HOUSEHOLD FOOD SECURITY AND DIETARY DIVERSITY IN THE CONTEXT OF AN AGRICULTURAL AND MARKET DEVELOPMENT PROGRAM IN GUATEMALA

BY

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DISSEPTION

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ABSTRACT

Household food insecurity results when safe and nutritious food is not available, cannot be accessed in socially acceptable ways, or is not physiologically utilized completely. World Food Program’s (WFP) Purchase for Progress (P4P) is a pilot initiative that provides access to food markets and promotes agricultural productivity for over one million low-income smallholder farmers worldwide (>7,000 in Guatemala alone). P4P combines novel market development strategies with investments in capacity building in an effort to sustainably boost national food security and improve livelihoods. The objective was to characterize the main determinants of household food security and dietary diversity in the context of an agricultural and market development program in Guatemala. We compared food security and dietary diversity between P4P beneficiaries and a control group. We evaluated household conditions, food security (ELCSA), and dietary diversity (HDDS) in 372 households (271 P4P; 101 control) using a cross-sectional design and mixed-methods. Most Significant Change (MSC) methodology was used to characterize participants' experiences in a subset sample of 57 households (46 P4P; 11 control). Education level (EL), number of children (NC), household quality (HQS), food security (FSS), carotenoid-rich foods (VAS), and dietary diversity for households (HDDS), women (WDDS), children (IDDS), and normalized (HDDSn) were calculated from quantitative data. MSC interviews were transcribed verbatim. Interview transcripts were analyzed according to the principles of grounded theory, using open, axial and selective coding (NVivo ver. 9.2 and 10) which involved breaking down, examining, comparing, labeling, categorizing and integrating data into pre-determined and emerging categories. Connections among categories were established according to a coding paradigm comprising observed conditions, context, action/interactional strategies and consequences. We constructed and linked program impact pathways (PIP) based on a mixed-methods. Each pathway factor was laid out along the hypothesized PIP using as blueprints P4P’s program theory and current conceptual frameworks linking agriculture, food security and nutrition. Factor inclusion was supported by evidence from three sources: our study, P4P’s monitoring and evaluation, and current literature. A six-step process integrated information: data weighting, entry, preparation, analysis, interpretation and final integration. P4P participants were less food insecure (FSS=7.4±4.4 vs. 9.2±3.1; p<0.01), had increased VAS (p<0.01), overall and normalized dietary
diversity (HDDS=8.9±1.8 vs. 7.0±1.8). HDDS was also higher among women and children (p<0.01). Among P4P participants, food security was associated (p<0.05) with education level (r=0.23). Dietary diversity was associated (p<0.05) with education level (r=0.23) and number of children (r= −0.17). Among controls, food security was associated (p<0.05) with dietary diversity (r=0.53), housing quality (r=0.61), and number of children (r= −0.23). Also, among P4P participants food security and dietary diversity were different (p<0.05) across funding agencies, States, and farmers’ organizations. After content analysis of MSC statements, a total of 24 conceptual categories encompassing 58 subcategories of concepts were generated. Four conceptual categories and thirteen subcategories were relevant in describing food security and dietary diversity among P4P beneficiaries and controls: 1) Contextual settings: physical, social, governance, legal and economic; 2) Resources: time and capital; 3) Agricultural processes: contextual settings (household), resources, crop diversification and production practices; 4) Empowerment strategies: women and general. P4P promotes household food security and dietary diversity among smallholder farmers by enabling four PIPs: income, agricultural productivity via crop diversification and production practices, market access, and empowerment strategies. PIP research illustrates the role of P4P activities in underpinning nutrition security, specifically by supporting food security and dietary diversity among smallholder farmers in Guatemala. Results support the impact of agricultural and market development interventions such as the Purchase for Progress Program, and confirm its positive effect on food security and dietary diversity; which are perceived as important elements in improving livelihoods of smallholder farmers in Guatemala.
To the loving memory of Patricia Palma
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CHAPTER 1
OVERVIEW

1.1. Introduction

The present research explores determinants of food security and dietary diversity in the context of an agricultural and market development program in Guatemala. Global hunger and food insecurity have increased in the last decade. It is estimated that 30-40% of the world's population is currently suffering from one or more forms of malnutrition, including inadequate caloric and protein intake and poor diet quality, specially one lacking micronutrients (FAO, 2011b; FAO, WFP, & IFAD, 2012). Approximately 870 million people worldwide are undernourished or chronically food insecure (Guha-Khasnobis, Acharya, & Davis, 2007). Maternal and child undernutrition are the underlying causes of 3.5 million deaths annually, 35% of the disease-burden in children younger than 5 years, and 11% of total global disability-adjusted life-years (WFP, 2013). The cost of the resulting incapacities and deaths due to food insecurity and poor diets represent 5% of the Gross National Product (GNP) in developing countries (FAO, 2011b). Policy makers and academics increasingly recognize the role of appropriate nutrition and food security in supporting health (M. T. Ruel, 2010). These together are critical factors when investing in human capital development, one that raises output as well as the returns to investments in education and health care (Revoredo-Giha, 2009). Several studies in developing countries have demonstrated the benefits of investments in development programs that target areas such as agriculture, water and irrigation systems, agricultural education, market development and the reduction of poverty, along with improvements in food security and hunger reduction (Hanjra, Ferede, & Gutta, 2009a;
Studies conducted in Asia (Huang, Richard, & Chang, 2009); Africa (Babatunde & Qaim, 2010; Stage & Rekve, 1998); and Latin America (Cavatassi et al., 2011; Immink & Alarcon, 1993) provide significant evidence that public spending on programs targeting hunger reduction is an investment with high returns and should constitute a top priority in national development agendas. Because of this, one of the main drivers for the recent surge in international investments in food production systems is the issue of food security (FAO, 2011b).

Household food security is an important measure of wellbeing (Hoddinott, 2011). Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2011). Food security is an interdisciplinary concept with relevance to numerous economic, political, and social considerations. Because reliable information guides action, many of the current research efforts focus on improving food insecurity measurement and fostering a deeper understanding of this global issue (Maxwell, 1996). Dietary diversity is a concept directly associated with food security and is often used as a complementary measure (M. Ruel, 2003). Dietary diversity is defined as the number of individual food items or food groups consumed over a given period of time (G. Kennedy, Ballard, & Dop, 2011). Nutritionists have long recognized dietary diversity as a key element of high-quality diets. Increasing the variety of foods across and within food groups is recommended by most dietary guidelines in the United States as well as internationally, because it is thought to ensure adequate intake of essential nutrients and thus to promote good health (Ruel, 2003).
A threefold challenge now faces the world: (1) Match the rapidly changing demand for food from a larger and more affluent population to its supply; (2) do so in ways that are environmentally and socially sustainable; and (3) ensure that the world’s poorest people are no longer hungry. This challenge requires radical changes in the way food is produced, stored, processed, distributed, and accessed (Godfray et al., 2010). Agricultural growth is particularly effective in promoting economic growth and reducing hunger and malnutrition; but this process should be “nutrition-sensitive” (FAO, 2012). To potentiate and accelerate this process, economic growth needs to be accompanied by purposeful and decisive public action (FAO, 2011; FAO, 2012; Godfray et al., 2010), along with programs that create a context-relevant and conducive environment for long-term economic growth, especially for the poor.

1.2. Research Aims and Objectives

The overall objective of this research is to enhance our understanding of the main determinants of food security and dietary diversity in developing countries. The knowledge generated with this research will contribute to the expanding body of knowledge on the context-specific nature and determinants of food security and dietary diversity. By generating a better understanding of this complex phenomenon, this research will also contribute to the design and implementation of more effective programs and policies aimed at improving food security and the nutritional status of populations in developing nations. The main objective of this study is to characterize the principal determinants of household food security and dietary diversity in the context of an agricultural and market development program in Guatemala.
Specific Aim 1: Characterize household food security and dietary diversity among smallholder farmers in Guatemala. We compared food security and dietary diversity among smallholder farmers in Guatemala, who were either beneficiaries of an agricultural and market development program or part of a control group.

Specific Aim 2: Identify the main determinants of household food security and dietary diversity among Guatemalan smallholder farmers in the context of an agricultural and market development program. The potential association among current indicators of food security and dietary diversity were explored. Qualitative methodologies were used to characterize participants’ experiences. Information generated with this approach was used to elucidate the main Program Impact Pathways (PIPS).

This study provides unique insights and will contribute to better understand the context-specific reality of those suffering from food insecurity. Information generated in this study also contributes to the limited body of knowledge on program impact pathways and the use of qualitative methodologies to study food security. Results broaden our knowledge and offer a better understanding of the contributions of agricultural and market development interventions to food security and dietary diversity in developing countries. We expect that this collective knowledge will be used to guide the development and implementation of future policies and programs aimed at improving food security, diet diversity and overall livelihoods of smallholder farmers in developing nations.
1.3. Background, Rationale and Significance

Food insecurity is a daily reality for hundreds of millions of people and a growing concern worldwide. Since the late 1980s, a gradual decline in investment and official development assistance to agriculture was in some ways offset by economic growth in Asia and Latin America. This contributed to a steady decline in the proportion of undernourished people in developing countries (WFP, 2013). As food prices nearly doubled from 2006 to 2008, the number of people suffering from hunger and food insecurity increased significantly, which by the end of 2009 was estimated to be over a billion people in the world (Bermudez, deFulladolsa, Deman, & Melgar-Quinones, 2010). After decades of a steady drop in investments in agriculture, there is now a renewed interest in food security as one of the key themes in international development cooperation. Governments and funding agencies have progressively committed more aid to agriculture and food assistance programs, reaching almost $9 billion in 2010 (FAO, 2011). This interest has translated to an urgent need to understand the current determinants of food security and the interventions that are most effective in promoting it.

The Purchase for Progress (P4P) Program. The approach of the P4P assumes that participant households may increase their incomes by selling more (because of increased production or reduced losses) or getting a higher return (because of better markets, higher quality, aggregation, better marking skills, reduced production costs or better marketing information) and that these changes will positively impact their quality of life (P4P, 2011). Although a limited number of studies have looked at the relationship between the proposed hypothesis of increased income (Amalu, 2002; Babatunde & Qaim, 2010; E. Kennedy & Haddad, 1992) and/or farmers’ self-sufficiency (Appendini & Liverman,
1994; Barkin, 1987; Elmulthum, Awaad, & Elamin, 2011; Hanjra, Ferede, & Gutta, 2009b; Huang et al., 2009; Kelly, Adesina, & Gordon, 2003; Magnan, Lybbert, McCalla, & Lampietti, 2011; Ritson, 1980; Stage & Rekve, 1998) and improvements in nutritional status, food safety and diet diversity, still more research is needed to understand how agricultural and market development programs effectively influence these changes.

**Challenges of measuring household food security.** Food security exists “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. This definition, supported by the ethnographic research (Frongillo, Chowdhury, Ekström, & Naved, 2003; A. M. Hamelin, Beaudry, & Habicht, 2002; A. Hamelin, Mercier, & Bédard, 2010; Radimer, Olson, & Campbell, 1990; Radimer, Olson, Greene, Campbell, & Habicht, 1992; Wolfe & Frongillo, 2001) suggests that food insecurity is experienced when there is: 1) uncertainty about future food availability and access; 2) insufficiency in the amount and kind of food required for a healthy lifestyle; and/or, 3) the need to use socially unacceptable ways to acquire food. In many developing countries household-level food insecurity and other proxy measures (diet diversity and nutrient adequacy) are still understood, measured, and responded to as a one-dimensional problem of insufficient food quantity (Webb et al., 2006). This has led to a growing demand for measures that more accurately reflect the experiences of households faced with the difficulties of accessing food (M. T. Ruel, Deitchler, & Arimond, 2010). Consequences of uncertainty, insufficiency, and social unacceptability are assumed to be part of the experience of food insecurity. Typically, uncertainty leads to concern and anxiety. Feelings of alienation and deprivation, distress, and adverse changes in family and social
interactions also occur (Frongillo et al., 2003; A. Hamelin et al., 2010). The concept of food security goes beyond biological constructs to include coping mechanisms; even when food insecurity does not have immediate biological consequences (Habicht, Pelto, Frongillo, & Rose, 2004). Management strategies that households use to prevent or act upon the experience of food insecurity are conceptually different from food insecurity but are directly tied to experience of food security (National Research Council, 2011). Therefore, to understand the complex nature of food security requires a better understanding of the intricacies of livelihood strategies, household dynamics and the different coping mechanisms of the food insecure.

Current household food insecurity scales provide a useful summary to program officers and/or policy makers to tailor programs at the population level, monitor the household food insecurity and diet diversity situation in an area over time, and for evaluating the broader impact of interventions (FAO, 2012). Because of the nature and constraints of a single one-dimensional scale, however, rich detail about important elements of the household experience is likely to remain unknown, discarded or lost in the aggregation. Households become food insecure when they are unable to mitigate negative shocks to, or erosion of, food availability, access, and/or utilization (Webb et al., 2006). Insecure households make essentially rational decisions with a view not only to survival but also to the protection of assets and potential longer-term income streams (Coates et al., 2006b). But the ways in which households manage the process of disinvestment of assets or reduce their food intake or even take greater risks to obtain income do not lend themselves to conventional measures of the stock or flow of physical goods (as reflected in cash income, the price of goods, or nutritional status). As a result, the recent search
for measures of access failure has focused increasingly on iconic household behaviors that are known to reflect not only increased severity in food stresses but also the actual experience of becoming food insecure.

**Qualitative Evaluation.** The most significant change (MSC) is a participatory methodology that uses an inductive approach that involves the systematic collection, analysis and selection of “significant change” stories (Davies & Dart, 2007a). It focuses on what and why most significant changes have occurred. The Most Significant Change, within the framework of development programs such as P4P, facilitates project and program improvement by focusing the direction of work away from less-valued directions toward more fully shared visions and explicitly valued directions. In the context of this study it was used to help uncover important, unknown and potentially valuable outcomes not initially sought by program developers. Thus, MSC can be used to create a space for reflection and self-expression and to facilitate a dynamic dialogue among multiple program stakeholders. The methodology of the Most Significant Change and its outcomes are well suited to be used in programs like P4P that have a diverse, complex set of outcomes (e.g., increasing income, reducing poverty, support food security, etc.) with multiple stakeholders groups and financing agencies (Davies & Dart, 2007a; Kotvojs & Lasambouw, 2009). Information generated with this approach could be used to better understand and contrast the determinants of food security for those benefiting from agricultural and market development programs. Qualitative data collected from MSC complement quantitative data on food security collected using ELCSA, HDDS and other indirect indicators. The data from MSC have helped us better understand and construct a context-specific view of the food security situation for P4P.
beneficiaries. It also brought the unique perspective of different members of the P4P/WFP organization, from field personnel to administrators and decision-makers. Their collective vision of the “most significant changes” was contrasted and compared with the vision of those benefiting from the program. *Although used in other applications, to the best of the researchers’ knowledge, MSC has not been used to evaluate food security in the context of agricultural and market development programs*.

