preschool education has become increasingly available to Guatemalan children during the last two decades. In the 1980s, ICA promoted creation of community preschools for 3–4 year olds in several rural areas throughout Guatemala, training local volunteer women to teach in and run the schools. In the 1990s, the government built and staffed public schools in many rural areas to provide kindergarten education to 5–6 year olds. Finally, also in the 1990s, the Ministry of Education briefly promoted a program providing short courses for children preparing to enroll in first grade. Even with these three programs in place, however, only one third of Guatemalan children 5–6 years old attend kindergarten; the fraction is much higher in urban compared to rural areas.

The formal educational system in Guatemala is divided into primary and secondary education. Primary school comprises grades one through six. Secondary education consists of five to seven grades, divided into two parts. The first three years of lower secondary education are the basic grades (básicos), and instruction is expected to provide academic and technical skills necessary to join the labor force. The 2–4 years of upper secondary school are the diversified grades (diversificados) and students can choose among four specialized and career-oriented tracks:

- general (academic) high school education (bachillerato en ciencias y letras)
- teaching education (magisterio)
- commercial education, such as an accounting degree (perito contador), and
• technical education, such as a secretarial degree (secretariado) (World Bank 2003).

Typically, students who plan to go on to university education finish their general academic preparation (bachillerato) in two years at the secondary diversified level. More specialized (vocational), terminal diversified degrees, such as accounting, can take up to four years (World Bank 2003).

Public primary schools have been available within the four villages since the 1960s. At that time, public or private secondary schools were available only in larger towns, such as the municipal and departmental capitals, and Guatemala City. Only in the mid- to late 1990s did basic secondary education become widely available in rural areas, through community-based schools and, beginning in 1998, via telesecundarias. Community-based secondary schools are established, funded and run at the community level in collaboration with local government, community organizations, and national and international non-profit organizations. The telesecundarias consist of at least one teacher with equipment and material support: television set, video player, videotapes on different subjects, and student guides. There are currently over 400 telesecundarias in Guatemala, including approximately 20 in El Progreso (www.mineduc.gob.gt 2004).

While public schooling is formally free in Guatemala, local public primary schools often request some funds from parents of students, since government resources are rarely enough to provide sufficient infrastructure, equipment, didactic materials, textbooks, and school supplies. Also, since rural children must typically commute long distances or migrate to attend public secondary schools, the cost to parents rises, and the likelihood of enrollment declines. Reflecting in part the relative difficulty of attending secondary school compared with primary school, only 25% of appropriately aged children were enrolled in secondary school in 2000, compared with 79% of target-age children in primary school. Even with increasing availability of rural secondary schools over the last decade, only 12% of target-aged rural children in Guatemala attended public secondary school in 2000, though the percentage was much higher, 46%, in urban areas (World Bank 2003).

Finally, there are a number of different informal educational opportunities available to Guatemalan adults, including literacy training and alternative primary education. From the 1960s until 1985, each successive government promoted some sort of literacy campaign, and literacy programs (for those over 14) have reflected those policies. Some continuity was achieved through the founding of the National Committee for Literacy (CONALFA) in 1985. CONALFA is a national organization that provides training and educational materials for local literacy promoters who, in turn, teach in their own villages. Instruction is divided into phases that are equivalent to the six primary grades, such that graduating CONALFA is equivalent to finishing primary school. Over time, demand has increased for these informal educational services for older students, due not only to the demand for better-educated workers, but also to the prevalence of over-age students in formal primary and secondary schools. The latter is high both because of high rates of late initial enrollment and because of grade repetition. During 2000, 19% of all 15 year-olds in Guatemala were still in primary school, and approximately 15% of basic secondary students were over-aged (World Bank 2003).
6.2 Educational opportunities available to villagers

6.2.1 Preschool and Kindergarten

San Juan and Conacaste are the only two villages with preschools serving 3–4 year olds, established by ICA. The preschool began in Conacaste in 1979 and in San Juan in the 1980s.

All four villages currently have public kindergartens for 5–6 year olds. Three of these were established in the 1990s and have their own facilities, but in Conacaste a recently inaugurated public kindergarten borrows classrooms from the ICA preschool and the primary school. Even so, it seems that the kindergarten in Conacaste is attended and staffed as well as, or better than, the kindergartens in the other villages, with three teachers for about 60–75 children per year. Santo Domingo has two teachers for 40 students per year. The public kindergarten in Espíritu Santo has two teachers and 30 students, while the public kindergarten of San Juan has only one teacher for 30 students.

6.2.2 Primary school

Infrastructure: Although primary schooling was available in all villages at the time of the original intervention, the available educational infrastructure has changed enormously since then. During the 1960s, the primary-school infrastructure in all four villages was so deficient that it barely met minimal needs for effective teaching (Pivaral 1972). In Espíritu Santo, the school was a thatched hut with wattle and daub walls. In the three mountain villages, the primary schools were all one-room adobe structures. None of the schools had water or electricity. After the INCAP Longitudinal Study (1969–77) began, though not as a part of the intervention, all four schools were improved. In both Conacaste and Santo Domingo, adobe classrooms were added to relieve overcrowding. In Espíritu Santo and San Juan, new schools were built, and electricity was installed in San Juan’s primary school in the mid-1970s.

Espíritu Santo and Santo Domingo were the first to build cement-block primary schools, around 1973. In Espíritu Santo, four classrooms, one storeroom, and latrines were built, and these structures still stand and form the core of the village’s primary school. In Santo Domingo, a single modern cement block classroom was built. Santo Domingo’s school survived the earthquake of 1976 with minor damage, and classes were suspended only for a few weeks. Espíritu Santo’s, on the other hand, was destroyed. Conacaste had an adobe primary school at the time of the earthquake and it, too, was destroyed. In the aftermath, modern classrooms were built in Conacaste, using donated materials. This structure, which also included two latrines and had electricity, was in full use by 1980. In 1985, the government built a new structure, replacing the one from 1980. This building remains the present primary school. San Juan waited until 1983 for a modern primary school structure with three classrooms (that are still standing), though the adobe structure in place during the earthquake suffered only minor damage.

All of the modern primary schools have been improved upon since their construction. The two built in the 1970s in Espíritu Santo and Santo Domingo, underwent two waves
of improvements: one in the 1980s and one in the 1990s. In Espíritu Santo during the mid-1980s, four classrooms and latrines were added. In the mid-1990s, the government and PLAN International added three more classrooms. Even with these additions, however, the storeroom is still used as a classroom, as it was in the 1970s. In Santo Domingo, two classrooms were added in the 1980s, and four classrooms, latrines, and a water tank were built during the 1990s. In the late 1990s, FIS expanded the school to include a second story.

The two schools built during the 1980s underwent expansion during the 1990s. In San Juan, PLAN International built one classroom, a kitchen and latrines, while FIS financed latrines, additional classrooms, and furniture. In Conacaste, PLAN International helped add four classrooms, toilets, a kitchen, and a shop in 1990. Table 3 summarizes the key changes in primary school infrastructure over the last 30 years.

<table>
<thead>
<tr>
<th>Table 3 – Primary school infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Espíritu Santo</strong></td>
</tr>
<tr>
<td>Number classrooms in 1969</td>
</tr>
<tr>
<td>Destroyed/damaged in 1976 earthquake</td>
</tr>
<tr>
<td>Number of classrooms</td>
</tr>
<tr>
<td>Number of classrooms</td>
</tr>
<tr>
<td>Number of classrooms w/ 1980s additions</td>
</tr>
<tr>
<td>Number of classrooms w/ 1990s additions</td>
</tr>
</tbody>
</table>

Source: Estudio 1360 (2002).