*Payoff.* Results from this project contribute to generate a better understanding of the main determinants of food insecurity for those benefiting from agricultural and market development programs in developing countries. This information adds to the limited body of knowledge on the relationship between intra and extra-household factors and food insecurity and dietary diversity. Within this context, information generated with this study will be useful in determining important elements of household dynamics that are related to the experience of food insecurity. Results also provide a better understanding of how agricultural and market development programs affect the multiple constructs of food security, and dietary diversity in developing countries. An integrative analysis of both qualitative and quantitative results was used to elucidate important program impact pathways. This will contribute to our understanding of the main mechanisms by which an agricultural and market development intervention affects food security and dietary diversity in developing countries. Data from this study will help guide the development and implementation of future policies and programs aimed at reducing food insecurity and improving dietary diversity.
1.4. Thesis Structure

This thesis is presented in six chapters. Following this overview (Chapter 1), a comprehensive review of existing literature is presented in Chapter 2 to highlight the background and rationale for this research and to introduce the theoretical framework for the results presented in subsequent chapters. Chapters 3 and 4 present the methods and results for components (aims) 1 and 2 of this research. Results from Chapter 3 characterize current household food security and dietary diversity among smallholder farmers in Guatemala. Participants belong to either an agricultural and market development program or a control group. Chapter 4 builds-up on this characterization and introduces qualitative information on the main determinants of household food security and dietary diversity for program beneficiaries and those in the control group. It is important to note that the results in Chapter 3 provide the functional framework for the subsequent analysis of the information presented in Chapter 4. Results draw fundamentally on descriptive summaries of the research findings and integration of secondary information from P4P’s measuring and evaluation system, as this research adopts an integrated design. The approach to mixed methods in this research integrates the findings at the level of analysis and the development of conclusions (Greene, 2007). Specifically, in Chapter 5 the findings from Chapters 3 and 4 are integrated to identify a hierarchy of factors important for food security and dietary diversity and to develop a set of mixed methods inferences for this research. Results are integrated into four program-impact pathways and a conceptual framework. Chapter 6 presents the overall conclusions and implications of this research. It also provides an analysis of the main strengths and limitations of this research and future directions.
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CHAPTER 2
LITERATURE REVIEW

2.1. Introduction

World hunger is severe. Nearly 30 per cent of the world's population is currently suffering from one or more forms of malnutrition, including inadequate caloric consumption, protein deficiency, poor dietary quality, and inadequate concentrations of protein and micronutrients (FAO et al., 2012). World hunger, according to the 2012 Global Hunger Index (GHI), has declined somewhat since 1990 but remains “serious.” The global average masks dramatic differences among regions and countries. Good nutrition is increasingly understood as an investment in human capital that raises output as well as the returns on investments in education and health care (Revoredo-Ghia et al., 2009). There is ample evidence that public spending in reducing hunger and poverty along with strategies aimed at promoting sustainable economic growth are investments with high returns and should constitute a top priority in developing countries. In order for economic growth to enhance the nutrition of the neediest, the poor must participate in the growth process and its benefits: (1) growth needs to involve and reach the poor; (2) the poor need to use the additional income for improving the quantity and quality of their diets and for improved health services; and (3) governments need to use additional public resources for public goods and services to benefit the poor and hungry (FAO, 2012). Economic and agricultural growth should be “nutrition-sensitive”. Growth needs to result in better nutritional outcomes through enhanced opportunities for the poor to diversify their diets; improved access to safe drinking water and sanitation; improved access to health services; better consumer awareness regarding adequate nutrition and child care
practices; and targeted distribution of supplements in situations of acute micronutrient deficiencies. Good nutrition, in turn, is key to sustainable economic growth (FAO, 2012; Godfray et al., 2010). Because of this, one of the main drivers for the recent surge in international investment in food production systems appears to be the issue food security and a fear that dependence on world markets for foods supplies or agricultural raw materials has become more risky (IFPRI, 2013; FAO, 2011). Agricultural growth is particularly effective in reducing hunger and malnutrition. Most of the extreme poor depend on agriculture and related activities for a significant part of their livelihoods. Agricultural growth involving smallholders, especially women, will be most effective in reducing extreme poverty and hunger when it increases returns to labor and generates employment for the poor (FAO, 2012; von Grebmer et al., 2012). Several studies have demonstrated the link between investments in agricultural programs, water and irrigation systems, agricultural education programs, market interventions and the reduction of poverty, improvements in food security and hunger reduction in developing countries (Kelly et al., 2003; Hanjra et al., 2009; Xu et al., 2009). Social protection is concerned with preventing, managing, and overcoming situations that adversely affect people’s wellbeing (Cook, 2010); and is crucial for accelerating hunger reduction. First, it can protect the most vulnerable who have not benefited from economic growth. Second, social protection, properly structured, can contribute directly to more rapid economic growth through human resource development and strengthened ability of the poor, especially smallholders, to manage risks and adopt improved technologies with higher productivity. To accelerate hunger reduction, economic growth needs to be accompanied by purposeful and decisive publication. Public policies and programs must create a
conducive environment for pro-poor long-term economic growth (von Grebmer et al., 2012). Key elements of enabling environments include provision of public goods and services for the development of the productive sectors, equitable access to resources by the poor, empowerment of women, and design and implementation of social protection systems. An improved governance system, based on transparency, participation, accountability, rule of law and human rights, is essential for the effectiveness of such policies and programs (FAO, 2012; von Grebmer et al., 2012).

2.2. The state of food and nutrition security in the world

The past half century has seen marked growth in food production, allowing for a dramatic decrease in the proportion of the world’s people that are hungry (Godfray et al., 2010). Nevertheless, worldwide approximately 870 million people are estimated to have been undernourished (in terms of dietary energy supply) in the period 2010–12. This Figure represents 12.5 percent of the global population, or one in eight people. The vast majority of these, 852 million, live in developing countries, where the prevalence of undernourishment is now estimated at 14.9 percent of the population (FAO, 2012). As many as 2.8 million children and 300,000 women die needlessly every year because of malnutrition in developing countries (Guha-Khasnobis et al., 2008). Improvements in data collection methodology indicate that the number of undernourished people in the world is estimated to have declined more steeply than previously estimated until 2007, although the rate of decline has slowed thereafter (FAO, 2012). The new numbers of hungry people paint only a slightly more optimistic picture of the undernourished population (Figure 1). The new estimates show that developing countries made significant and constant progress in reducing chronic undernourishment until 2007—
when progress slowed—and are closer than previously believed to reaching the Millennium Development Goal of halving the prevalence of undernourishment by 2015. Regionally, the highest Global Hunger Index (GHI) scores are in South Asia and Sub-Saharan Africa. South Asia reduced its GHI score significantly between 1990 and 1996—mainly by reducing the share of underweight children—but could not maintain this rapid progress (IFPRI, 2013).

Figure 1. Estimates and projections of undernourished people worldwide, 1990–2015 (IFPRI, 2013)

Twenty countries still have levels of hunger that are “extremely alarming” or “alarming.” Most of the countries with alarming GHI scores are in Sub-Saharan Africa and South Asia. Two of the three countries with extremely alarming 2012 GHI scores—Burundi and Eritrea—are in Sub-Saharan Africa; the third country with an extremely alarming score is Haiti (von Grebmer et al., 2012; Grebmer et al., 2011). Regionally, the rate of progress in the reduction of undernourishment has been higher in Asia and the Pacific and in Latin
America and the Caribbean (FAO, 2012; IFPRI, 2012). Considerable differences among regions and countries remain a reduction in both the number and proportion of undernourishment in Asia and the Pacific has continued in recent years, meaning that the region is almost on track for achieving its MDG hunger target. The same holds true for Latin America and the Caribbean. South-Eastern Asia has shown the most rapid reduction (from 29.6 to 10.9 percent), followed by Eastern Asia and Latin America (FAO, 2012). Undernourishment in sub-Saharan Africa has improved, but less rapidly, while Western Asia has seen an increase in the prevalence of undernourishment over this period. Different rates of progress have led to significant changes in the distribution of the undernourished in the world between 1990–92 and 2010–12 (Figure 2). The share of the world’s undernourished people has declined most rapidly in South-Eastern Asia and Eastern Asia (from 13.4 to 7.5 percent and from 26.1 to 19.2 percent, respectively), while declining from 6.5 to 5.6 percent in Latin America. Meanwhile, the share has increased from 32.7 to 35.0 percent in Southern Asia, from 17.0 to 27.0 percent in sub-Saharan Africa and from 1.3 to 2.9 percent in Western Asia and Northern Africa (FAO, 2012; WFP, 2013). For developing countries as a whole, the prevalence of undernourishment has fallen from 23.2 to 14.9 percent over the period 1990–2010, while the incidence of poverty has declined from 47.5 to 22.4 percent, and that of child mortality from 9.5 to 6.1 percent (WFP, 2013).
Behind these regional divergences stand markedly different capacities to deal with economic shocks (such as price increases and economic recessions), including vastly different levels of vulnerability in the face of global recession and differences in the ability to take advantage of higher prices through increased supply response, depending on market infrastructure, technology levels and natural resource endowments (IFPRI, 2013). The experience of recent years has demonstrated that the consequences of food price rises and other economic shocks are diverse and complex, involving more than simply total dietary energy intake; they range from a deterioration of dietary quality to possible cuts in other types of consumption that are fundamental for human development and growth in both the short and longer term (FAO, 2012; WFP, 2013).

### 2.2.1. The State of food and nutrition security in Latin America

Hunger currently affects 868 million people worldwide, 49 million of which live in Latin America and the Caribbean. This means that 8.3% of the population in this region does not consume the recommended daily needed for a healthy life (FAO, 2012). In Latin America and the Caribbean some progress has been made in the last decade. Between 1990-1992 and 2010-2012 there was a 24.9% reduction in the total number of

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**Figure 2.** Number of undernourished by Region, 1990-1992 and 2010-2012 (FAO, 2012)
hungry people. This means that 16 million people in the region were no longer classified as undernourished between 1990-1992 and 2010-2012. Between 1990-1992 and 2007-2009 the average rate of decline was of 8.4%, while the decline for 2010-2012 was only 2% (FAO, 2012). This may reflect mainly the impact of the global economic crisis and the slowdown in the growth of economies of the region. The countries most affected by hunger in the region are Haiti (with a prevalence of 44.5%), Guatemala (30.4 %), Paraguay (25.5%), Bolivia (24.1%), and Nicaragua (20.1%) (FAO, 2012; WFP, 2013). In these countries, the prevalence of chronic malnutrition - that is, low height for age- in children under 5 years is 29.7% (2006), 48% (2009), 17.5% (2005), 27.2% (2008) and 23% (2007) respectively (FAO, 2012). Cuba, Argentina, Chile, Mexico, Uruguay and Venezuela have managed to eradicate the scourge of hunger, while Caribbean countries like the Dominican Republic and Haiti, and other Central American nations like Guatemala, have stagnated or slowed reducing hunger (FAO, 2012). Many of the countries have reduced the proportion of hungry people, including notably Brazil, where hunger fell sharply in absolute and relative terms (Table 1).

Table 1. Evolution of hunger in Latin America and the Caribbean.

<table>
<thead>
<tr>
<th>Country</th>
<th>1990-92</th>
<th>2007-09</th>
<th>2010-12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Latin America and the Caribbean overall</strong></td>
<td>14.2%</td>
<td>8.7%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Caribbean</td>
<td>28.5%</td>
<td>18.6%</td>
<td>17.8%</td>
</tr>
<tr>
<td>Cuba</td>
<td>11.5%</td>
<td>&lt; 5%</td>
<td>&lt; 5%</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>30.4%</td>
<td>15.9%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Haiti</td>
<td>63.5%</td>
<td>46.8%</td>
<td>44.5%</td>
</tr>
<tr>
<td><strong>Latin America</strong></td>
<td>13.6%</td>
<td>8.1%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Argentina</td>
<td>&lt; 5%</td>
<td>&lt; 5%</td>
<td>&lt; 5%</td>
</tr>
<tr>
<td>Bolivia</td>
<td>34.6%</td>
<td>27.5%</td>
<td>24.1%</td>
</tr>
<tr>
<td>Brazil</td>
<td>14.9%</td>
<td>7.8%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Chile</td>
<td>8.1%</td>
<td>&lt; 5%</td>
<td>&lt; 5%</td>
</tr>
</tbody>
</table>

Continues
<table>
<thead>
<tr>
<th>Country</th>
<th>1st Column</th>
<th>2nd Column</th>
<th>3rd Column</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>19.1</td>
<td>12.5</td>
<td>12.6</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
<td>6.5</td>
</tr>
<tr>
<td>Ecuador</td>
<td>24.5</td>
<td>19.6</td>
<td>18.3</td>
</tr>
<tr>
<td>El Salvador</td>
<td>15.6</td>
<td>11.3</td>
<td>12.3</td>
</tr>
<tr>
<td>Guatemala</td>
<td>16.2</td>
<td>30.2</td>
<td>30.4</td>
</tr>
<tr>
<td>Honduras</td>
<td>21.4</td>
<td>11.6</td>
<td>9.6</td>
</tr>
<tr>
<td>Mexico</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>55.1</td>
<td>23.9</td>
<td>20.1</td>
</tr>
<tr>
<td>Panama</td>
<td>22.8</td>
<td>13.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Paraguay</td>
<td>19.7</td>
<td>16.8</td>
<td>25.5</td>
</tr>
<tr>
<td>Peru</td>
<td>32.6</td>
<td>15.9</td>
<td>11.2</td>
</tr>
<tr>
<td>Uruguay</td>
<td>7.3</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Venezuela</td>
<td>13.5</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
</tr>
</tbody>
</table>

\(^1\)FAO, 2012b. \(^2\)Proportion of people suffering hunger compared to total population. \(^3\)Indicated proportion of people suffering hunger is less than 5% of total population.

Many of the aspects that condition for food insecurity and particularly malnutrition and undernourishment are both a consequence and the cause of poverty for the majority of people in developing countries. For this reason, nutritional status indicators at the population level strongly correlate with the poverty index. Poverty is usually considered a strong predictor of nutritional status and vice versa (FAO, 2011).

Extreme poverty in the region has a similar spatial distribution to that observed for the indicators of undernutrition and malnutrition, and it behaves in a similar fashion over time. These phenomena are concentrated in Central America and in some Andean countries such as Peru, Bolivia and Ecuador. Moreover, Chile and Costa Rica show generally good results and correlation for all three indicators considered (FAO, 2013).
2.3. Food and nutrition security in Guatemala

2.3.1. Population and poverty

Guatemala is a Central American country that has improved some of its socioeconomic indicators over the past 15 years; however, nutrition is a factor that remains underdeveloped (Loewenberg, 2009). Guatemala is ranked 177 out of total of 182 countries on the Human Development Index (HDI). It is a medium-low income country with a per capita GDP of USD 2,576 and a Gini coefficient of 55, making it one of the countries with the least equitable incomes distribution. It has a population of just fewer than 14 million, 34 percent of whom are under 14 years of age (WFP, 2010). Seventy-two percent of the poor populations, who account for 75 percent of the indigenous population, are concentrated in the rural areas. 1.3 million households, accounting for one-half of the total national population, are rural. Of these households, 83 percent depend on agriculture and livestock as their only source of income and 38 percent have no cropland of their own (FAO, 2012; WFP, 2010). The country comprises 23 linguistic communities, 51 percent of the population are classified as poor, and 15 percent extremely poor. Malnutrition is concentrated among the poor, the least educated households, the rural and sub-urban populations, and indigenous people. The prevalence of chronic malnutrition is almost twice as high among children of indigenous families (58%) compared to children of non-indigenous families (32 percent). In Guatemala, 64 percent of extremely poor and 53 percent of all poor children are stunted, while the corresponding figure for the non-poor is 28 percent (Robles and Keefe, 2011).
2.3.2. The state of food and nutrition security in Guatemala

Guatemala has among the lowest food security indicators in the world (Tables 2 and 3); not only is the prevalence of chronic malnutrition in Guatemala (48% in 2009) much higher than in any other country in Latin American and the Caribbean region, but also the highest among all countries in the world for which reliable information is available (WFP, 2012; Marini and Gragnolati, 2003). It is estimated that the prevalence of vitamin A deficiency and Iron Deficiency Anemia (IDA) in young children (<5 years of age) is 37% and 60%, respectively (Loewenberg, 2009). Chronic malnutrition among children is the main effect of food insecurity affecting the vulnerable households affected by adverse natural events. The cost of the repercussions of food insecurity on the health, growth and cognitive development of the human being in Guatemala is equivalent to 11.4 percent of the annual GDP (Nicolò et al., 2006).