**Grades, teachers, enrollment, promotion, and repetition:** With improvements in primary schooling infrastructure, came increases in the number of primary grades offered, the number of primary school teachers, and total enrollment. Instruction in the first two primary grades was offered for the first time in the three mountain villages during the 1940s, and in Espíritu Santo during the 1950s (Table 4). By the mid-1960s, grades 1–4 were offered in Espíritu Santo and San Juan, and grades 1–3 were offered in Santo Domingo. By 1968, grades 1–4 were offered in Conacaste. In 1967, the primary school in Santo Domingo became the first to offer all six grades. Espíritu Santo was the second, in 1973, and both San Juan and Conacaste were offering all 6 grades starting in 1974.
Table 4 – Primary school grades offered

<table>
<thead>
<tr>
<th></th>
<th>Espíritu Santo</th>
<th>San Juan</th>
<th>Conacaste</th>
<th>Santo Domingo</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year grades 1–2 offered</td>
<td>1950s</td>
<td>1940s</td>
<td>1940s</td>
<td>1940s</td>
</tr>
<tr>
<td>First year grades 1–2 offered</td>
<td>1965</td>
<td>1960s</td>
<td>1968</td>
<td>1964*</td>
</tr>
<tr>
<td># teachers</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td># students</td>
<td>61</td>
<td>n.a.</td>
<td>37</td>
<td>76</td>
</tr>
<tr>
<td>First year grades 1–6 offered</td>
<td>1973</td>
<td>1974</td>
<td>1974</td>
<td>1967</td>
</tr>
<tr>
<td># teachers</td>
<td>2</td>
<td>2</td>
<td>2–3</td>
<td>3</td>
</tr>
<tr>
<td># students</td>
<td>n.a.</td>
<td>98</td>
<td>n.a.</td>
<td>95</td>
</tr>
</tbody>
</table>


While there is school enrollment data available for some villages as far back as the early 1970s, we have information from primary school records in all four villages starting in 1979 and measured at six points in time between 1979 and the present (the final year available differs across villages but is between 1998 and 2001). Data available prior to 1979 for three villages show that Espíritu Santo was experiencing the greatest growth in school enrollment, doubling between 1976 and 1979. Enrollments in San Juan and Santo Domingo also grew more than 50% between 1974–1979 and 1970–1979 respectively. There is no information available for Conacaste primary school enrollment before 1979.

As shown in Table 5, the number of teachers at each primary school has risen since 1979, as has the enrollment. Despite increasing enrollments, however, the student-teacher ratios fell substantially in all villages except Santo Domingo.

Table 5 – Number of teachers, total enrollment, and student-teacher ratio, by village

<table>
<thead>
<tr>
<th>Year</th>
<th>Espíritu Santo</th>
<th>San Juan</th>
<th>Conacaste</th>
<th>Santo Domingo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of teachers (T)</td>
<td>Number of students enrolled (S)</td>
<td>S/T</td>
<td>T</td>
</tr>
<tr>
<td>1979</td>
<td>4</td>
<td>162</td>
<td>40</td>
<td>3</td>
</tr>
<tr>
<td>1982/83</td>
<td>5</td>
<td>199</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>1991</td>
<td>5</td>
<td>216</td>
<td>43</td>
<td>5</td>
</tr>
<tr>
<td>1994</td>
<td>6</td>
<td>212</td>
<td>35</td>
<td>5</td>
</tr>
<tr>
<td>1997</td>
<td>6</td>
<td>224</td>
<td>37</td>
<td>5</td>
</tr>
<tr>
<td>1998–2001</td>
<td>8</td>
<td>214</td>
<td>27</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Estudio 1360 (2002).
Between 1979 and the present, enrollment in the two larger villages, Conacaste and Santo Domingo, more than doubled. In Conacaste, this growth occurred primarily during the 1980s, while in Santo Domingo there seems to be a steady increase throughout the 20-year period for which we have data. Enrollment in San Juan increased over 50% between 1979 and the present, with most of this increase occurring in the 1980s. Finally, in contrast to the period before 1979 where Espíritu Santo had the highest growth in primary school enrollment, between 1979 and the present enrollment increased by just over 30%.4

Overall promotion rates, the percentage of children graduating from one grade and eligible to continue to the next, while volatile, were about the same in 1998–2001 as they were in 1979 in all villages except for Conacaste, where there has been steady improvement since 1982/3 (Table 6). In 1979, Conacaste had the lowest promotion rate (61%) and the highest repetition and dropout rates (19% and 18%, respectively). By the late 1990s and early 2000s, however, it’s promotion rates had risen to 80% and Conacaste had overtaken Santo Domingo, where promotion rates had historically been among the highest. In 1998–2001, Conacaste also had the lowest dropout rate (2%) and the second lowest repetition rate (15%), behind Santo Domingo. In contrast, repetition rates for San Juan and Espíritu Santo are around 20%. Finally, Espíritu Santo and Santo Domingo had the worst dropout rates (10%) in 1998–2001.

Table 6 – Primary school promotion, repetition, and drop-out rates

<table>
<thead>
<tr>
<th>Year</th>
<th>Promotion rate: % students graduating (P)</th>
<th>Repetition rate: % students repeating (R)</th>
<th>Drop-out rate: % students dropping out (D)</th>
<th>(P)</th>
<th>(R)</th>
<th>(D)</th>
<th>(P)</th>
<th>(R)</th>
<th>(D)</th>
<th>(P)</th>
<th>(R)</th>
<th>(D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>72</td>
<td>15</td>
<td>12</td>
<td>72</td>
<td>19</td>
<td>8</td>
<td>61</td>
<td>21</td>
<td>18</td>
<td>80</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>1982/83</td>
<td>76</td>
<td>18</td>
<td>6</td>
<td>61</td>
<td>27</td>
<td>11</td>
<td>59</td>
<td>27</td>
<td>14</td>
<td>79</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>1991</td>
<td>67</td>
<td>20</td>
<td>13</td>
<td>65</td>
<td>15</td>
<td>82</td>
<td>82</td>
<td>17</td>
<td>7</td>
<td>72</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>1997</td>
<td>73</td>
<td>18</td>
<td>8</td>
<td>70</td>
<td>22</td>
<td>83</td>
<td>83</td>
<td>13</td>
<td>4</td>
<td>82</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>1998 – 2001</td>
<td>71</td>
<td>19</td>
<td>10</td>
<td>75</td>
<td>21</td>
<td>5</td>
<td>80</td>
<td>15</td>
<td>2</td>
<td>77</td>
<td>13</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Estudio 1360 (2002).

Disaggregating promotion rates by grade helps identify the grades children are more likely to drop out of or repeat.5 Passing first grade presents the greatest challenge to

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4 Maluccio et al. (2005) describe gross primary school enrollment ratios based on village population projects.

5 Information on the number of children returning to school who did not pass the previous year is unavailable.
children advancing through primary school, with promotion rates across villages and over time ranging between 39–62% in 1979. Once a child reaches fifth or sixth grade, however, he or she is much more likely to pass—promotion rates are 80%–100%. This pattern does not change over the years, as shown in Figure 3 for 1979 and 1998–2001 grade promotion rates, respectively.