Table 2. Overall Food Security Index (FSI) Guatemala – 2012¹.

<table>
<thead>
<tr>
<th>Overall Score</th>
<th>Score/100</th>
<th>Country Average²</th>
<th>Rank / 105³</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Affordability</td>
<td>43.3</td>
<td>52.9</td>
<td>60</td>
</tr>
<tr>
<td>2. Availability</td>
<td>49.4</td>
<td>53.8</td>
<td>55</td>
</tr>
<tr>
<td>3. Quality and Safety</td>
<td>48.4</td>
<td>56.5</td>
<td>63</td>
</tr>
</tbody>
</table>

¹Economist Intelligence Unit, 2012. ²Out of a 100 possible points. ³Based on data collected from a total of 105 countries.
Table 3. National Food Security Index (FSI) datasheet: Guatemala

<table>
<thead>
<tr>
<th>1. AFFORDABILITY</th>
<th>Unit</th>
<th>Data</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Food consumption as a share of household expenditure</td>
<td>% of total household expenditure</td>
<td>47.2</td>
<td>2006</td>
</tr>
<tr>
<td>1.2 Proportion of population under global poverty line</td>
<td>% of population living under $2/day PPP</td>
<td>26.3</td>
<td>2006</td>
</tr>
<tr>
<td>1.3 Gross domestic product per capita</td>
<td>US$ at PPP / capita</td>
<td>7,280</td>
<td>2011</td>
</tr>
<tr>
<td>1.4 Agricultural import tariffs</td>
<td>%</td>
<td>9.9</td>
<td>2010</td>
</tr>
<tr>
<td>1.5 Presence of food safety net programs</td>
<td>Qualitative assessment (0-4)</td>
<td>2</td>
<td>2012</td>
</tr>
<tr>
<td>1.6 Access to financing for farmers</td>
<td>Qualitative assessment (0-4)</td>
<td>2</td>
<td>2012</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. AVAILABILITY</th>
<th>Unit</th>
<th>Data</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Sufficiency of supply</td>
<td>kcal/capita/day</td>
<td>2,150</td>
<td>2007</td>
</tr>
<tr>
<td>2.1.2 Dependency on chronic food aid</td>
<td>Qualitative assessment (0-2)</td>
<td>2</td>
<td>2006-2010</td>
</tr>
<tr>
<td>2.2 Public expenditure on agricultural R&amp;D</td>
<td>% of agricultural GDP</td>
<td>1</td>
<td>2006-2011</td>
</tr>
<tr>
<td>2.3 Agricultural infrastructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3.1 Existence of adequate crop storage facilities</td>
<td>Qualitative assessment (0-1)</td>
<td>1</td>
<td>2012</td>
</tr>
<tr>
<td>2.3.2 Road infrastructure</td>
<td>Qualitative assessment (0-4)</td>
<td>1</td>
<td>Q4 2011</td>
</tr>
<tr>
<td>2.3.3 Port infrastructure</td>
<td>Qualitative assessment (0-4)</td>
<td>2</td>
<td>Q4 2011</td>
</tr>
<tr>
<td>2.4 Volatility of agricultural production</td>
<td>standard deviations</td>
<td>0.07</td>
<td>1990-2010</td>
</tr>
<tr>
<td>2.5 Political stability risk</td>
<td>Rating 0-100; 100=highest risk</td>
<td>45</td>
<td>2011 Q4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. QUALITY AND SAFETY</th>
<th>Unit</th>
<th>Data</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Diet diversification</td>
<td>%</td>
<td>48</td>
<td>2005-2007</td>
</tr>
<tr>
<td>3.2 Nutritional standards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.1 National dietary guidelines</td>
<td>Qualitative assessment (0-1)</td>
<td>1</td>
<td>2012</td>
</tr>
<tr>
<td>3.2.2 National nutrition plan or strategy</td>
<td>Qualitative assessment (0-1)</td>
<td>1</td>
<td>2012</td>
</tr>
<tr>
<td>3.2.3 Nutrition monitoring and surveillance</td>
<td>Qualitative assessment (0-1)</td>
<td>0</td>
<td>2012</td>
</tr>
<tr>
<td>3.3 Micronutrient availability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1 Dietary availability of vitamin A</td>
<td>Qualitative assessment (0-2)</td>
<td>1</td>
<td>2005-2007</td>
</tr>
<tr>
<td>3.3.2 Dietary availability of animal iron</td>
<td>mg/person/day</td>
<td>1.40</td>
<td>2005-2007</td>
</tr>
<tr>
<td>3.3.3 Dietary availability of vegetal iron</td>
<td>mg/person/day</td>
<td>11.70</td>
<td>2005-2007</td>
</tr>
</tbody>
</table>

(Continues)
Table 3 (Continued)

<table>
<thead>
<tr>
<th>Unit Data</th>
<th>Unit</th>
<th>Data</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4 Protein quality</td>
<td>Grams</td>
<td>41.21</td>
<td>2005-2007</td>
</tr>
<tr>
<td>3.5 Food safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5.1 Agency to ensure the safety and health of food</td>
<td>Qualitative assessment (0-1)</td>
<td>1</td>
<td>2012</td>
</tr>
<tr>
<td>3.5.2 Percentage of population with access to potable water</td>
<td>%</td>
<td>94</td>
<td>2008</td>
</tr>
<tr>
<td>3.5.3 Presence of formal grocery sector</td>
<td>Qualitative assessment (0-2)</td>
<td>2</td>
<td>2012</td>
</tr>
</tbody>
</table>

4. BACKGROUND VARIABLES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Data</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Prevalence of undernourishment</td>
<td>%</td>
<td>22</td>
<td>2006-2008</td>
</tr>
<tr>
<td>4.2.1 Percentage of children stunted</td>
<td>%</td>
<td>48</td>
<td>2009</td>
</tr>
<tr>
<td>4.2.2 Percentage of children underweight</td>
<td>%</td>
<td>13</td>
<td>2009</td>
</tr>
<tr>
<td>4.3 Intensity of food deprivation</td>
<td>kcal/person/day</td>
<td>230</td>
<td>2006-2008</td>
</tr>
<tr>
<td>4.4 Human Development Index</td>
<td>Rating 0-1</td>
<td>0.57</td>
<td>2011</td>
</tr>
<tr>
<td>4.5 EIU Women's Economic Opportunity Index</td>
<td>Rating 0-100; 100=most favorable conditions for women</td>
<td>55.60</td>
<td>2011</td>
</tr>
<tr>
<td>4.6 EIU Democracy Index</td>
<td>Rating 1-10; 10=most democratic</td>
<td>5.88</td>
<td>2011</td>
</tr>
</tbody>
</table>

1Economist Intelligence Unit, 2012

Acute malnutrition affects 0.9 percent of the population (ENSMI, 2009), the most seriously affected regions being the North-East (1.3 percent), the South-West (1.2 percent) and the North (1.1 percent). It is generally felt that acute malnutrition is most frequent and serious in the Eastern region of the country, particularly in the ‘Dry Corridor’, while chronic malnutrition is most prevalent in the Western region. Because of the great inequalities and differences in income and marginalization, it is the most vulnerable households that do not have the capacity to react, or mechanisms to re-establish their means of subsistence when affected by issues like poverty, natural disasters and others (De Janvry and Sadoulet, 2010; Nicolò et al., 2006). According to Nicolò et al., and Robles and Keefe the structural causes which compound the effects of
the natural events and limit the people’s ability to reestablish their life resources may partly be summarized as follows:

1. The cost of the food basket rising more steeply than the minimum vital wage (e.g., 1995-2000 and 2007-2009).
2. Inadequate access to assets: land, credit, education, housing, goods, basic services, which affects the most vulnerable families.
3. Limited financial resources of households suffering from food insecurity due to unstable and inadequate sources of income (as day laborers, or subsistence farmers) and a poor diet.
4. Inadequate dietary and child care practices, caused by low calorie consumption and a limited variety of foods

2.3.3. Determinants of Food and Nutrition Security in Guatemala

Malnutrition is the product of the interaction of many factors (Table 4), including individual and household decisions, community infrastructures, the cultural and natural environment in which individuals live, national policies, and international economic conditions (Loewenberg, 2009). Table presents these factors based on the Food Security Index (FSI).

Poverty. High rates of malnutrition jeopardize future economic growth by reducing the intellectual and physical potential of the population. Malnutrition, therefore, contributes to creating poverty. Conversely, poverty boosts malnutrition by reducing an individual’s access to food and increasing his/her exposure to disease. In Guatemala, 64 percent of extremely poor and 53 percent of all poor children are stunted, while the corresponding figure for the non-poor is 28 percent (Robles and Keefe, 2011).
**Disease.** Morbidities, especially diarrhea and respiratory infections, are both causes and consequences of malnutrition.

Table 4. Food security strengths and weaknesses for Guatemala based on FSI\(^1\)

<table>
<thead>
<tr>
<th>STRENGTHS (Scores 75 or more)</th>
<th>MODERATE (Scores 25 - 75)</th>
<th>WEAKNESSES (Scores less than 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food safety</td>
<td>96.0</td>
<td>Proportion of population under global poverty line</td>
</tr>
<tr>
<td>Agricultural import tariffs</td>
<td>86.7</td>
<td>Nutritional standards</td>
</tr>
<tr>
<td>Volatility of agricultural prod.</td>
<td>84.6</td>
<td>Agricultural infrastructure</td>
</tr>
<tr>
<td>Diet diversification</td>
<td>50.9</td>
<td></td>
</tr>
<tr>
<td>Presence of food safety net programs</td>
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<td></td>
</tr>
<tr>
<td>Access to financing for farmers</td>
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<td></td>
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<tr>
<td>Political stability risk</td>
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<tr>
<td>Sufficiency of supply</td>
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<td></td>
</tr>
<tr>
<td>Food consumption as a share of household expenditure</td>
<td>37.0</td>
<td></td>
</tr>
<tr>
<td>Micronutrient availability</td>
<td>32.5</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Economist Intelligence Unit, 2012

Stunting rates are much higher among children with frequent exposure to diarrhea or respiratory infections. Disease prevention and treatment, together with increasing the availability and improving the quality of water and sanitation are critical for fighting chronic malnutrition (WHO, 2013; WFP, 2013).

**Education and Literacy.** The level of education attained by adults in a household is among the most important determinants of children’s growth attainment. The positive impact of parents’ education on child height can operate through different mechanisms, which are normally unrelated to the school curriculum. Education can reflect a greater
ability to acquire information (obtained through reading newspapers, watching television, or listening to the radio) or a previous investment made by the family of the child’s parents. Education can also have indirect effects by bringing an individual more income and greater self-confidence (Marini and Gragnolati, 2003).

**Family Planning.** Guatemala is characterized by a very high fertility rate and very low knowledge of birth control methods, especially among the poor. Pregnancies at a young age, high numbers of children, and short intra-birth intervals are associated with child deficient growth patterns (WHO, 2013; Marini and Gragnolati, 2003).

**Breastfeeding.** Breastfeeding is one of the most important household actions that influence children’s nutritional outcomes and that can be modified through policies and programs. Exclusive breastfeeding for at least the first six months of life provides a baby with an adequate source of nutrients and antibodies and eliminates the risks of illnesses associated with the use of infected utensils to feed formula. Moreover, in a country where contraceptive use is as low as in Guatemala, breastfeeding plays a major role in repressing fertility by extending the duration of post-partum amenorrhea (WHO, 2013).

**Community Infrastructure.** The availability of infrastructure such as piped water, flushable toilets, television, and garbage collection systems contribute to improving the nutritional status of children (Robles and Keefe, 2011).

Although Guatemala has been a pioneer in Central America in developing and adopting micronutrient fortification programs, very few of its programs are successful, mostly because of interruptions in the service, weak government regulation, and poor product targeting. Only 16 percent of Guatemalan infants surveyed in 1999 met the daily caloric
requirement, and only 2 percent of the children in the sample had diets that provided the recommended intake of iron (Marini and Gragnolati, 2003).

2.4. **Defining and conceptualizing food security and dietary diversity**

Household food security is an important measure of wellbeing (Hoddinott and Yisehac, 2002). Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2011). This definition, supported by the ethnographic research conducted by Radimer et al., 1990; Radimer et al., 1992; Wolfe and Frongillo, 2001; Hamelin, Habicht, and Beaudry 1999, and Hamelin et al., 2002, means that food insecurity is experienced when there is (1) uncertainty about future food availability and access, (2) insufficiency in the amount and kind of food required for a healthy lifestyle, and/or (3) the need to use socially unacceptable ways to acquire food. Consequences of uncertainty, insufficiency, and social unacceptability are assumed to be part of the experience of food insecurity. Worry and anxiety typically result from uncertainty. Feelings of alienation and deprivation, distress, and adverse changes in family and social interactions also occur (Hamelin et al., 2002; Frongillo et al., 2003). Management strategies that people use to prevent or respond to the experience of food insecurity are conceptually different from food insecurity but are tied to it (National Research Council, 2011). Ensuring food security has been a central feature of global governance efforts to promote peace, prosperity, and stability. An effort to address global challenges of hunger and malnutrition by improving food production, supply, and trade has been a central goal of multiple aid organizations worldwide (McDonald, 2011).
Dietary diversity is defined as the number of individual food items or food groups consumed over a given period of time (Kennedy et al., 2007). Nutritionists have long recognized dietary diversity as a key element of high-quality diets. Increasing the variety of foods across and within food groups is recommended by most dietary guidelines, in the United States as well as internationally because it is thought to ensure adequate intake of essential nutrients and thus to promote good health (Ruel, 2004). The rationale for emphasizing dietary diversity in developing countries stems mainly from a concern related to nutrient deficiency and the recognition of the importance of increasing food and food group variety to ensure nutrient adequacy. Lack of dietary diversity is a particularly severe problem among poor populations in the developing world, because their diets are predominantly based on starchy staples and often include little or no animal products and few fresh fruits and vegetables. These plant-based diets tend to be low in a number of micronutrients, and the micronutrients they contain are often in a form that is not easily absorbed (Ruel, 2004). Dietary diversity is a useful indicator for four reasons. First, a more varied diet is a valid outcome in its own right. Second, a more varied diet is associated with a number of positive outcomes such as improved birth-weight and child anthropometric status, improved hemoglobin concentrations and reduced risk of mortality from cardiovascular disease and cancer. Third, questions on dietary diversity can be asked at the household or individual level, making it possible to examine food security at the household and intra-household levels. Fourth, obtaining these data is relatively straightforward (FANTA, 2006). At the household level, dietary diversity is usually considered as a measure of access to food (e.g., of household’s capacity to access a variety of costly food groups). Individual dietary diversity scores aim to reflect nutrient
adequacy (Steyn et al., 2006). Dietary diversity scores have been validated for several age/sex groups as proxy measures for macro and/or micronutrient adequacy of the diet. Studies have shown that an adequate individual dietary diversity score is related to sufficient nutrient adequacy in the diet (Thorne-Lyman et al., 2010).