In 1979, Santo Domingo and San Juan had first grade promotion rates 20 percentage points higher than Espíritu Santo and Conacaste (60% versus 40%). However, if a child was able to pass first grade in one of the latter two villages, the chances of passing second grade was much higher than in Santo Domingo and San Juan. Promotion rates dipped slightly for third grade in all villages (except Conacaste), after which advancement from fourth through sixth grade was almost guaranteed in all villages, with promotion rates between 92–100%. In 1979, all four villages had 100% promotion rates for sixth grade. In more recent times, instruction, or promotion policy, appears to have changed such that a child now is somewhat more likely to pass the first grade (conditional on starting) than in 1979, but less likely to pass the fourth, fifth and sixth grades. Conacaste showed the largest improvement in first grade promotion rates, climbing from 40% to 65% over the 20-year period.

Finally, we consider gender differences in the enrollment and promotion rates. The girl-boy ratios for enrollment and promotion rarely rise above one when examined by period and village. In fact, only in Conacaste are the girl-boy promotion and/or enrollment ratios greater than or equal to one (indicating greater equity there), whereas in Espíritu Santo in the mid-1990s, the girl-boy enrollment (62%) and promotion (51%) ratios are the lowest across villages and across years. That the ratios are consistently less than one suggests that more boys than girls are attending and advancing through school, a pattern confirmed in the schooling outcomes examined in Maluccio et al. (2005). In 1998–2001, however, the girl-boy promotion ratio is higher than the girl-boy enrollment.
ratio in all villages, indicating that once girls enroll, they are more likely to pass than boys.

**Feeding programs:** School feeding in all four villages has been driven by public policy, typically incorporating INCAP products, with few differences across villages. During the 1960s, the government provided powdered milk and processed cheese for school snacks, and flour for making bread. In the 1970s, children would drink INCAP beverage, either atole or fresco, at the INCAP supplementation center, combined with maize tostadas served at school. During the 1980s, INCAP’s Incaparina (similar to atole supplement) was the school snack, and from 1986–1990 the government provided INCAP’s fortified galleta escolar, or school biscuit. In the early 1990s, schools served these biscuits with atole or vitatol, enriched high-calorie and high-protein beverages. From 1998–99 the Ministry of Education provided schools with an enriched breakfast ingredient known as proteínas, with higher caloric content than the school biscuits and drinks. Mothers of students formed school breakfast committees and were trained to prepare the breakfast. Under this program, funds were provided to purchase locally produced fruits and vegetables. Currently, parents contribute fees to the primary schools in all four villages to help provide school snacks.

**Other school programs and committees:** The villages also seem to have benefited to similar degrees from government programs that provide textbooks and scholarships, and that promote parent organizations.

During the administration of Arzú (1996–2000), girls received school scholarships of Q300 ($38) per year. President Portillo opened up the scholarship to boys in 2000. During 2000 and 2001, children in all four villages qualified for these scholarships. Children in Santo Domingo have received additional outside help from PLAN International, who sponsored boys and girls through a “Godparent” program since the 1970s. Finally, private companies (TELGUA and Cementos Progreso) provide educational bonuses for their employees’ children, benefiting some children in Santo Domingo and Conacaste.

6.2.3 **Secondary school**

**Infrastructure:** Basic secondary education has become available recently within three of the four villages; only Espíritu Santo remains without its own basic secondary school, although it is only 1 km to the municipal seat where there has long been both basic and diversified secondary education. In 1997, San Juan was the first of the villages to establish its own basic secondary school. The community, as well as others, supports this private, non-profit school. In 2002, parents paid Q65 ($8) for enrollment and Q65 ($8) per month tuition. Students are expected to subsidize their studies by raising money through school projects. A local teacher directs the school, which offers the first three basic secondary grades. In 2002, there were 32 students enrolled.

Both Conacaste and Santo Domingo have telesecundaria schools that offer basic secondary education and were established in the late 1990s. Conacaste’s telesecundaria was established in 1998, and in 2002 had three teachers instructing 60 students per year (approximately 20 per grade). Santo Domingo’s telesecundaria was established in the late 1990s, and also has approximately 20 students per grade. The diversified grades are still unavailable within any of the four study villages.
Even with basic secondary in the villages, however, some parents choose to send their children out of the community for secondary education, since the local options are viewed as inferior to those in the municipal, departmental, and national capitals. Access to diversified levels of schooling, then, varies with access outside the village.

Outside the villages: The Instituto Básico of El Jicaro was established in 1962 as a private institute offering only the first grade of basic secondary school. Each subsequent year another grade was added such that by 1964 all three basic grades were offered. In 1970 the school turned public. In the early 1980s, the government funded the construction of a formal two-story building with cement-block classrooms. The school currently has 12 classrooms, workshops for art and home economics, and a library. In the early 1960s, the school began with 7 teachers, and only 2–3 students came from Espíritu Santo. Currently, there are 14 teachers, and about 20 of the schools students are from Espíritu Santo. While public education is in principal free, it costs about Q450 ($58) per year to attend, including the cost of uniforms, textbooks, school supplies, art supplies, enrollment fees, and monthly contributions. A private basic secondary school was established in El Jicaro in 2002, though it currently offers only the first year of basic secondary school.

A private diversified secondary school was opened in El Jicaro in 1978 by local teachers. Due to competition from diversified secondary schools in nearby towns that offered more degree options, however, it closed in 2000. With funding from the state, municipality, and interested parents, a new diversified secondary school re-opened in the same six class-room building that same year. This school offers two diversified degrees: a teaching diploma with an ecological orientation and business administration of agricultural enterprises. Thirteen teachers currently instruct about 100 students, about 15 of whom come from Espíritu Santo. The expense per student per year, including enrollment, monthly fees, textbooks, uniforms, and school supplies, is approximately Q1000 ($128).

Before and even after the establishment of local secondary schools in the three mountain villages, students intent on continuing their studies at the secondary level have traveled to Sanarate, El Progreso, and Guatemala City. Those from Santo Domingo have also attended secondary school in their municipal capital, San Antonio La Paz. Since Sanarate has been the most common destination for secondary students from the three mountain villages, we focus on the options available there. There are two main basic secondary schools in Sanarate, one public and the other private. Both have been in operation since before the 1960s. Five smaller private schools also operate in Sanarate (the first opened in 1979 and the most recent in 2002) and offer both basic secondary and diversified secondary or other advanced degrees. Currently, 2–3 students from San Juan and about ten students from Conacaste attend the public basic secondary school in Sanarate. The cost per student is approximately Q500 ($64) per year for uniforms, school supplies and textbooks, not including the cost of daily transportation and food.

6.2.4 Literacy programs

CONALFA has been active in all the villages since it was established. Two additional programs were mentioned in Conacaste but are available more widely. The first is the graduation requirement that higher secondary students tutor illiterate people. The second is educational programming offered over the radio that allows students to
gradually complete primary school requirements, Instituto Guatemalteco de Educación Radiofónica.

6.3 Summary of schooling services in the four villages

Among the four villages, Espíritu Santo and Santo Domingo had better schooling opportunities over the period. Perhaps unsurprisingly, then, they have also had consistently higher average schooling and literacy rates (Engle et al. 1992; Maluccio et al. 2005). Santo Domingo’s primary school was the first to offer all of the primary school grades and, at the same time as Espíritu Santo, built the first modern primary school. Both of these villages are close enough to their respective municipal capitals to have made secondary education a viable option since the 1960s.

Nevertheless, are some important differences among the villages. First, Espíritu Santo, along with San Juan, experienced very low increases in enrollment between 1979 and 2002, between 30–50%. Meanwhile, Santo Domingo and Conacaste, the two larger villages, experienced growth in enrollment that matched their population growth, with both enrollment and population doubling from 1979–2002. Second, school records show that enrollment and promotion in Espíritu Santo largely favors boys. This gender difference in education is supported by census data that shows a larger gap between male and female literacy and schooling in Espíritu Santo than in the other villages in all census years (Maluccio et al. 2005).