Nutrient adequacy refers to the achievement of recommended intakes of energy and other essential nutrients (Ruel, 2010). Growth is the most commonly used functional outcome measure of nutrient adequacy. This outcome is particularly useful for screening purposes because the normal progression of growth is dependent on many needs being met and many physiological processes proceeding normally (Arimond et al., 2011). There is ample evidence from developed countries showing that dietary diversity is indeed strongly associated with nutrient adequacy. There is less evidence from developing countries, but the few available studies of adult women have also supported the association between diversity and nutrient adequacy (Arimond et al., 2009; Arimond et al., 2011; Becquey et al., 2009; Butte et al., 2002; Daniels, 2009; Wiesmann et al., 2009).

Assessing the probability of nutrient adequacy adds value to the food and nutrition monitoring systems in developing countries, where energy intake is the most important indicator of food security (Haddad et al., 1994). In developing countries, methods for evaluating nutrient adequacy should be simple and practical (Torheim et al., 2003). Hatloy and others showed that the food diversity scores could give a fairly good assessment of the nutritional adequacy of the diet. Other researchers have also indicated that dietary diversity is a useful indicator of nutrient adequacy in adolescents or in adults (Foote et al., 2004; Mirmiran et al., 2004; Torheim et al., 2003; Ogle and Tuyet, 2001). Studies by Torheim et al. and Roche et al confirmed that simple counts of food items and
Food groups can be used as indicators of nutrient adequacy in rural Mali; and that a traditional food diversity score is a useful tool for predicting nutrient adequacy in the Peruvian Amazon.

**Food and Nutrition Security.** Household food security is a major determinant of nutrition security that can only be fully understood through a multi-level analysis taking into account global, national/regional, as well as local, household and individual-level factors (Figure 3). Nutrition security is a process that can be understood at the organism level as it is achieved when the cells and the tissues and organs that form the human body are properly nourished (Perez-Escamilla and Segal-Correa, 2008). Nutrition security is the product of food security and health security and the interrelationship between the two. Thus, nutrition security is derived from access to both a healthy diet and to preventive and curative healthcare. Both food security and health are strongly linked with available household income. Another factor that influences food security is the availability of a variety of nutritious foods at the local, regional, and national levels. The availability of foods at the national level depends on local production for local consumption, as well as on the ability to import a variety of healthy and nutritious foods. Thus, a stable and

![Figure 3. Food and nutrition security distal, intermediate and proximal determinants (Source: Perez-Escamilla and Segal-Correa, 2008).](image-url)
sustainable global food supply is essential for ensuring food security. In sum, household food security and the individual’s nutrition security depend on local, regional, national, and global factors.

### 2.4.1. Food security: a post-modern perspective

Food security is an interdisciplinary concept with relevance to numerous economic, political, and social considerations (Scanlan, 2003). The concept of food security goes beyond biological constructs to include coping mechanisms, even when food insecurity does not have immediate biological consequences (Habicht et al., 2004). The historical evolution in thinking about hunger, malnutrition, inadequate dietary intake, and food insecurity has established separate, and not necessarily overlapping, constructs. It is now recognized that food insecurity occurs in developed countries without hunger and malnutrition (Habicht et al., 2004). The history of thinking about food security since the World Food Conference (1976) can be conceptualized as consisting of three important and overlapping paradigm shifts (Maxwell, 1996). The three shifts are: 1) from the global and the national to the household and the individual, 2) from a food first perspective to a livelihood perspective, and 3) from objective indicators to subjective perception. The third shift is from an objective to a subjective approach, there has been a long-standing distinction between "the conditions of deprivation", referring to objective analysis, and "feelings of deprivation", related to the subjective (Webb et al., 2006). Conventional approaches to food security have relied on objective measurement: "target" levels of consumption; or more generally, a timely, reliable and nutritionally adequate supply of food (Coates et al., 2006). A problem then arises because qualitative aspects are omitted from the kind of quantitative measure listed. The issues that might be left out
include technical food quality, consistency with local food habits, cultural acceptability and human dignity, even autonomy and self-determination. The implication is that nutritional adequacy is a necessary but not sufficient condition for food security. These ideas suggest that it is not just the quantity of food entitlement that matters, but also the "quality" of entitlement.

The aggregate effect of the three paradigm shifts is a significant change in the food security agenda since the mid-1970s. Instead of a discussion largely concerned with national food supply and price, we find a discussion concerned with the complexities of livelihood strategies in difficult and uncertain environments, and with understanding how people themselves respond to perceived risks and uncertainties. In this respect, Maxwell and Smith argue that, “Flexibility, adaptability, diversification and resilience are key words. Perceptions matter. Intra-household issues are central. Importantly . . . food security must be treated as a multi-objective phenomenon, where the identification and weighting of objectives can only be decided by the food insecure themselves” (Maxwell and Smith, 1992). The emphasis on flexibility, diversity and the perceptions of the people concerned are themes also found in rural development, industrial development, public administration, planning, and other components of development studies (Maxwell, 1996).

More generally, these are also the themes of post-modernism as expressed by Rosenau, “Post-modernists rearrange the whole social science enterprise. Those of a modern conviction seek to isolate elements, specify relationships and formulate a synthesis; post-modernists do the opposite. They offer indeterminacy rather than determinism, diversity rather than unity, difference rather than synthesis, complexity rather than simplification. They look to the unique rather than causality, and to the unrepeatable rather than the re-
occurring, the habitual or the routine” (Rosenau, 1992). This quotation echoes in the ongoing debate on food security, thinking about food security has evolved in ways consistent with a post-modern perspective, in particular related to the contemporary food security preoccupation with local perceptions, knowledge and strategies, as well as the use of participatory research methods. Post-modernism seems to offer a number of core ideas which are relevant across the development field and certainly extend thinking on food security. This challenges the reluctance of many post-modernists to progress beyond deconstruction and take responsibility for reconstruction (Scanlan, 2003).

2.5. Measuring food security and dietary diversity

Despite the scale of human suffering brought about by food insecurity and malnutrition, the fight against world hunger receives far less attention than the fight against poverty from bilateral and multilateral donors and lending agencies. One important by-product of the lack of attention to food security is that the issue is relatively understudied compared to poverty (Guha-Khasnobis et al., 2008). Thus there is an urgent need to monitor and evaluate the extent, nature, and impacts of international investments in development programs and to catalog best practices in law and policy to better inform both host countries and investors. Detailed impact analysis is needed to assess what policies and legislation, whether national or international, are needed, and what specific measures are most appropriate to foster development (Hallam, 2011). Conceptually, food security is generally broken down into four different components—availability, access, utilization, and vulnerability—each capturing different, but overlapping, dimensions of the phenomenon (Webb et al., 2006). Measuring and assessing food insecurity has been proven to be challenging and daunting tasks for researchers and practitioners.
Traditionally, a divide has persisted between objective-quantitative methods versus subjective-qualitative techniques for the measurement of poverty and food insecurity. More recently, these two types of measures and methods have been increasingly viewed as complementary, and it has become evident that a suite of indicators is necessary to capture the multifaceted nature of food security (Melgar-Quiñonez et al., 2010).

2.5.1. Current Methods to Measure Food Security.

A number of methods have been or are currently used to gain an understanding of food insecurity and to apply this understanding to the development of measures.

*Ethnography.* A qualitative research design aimed at exploring cultural traits that involves in-depth interviewing and participant observation, usually by living in a community for an extended period of time. Ethnography can be used to help develop quantitative measures. For example, Chung et al. used ethnography in south-central India to understand local perceptions, early signs coping strategies, and intra-household decision-making related to food security. From this, unique, locally defined indicators of food insecurity were developed (Chung et al., 1997). Ethnography was also used in rural Nepal to help develop culturally appropriate and valid quantitative instruments for assessing and operationalizing household food security and for constructing scales of past food supply, current food stores, and adequacy of future food supply (Gittelsohn et al., 1998).

*Rapid rural appraisal (RRA).* A relatively new approach to conduct action-oriented research in developing countries. It is largely used in assisting agricultural development using a number of simple tools and techniques for assessing problems and situations at the community level. These often involve focus groups and in-depth interviews.
Information gathered through RRA can be used to understand the food security situation and to help develop quantitative measures. Examples of a few such RRA/PRA techniques follow (Gittelsohn et al., 1998; Schoonmaker, 1999; Nyborg and Haug, 1994; Nyborg et al., 1995; Gervais and Schoonmaker, 1999). Food-security ranking involves asking a diversity of key informants to categorize village households according to the level of food security in the current year and in good and bad years. Village mapping is similar but involves asking groups of men and women to draw a map of their neighborhood on the ground, identifying food-insecure households and causes of food insecurity. Criteria used for categorizing households, differences between years, and causes given can be useful for understanding food insecurity in that community. Food-security calendars are useful for understanding the seasonal dimension of food security. Participants are asked to indicate for each food-security group and for both good and bad years the months in which they eat until they are full and the months they suffer from hunger. Then the calendar is “interviewed,” asking about consumption patterns and coping strategies for each group during each period of food security, as well as underlying causes of hunger. Bean-ranking is a pictorial method that can be used to rank households into food-security groups and then “interview” the piles of beans to understand the coping strategies and other characteristics of each group, to develop household “food charts,” and to construct histogram-like seasonal charts for rainfall, harvests of staples, food consumption illness, etc.

**Coping strategies.** Maxwell developed a method for assessing household food security indirectly through food-related coping strategies, that is, the actions people take when they do not have enough food or money to buy food. In-depth interviews were used to
identify coping strategies, then their relative severity was rated by focus groups. A questionnaire assessing frequency of use of each strategy was developed, from which a food-security score is derived by applying severity weightings (Maxwell, 1996; Maxwell et al., 1999).

**Food-economy approach.** This method monitors household food security and early warnings of food crises by quantifying household access to food in normal years and the effects of external shocks. The food-economy approach is a framework for analyzing household food security. At the heart of the food economy approach is the representation of typical rural households’ everyday circumstances. Its focus lies in identifying and quantifying households’ means of access to food. The fundamental premise of the food economy framework is that understanding how families gain access to food in normal years is essential for analyzing the effects of external shocks on access to food in a bad year. Building up a ‘normal year’ picture helps to determine key indicators for monitoring food security, and to understand the significance of changes in these indicators. While food economy analysis aims to help in operational decision-making, it is not meant to provide ‘the answer’. Rather it aims to allow for a more rational consideration of the options open to policy makers, and to encourage critical analysis and debate (Boudreau, 1998).

**Expert systems.** Phillips and Taylor (1998) developed a method for assessing household food security that combines a household questionnaire with a quasi-expert analysis system. In-depth interviews were used to develop a conceptual model, and then, using a modified Delphi technique, local and national experts identified indicators that were used to help develop the questionnaire. The questionnaire includes both open- and closed-
ended questions with locally appropriate responses identified by focus groups. Data analysis uses a complex set of database programs that emulate an expert system, asking questions of the data until this determines the current level of food security of a given household, the amount of food-security “risks” it faces, and the degree of food-security “insurance” it has (Phillips and Taylor, 1998).

**Livelihood security.** Based on the assumption that indicators derived from indigenous livelihood systems and methods of prediction and response can outperform conventional famine early-warning systems, Davies (1996) developed an approach to food-security monitoring. Field agents live in or near the communities they monitor for a year and use in-depth interviews, RRA techniques, and more conventional surveys, such as market surveys, to understand the local livelihood systems and develop indicators for tracking livelihood vulnerability. These indicators are monitored annually and used to predict needs and develop appropriate interventions (Davies, 1996).

The different methods described above illustrate the use and development of several quantitative and qualitative methodologies to measure food security/insecurity. Even when such a variety of available methods exist, to the best of my knowledge only a limited number of studies has used mixed methods to measure and understand food security (Chung et al., 1997; Coates et al., 2006; Ford and Beaumier, 2011; Frongillo and Nanama, 2006; Gonzalez et al., 2008; Hamelin et al., 2002; Lorenzana and Sanjur, 1999; Vargas and Penny, 2009). I propose that organizations such as governments, large-scale NGOs, or international aid agencies like the WFP/P4P that plan to carry out more centralized forms of targeting may find a combination of qualitative and quantitative methods more appropriate. Clearly, each method has advantages and disadvantages. In
the context of food security the qualitative methods usually require more time for analysis and depend on staff with special talents for collecting and interpreting qualitative information. In addition, qualitative results remain specific to the location of the study (which could be a good thing when trying to understand context-specific aspects of food security) and cannot be generalized to other locations without more study. By contrast, the quantitative methods require staff with statistical skills as well as large databases that increase the probability of sufficient power for tests of statistical association. The results from quantitative studies can be more readily applied to similar populations, but may be difficult to interpret if little is known about the context in which the studies were conducted. The following section discusses the purposes for mixing methods to measure and understand food security within the framework of agricultural and market development programs.

2.5.2. The Use of Mixed Methods to Study Food Security

Measurement is important not for elevating thought to the level of science but for aiding us in the process of inquiry (Webb et al., 2006). The consensus to combine qualitative and quantitative methodologies stems from the necessity to understand complex social phenomena (i.e. food security). In order to do so, it’s been proposed that the use of multiple methods could generate distinctive and complementarity “perspectives” about the phenomena being studied (Hentschel, 2001). It is important to note that the perspective of using multiple methods must be “contextualized” and should guide the design, implementation and analysis of results. Contextual methodologies will be defined in this discussion as that attempt to capture a social phenomenon within its social, economic and cultural context. Non-contextual methodologies are defined as the
sampling, the interview schedule, the training of enumerators and other aspects of best practice survey technique that are designed precisely to collect information that is untainted by the particularities of the context in which it is described (Kanbur, 2001).

**The Quantitative component.** The school of thought associated with quantitative food security assessments is logical positivism (Christiaensen, 2001). In this view, there exists a single, external reality and it is the analyst's task to capture this as closely as possible. To do so, the analyst seeks to increase the likelihood of unbiased, objective answers mainly by relying on statistical principles in its study design (experimental, quasi-experimental, representative sampling) and structure, standardization and quantification in its data collection.

The former principles are intended to guarantee representativeness permitting a generalization of the results for the population under study. The latter principles aim – amongst others – to solve problems of bias and variability in the interviewer-interviewee interaction. The analyst's role is limited to the provision of objective information to the decision makers. In this framework, the experience of food insecurity can be quantified using a set of measurable indicators like dietary intake and nutritional status. An example of the use of such measurements would be the relative amount of food available for consumption. At the least severe level, there is less food available in the home than would be desired or expected. At the intermediate level, the individual actually consumes an insufficient amount of food or less food than usual. The most severe level of the quantitative experience is hunger, when an individual goes one or more days without food.
The Qualitative component. Qualitative research methods on the other hand are associated with the interpretivist, post-modernism and constructivist traditions. These views start from the recognition of a multitude of realities, and assume that experiences plus meaning are socially constructed, thus meaningfulness is contextual. In this context, the inquirer is, in part, an author of research findings (Christiaensen, 2001; Greene, 2007). To fully understand the topic of interest within its context, the inquiry methods used seek to involve many stakeholders and to obtain multiple perspectives on the subject of research and the meaning of the concepts, through semi- or unstructured, exploratory data collection methods. On this framework, the experience of food insecurity is studied using reported information on individual and households’ behaviors in the presence or threat of food shortages. Through the methods described above, the analyst seeks a deeper and contextualized understanding of intricate issues like family and social interactions, distress and alienation in an effort to better capture the subjective and context-specific reality of food insecurity. For example, at the least severe level, being food insecure could mean having to buy or eat less-desired foods along with the psychosocial implications of a situation like this. A more severe level of food insecurity could involve feelings of shame, acquiring food in socially unacceptable ways or distress due to the lack of control over how to procure food. Within this framework we can also analyze the social component of food insecurity. This component has two important aspects. The first is individuals obtaining food in ways that many see as socially unacceptable\(^1\). Examples include food from aid agencies or governments, buying food on

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\(^1\) **Note:** the concept of social acceptability is context-specific. What constitutes a socially acceptable food practice in one culture could be totally unacceptable in another; this variation is also observed across segments of the same society. The references section of this article offers several examples of studies highlighting this aspect of food security.
credit, and, in severe cases, asking friends or relatives for money or food or stealing. The second aspect is engaging in culturally unusual\(^1\) patterns of eating—including eating meals at unusual times or skipping meals altogether, rationing food, prioritizing intra-household food distribution (usually favorably to kids), the use of unusual food ingredients (wild flora and fauna), etc.

The quantitative and qualitative components of food insecurity all have an important and integrated effect on the wellbeing of the individual (Figure 4). Although each food-insecure person doubtless experiences somewhat different feelings, two emotional reactions to food insecurity have been found to be most common in vulnerable populations. First, uncertainty as to whether one will have enough food or nutritionally adequate food leads to anxiety. Second, especially in a social setting, the necessity to compromise about food choices (disregarding wishes or needs) leads to feelings of deprivation, anger, and embarrassment (Frongillo and Horan, 2004).

In the food security literature, quantitative research methods dominate as the main approach. Yet, proper implementation and interpretation of the approach also requires substantial contextual knowledge. Data are social products and to the extent that the analyst is unaware of the social context, his respondents may easily mislead him in an attempt to avoid cultural taboos or to distort the information in their advantage.
Figure 4. Wellbeing determinants, strategies, and consequences in the context of food insecurity (FAO, 2012).

2.6. **Linkages between agricultural interventions and food security**

A complex relationship exists between agricultural production, income and nutrition (Ramirez, 2002). There is a growing consensus that the union between agriculture and nutrition requires cultural, economic and social conditioning factors (Berti, Krasevec and FitzGerald, 2004). Arimond defines agricultural interventions as “changes purposively introduced into an existing agricultural system to promote new crops, technologies, management practices, production and marketing methods and other innovations”. The agriculture sector, a supplier of food and essential nutrients, a source of income and employment, and an engine of growth has important implications for nutrition and health (Fan and Pandya-Lorch, 2012; Hawkes and Ruel, 2008). At a deeper
level, the purpose of agriculture is not just to grow crops and livestock for food and raw materials, but to grow healthy, well-nourished people. One of farmers’ most important tasks is to produce food of sufficient quantity (that is, enough calories) and quality (with the vitamins and minerals needed by the human body) to feed all of the planet’s people sustainably so they can lead healthy, productive lives. Agricultural production is an important means for most people to get the food and essential nutrients they need. And in many poor countries, where agriculture is highly labor intensive, productive agriculture requires the labor of healthy, well-nourished people. In an ideal world, consumers would be fully aware of the merits of nutritious foods, and producers, processors, and marketers, in turn, would know how to produce, process, and market these high-quality, nutrient-rich foods (Hawkes and Ruel, 2008). Market forces would provide the incentives, through product prices, to all involved in producing or consuming nutrient-rich foods. Unfortunately market prices do not provide an adequate incentive for producing nutritious food. And, even if prices did reflect the nutritional value of food, they could put nutritious foods out of reach of poor people. This means public interventions are needed to correct market failures (when prices do not reflect the nutritional value of foods) or to improve affordability (for poor people) (Fan, Pandya-Lorch, and Fritschel, 2012; Hallam, 2011). After decades of neglect, volatile food prices and the persistence of hunger and malnutrition have brought agriculture and nutrition to the forefront of the international development agenda. As governments, donors, and other key actors deepen their commitments, they are also increasing their focus on how successful developmental interventions can be expanded, replicated, and adapted to new and different contexts, for greater sustained impact (Linn, Fan and Pandya-Lorch, 2012; Linn, 2012).
Figure 5 provides a conceptual framework that outlines the broad linkages between agriculture and the health and nutritional status of individuals.

![Conceptual Framework](image)

**Figure 5.** Linkages between agriculture allocation and nutrition (Gillespie et al., 2012).

Agricultural interventions have the potential to influence nutrition through a variety of pathways (Figure 5). Table 5 provides a summary of relevant sources outlining some of these linkages.

**Table 5.** Summary of evidence of the link between agriculture and nutrition.

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<th>Publication Type</th>
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<td>Book</td>
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<td>2. Changes in crops, farm practices, and markets</td>
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<td>3. Changes to crop varieties and production methods</td>
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<td>1. Increases in food availability and access at the household level</td>
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<tr>
<td>2. Increases in income through production for sale in markets</td>
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<td>3. Reductions in real food market prices associated with increased agricultural production</td>
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<td>4. Shifts in consumer preferences</td>
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<td>5. Shifts in control of resources</td>
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<td>1. Subsistence-oriented production for the household’s own consumption</td>
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<tr>
<td>2. Income-oriented production for sale in markets</td>
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<tr>
<td>3. Reduction in real food prices associated with increased agricultural production</td>
<td></td>
</tr>
<tr>
<td>4. Empowerment of women as agents instrumental to household food security and health outcomes</td>
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<tr>
<td>5. Indirect relationship between increasing agricultural productivity and nutrition outcomes through the agriculture sector’s contribution to national income and macroeconomic growth</td>
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<td>1. Increased incomes and lower food prices</td>
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<td>2. Health and sanitation environment at the community and household level</td>
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<td>3. Time-allocation patterns</td>
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</table>

*Presented in reverse chronological order.

2.6.1. The Purchase for Progress initiative

The Purchase for Progress (P4P) Initiative is a five-year pilot program from the World Food Programme (WFP) that enables low-income farmers in 21 different countries (Figure 6) to supply food to the WFP’s operations and other stakeholders (WFP, 2011). The aim of the program is to provide smallholder farmers in developing countries a
greater incentive to invest in their production, and the possibility to sell to a reliable buyer and receive a fair price for their crops. P4P at the same time invests in capacity building at country level in areas such as post-harvest handling or storage, which will yield sustainable results in boosting national food security over the long term (WFP, 2011).

![Figure 6. Purchase for Progress (P4P) global distribution (P4P, 2013)](image)

As a pilot, P4P emphasizes learning and encompasses three pillars: 1) WFP’s demand platform; 2) partnerships and capacity building; 3) learning and sharing. The P4P initiative seeks to learn if and how WFP can broaden the developmental impact of its procurement activities (P4P, 2011). The P4P initiative has four objectives: 1) to identify and share best practices for WFP, NGOs, governments and agricultural market stakeholders to increase profitable smallholder farmer engagement in markets; 2) to
increase smallholder farmers’ capacities in order to raise their income from agricultural markets; 3) to identify and implement best practices for increasing sales by low-income farmers to WFP with a particular focus on small-scale farmers; 4) to transform the WFP food purchase model in a way that supports sustainable production and address the root causes of hunger (P4P, 2011). P4P’s conceptual framework is based on the premise that by developing the capacity to sell to an institutional buyer such as the WFP, smallholder farmers and their farmers’ organizations can build the knowledge, skills and confidence to better engage with formal markets (WFP, 2011). Figure 7 illustrates the development logic of P4P. Increased smallholder income is a function of increased agricultural productivity, improved capacity for aggregation, market development and an enabling environment that supports smallholder market access (P4P, 2011).

Figure 7. Conceptual framework Purchase for Progress initiative (P4P, 2011)
Although some studies have looked at the relationship between the proposed hypothesis of increased income (Babatunde and Qaim, 2010; Kennedy and Haddad, 1992; Amalu, 2002) and/or farmers’ self-sufficiency (Appendini and Liverman, 1994; Barkin, 1987; Elmulthum et al., 2011; Hanjra et al., 2009; Huan et al., 2009; Kelly et al., 2003; Magnan et al., 2011; Ritson, 1980; Stage and Revke, 1998) and improvements in nutritional status, food safety and diet diversity, still more research is needed to understand how agricultural and market development programs effectively influence this change (Ramachandran, 2010). The P4P approach assumes that participant households may increase their incomes by selling more (because of increased production or reduced losses) or getting a higher return (because of better markets, higher quality, aggregation, better marking skills, reduced production costs or better marketing information) (P4P, 2011). The P4P hopes to achieve this through the following strategies: 1) Engaging farmers through innovative procurement modalities; 2) Catalyzing capacity building partnerships; 3) Contributing to capacity building; 4) Fostering policy dialogue; and 5) Stimulating public and private investments. As a pilot program, P4P emphasizes learning. Internally, WFP aims to use P4P to learn if and how it can enhance the developmental impacts of its local procurement and thus contribute to improving the livelihoods of smallholder farmers. Externally, WFP will share lessons and best practices with governments and other development stakeholders to further enhance market development efforts of the broader development community. Overall the learning generated by the P4P pilot will largely contribute to building capacity of WFP to leverage its demand platform to support agriculture and market development activities. Lessons learned through P4P are also expected to inform on how NGO’s and international agencies can better support
school feeding programs, how farmers can better adapt to the effect of climate change and how to improve nutrition interventions. A final assessment of country programs by the end of the pilot will focus on two questions: 1) what are the successful models or approaches; 2) in what contexts are they appropriate; and 3) are there any unintended consequences (Aker, 2008).

2.6.2. The Purchase for Progress Initiative in Guatemala

Guatemala is currently experiencing a resurgence of farmers’ organizations backed by government and donor support aimed at improving organizations’ production and marketing capacities. This environment presents an opportunity for WFP to link its smallholder-targeted demand with the capacity building activities of other actors to create an environment in which smallholder farmers can increase their incomes and food security by improving the quantity and quality of commodities they offer to the market and by accessing more profitable markets. The initiative in Guatemala has three P4P projects working in the field, one sponsored by the Howard G. Buffett Foundation (HGBF), one by the European Union Food Facility (EUFF) and a third sponsored by the government of Canada (Figure 8). As of January of 2013, P4P Guatemala supports 7,363 smallholder farmers (34% women) distributed among 64 farmers’ organizations located in 10 different states (Figure 8). Since the inception of P4P Guatemala in 2009, it has contracted from small farmers approximately 20,072 metric tons of corn and black beans, which represent a total value of over $9 million dollars. As part of their ongoing activities, P4P Guatemala has conducted over 1,300 training modules with a total of over 51,000 people participating in the different program activities. The initiative has a

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2 Information included in this section is from the report: Guatemala country profile (P4P, 2010).
network of over 40 partner institutions in the financial, governmental, non-governmental and commercial sectors. Partners participate in technical assistance programs; provide field training, sales and financial services and other activities to P4P beneficiaries.

![Image of map showing geographical distribution of farmers’ organizations and funding agencies P4P Guatemala](image)

**Figure 8.** Geographical distribution of farmers’ organizations and funding agencies P4P Guatemala (P4P, 2011).

Program activities focus on increasing smallholders’ productivity and farmer organizations’ organizational and marketing capacities in order to create more profitable access to broader markets. A focus on strengthening the direct relationships between
farmers, farmers’ organizations, development partners (including government agencies), and demand-side actors (processors, industry, traders, donors, government, institutions) will enhance prospects for sustainability.

The following sections summarize important elements of Guatemala’s strategy as they apply to the four key activity areas within P4P: productivity, group marketing, market development, and policy environment.

**Smallholder Productivity.** Smallholder productivity in Guatemala is generally low. Barriers to increased smallholder productivity include: small areas cultivated (5 hectares or less on average), low access to and use of improved inputs (seed, fertilizer, pesticides), poor cultivation skills and practices, high post-harvest losses, production variability due to floods and droughts, and price instability. The FAO identifies limited use of improved inputs as a principle constraint to improved productivity and the inability of many smallholders to acquire production credit as the primary barrier to obtaining inputs. Low commodity prices that discourage investment in production and limited knowledge of how to use inputs appropriately further limit smallholder farmers’ application of improved inputs. To address these constraints, P4P works with financial institutions to improve smallholders’ access to production credit and works with partners to establish community-level plots to demonstrate cultivation techniques; deliver training on post-harvest handling; and construct, or facilitate access to, farm-level storage facilities.

**Group Marketing (Farmers’ Organizations).** Guatemala has many farmers’ organizations which usually take the form of cooperatives, associations, syndicates, or Rural Associative Companies. In general these organizations lack many of the skills required to effectively aggregate and market members’ staple commodities. Poor
organizational and management skills limit organizations’ ability to effectively market members’ commodities, affect the trust members place in the organization, and thereby limit its ability to obtain commodities from members. Limited access to credit for marketing further constrains organizations’ capacities for aggregating commodities. In conjunction with its partners, P4P strengthens organizations’ management capacities (organizational, administrative, financial, and fiscal); facilitates access to marketing, investment, and production credit; improves knowledge of appropriate production technologies and practices; and builds organizations’ marketing skills. Throughout its work with farmers’ organizations, WFP focusses particularly on enhancing the skills of women and their participation and role in organizations. Encouraging increased engagement of rural youth in agriculture and in farmers’ organizations will also contribute to sustainability.

**Market Development.** Smallholder access to commodity markets in Guatemala is largely informal with multiple layers of intermediaries often separating smallholder farmers from markets. These intermediaries provide the service of aggregating small quantities of commodities from many small farmers located in remote areas with poor transportation infrastructure, conditioning the commodities, and transporting them to markets. They also bear the risks associated with marketing. The price smallholders receive at the farm gate reflects the cost of these services. However, a limited number of buyers – particularly in the most remote regions – may allow some intermediaries to capture a larger share of the terminal price than is justified by marketing costs. Guatemala’s P4P program intends to build smallholder farmers’ capacities to capture a greater share of the marketing margin (through value addition or efficiencies associated with group marketing) and connect
smallholder farmers more directly to markets. To enhance prospects for sustainability beyond P4P, WFP expects to connect participating smallholders to government food security program, donor-run food assistance program, industrial buyers, and food processors.

**Policy Environment.** The policy environment in Guatemala generally supports P4P. Guatemala’s agricultural policy focuses on contributing to a sustained improvement in (rural) livelihoods through commercial development. It emphasizes increasing smallholder productivity and access to markets, improving distribution and production of good quality and safe foods, strengthening organizations in rural and marginal urban areas, and supporting poor farmers by providing agricultural inputs, tools, and silos. Potential smallholder-friendly changes to the policy environment include making the online Market Information System (MIS) more accessible to smallholder farmers and advocating for increased government and institutional procurement of smallholder commodities.