Conacaste distinguishes itself as the most improved village in terms of school infrastructure and schooling indicators, such as promotion rates and gender equity. It was the only village that has shown improvement in promotion rates over the period. It also has the longest tradition among the four villages of an active preschool, and has double the number of children attending preschool and kindergarten than the other three villages. Finally, Conacaste was the first of the four villages to establish its own basic secondary school in 1997.

Currently (2002), it would appear that the availability of schooling options and their quality are approximately equal across the four study villages. All have access to the first six primary grades and adequate schooling infrastructure, and the student teacher ratios are roughly equal. Additionally, all enjoy access to the three basic secondary grades within or very near the village. The three mountain villages have basic secondary offered in the village, and secondary students from Espíritu Santo need only travel 1km to El Jicaro. Finally, in contrast to health related programs, much of the school feeding, scholarship, textbook and literacy programs have had roughly equal presence in all four of the study villages.

7. Livelihoods

7.1 Land tenure and land quality

During the liberal reforms of 1872, the peasants of San Juan and Espíritu Santo were given the opportunity and rights to own land. In San Juan, the municipal government of Sanarate had owned the land and allocated plots to residents on the condition that they continue to pay labor tribute to nearby estates or on the coast. The land distribution there was, and has remained, egalitarian. Espíritu Santo had been a cattle post owned by an order of Jesuit priests. With the reforms in the 1870s, it was subdivided into plots
and sold. Selling the land, rather than just distributing it as was done in San Juan, allowed wealthier families to purchase higher quality parcels, while ranch hands of the former cattle post either purchased low quality land or relied on sharecropping arrangements with landowners for access. The result was a more skewed land ownership pattern at the outset than in San Juan (Bergeron 1992).

Half a century later in 1927, Conacaste was established on the site of a nationalized former estate (Bergeron 1992). About fifty peasant families continued to work on parcels allocated to them by the former estate owner. Apparently this initial distribution was not equitable and, as a result, between 1931 and 1944, the land was redistributed to correct this. Official land titles were granted from 1954 to 1957. Since then, however, an active land sales market has resulted in an unequal land distribution.

Santo Domingo was the last of the four villages in which peasants were granted land rights. The village is also on the site of a former estate that was nationalized, in 1955, and given to the former tenant farmers as communal property. The tenant farmers evenly divided the land among themselves.

Presently, the two villages with the highest quality land, Espíritu Santo and Conacaste, have the most skewed land distribution.

**Land quality:** Espíritu Santo, the only one of the four villages located in the fertile lower Motagua River valley, has the highest quality land and agricultural potential. While not all this land is owned by its residents, they have had better access to land and it has led to investment in infrastructure and availability of agricultural wage labor that were much higher here than in the other three villages (Bergeron 1992). Espíritu Santo illustrates well the dual nature of Guatemalan agriculture, in which wealthier commercial farmers farm the soils of greatest agricultural potential and subsistence farmers utilize the more marginal land, often under sharecropping arrangements.

Espíritu Santo can be divided into four agricultural zones: riverbank; piedmont; irrigated plots in the piedmont; and hills (Bergeron 1992). When the land was initially sold in 1872, wealthier families from regional centers, including El Jicaro, bought up the fertile riverbanks (Bergeron 1992). This land was (later) suited to mechanization and used for high-value crops such as tobacco, tomatoes, and sweet peppers. The commercial farms provided plentiful wage labor for villagers and during the off-season allowed wage laborers to grow subsistence crops, often under sharecropping arrangements. Even today, the riverbanks are mostly owned by absentee landlords, though they have lost value since 1998, when hurricane Mitch stripped away much of the fertile topsoil. The price for rental or sharecropping arrangements on the parcels that remained after the hurricane increased substantially. Those farmers who once sharecropped on riverbanks have now turned to the piedmont, driving up rental prices there as well.

The piedmont is higher elevation land near the riverbanks and at one time had rich soil both for cultivation and pasture, though it was never suitable for mechanized farming. Families from El Jicaro and a few from Espíritu Santo now own the piedmont lands. Plots are small and most households owned one manzana ($7000 \text{ m}^2$) or less in 1974. By 1987, average land holdings were about one-half a manzana. Moreover, the soils have become badly degraded, particularly after Hurricane Mitch in 1998. Many farmers from Espíritu Santo have access to land in the piedmont only through rental and

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$^6$ Section 3 described the agricultural potential of the villages.
sharecropping arrangements. In the past, the terms of the agreement were that renters maintained fences and left maize stubble in the field for the owner’s cattle. Over time, the agreements shifted to in-kind and, in the 1980s, toward cash payments (Bergeron 1992).

A section of the piedmont is part of a small irrigation scheme that has been in place for over a century. The system is fed from a small spring in the nearby village of Ojo de Agua, and there are several kilometers of water canals. The plots under this scheme are small, no more than eight tareas (400 m$^2$), or about half a manzana, and usually are only three to four tareas. Tomatoes, jalapeño chilies, and sweet peppers are cultivated for commercial purposes, and occasionally subsistence maize and beans. Few who own here are willing to sell, and land prices have nearly tripled since the 1980s. While landholdings in the piedmont and irrigated areas are small compared to landholdings in the other three villages, the richness of the alluvial soils allowed equivalent, or better harvests, on smaller parcels, at least until 1998.

Finally, the municipality of El Jicaro owns the hills surrounding Espíritu Santo, and local farmers can access them for a small fee. Subsistence crops of maize were planted here until the early 1990s (Bergeron 1992) but currently the soil is so degraded that villagers typically only gather firewood on it.

Conacaste, while not situated in the fertile lower Motagua River valley, benefits from a highland plateau formation that allows for irrigation and mechanization, and therefore commercial agriculture. This high agricultural potential resulted in the most skewed land distribution of all four villages by 1974, despite egalitarian beginnings (Bergeron 1992). As in the other villages, parcel fragmentation has also occurred as the population grows, with average landholdings decreasing from 4.7 manzanas in 1974 to only 2.1 manzanas in 1998. In contrast to Espíritu Santo, most Conacaste farmers own the land they farm, and there is an active land sales market. After the decline in commercial agriculture during the early 1990s, accessing land through rental markets became more common, as well, although few rent land for subsistence agriculture. As in Espíritu Santo, the municipality owns the surrounding hills and villagers access them for firewood (Bergeron 1992).

The two villages with the more equal land distribution are also the two with the least agricultural potential. There has never been mechanized agriculture in either village. San Juan has slightly better prospects for agriculture, since it has a small area of flat land along the base of the hills and slightly better soils. Population pressures have also been important over the period. Average landholdings halved from 1974 to 1987, from 4.3 manzanas to 2.5 manzanas, mostly because of population growth and the division of plots among family members. There is a rental market and renters usually pay in-kind by maintaining fences, leaving maize stubble for cattle grazing, and, more recently, in maize. Rental fees are gradually increasing and becoming monetized. In Santo Domingo, most farmers own their land, but the size of landholdings has decreased substantially from five manzanas in 1974 to 1.6 manzanas in 1987, smaller than in the other two mountain villages (Bergeron 1992).

### 7.2 Subsistence agriculture
As in other parts of El Progreso, before the intervention in the late 1960s, the economies of all four villages were based primarily on small-scale subsistence agriculture. While other occupations existed, these were secondary and complementary to agriculture (Pivaral 1972). This “initial condition” is common to all four villages, and therefore provides a marker with which to compare and measure the evolution of each village’s economy. The two most important crops were the staples of the local diet, maize and beans, although other crops such as tomatoes or sorghum were grown by many.