**Program description and characteristics of farmers’ organizations.** During 2009 and 2010 P4P-Guatemala conducted a baseline assessment to characterize P4P farmers and farmers’ organizations as well as a group of non-participating farmers’ organizations of similar characteristics that served as a control group. Baseline information indicates that participating (P4P) and non-participating (control) farmers’ organizations are substantially different. Table 6 summarizes selected characteristics of farmers’ organization benefiting from P4P and of those in the control group. Key findings include:

- Non-participating organizations are substantially larger than participating organizations.
• However, the much more similar median size suggests the presence of a small number of very large organizations in the non-participating sample and greater similarity in group size.
• Participating and non-participating groups are of similar age.
• Participating organizations have significantly greater capacity than non-participating organizations in terms of the selected capacity indicators. A greater percentage of participating organizations has received loans, has access to storage facilities, and engage in production and marketing planning. A greater percentage of participating organizations’ members and staff has received training, and participating organizations are able to aggregate much larger quantities of commodities for sale.
• A significantly greater percentage of participating organizations than non-participating provides production and marketing services to their members.
• Participating organizations are more likely than non-participating organizations to engage in marketing and a greater percentage have sold commodities in the past two years.
• A substantially greater percentage of participating organizations than non-participating organizations sells maize, and they sell substantially greater quantities on average.
• Both participating and non-participating organizations sell a majority of their commodities to millers. However, participating organizations are much more dependent on millers than are non-participating organizations who sell about a quarter of their commodities to traders.
Table 6. Main characteristics of farmer organizations (FO): P4P and Control.

<table>
<thead>
<tr>
<th>General Characteristics</th>
<th>P4P Organizations (N=37)</th>
<th>Non-P4P Organizations (N=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean and median number of organization members</td>
<td>146/55</td>
<td>2,718/75</td>
</tr>
<tr>
<td>Mean and median age of organization (years since established)</td>
<td>8.2/7</td>
<td>7.5/6</td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage with access to credit (applied for and received a cash loan)</td>
<td>54%</td>
<td>46%</td>
</tr>
<tr>
<td>Percentage with staff trained in organizational management</td>
<td>100%</td>
<td>72%</td>
</tr>
<tr>
<td>Percentage with members trained in production practices</td>
<td>97%</td>
<td>63%</td>
</tr>
<tr>
<td>Percentage with production and/or marketing plans</td>
<td>65%</td>
<td>14%</td>
</tr>
<tr>
<td>Percentage with access to storage facilities</td>
<td>30%</td>
<td>19%</td>
</tr>
<tr>
<td>Mean and median maximum single sale size (MT)</td>
<td>696/22</td>
<td>197/228</td>
</tr>
<tr>
<td><strong>Marketing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number and percentage of organizations that directly market their members’ staple commodities</td>
<td>22%</td>
<td>3%</td>
</tr>
<tr>
<td>Number and percentage of organizations with sales in past two years</td>
<td>8/22%</td>
<td>1/2%</td>
</tr>
<tr>
<td>Percentage of organizations that sell corn and beans; and quantity (MT) collected/sold for each commodity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>22%</td>
<td>857/40</td>
</tr>
<tr>
<td>Beans</td>
<td>3%</td>
<td>1/1</td>
</tr>
<tr>
<td>Rice</td>
<td>0%</td>
<td>0/0</td>
</tr>
</tbody>
</table>

2.7. Summary

Food insecurity is a daily reality for hundreds of millions of people and a growing concern worldwide. After the price volatility experienced in 2008-2009 and decades of a steady drop in investments agriculture, there is now a renewed interest in food security as one of the key themes in international development co-operation. Governments and
funding agencies have progressively committed more aid to agriculture and food assistance programs, while also promoting sustainable economic development programs. This interest has translated to an urgent need to understand the current determinants of food security and the interventions that are most effective in solving its underlying causes. Nutrition-sensitive interventions, including agricultural development programs, are multi-sectorial and target the main determinants of poverty, and food insecurity. It is expected that agricultural development programs like P4P contribute to livelihoods and food security through direct production of food and by generating income that can be spent on food, education, and health care that benefit nutrition. However, empirical evidence of the effectiveness of these programs, especially their impact on nutritional outcomes, is limited. Thus, strengthening of nutrition goals and actions and rigorous effectiveness assessments are needed. Also, strengthening the policy and programmatic links between agriculture and health and nutrition requires means of seeing how their myriad links fit together. There is growing consensus that a better understanding is needed on the different cultural, economic and social conditioning factors that affect the complex nature if this association. The overall objective of this research is to enhance our understanding of the main determinants of food security and dietary diversity in the context of agricultural and market development programs. This study will be the first to apply the MSC methodology to study the determinants of food security in a developing country. This approach will provide unique insights and will help us better understand the context-specific reality of those suffering from food insecurity. Information generated in this study will also contribute to the limited body of knowledge on the use of qualitative methodologies to study food security. Results will also broaden our
knowledge and offer a better understanding on the role that agricultural and development programs play on food security, diet diversity in developing countries. This knowledge could be used to guide the development and implementation of policies and programs aimed at improving food security and dietary diversity in developing nations.
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CHAPTER 3

CHARACTERIZATION OF HOUSEHOLD FOOD SECURITY AND DIETARY DIVERSITY AMONG SMALLHOLDER FARMERS IN GUATEMALA

3.1. Introduction

Food and nutrition security are foundational to the development of both individuals and countries and to the achievement of all major social and economic goals (Gillespie, Egal and Park, 2013). Globally, more than 870 million people lack adequate access to food on a regular basis (FAO, 2012). There are 126 million under-weight children in the world and over 2 billion people who suffer from micronutrient deficiencies (Hammond and Dubé, 2013; Müller and Krawinkel, 2005; von Braun, 2005). Agricultural food systems are a primary driver for food security, affecting individual opportunities, individual and household decision-making, and several livelihood outcomes (Hammond and Dubé, 2013). In the last 50 years, there has been significant growth in global agricultural productivity, with aggregate global food supply rising more than 50% and food production per capita increasing by almost 20% (Dubé, Pingali and Webb, 2013). If the world is to succeed in reducing food and nutrition insecurity and meeting the demand for food of today’s and future generations, fundamental changes in the agricultural and food systems are needed. Agricultural food systems are affected by multiple factors, including diffusion of agricultural technology (Berger, 2001; Bates, 1984), functioning of capital markets, local and regional/global infrastructure, organization of supply chains, sociopolitical factors, social norms and cultural preferences (Neff et al., 2009; Hyden, 2007). Most of the poor, especially in rural areas, depend on agriculture and related activities for a significant part of their livelihoods.
Agricultural growth involving smallholders, especially women, will be most effective in reducing extreme poverty, and food and nutrition insecurity (FAO, 2012). Smallholder agriculture is the foundation of food security in many developing countries and an important part of the socio/economic/ecological landscape in all countries (HLPE, 2013). Smallholder farmers also play a crucial role in supplying local markets with a constant source of fresh and affordable agricultural products (Gillespie, Egal and Park, 2013). Investments in the social and economic mechanisms needed to enable improved smallholder yields, especially where targeted at women, can be important as means of increasing the income and improving livelihoods of both farm and rural non-farm households in developing nations (Godfray et al., 2010). Smallholder farmers are called to play a fundamental role in achieving food and nutrition security in the Latin American region, especially in countries like Guatemala.

There are close to one million smallholder farmers in Guatemala, of which 83% live in rural and peri-urban areas (Baumeister, 2010). Smallholder farmers in Guatemala produced close to 19,000 MT of basic grains (corn and beans) between 2007 and 2008 and were responsible for the production and commercialization of close to 47% of all agricultural products sold in local markets (ENCOVI, 2012; ENA, 2008). Smallholder farmers contribute to Guatemala’s food security and nutrition both directly, as they link production and consumption for many rural households, and indirectly because (a) they provide domestic markets with the main food products, (b) they do so in a potentially resilient way, and (c) their work in many regions functions as an important social safety net (HLPE, 2013; ENCOVI, 2012; ENA, 2008).
3.2. Methods

3.2.1. Overview

This chapter presents research on household food security and dietary diversity among smallholder farmers in rural Guatemala. Information presented in this chapter intends to answer the following research questions: What is the current status and main determinants of food security and dietary diversity among smallholder farmers in Guatemala?

To answer these questions, household food security and dietary diversity were characterized among two groups of smallholder farmers, one participating in the Purchase for Progress (P4P) initiative in Guatemala and a quasi-control group of similar characteristics. In both groups, we evaluated household conditions and other socio-economic variables, food security using the Latin American and Caribbean Food Security Scale (ELCSA), and dietary diversity using the Household Dietary Diversity Score (HDDS). Data were collected from a representative sample consisting of 372 households (271 P4P; 101 control) using a cross-sectional design. Conditions at the household level included eight different variables. Data collected from ELCSA were used to calculate three different variables pertaining to food security. HDDS data were used to calculate six different variables that described dietary diversity at the household level. In the results section, indicators of food security and dietary diversity were associated with selected household and socio-economic variables and later integrated into a multiple linear regression model. This section is followed by a general summary and conclusions.
3.2.2. Ethics approval

Approval for this research project was obtained from the Institutional Review Board (IRB) at the University of Illinois Urbana-Champaign and from the Center for Studies of Sensory Impairment, Aging and Metabolism (CeSSIAM) in Guatemala. A copy of all research protocols, instruments, informed consent forms and sampling strategy were provided to and discussed with members of the Purchase for Progress (P4P) team in Rome (world headquarters), Panama (regional headquarters) and Guatemala (country office). Visits to each farmer organization were planned in advance with assistance from field staff.

Researchers interviewed only adult members (older than 18 years at the moment of the interview) from each farmer organization visited. Prior to conducting the interview, each researcher obtained consent verbally and in writing by completing the following protocol: 1) explained the purpose of the study; 2) explained the research activities to be carried-out; 3) provided a copy of the consent letter (in Spanish); 4) read and discussed the consent form; 5) answered any questions; 6) obtained from each consenting participant his/her name and signature; 7) dated the consent form and stored it in a dedicated and secured container. In cases in which subjects did not consent to participate or were unable to do so, researchers acknowledged them for their time and refrained from collecting or recording any information. Signed consent forms were kept separate from completed research surveys at all times and were stored in a locked cabinet. Only the research team had direct access to the data collected. Copies of all consent forms used in this study are presented in Appendices A - D.
3.2.3. Sampling

Sampling methods for this study were based in part on P4P’s monitoring and evaluation (M&E) sampling manual (P4P, 2011) and recommendations from P4P’s M&E unit in Guatemala (Palencia, M.E. 2012; personal communication, January 6, 2012). To create the sampling frame, a complete dataset with a list of all P4P’s Farmer Organizations (FOs), beneficiaries and control organizations (quasi-controls) was provided by P4P’s main office in Guatemala. This dataset included detailed information about number of beneficiaries in each FO, gender distribution, geographical location, funding source and other relevant data. A cross-sectional design with a three (P4P) and two-stage (control) cluster sampling and probability-proportional-to-size strategy (Campbell et al., 2011; Magnani, 1999) was used. Power calculations and both purposive and random sampling were used to obtain a sampling frame that represented the diversity of households in both P4P and control organizations.

For P4P participants, the first stage (main clusters) was a purposive selection of two funding sources (main clusters). The P4P initiative in Guatemala is funded by three main donors: 1) the Canadian Agency for Development (Canada); 2) the Howard G. Buffett Foundation (Buffett) and 3) the European Union. Due to language barriers (instrument validity) and safety restrictions, only states within two geographical regions (Figure 10) were selected: South (Buffett) and East (Canada). The second stage was a purposive selection of 4 states within each geographical area, a total of eight states (secondary clusters) were included in this study. The third stage was a purposive selection of farmer organizations (tertiary clusters) within each state. A total of 46 FO’s were included in this study. Finally, farmers (household heads) from each organization
voluntarily opted to participate in the meetings and subsequent interview processes carried out for each FO. Figure 9 shows a summary of the sampling process. In total, data were collected from 271 households.

For the control group, the first stage was a purposive selection of 3 states (main clusters) within each funding source (geographical distribution) previously described for the P4P cohort. Although control organizations did not receive funding from any donors, we used the same geographical matching for organizations in the P4P cohort to ensure representativeness of control organizations. A total of six control states were included in this study (Figure 10). The second stage was a purposive selection of farmer organizations within each state. A total 11 FOs were included in this group. Finally, farmers (household heads) from each organization voluntarily opted to participate in the meeting and subsequent interview process carried out for each FO. Figure 9 shows a summary of the sampling process. In total, data were collected from 101 households.

**Figure 9.** Two (control) and three-stage (P4P) cluster sampling strategy.
Figure 8 (Chapter 2) shows the official geographical distribution of P4P’s farmer organizations and funding sources in Guatemala and Figure 10 shows geophysical coordinates for each individual P4P and control farmer organization included in this study.

![Figure 10. Coverage and geographical distribution of sample farmers’ organizations, P4P and control.](image)

### 3.2.4. Data collection and construction of variables

Data collection was conducted between June and August, 2012. The program officially started in 2008 for the Buffett cohort and in 2009 for the Canada cohort. Conversely, data were collected at year 4 of the program for Buffett farmers and year 3 for Canada farmers. Four different research instruments were used. A general information
survey was used to collect information on gender, age, educational level, educational attainment (highest completed grade), household occupancy, fertility rate (births per woman) and gender distribution of children conceived. Housing quality conditions were evaluated using the “rapid visual assessment - housing quality” questionnaire (Arias and De Vos, 1996).

Food security was evaluated using the Latin American and Caribbean Food Security Scale/Escala Latino Americana y Caribeña de Seguridad Alimentaria (ELCSA) (Acker, 2011; Pérez-Escamilla, 2009; Pérez-Escamilla et al., 2007). ELCSA uses questions that progressively increase in severity (food insecurity). The first eight survey questions inquire about food-related conditions of the household, while the last 7 questions ask about the child’s experience in the household. The recall period for this study was “in the last three months”. Data collected with ELCSA were used to create a Food Insecurity Score (FIS) according to the methods described by Acker, 2011 and Perez-Escamilla et al., 2007. Food insecurity scores were calculated based on the number of affirmative responses on each questionnaire. Data were codified for our analyses, in which affirmative responses (YES) were assigned a numerical value of one and negative responses (NO) were assigned a numerical value of zero. The FIS variable was calculated for each household by adding up the numerical value assigned to each individual question. Food insecurity scores were classified into four categories (Table 7) and ranged from 0-15 (FIS15) (low to high food insecurity) for households with minors and from 0-8 (FIS8) for household with no minors.
Table 7. Household food insecurity status classification\textsuperscript{1}.