Rain-fed maize has traditionally been grown during two seasons per year in all four villages. The first season starts with the first rains of April or May, and the second begins in August. The second season is riskier due to less certain rainfall, and yields are usually lower. Farmers have typically used local variety seeds, either maiz venturero or maiz criollo, but with time these have been mixed with improved hybrid varieties. Additionally, during the 1980s, more intensive cropping techniques were adopted, with fewer seeds planted in closer proximity.

In all four villages, beans and maize traditionally have been intercropped. Usually planted during the second season, beans serve both subsistence and commercial purposes since surpluses can be sold. During the farm cooperative era (described below), beans were grown as cash crops in both Espiritu Santo and in Conacaste. As they are vulnerable to plant diseases transmitted by the white fly, however, they are occasionally abandoned, as in Santo Domingo in the 1980s and Conacaste between 1988 and 1997. Recently, to improve yields, farmers in Santo Domingo have stopped intercropping beans with maize, instead planting beans as a single crop. Sorghum and maize are also intercropped in San Juan and Santo Domingo. Sorghum cultivation is diminishing, however, due to its labor-intensive seed processing. Squash was mentioned as a crop traditionally intercropped with maize every but Conacaste; it is used both for human consumption and pig feed. Finally, watermelon is traditionally planted along with maize in Espiritu Santo.

As with beans, maize has served both as a subsistence and commercial crop in Espiritu Santo. Farmers sharecropping on the riverbanks during the off-season from tobacco farming were provided with commercial-quality hybrid seed, agrochemicals, and mechanical tillage by the landowners. In return, sharecroppers would give the landowner half of the harvest, which was sold as a commercial crop. Additionally, yields were often so good for the riverbank sharecropper that they had surplus to sell (above their subsistence needs).

Farmers in Conacaste began using fertilizers and pesticides on their subsistence crops earlier than farmers in the other three villages, probably due to the influence of commercial cropping. The next earliest adoption of more modern inputs is recorded for Espiritu Santo, also influenced by commercial agriculture, where farmers began applying fertilizers in the 1970s and pesticides in the 1980s. Farmers in San Juan and Santo Domingo adopted these inputs to their subsistence farming later, starting to use fertilizers in the 1980s and pesticides more recently. Each village has seen an increase in the use of pesticides for subsistence farming since fighting crop diseases has become increasingly difficult.

Until the 1980s, subsistence farmers in the villages relied heavily on (unpaid) family labor. As children increasingly have stayed in school longer, and as young people have
left the village for non-agricultural wage work (or schooling), the supply of family labor has been restricted. These changes have left the subsistence farmer more dependent on hired help, especially during periods of heavy labor demand. Increased expenditure on chemical inputs, along with decreased availability of family labor and decreased plot size, have changed the economics of subsistence farming in the villages, leading subsistence farmers to scale back and in many cases exit from subsistence agriculture. Nevertheless, approximately one-third of the wage-labor workers that commute to Guatemala City during the week cultivate small parcels of subsistence crops on the weekends. In all the villages, many of the subsistence farmers are of an older generation, while younger men consider farming as an activity that one undertakes after failing to secure a good wage job. Older farmers have an emotional connection to farming as their traditional way of life, while younger men seem no longer to identify themselves by their relationship to the land. Subsistence agriculture is now only a small, but potentially important, part of livelihood strategies in the four villages.

Until the 1980s, subsistence agriculture was the most important component of livelihood strategies in the villages, though often it was combined with small-scale commodity production, as well as wage labor in both the agricultural and non-agricultural sectors (Bergeron 1992). Rising rural population, however, has led to an increasing fragmentation of land holdings and increased land degradation, limiting prospects for subsistence production. As a result of these trends as well as a series of adverse shocks, the importance of agriculture has diminished over time. By contrast, during the 1990s the tourism, service, and maquila sectors all grew, creating new opportunities for employment in the non-agricultural sector (World Bank 2003). As a result, subsistence agriculture currently forms only a small part of village livelihoods.

7.3 Commercial agriculture

Pivaral (1972) describes commercial agricultural activity in the four villages in the 1960s as mostly associated with own agricultural production, seasonal, and uncommon. Since the time of Pivaral’s research, however, commercial agriculture has shaped and even driven the development of three of the four villages, and its absence has distinguished the other, Santo Domingo. Since the late 1960s, three villages experienced periods of rapid economic growth and expansion of infrastructure that coincided with booms in local commercial agriculture: manioc (and the starch produced from it) in San Juan, horticulture in Conacaste, and tobacco in Espíritu Santo.

In the last 10–20 years, however, all three villages experienced the deterioration of these same commercial agriculture livelihoods. The development of less expensive, corn-based starch in destroyed the market for manioc-based starch from San Juan in the early 1980s. Fluctuating tomato prices and increasing costs of pest control and irrigation resulted in the folding of the horticultural agricultural cooperative in Conacaste in 1991. And, in 1998, hurricane Mitch washed away fertile tobacco fields along the lower Motagua River near Espíritu Santo. In two of these villages, San Juan and Conacaste, many villagers were landowners who were affected by these downturns in commercial agriculture. In Espíritu Santo, village farmers affected by the downturn were mostly sharecroppers (who carried out subsistence agriculture through sharecropping arrangements). In both Espíritu Santo and Conacaste, however, shocks to commercial
agriculture affected not only landowners and sharecroppers—but also hundreds of others in the villages who lost wage work from tobacco and horticulture.

Despite these shifts, commercial agriculture remains part of the livelihood strategy of villagers in Espíritu Santo and Conacaste. Producers in Espíritu Santo have long practiced in horticultural production, specifically tomatoes, chilies, and sweet peppers, on the flat riverbanks as well as in the irrigated plots of the piedmont. After hurricane Mitch, these activities persisted only in the piedmont, and on a much smaller scale. Villagers also harvest and sell limes and other fruits. A few farmers continue to produce vegetables and specialty crops in Conacaste. Below, we describe the experience of each village with commercial agriculture in further detail.

Espíritu Santo has been involved in commercial agriculture of primarily three crops: tobacco, tomatoes (and other vegetables), and fruit trees. Since the 1940s, both large and small landholders have grown tobacco in the municipality of El Jicaro. To promote production, the government built a large irrigation scheme in the lower Motagua region from El Rancho to El Jicaro in the early 1970s. The fertile riverbanks near Espíritu Santo fell within this irrigation network (described above). Initially, tobacco was grown by individual farmers and sold to three different tobacco companies. In the 1970s, the production arrangements changed to subcontracting. British Tobacco supplied seeds, agrochemicals, and other working capital to producers, and closely supervised production. Contracts were mainly given to large producers, with the effect that small-scale producers were displaced from the market.

While no villagers from Espíritu Santo produced tobacco, many village residents, including women and children, worked for wages on the tobacco farms, particularly during harvest. Since tobacco is a seasonal crop, grown from November to February, these same workers could sharecrop on the tobacco lands during the tobacco off-season. While production began to decline in the mid-1990s due to limits on tobacco exports, the final blow to this crop came when the tobacco fields were washed away during hurricane Mitch in 1998. Only a few farmers continue to grow tobacco.

Espíritu Santo’s experience with commercial horticulture has been frustrated by fluctuating prices and increasing pest problems. While villagers have planted tomatoes and chilies in the irrigated and non-irrigated sections of the piedmont since the 1960s, pests became a problem starting in the mid-1970s. Many local farmers stopped growing these two cash crops altogether, and those who continued increased their use of pesticides. By the mid-1980s, pest control became more expensive and tomatoes had been replaced almost completely by chilies, since the latter were perceived to be more pest resistant, easier to store, and less subject to price volatility. Chilies provide brief seasonal wage labor to villagers during the harvest. While this source of agricultural wages was important before hurricane Mitch, it is less so now, since the current areas planted to it are much smaller. Tomatoes planted in the piedmont also provided wage labor to villagers until the mid-1980s. Large scale producers, better able to deal with the risks of tomato production, continued to plant tomatoes on the riverbanks throughout the 1980s and 1990s, providing an additional source of wage labor until 1998.

Lastly, lime and other native fruit trees have grown in the region of Espíritu Santo as long as village residents can remember. By 1945, lime was a commercial crop, but it was not produced intensively until the 1960s. Lime trees bear fruit all year and are produced under two different cropping systems. The traditional system is that of
interspersing trees among other crops. A second, more intensive system arose in the 1960s with increased demand for limes—small plantations of lime trees requiring irrigation, pruning, and fertilization. These groves have consistently employed several local people. During the 1960s the main demand for limes came from a small perfume factory in El Rancho. By the 1980s, five lime dehydration plants were in operation in the area, and bought limes from local suppliers for export to the Middle East and Europe.

In the late 1990s, with the support of several governmental institutions, villagers formed a cooperative and constructed their own lime dehydration plant. About 20 villagers are current members, and they own six manzanas of land and the dehydration shed. They paid back the original government loans and now receive credit from a private association of exporters. The cooperative provides seasonal work, for about six months per year. It has guaranteed a steady supply of limes by agreeing to purchase limes from local producers no matter what their condition, albeit at lower prices than those paid by outside dehydration plants. Local lime growers, appreciative of the guaranteed demand, have planted more lime groves. These groves have advantages that horticultural products never had—they provide steady (if small) profits, and require little capital or labor investment. Thus far, the trees have proven resilient to pests. In fact, several producers in the irrigated portion of the piedmont have replaced their vegetable plots with lime groves. In addition to lime, other high yielding and less labor-intensive fruit crops such as papaya also are increasing in popularity in Espíritu Santo. While not widespread, fruit crops provide steady agricultural employment for a few villagers, and temporary employment for others during harvest.

In Conacaste, commercial agriculture also began before the start of the INCAP Longitudinal Study (1969–77). In the late 1960s, several farmers produced tomatoes, cucumbers, chilies, and other vegetables, as well as tobacco. Farmers in Conacaste actually began growing tobacco during the 1940s. By the 1960s, cigarette manufacturers were purchasing tobacco from individual growers through subcontracts which supported them with credit and technical support. As in Espíritu Santo, tobacco production provided agricultural wage labor for other residents as well. Tobacco production halted in Conacaste in the late 1960s, however.

Horticultural crops have been grown in Conacaste since the 1940s. As in Espíritu Santo, however, Conacaste’s experience with horticulture has been frustrated by fluctuating prices and increasing pest problems. Initially, crops were rain-fed and agrochemicals were hardly used. By 1962, the first mini-irrigation system was installed by one farmer who sold his produce at market in Guatemala City. In the mid-1970s, ICA began a project in Conacaste that offered training in a variety of topics, including horticulture. A horticultural exhibition plot on the outskirts of town introduced the use of improved seed varieties, application of modern fertilizer, and drip irrigation. In the early 1980s, a group of 35 farmers organized a cooperative and applied for a loan from the Inter-American Development Bank. The loan was granted and used to construct a well and install water pumps for both irrigation and consumption. In 1981, four farmers began horticultural production as a pilot test. Each received equipment and supplies to plant one manzana of vegetables, primarily tomatoes. Yields were high and production costs low. After four years, another 30 members, all landholders, joined the cooperative, receiving similar equipment and credit for supplies. The cooperative became a wholesaler of supplies, though farmers sold their products separately. All the farmers began producing tomatoes, but within a few years, prices declined. They began to
diversify into sweet corn, okra, beans, broccoli, cucumber, and sweet peppers, not only because of low tomato prices, but also because tomato pests were becoming harder and more expensive to manage. Around 1987, 35 additional farmers joined the irrigation scheme such that seventy manzanas were under labor-intensive cultivation, providing wage labor to hundreds of workers, including women, men and children.

The success of the cooperative, however, was short-lived. By 1988, production costs had increased substantially as pest control became more difficult and expensive, and as the cost of electricity used to run the irrigation pumps rose. This, combined with volatile tomato prices, caused many farmers to fall behind in their payments to the cooperative. By 1990, the farmers had tried a switch to cucumbers for export to the United States. While production was good, prices were not as high as previously experienced. Additionally, there was an unsolved theft at the cooperative. Farmers could not make their loan payments and the cooperative could not pay its electric bill. By 1991, the cooperative and irrigation scheme had folded.

Since the demise of the cooperative in Conacaste, approximately ten farmers have paid off their loans and received additional financing, continuing to grow tomatoes and vegetables. They use the former cooperative’s drip irrigation equipment, but constructed their own well and purchased their own electric pump. Recently, FIS set up a revolving credit fund benefiting 30 farmers, including five women, to start small agribusinesses around small animal husbandry, tilapia ponds, and high-value crops such as string beans and edible flowers. Finally, several women from Conacaste have a small but significant source of income from collecting mangos growing on trees scattered throughout the village’s agricultural fields.

San Juan’s experience with commercial agriculture has been shorter less diversified, than either Espíritu Santo or Conacaste. Beginning in the 1960s, a few households in San Juan planted manioc, and produced a value-added product, starch, in their homes (known locally as yuquilla). In 1965, mechanical mills were introduced, easing the labor involved in producing the starch, and thus more households entered into the activity. The catalysts to this local industry were buyers from Sansare, who provided cash advances, seed, and other supplies, as well as a guaranteed buyer. The relative price of this form of starch drove the boom, and by 1974, almost all households in San Juan, 83% according to Bergeron (1992), were involved in growing manioc and producing starch. Even landless residents rented land to participate. Entire families provided their labor to starch production, and the traditional pattern of migration to cotton plantations temporarily ended. This boom brought relative wealth to San Juan. Farmers saved money, purchased land, and made improvements to their homes. The village underwent improvements in water and electric infrastructure necessary for production. By the early 1980s, however, the boom ended. In part, this was because the market was undercut by Brazil’s export of less expensive maize-based starches. Finally, the entrepreneur in Sansare who did the majority of the buying in San Juan died, and his family decided not to continue the business. In 1985 when the boom ended, only a few farmers continued producing manioc with most returning to the traditional work pattern of subsistence farming and migration to agricultural wage jobs on the coast.

Commercial agriculture in Santo Domingo has been, and remains, virtually non-existent. Most agricultural products that are sold are subsistence crops, such as beans during an unusual surplus year or for immediate cash flow needs. Some gardening, including tomatoes and chilies, takes place, and occasionally mangos are collected and sold.
7.4 Agricultural wage labor

Agricultural wage labor has been available locally within the community in two of the four villages, Espíritu Santo and Conacaste. In Espíritu Santo, the tobacco and vegetable farms on the banks of the Motagua River provided a steady source of wage labor for villagers until 1998. In fact, during the tobacco harvest the demand for workers typically led to higher agricultural wages than in the surrounding areas. Currently, however, little agricultural wage labor is locally available in Espíritu Santo. Some vegetable farmers still working plots in the piedmont hire a handful of workers, and as previously mentioned, the lime dehydration plant offers employment during half of the year.