<table>
<thead>
<tr>
<th>Households With Minors\textsuperscript{2}</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0\textsuperscript{3}</td>
<td>Food secure</td>
</tr>
<tr>
<td>1-5</td>
<td>Mildly Food Insecure</td>
</tr>
<tr>
<td>6-10</td>
<td>Moderately Food Insecure</td>
</tr>
<tr>
<td>11+</td>
<td>Severely Food Insecure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Households Without Minors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Food secure</td>
</tr>
<tr>
<td>1-3</td>
<td>Mildly Food Insecure</td>
</tr>
<tr>
<td>4-6</td>
<td>Moderately Food Insecure</td>
</tr>
<tr>
<td>7-8</td>
<td>Severely Food Insecure</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Acker, 2011 and Perez-Escamilla et al., 2007.
\textsuperscript{2}Minors are those individuals within the household that were \textless{}18 years old at the moment of the interview.
\textsuperscript{3}Indicates the number of positive responses.

Household dietary diversity was evaluated using the Household Dietary Diversity Score (HDDS) questionnaire (Kennedy et al., 2011; Swindale and Bilinsky, 2006; Hoddinott and Yohannes, 2002). Food items in HDDS are organized into 12 different food groups (Kennedy et al., 2011). Food items contained within each group are included and modified based on food consumption patterns specific to each country. For this study, food items included in HDDS were specifically adapted to Guatemala’s food consumption patterns based on the work by Soto-Mendez et al., 2011 and INCAP, 2008. A total of 152 different food items were included in the final HDDS questionnaire. The recall period for HDDS was “the previous 24 h” and included all food items consumed by at least one member of the household during that period. Dietary diversity data were used to calculate an overall Household Dietary Diversity Score (HDDS12; range 0-12) according to the method by Kennedy et al. A normalized dietary diversity score (HDDS\textsubscript{n}, 0-17) was calculated by adding positive responses for food items included in all groups and subgroups listed in HDDS. Three additional variables were constructed by adding up
the individual scores of selected food groups. These variables were: 1) Women’s Dietary Diversity Score (WDDS, 0-9), which was calculated by adding positive responses for items included in nine food groups listed in HDDS. Similarly, 2) Children’s Dietary Diversity Score (IDDS, 0-8) and 3) Carotenoid-rich foods (VAS, 0-2) scores were calculated by adding positive responses for selected food groups listed in HDDS. For all variables, a higher score indicated higher dietary diversity and improved household access to high-quality foods. Copies of all instruments are presented in Appendices E-N.

3.2.5. Statistical analysis

Data normality for all variables was determined using Shapiro-Wilks tests. Descriptive statistics were run, and unpaired-sample t tests were used to compare means between groups (P4P vs. Control) and within clusters (funding source, state and farmer organization). The associations between food insecurity and dietary diversity scores and these with other variables (e.g., housing quality scores) were assessed using the bivariate Spearman’s correlation coefficients and multiple linear regression. In the linear regression model, the response variable was either ELCSA (food insecurity) and/or HDDS (dietary diversity) scores. The predictor variables of interest were those described in the previous section (e.g., housing quality score). The model was as follows:

\[
FIS/HDDS = \beta_0 + \beta_1 \text{HQS} + \beta_2 \text{EduLevel} + \beta_3 \text{HQS} + \ldots + \beta_n \text{HDDS} \quad \text{[Equation 1]}
\]

The linear regression was used to assess the association of food insecurity or dietary diversity scores with changes in selected socio-economic variables of interest, and it was not intended to convey casual relations. One-way analysis of variance
(ANOVA) was used to compare food insecurity and dietary diversity scores, and selected household variables within and across secondary and tertiary clusters. Post hoc mean comparison tests (i.e. Tukey and Fisher’s LSD) were used to compare food insecurity, and dietary diversity scores and selected socioeconomic variables between groups. Categorical variables were compared using Chi square ($\chi^2$) tests. All statistical analyses were performed using SAS Enterprise® version 4.3 and SAS® version 9.3 (SAS Institute Inc., Cary, NC). The level of significance in this study was set at $P<0.05$. 
3.3. Results and discussion

3.3.1. Sample characteristics

Selected household variables are presented in Table 8 and a comparison between groups is presented in Table 9. For P4P, seventy-three percent of respondents (2/3) were distributed among three age categories: 1) 18-29; 2) 30-39; 3) 40-49. Subjects’ ages ranged between 18 – 75 years. For the control group, 78% of respondents were distributed among two age categories, the majority of which ranged between 40 – 59 years. Higher participation of younger groups in P4P was expected as the program works with FOs that includes younger members (< 30 y) as a strategy to ensure program sustainability and dynamism.

Over 84% of P4P households included four members or more; with 30% of households sheltering seven or more residents. In contrast, 93% of households in the control group had four or more members; with 57% of households sheltering seven or more residents. According to the 2011 National Livelihood Survey (ENCOVI); the national average household occupancy rate was 5.4 residents/household.

Seventy three percent of subjects in the control group did not complete elementary school, compared to 56% in the P4P. This indicates that for both groups more than half of the respondents did not complete any of the three stages of the formal education system in Guatemala: 1) Primary: elementary, grades 1-6; 2) Secondary: high school, grades 7-12; and 3) University: college of higher education (Ministerio de Educacion de Guatemala, 2013). According to the 2011 ENCOVI survey, an average of 66% of those living in rural areas in Guatemala never completes primary school and only 0.5% receives a college degree.
Table 8. Frequency (%) distribution of selected household variables.

<table>
<thead>
<tr>
<th></th>
<th>CONTROL (N=101) (%)</th>
<th>P4P (N=271) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>33</td>
<td>60</td>
</tr>
<tr>
<td>Male</td>
<td>67</td>
<td>40</td>
</tr>
<tr>
<td>Age Range (y)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-29</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>30-39</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>40-49</td>
<td>42</td>
<td>30</td>
</tr>
<tr>
<td>50-59</td>
<td>36</td>
<td>23</td>
</tr>
<tr>
<td>60-69</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>&gt;70</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Household Occupancy (Total number of members)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>4-6</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>57</td>
<td>30</td>
</tr>
<tr>
<td>Educational Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>73</td>
<td>56</td>
</tr>
<tr>
<td>Elementary school</td>
<td>22</td>
<td>34</td>
</tr>
<tr>
<td>High school</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>College</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Graduate</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
</tbody>
</table>

The average educational attainment (highest grade completed, Table 9) was significantly lower (2.93 grades) for subjects in the control group compared to those in P4P (3.87 grades). This indicates that subjects in the P4P group had higher educational attainment rates, completing on average an additional grade compared to those in the control. Both of these averages were consistent with reports from the literature that indicate that a large percentage of adults in rural Guatemala never complete elementary school (ENCOVI, 2012). No differences were observed on the average household occupancy rate (person/household) between groups. For both groups the average household occupancy indicates that there were more than 8 people living on each household. This is higher than the reported 2011 national average of 5.37
person/household for Guatemala (ENCOVI, 2012). Moreover, the average household occupancy rate for the eight states included in this study was 4.91 person/household; or about half of that from our sample.

Table 9. Comparison of selected household (socioeconomic) variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CONTROL</th>
<th>P4P</th>
<th>P&lt;0.05(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Educational attainment (^2)</td>
<td>2.93</td>
<td>1.59</td>
<td>78</td>
</tr>
<tr>
<td>Household occupancy (^3)</td>
<td>8.37</td>
<td>1.57</td>
<td>58</td>
</tr>
<tr>
<td>Fertility rate (^4)</td>
<td>5.85</td>
<td>2.67</td>
<td>95</td>
</tr>
<tr>
<td>Female</td>
<td>2.86</td>
<td>1.56</td>
<td>84</td>
</tr>
<tr>
<td>Male</td>
<td>3.45</td>
<td>1.89</td>
<td>90</td>
</tr>
<tr>
<td>Housing Quality Score (HQS)</td>
<td>6.43</td>
<td>2.31</td>
<td>23</td>
</tr>
</tbody>
</table>

\(^1\) Symbol (*) indicates a statistical difference (P<0.05) between groups (Control vs. P4P).  
\(^2\) Refers to the highest level of education (grade) that an individual has completed (0-12 grades).  
\(^3\) Indicates total number of people living in the household (people/household) at the time of the interview.  
\(^4\) Indicates the total number of children conceived (live children per woman) in current marriage.

The average fertility rate was significantly lower in P4P (4.32 children/woman) compared to the control (5.85 children/woman). Control households had one additional child. In addition, control households had higher number of female and male offspring than those in the P4P group. According to the World Bank (2013) the fertility rate in Guatemala was 3.9 children/woman in 2011. However, according to the United Nations Children’s Fund (UNICEF), fertility rates are higher among indigenous populations and for those living in rural areas. In 2007, the average fertility rate for women in rural areas in Guatemala was 5.2 (children/woman) compared to 3.4 for those in urban areas (UNICEF, 2007). The majority of subjects in this study live in rural areas. This explains
the differences in our data when compared to that reported by the World Bank, which takes into account fertility rates for both rural and urban populations.

Housing Quality Score (HQS) was not different between P4P and control. Housing quality conditions were evaluated using the “Rapid Visual Assessment - Housing Quality” questionnaire (Arias and De Vos, 1996). Housing characteristics measure material aspects of socioeconomic circumstances (Galobardes et al., 2006). Several housing quality indexes have been used to study the relationship between housing quality, socioeconomic status and occupant health in developing countries (Osei-Wusu Adjei and Ohene Kyei, 2013; Herrin et al., 2012). Although mean comparisons did not show differences between groups, quantile distribution of HQS data allowed for a better representation of this variable association with other household variables within the control (tertile, Figure 11) and P4P (quartile, Figure 12) groups.

In the control group, fertility rate was significantly higher in those households with poor housing quality conditions (lower HQS scores). The opposite was observed in the P4P group (Figure 12), where fertility rates seemed to increase with higher housing quality scores. The HQS has been previously used as a proxy indicator of socioeconomic status in developing countries (Fiadzo et al., 2001; Arias and De Vos, 1996; Mosley and Chen, 1984). Numerous studies have looked at the relationship between several variables that determine socioeconomic status and fertility rates in developing countries (Bollen et al., 2001; Wagstaff et al., 2000; Wyshak, 1999; Ribakovski and Zakharova, 1983; Mauldin et al., 1978). These studies concur that for most developing countries there is an inverse relationship between socioeconomic status and fertility rates. Socioeconomic variables such as income do not affect household structure directly, but instead operate
through demographic and residential choice factors. These factors can therefore be considered intermediate or proximate determinants. For example, as a society develops, social and economic changes (indirect factors) bring about reductions in fertility (a proximate determinant), and the decline in fertility, in turn, leads to a change in household structure by reducing the number of children. This conclusion coincides with what we observed in the control group but not for P4P households. One possible explanation for this dichotomy might be related to the educational attainment observed in P4P households.

Figure 11. Comparison of selected household variables for each HQS tertile in Control group. *For each variable, bars are means (±SD) within each HQS tertile. Bars with different letters represent statistical differences (Tukey, P<0.05).
Figure 12. Comparison of selected household variables for each HQS quartile: P4P. *For each variable, bars are means (±SD) within each HQS quartile. Bars with different letters represent statistical differences (Tukey, P<0.05).

Although years of schooling were higher than those in the control, on average educational attainment in both groups was lower compared to national and international standards. A large-scale study looked at data from several centuries and across world regions on the relationship between fertility rates and socioeconomic status. These results coincide with the trend observed in the control group and indicate that those individuals with high income/wealth or high occupation/social class switch from having relatively many to fewer or the same number of children. Increased education level, however, depresses fertility rate for as long as this relation is observed. In other words, even in individuals that have achieved higher socioeconomic status, fertility rates might be higher if educational level/attainment remains low. The body of evidence on this subject also
indicates that measuring and interpreting both socioeconomic and fertility rate data are challenging and should be conducted taking into account specific contextual settings.

Educational attainment (measured as the highest completed grade) was significantly higher among those with better HQS scores (Figures 11 and 12). Educational attainment is related to socioeconomic origins insofar that it reflects both economic constraints and class specific behavior during upbringing and is pivotal as determinant of class position in adult life (Halleröda and Gustafsson, 2010; Erikson and Jonsson, 1996 and Mayer, 1997). There is a limited body of literature on the relationship between housing quality and educational attainment or other indicators of human development in low-income countries, especially in Latin America. Using data from 126 countries, Bradley and Putnick looked at the relationship between socioeconomic status, as indicated by the quality of housing premises, and human development. They found the quality of housing and availability of material resources at the household level are consistently and directly correlated to the UN’s Human Development Index (HDI), which is partly constructed based on the measurement of several educational parameters; our findings were consistent with these observations (Bradley & Putnick, 2012).

The terms household and family are not always used consistently in the literature. In this study we use the definition by Bongaarts (2001) to describe household occupancy: “a household is defined as a group of persons (or one person) who make common provision for food, shelter, share resources and other essentials for living; these individuals may or may not be bound by familial ties”. Household occupancy in the context of this study reflects the presence of family members and/or visitors and
members who were temporarily hosted in the household at the time the interview was conducted.

For both groups, household occupancy was significantly higher with higher housing quality scores, except for those P4P households in the upper HQS quartile (very good). This indicates that a higher socioeconomic status, as indicated by HQS scores, allows for a larger household occupancy. Qualitative data presented in Chapter 4 helps in explaining this finding. Data from MSC interviews described a phenomenon in which members of certain households tend to temporarily “take-in (adopt/foster)” members of other families that are going through hardship (i.e. financial, marital disruptions, food insecurity, etc.). Most of these “temporary household guests” tend to be minors that can be relatives or unrelated neighbors and friends. This has been identified as a common coping strategy in developing countries in which the household relies on community support to face difficult times; this support usually includes food provisioning, shelter, financial support and healthcare (Bongaarts, 2001). As a result of this, average size of the household (complexity) tends to increase due to vertical extension through the addition of members of more than two generations or by horizontal extension through the addition of siblings and their spouses and offspring, more distant relatives or individuals unrelated to the household head.
3.3.2. Household food security

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO et al., 2012). Figure 13 presents the average food insecurity scores for control and P4P households that included children. It also shows the food insecurity classification according to ELCSA scores. Food insecurity was lower in the P4P group, approximately two points on the ELCSA scale, compared to the control. Even though this difference, both the control and P4P households were classified (based on average scores) as being moderately food insecure. The average food insecurity score for P4P households fits into the upper end of the scale (9.21) whereas the average score for the control fits into the lower end (7.44).

Figure 13. Food insecurity scores and ELCSA classification: Control vs. P4P. Bars represent means (±SD) for each group. Bars with different letters represent statistical differences (P<0.05).
Figure 14 shows the interquartile distribution of food insecurity scores in both control and P4P households. For the control group, 87% of households were classified as being either moderately (50%) or severely (37%) food insecure. For P4P, a lower proportion of households were grouped in the upper levels of food insecurity according to ELCSA classification. A little over half (57%) of household were classified as being either moderately (28%) or severely (27%) food insecure. Only 1% of households were food secure in the control group, compared to 5% in P4P.

![Food Insecurity Classification](image)

**Figure 14.** Inter-Quartile distribution of household food insecurity scores.
The 2011 Guatemalan National Statistics Institute (INE) survey (ENCOVI) included the measurement of food security at the household level using the Latin American and Caribbean Food Insecurity Scale (ELCSA). According to ENCOVI, 19% of households in Guatemala were food secure, and 39% mildly, 27% moderately and 14% were severely food insecure. Results from our study (Figure 14) indicated that in the control group only 1% of households were food secure, and 13% mildly, 50% moderately and 35% were severely food insecure. Results for P4P are more in-line with those from ENCOVI, where 5% of households were food secure, and 39% mildly, 28% moderately and 27% severely food insecure.