In Conacaste during the 1980s, the horticulture cooperative provided hundreds of permanent jobs to people in the village, including women and children. Women were in charge of tasks requiring more dexterity, such as setting twine, transplanting, fertilizing, and harvesting, whereas men were in charge of more technical jobs such as the application of pesticides and working the irrigation system. These jobs disappeared in 1991 with the collapse of the cooperative. However, women from Conacaste gained experience and earned a reputation for being good agricultural workers, and many are now employed in agriculture nearby. One producer of ornamental plants and tomatoes in Sanarate has been providing labor opportunities to villagers from Conacaste (as well as San Juan) since the late 1970s.

All four villages have a history of seasonal migration for agricultural wage labor. When subsistence agriculture was the predominant livelihood, men would migrate to work on sugar and cotton plantations along the coast, typically after harvesting their own subsistence crops. With its proximity to Guatemala City and increasing demands for non-agricultural wage labor, however, they no longer do so. With the exception of the period during the manioc boom, men from San Juan have migrated to the coast for agricultural jobs. Before the 1976 earthquake, men from Conacaste also regularly migrated to the coast, but afterward, local and regional demand for masons, and then the vegetable cooperative, led to local wage labor. Since the collapse of the cooperative in 1991, some have resumed seasonal migration. Finally, during the last ten years, declining demand for tobacco and the hurricane of 1998 eliminated most of the locally available agricultural wage jobs in Espíritu Santo, and some men have taken up seasonal migration to agricultural wage jobs.

7.5 Non-agricultural wage labor

Since at least 1987, the main source of income for residents of Santo Domingo has been non-agricultural wage labor. According to Bergeron (1992), it accounted for 60% of all earnings in 1987. One of the most important employers has been a cement company, Cementos Progreso, with its major plant in Sinaca, Sanarate, on the Atlantic coast highway. Though the work is difficult, Cementos Progreso is considered a good employer, providing legal benefits, life insurance, savings accounts, school bonuses, educational scholarships, medical coverage, and higher than average wages. Villagers from Santo Domingo have worked at Cementos Progreso since it opened in 1974. When it expanded in 1980, villagers from Conacaste began working there; it became even more important to them with the collapse of the cooperative in 1991. Both villages have convenient transportation to the plant, such that it is possible to live in the village and commute daily to work.
There also are many non-agricultural wage labor opportunities via the Atlantic coast highway, on the way to, and in, Guatemala City. Since the 1960s, there have been employment opportunities for young women to work as domestic help in the capital. In the 1980s and 1990s, this type of work became less popular with the availability of better-paid work in the maquilas, or free-trade assembly and re-export factories. Finally, when demand for carpentry or masonry has been high in the capital, for example throughout the 1980s construction boom, many men have traveled to Guatemala City to work for construction companies. When demand for small-scale construction work at home has been high, masonry also has been carried out as self-employment.

Villagers from Santo Domingo have taken advantage of these non-agricultural wage opportunities for much longer than residents of the other two mountain villages, due to its proximity to the Atlantic coast highway and affordable daily transportation to the capital, beginning in the 1980s. Commuting daily to non-agricultural work is more difficult for residents of Conacaste, unless of course they work for Cementos Progreso. In 1991, when the agricultural cooperative closed, many men from Conacaste migrated to Guatemala City and the United States in search of work. These men usually migrated semi-permanently, even to Guatemala City, since daily commuting was not possible from Conacaste. This created many de facto female-headed households, with fathers coming home only on the weekends. Transportation between Conacaste and Guatemala City improved in 1994, with the addition of daily bus service, making daily commuting a more feasible alternative.

Throughout the 1980s, there was semi-permanent migration of labor from San Juan, mostly to Guatemala City to work in the maquilas or in construction companies. While in Conacaste male heads of households left for work, in San Juan it seems to have been younger men and women who migrated. As in the other two mountain villages, several young women migrated to Guatemala City to work as domestic help, and then switched to the maquilas because of higher wages. The possibility of commuting daily to Guatemala City from San Juan is even more difficult than from Conacaste, since daily bus service to Sanarate only started in the 1990s, and the village does not yet have direct service to the capital. Bergeron (1992) observed that in 1987, some villagers from San Juan commuted daily to Sanarate for non-agricultural employment. A small local employment opportunity emerged in the mid-1990s when a villager established a cashew processing plant that employed about 20 villagers. This plant has recently been decentralized, however, and cashew processing is now done on a piece-rate basis.

Since the 1960s, security-related occupations, such as policemen or security guards, have been relatively popular among men from Espíritu Santo. There are currently about 20 men working in this occupation, which has grown in importance in the Guatemalan economy. As in the mountain villages, masonry is an occupation that can be categorized either as wage labor when done for a company or as self-employment. Only since hurricane Mitch, however, have people from Espíritu Santo sought outside non-agricultural employment in large numbers. Many men have left in search of jobs, yet they make an observation common to all four villages that securing non-agricultural employment has become more difficult, especially for older adults, as employers require higher education levels than in the past. Women generally do not migrate far from Espíritu Santo for non-agricultural employment, though some work as domestic employees in El Jícaro.
7.6 Self-employment

Masonry and petty trade are two forms of self-employment common to all four villages. Before the 1976 earthquake, each village had a handful of men trained as masons, but in the aftermath of the earthquake—with its consequent increase in demand for those skills—many more became qualified. In Conacaste, these men were known locally as “earthquake masons.” In the three villages with more difficult access to Guatemala City, earthquake masons stayed in the villages, tending to local reconstruction. When this was finished, and when demand for construction rose in Guatemala City in the 1980s, these masons migrated to the capital to work for wages. Earthquake masons from Santo Domingo, given their close proximity to Guatemala City, immediately went to work for construction companies in the capital following the earthquake, returning to their village, along with masons from the other villages when the capital’s construction boom ended in the late 1980s. With the current low demand for masons in Guatemala City, most men remaining in this profession are self-employed.

Whereas masonry involves only men, petty trade is the domain of women. In all four villages, there have long been small retail shops selling basic foods and supplies. Many women also do domestic chores outside the home for pay. For example, some prepare food to sell at places of work, at the local schools, or house-to-house. Others have expanded their animal husbandry activities to include the slaughter and sale of meat. More recently, women have taken up selling other types of specialized retail products from their homes or door-to-door. During the last couple of years, women in Espíritu Santo and Conacaste have received financial and technical support in their small-business activities from various governmental and non-governmental organizations. In San Juan, since the 1970s women have maintained strong commercial relationships with surrounding villages, selling products such as beef, poultry, vegetables, plastic products, and clothing. Some even sell at the Sanarate municipal market. In all the villages, as more women and even men enter the retail/petty-trade market, competition increases, driving prices down and decreasing profit margins. The increasing ease with which villagers can reach larger markets such as Sanarate or Guatemala City, also has put downward pressure on prices.

Espíritu Santo is the only village with a distinctive form of self-employment, the elaboration of artisan palm products, for which it is well known. Palm weaving has been an important source of income since the 1960s, when approximately two-thirds of households in Espíritu Santo participated (Pivaral 1972). Bergeron (1992) found that in 1974 and 1987, the sale of palm products constituted the second most important source of income, next to agricultural wages. Although earnings are low per unit time, this activity is a permanent source of income. During the 1960s and 1970s, families marketed their own palm products, mostly hats and brooms, to buyers from Quiché department that came to Espíritu Santo regularly. In the late 1970s, one local intermediary coordinated a deal between palm weavers and Zacapa Centenario rum distillery to fill orders for rum bottle jackets. This contract continues to this day, with the intermediary holding the trademark to this and other products, and even exporting to Korea, Japan, the United States, and Italy. In 1985, PLAN International provided training to help weavers diversify their production, and currently they make items such as hats, placemats, and cribs. Also, another local intermediary has started a workshop that employs ten permanent labors. So, since the late 1970s, this form of self-employment has made a gradual move towards being part of a home piecework
industry and, in some cases, wage labor. Thus, during the last forty years the local palm industry has undergone diversification and commercialization of products.

**Home piecework industry:** As just described, Espíritu Santo’s palm weaving industry, once considered self-employment, has gradually turned into piecework, with two intermediaries coordinating contracts for local weavers, who are paid by the piece and work in their homes filling specific orders. Similarly, in San Juan, work done previously in a cashew processing plant has shifted to piecework done in the home, usually by women. In the other two villages, Conacaste and Santo Domingo, outside industries have contracted local residents, mostly women, to work from their homes and be paid by the piece. From 1998–2001, a ribbon making *maquila* allocated part of its production to women in Conacaste. The industry that produces textile scrubs provides women in Santo Domingo with scraps of fabric that they in turn process into the scrubs, known as *wipe*. In all the above cases, the work is difficult, and the pay per unit time low.

### 7.7 Summary of livelihoods in the four villages

Subsistence agriculture was the main livelihood activity in all four villages in the 1960s, as it was for the majority of rural Guatemalans at that time. The two main characteristics that distinguished the four villages at that time, however, land quality and distance to towns and highways, have influenced how livelihood opportunities have evolved in such a way that by 2002, opportunities are different from what they were in the 1960s as well as across villages. The main change over time, common to all four study villages, is that subsistence agriculture is no longer a dominant component of livelihoods.

Commercial agriculture has had a defining influence on the villages. Since the late 1960s, three villages have experienced periods of rapid economic growth and infrastructure development during booms in local commercial agriculture: tobacco in Espíritu Santo, manioc in San Juan, and horticulture in Conacaste. In Espíritu Santo and Conacaste, the two villages where land quality is the highest and commercial agriculture has been more stable, its presence has generated agricultural wage labor which in turn became a very important component of livelihood strategies, at least until 1991 in Conacaste and 1998 in Espíritu Santo. The production of manioc and its starch in San Juan involved mostly family labor, and its demise in the 1980s led not only to economic stagnation but also to deterioration of village infrastructure. In these three towns, some villagers have resumed seasonal migration patterns that were common before the booms in local commercial agriculture—traveling to banana or tobacco plantations for agricultural wages during several months of the year.

The one village essentially untouched by commercial agriculture, Santo Domingo, is distinguished for transitioning to non-agricultural wage labor as the main livelihood activity the earliest of the four villages, in the early 1970s. This like reflects its status as the closest to both the Atlantic Coast highway and Guatemala City. In the 1970s and 1980s the most important employer of residents of Santo Domingo was the *Cementos Progreso* factory. In the 1980s, *Cementos Progreso* also began to hire men from Conacaste, the village with second easiest access to both the highway and Guatemala City. With improvements in village-level transportation and roads, and greater availability of work in *maquila* factories along the highway and in Guatemala City, non-agricultural wages are now an integral component of livelihood strategies in all four villages, although perhaps less so in Espíritu Santo given it is the only village from which a daily commute to Guatemala City is not feasible.
Of the four villages, Espíritu Santo was the pioneer in small business activity, specifically one for which it is famous, the elaboration of woven palm products. This activity was, and remains, a very important income-generating activity for the people here. Other small business activities have been common to all four villages. For example, after the 1976 earthquake, many masons went into business for themselves, helping to rebuild their villages. More recently, there has been an increase in the number of small retail stores in the villages, presumably due in part to a greater cash flow from outside wage income and consequent greater demand for commercial products.

Many of these activities in the informal labor market are dominated by women: elaboration of palm products, sale of retail products, and sale of homemade items such as prepared dinners or snacks. Additionally, many women engage in piecework, an activity that is usually poorly remunerated, so that they can generate income while staying at home. Historically, women have also traveled away from the villages to be domestic servants, but at least for the younger more educated generations this pattern is changing such that women are now engaging in better-paid formal sector labor in maquilas or other employers in more urban areas.

8. Conclusions

Original differences in the agroecologies and locations of the four study villages of the INCAP Longitudinal Study (1969–77) have shaped their economic development over the past 35 years, leading to further important differences. Relative progress in infrastructure and service provision, however, did not always match the economic progress of village residents.

Santo Domingo and Espíritu Santo are good examples of this pattern. While livelihoods in Santo Domingo are dominated by high paying wages from non-agricultural urban jobs, infrastructure and services have not entirely reflected this seeming prosperity. Santo Domingo was the last village to receive within home water and electricity. It was also the last village to establish its own health clinic, which subsequently was very poorly staffed. Importantly, Santo Domingo did develop what was most vital to providing economic opportunity to its inhabitants, its road and transportation network. In fact, the case can be made that perhaps development of other infrastructure here was delayed because fully half of the adult inhabitants (the men) were enjoying outside services during their work week. Neglect of within village health services may be explained by availability of outside health services that were easily reached and arguably superior. Similarly, schooling infrastructure development might also have been driven by outside forces—the feasible option of secondary schooling and then a formal sector job was often just a bus ride away.

Espíritu Santo, on the other hand, is largely isolated from the economic opportunities available in and around Guatemala City. Until 1998, agricultural wage work and production of palm products sustained the population, albeit at an apparently inferior level of prosperity than in the mountain villages. At the same time, the development of village infrastructure and services has been superior here relative to the other three villages. The agri-businesses that until 1998 were the largest employers of village residents, provided support for infrastructure development, and a municipal tax on tobacco sales seems to have also financed many of the projects that made Espíritu
Santo a leader in development of infrastructure and services among the four villages. Finally, its proximity to El Jicaro, the municipal capital, has made many more services available to its residents earlier than in the other villages. Health and secondary schooling services one kilometer away in El Jicaro were available to residents of Espíritu Santo through much of the 1970s, when residents of the mountain villages were still walking four to eight kilometers to the nearest secondary school or health clinic. Espíritu Santo was the first of the four villages to receive within home water and electricity.

The somewhat more insulated village of San Juan does not display this same tension between economic development and progress in infrastructure and services. Most improvements in infrastructure and services occurred during the short-lived manioc boom. Economic stagnation and the deterioration of infrastructure came hand in hand during the 1980s after the fall of that agricultural industry. With improvements in transportation during the 1990s, however, San Juan is beginning to take advantage of some of the same outside opportunities to which residents of Santo Domingo have had access to since the 1970s.

Finally, Conacaste demonstrates the most balanced development among the four villages, showing relatively steady progress in infrastructure, services, and economic development. While it also suffered a bust in its commercial agriculture, it enjoyed much better road and transportation infrastructure and thus access to the outside, enabling a smoother transition to more reliance upon urban non-agricultural wages. Currently, Conacaste is the most economically diversified of the four villages. Several residents still participate in own-commercial agriculture. Many work in Cementos Progreso and other outside non-agricultural wage jobs. Women from Conacaste maintain a reputation from the cooperative era for being good agricultural workers, and thus participate in agricultural wage labor in and around Sanarate. Finally, as in the other four villages, small businesses have flourished in recent years. Conacaste has always had modest and well-maintained road infrastructure, enjoying some recent improvements. Health services have always been relatively good, preschool and kindergarten availability has been the best here, and quality of primary schooling is improving. To some extent, Conacaste enjoys aspects of both worlds—close enough to economic opportunity (in the capital) to recover and prosper after a bust in commercial agriculture and yet far enough away to require development of its own infrastructure and services.
9. References