Food insecurity is quite variable in Guatemala, with wide differences even within states and regions. Table 10 shows data on food insecurity prevalence for each of the states included in this study (P4P and control) and data from ENCOVI 2011 for the same states as comparison. On average, prevalence of mild and moderate food insecurity is higher for states located in the south region compared to those in the east region. The proportion of severely food insecure households is considerable higher for southern states in all groups (P4P, control and ENCOVI), compared to eastern states. Food insecurity scores are significantly higher for three (out of four) states located in the southern region in both P4P and control groups. States located in the eastern region have significantly lower food insecurity scores (Table 10). Data from our study and from ENCOVI confirms that Suchitepéquez and Santa Rosa present the highest prevalence of severely food insecure households (Table 10) among the states included in this study.

<table>
<thead>
<tr>
<th>STATE</th>
<th>Food Secure</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P4P</td>
<td>Control</td>
<td>ENCOVI&lt;sup&gt;1&lt;/sup&gt;</td>
<td>P4P</td>
</tr>
<tr>
<td>National Avg.</td>
<td>--</td>
<td>--</td>
<td>19</td>
<td>--</td>
</tr>
<tr>
<td>South Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escuintla</td>
<td>17&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0</td>
<td>14</td>
<td>39</td>
</tr>
<tr>
<td>Retalhuleu</td>
<td>4</td>
<td>0</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Santa Rosa</td>
<td>3</td>
<td>0</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Suchitepéquez</td>
<td>2</td>
<td>--</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Average</td>
<td>7</td>
<td>0</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>East (Oriente) Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiquimula</td>
<td>3</td>
<td>0</td>
<td>18</td>
<td>79</td>
</tr>
<tr>
<td>Jalapa</td>
<td>4</td>
<td>6</td>
<td>13</td>
<td>59</td>
</tr>
<tr>
<td>Jutiapa</td>
<td>9</td>
<td>0</td>
<td>18</td>
<td>84</td>
</tr>
<tr>
<td>Zacapa</td>
<td>0</td>
<td>--</td>
<td>19</td>
<td>43</td>
</tr>
<tr>
<td>Average</td>
<td>4</td>
<td>2</td>
<td>17</td>
<td>66</td>
</tr>
</tbody>
</table>

<sup>1</sup>Indicates percentage of households in the state under that specific food insecurity classification.
These findings, although consistent with data from ENCOVI, differ from other sources that indicate that states located on the eastern region in Guatemala known as “dry corridor” have higher food insecurity rates (FAO, 2012; FAO, 2011). The dry corridor includes five states located in central and eastern Guatemala; three of the four states included in this study (Zacapa, Chiquimula, and Jutiapa) are located on the dry corridor. This region is primarily inhabited by subsistence farmers, and exhibits annual seasonal drought and severe vulnerability to climate conditions (ENA, 2008). This causes marked periods of food shortages that spike acute malnutrition and affect the food security and incomes of people in the region (USDA, 2011). A recently published study by the United Nations Program for Development (UNPD) in Guatemala looked at weather patterns and climate-change impacts on all 23 states in Guatemala (UNPD, 2013). The report concluded that because of the similarities in the seasonal drought conditions and weather patterns, six more states now fit the profile of those previously included in the dry corridor area. The new states to be included as part of this region are: Huehuetenango, San Marcos, Retalhuleu, Quiché, Santa Rosa and Escuintla; three of those states (Retalhuleu, Santa Rosa and Escuintla) were part of this study. Severe weather conditions and seasonal drought periods can help explain the high prevalence of food insecurity observed among households located on these states, especially in Retalhuleu and Santa Rosa. Although Suchitepéquez is not included as part of the new group of states in the dry corridor area, it neighbors both Retalhuleu and Escuintla (Appendix R) and exhibits similar weather patterns, thus making its inhabitants vulnerable to recurrent periods of food insecurity.
3.3.3. Household dietary diversity

Household dietary diversity is defined as the number of different foods or food groups consumed within the household over a given reference period of time (Ruel, 2003). In this study, HDDS scores represent the average number of food groups (out of 12) consumed in a reference period of time (i.e., previous 24 h). Figure 15 shows the inter-tertile distribution of overall household dietary diversity scores (HDDS) in both control and P4P households. For this specific methodology there are no pre-determined categories for the classification of HDDS scores. The final tertile distribution of HDD scores depends on the specific characteristics and behavior exhibited by the population being studied (G. Kennedy et al., 2011). Based on the range of dietary diversity scores observed in both control and P4P households, the inter-tertile analysis classified HDD scores into three categories (Table 11).

Table 11. Category classification of HDDS scores based on observed dietary diversity ranges and inter-tertile distribution analysis.

<table>
<thead>
<tr>
<th>Score</th>
<th>Tertile</th>
<th>Household Dietary Diversity Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 3</td>
<td>Lower</td>
<td>Low</td>
</tr>
<tr>
<td>4 – 8</td>
<td>Middle</td>
<td>Medium</td>
</tr>
<tr>
<td>9 – 12</td>
<td>Upper</td>
<td>High</td>
</tr>
</tbody>
</table>

For the control group, 39% of households were classified into the upper (high), 39% in the middle (medium) and 4% in the lower (low) tertile of dietary diversity. For P4P, a considerably higher percentage of households (60%) were classified in the upper (high) tertile of dietary diversity compared to the control. Over a third (39%) of households were classified into the middle (medium) tertile; and only 1% were classified...
into the lower tertile of dietary diversity, compared to 4% of households in the control (Figure 15).

Figure 15. Inter-Tertile distribution of household dietary diversity scores (HDDS).

Household means for overall (HDDS) and normalized (HDDSn) dietary diversity scores for both groups are presented in Figure 16. Overall dietary diversity was significantly higher in P4P households, approximately two points on the HDDS scale, compared to control households. Based on the inter-tertile classification, the average dietary diversity scores for P4P (8.89) and control (7.00) households fell within the upper and middle tertile of this scale, indicating high and intermediate dietary diversity, respectively. This represents an average difference between cohorts of almost two full food groups per household. Moreover, P4P households consumed 75% (9 out the 12 food groups) of the available dietary diversity offering captured by HDDS.
In contrast, control households consumed only 58% (7 out the 12 food groups) of the available dietary diversity offering captured by HDDS.

![Figure 16](image-url)

**Figure 16.** Overall (HDDS) and normalized (HDDSn) household dietary diversity scores: Control vs. P4P. Bars represent means (±SD) for each group. Bars with different letters represent statistical differences (P<0.05).

A recent study by Soto-Mendez and others looked at food variety, dietary diversity and food characteristics in rural and urban settings in Guatemala. Using a modified version of the HDDS methodology, Soto-Mendez and colleagues found that rural households consumed on average 6 food groups. This methodology used a total of 8 food groups. Researchers reported that rural households included in this study consumed on average 75% (6/8 food groups) of the available dietary diversity offering captured by the instrument. This is similar to our observations in P4P households.
The normalized dietary diversity score takes into account the consumption of food items within each subgroup and scores them individually (Hoddinott and Yohannes, 2011; Kennedy et al., 2011). This results in a broader dietary diversity score range (0-17) that reflects consumption patterns across and within food groups and subgroups. For example, group D under HDDS includes the “vitamin A-rich fruits” and “other fruits” subgroups. Consuming food items from either and/or both subgroups is scored as one point in the final HDDS score, thus not allowing differentiating among food items consumed in each individual subgroup. Normalized dietary diversity was significantly higher in P4P households (11.13) compared to those in the control (8.67). In this context, P4P households consumed on average 11/17 food groups/subgroups in a 24 h period compared to the 9/17 food groups/subgroups consumed in control households. In the same study by Soto-Mendez and others, a modified version of the INCAP methodology was used. This methodology, similar to HDDSn, takes into account consumption of food items within groups. This methodology uses a total of 25 food groups/subgroups. Using this classification, researchers found that rural households consumed on average 56% (14/25 food groups/subgroups) of the available dietary diversity offering captured by the instrument; which is closer to the observations from the control group.

A women’s dietary diversity score (WDDS) was calculated for those households in which women were the principal interviewee. Similarly, a children’s dietary diversity score (IDDS) was calculated for those households that included minors\(^3\) at the time of the interview. Dietary diversity scores for women and children are presented in Figure 17.

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\(^3\) Subjects < 18 y that lived in the household at the time the interview was conducted.
P4P households have significantly higher dietary diversity scores for both women and children compared to control households.

**Figure 17.** Children’ (IDDS) and Women’ (WDDS) dietary diversity scores: Control and P4P household. Bars represent means (±SD) for each group. Bars with different letters represent statistical differences (P<0.05).

Similar to overall and normalized dietary diversity scores, P4P households that included women and children consumed (on average) two additional food groups compared to those in the control. Food groups used to calculate dietary diversity scores for women and children include food items that provide key nutrients for the proper development of individuals in these vulnerable groups.
A carotenoid-rich (VAS) dietary diversity score (Figure 18) was calculated aggregating scores from food groups that contain food items rich in provitamin-A carotenoids. There were significant differences in the consumption of carotenoid-rich foods between P4P and control households (Figure 18). On average, P4P households consumed twice as much carotenoid-rich foods compared to the control. In Guatemala 16% of preschool aged children are deficient in vitamin A (WHO, 2009). An estimated 1,500 deaths in the country are precipitated by vitamin A deficiency annually (UNICEF, 2004).

Further analyses of HHDSn results per funding source and region are presented in Figures 19 (P4P) and 20 (control). For P4P, average dietary diversity scores were significantly higher for two of the four states located in the southern region compared to those in the eastern region (Figure 19). For the control, there was no clear trend in terms of dietary diversity scores, two southern and two eastern states had the highest scores but there are not statistical differences between them (Figure 20). For P4P, data presented below indicates that southern states have higher food insecurity scores (on average) compared to eastern states.

Figure 18. Carotenoid-rich (VAS) dietary diversity scores: Control vs. P4P. Bars represent means (±SD) for each group. Bars with different letters represent statistical differences (P<0.05).
The opposite was observed for dietary diversity scores, where southern states had higher scores. This inverse relationship seems to indicate that the food insecurity problem in southern states is more related to the availability (quantity) dimension of food security, as opposed to being an issue of food access (quality). In other words, the variety (diversity) of foods P4P households have access to in southern states is only limited by the availability of such food items. This inverse relationship was especially marked amongst P4P subjects, this suggest a more fluent access (the economic dimension of food security) to a variety of foods in these households compare to the control.

Figure 19. Comparison of normalized dietary diversity scores (HDDS) among states in P4P group. Bars (±SD) with different letters are statistically different (Fisher’s LSD, P<0.05). Dotted line represents group average.
Figure 20. Normalized dietary diversity scores (HDDS<sub>n</sub>) comparison between states: Control. Bars (±SD) with different letters are statistically different (Fisher’s LSD, P<0.05). Red dotted line represents group average.

A comparative analysis on the consumption patterns (household level) of different food groups is presented in Figures 21 and 22, which reports on basic staples, fruits and vegetables, meats, and condiments, oils and fats group, respectively. Overall, with a few exceptions, P4P households consumed a higher proportion of these food groups compared to control households. Consumption of white roots, tubers and cereals was significantly higher in P4P households compared to the control (Figure 21a). Likewise, consumption of carotenoid-rich foods, orange and other Vegetables and tubers was also significantly higher among P4P households (Figure 21b). This has important implications in terms of the consumption of both macro and micronutrients and the overall nutritional adequacy of the diet. In general, the consumption of vegetables was higher among P4P
households; this has important implications associated with the consumption of key nutrients provided by this food group. For example, carotenoid-rich foods and orange vegetables/tubers are considered a good source of pro-vitamin A compounds like beta carotene and other nutrients such as folate and vitamin C. Vegetables are also a good source of fiber, and key nutrients like potassium, magnesium, and folic acid (Liu, 2013).

![Figure 21](image)

**Figure 21.** Relative and specific consumption of different food groups. Bars are proportions. ¹Indicates a statistical difference between groups ($\chi^2$, P<0.05).

Consumption of foods within the meat, seafood and eggs groups was significantly higher for P4P households (Figure 22a). Foods contained in this group are an important source of high quality protein, heme iron, zinc, poly-unsaturated fatty acids (PUFAs) and B vitamins (Batcher & Nichols, 1984; Geissler & Powers, 2010). Finally, consumption of oils, fats, condiments and spices was significantly higher among P4P households (Figure 22b). While the consumption of oils and fats are still needed for health, the calorie
content of food in both of these groups is still considerable. In fact, oils and solid fats both contain about 120 calories per Tablespoon (9 calories/g). Therefore, the amount of oil consumed needs to be limited to balance total calorie intake (Geissler & Powers, 2010). An example of a more detailed breakdown of the consumption of individual food items within each food group is presented in Appendix S.

![Graph](image)

**Figure 22.** Relative and specific consumption of different food groups. Bars are proportions. 1Indicates a statistical difference between groups ($\chi^2$, P<0.05).

Table 12 compares the top ten food items more frequently present in the diets in both P4P and control households. Results are presented as percentage of household that reported consuming each different food item. Out of the 152 food items included in HDDS, consumption of 26 (17%) of them were not reported by any household in the P4P group. Moreover, 79 food items (52%) from HDDS were not reported in any control household. These “unreported” food items were not included when comparing groups. A total of 63 (59%) food items were consumed by more than 50% of households in the control group. In contrast, a total of 115 (76%) were consumed by more than 50% of
households in the P4P group. With respect to the top-ten food items consumed in P4P and control households, there was a major homology across the two groups with all ten food items shared, albeit in varying order. Coffee (100%) is the most frequently consumed food item in control households, compared to corn tortillas (99%) in P4P homes. In Guatemala, sugar is traditionally used as a sweetener for coffee and other foods and drinks, so it's not surprising to see that it's among the top-five items in both groups. Sweet bread is the common name used for a variety of traditional pastries made customarily from wheat flour, water and/or milk, sugar and leavening agents. In Guatemala, these pastries are usually consumed alongside coffee both as part of breakfast and as a mid-afternoon snack or during dinner. Similarly, table salt and oil are two of the most commonly used cooking ingredients in Guatemala; thus, it is expected to find these among the top 10 food items consumed in both groups. For the most part, tomatoes and onions are either consumed as a stand-alone food item (e.g., tomato salad) or more commonly as ingredients in prepared dishes (e.g., traditional rice). Black beans and corn tortillas are important staple foods and are widely consumed in Guatemala. Both of these items were consumed by most households in both P4P (89 and 99%) and control (96 and 99%) cohorts. Black beans, along with corn are the two food crops promoted by P4P in all its initiatives.
Table 12. Top-ten food items consumed (frequency) across groups.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Food Group</th>
<th>HDDS Food Group</th>
<th>Food Item</th>
<th>% of Households&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Rank</th>
<th>Food Group</th>
<th>HDDS Food Group</th>
<th>Food Item</th>
<th>% of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cereals</td>
<td>P4P (N=271)</td>
<td>Corn tortilla</td>
<td>99</td>
<td>1</td>
<td>Sweetened beverages</td>
<td>CONTROL (N=101)</td>
<td>Coffee</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Condiments and spices</td>
<td></td>
<td>Salt</td>
<td>97</td>
<td>2</td>
<td>Cereals</td>
<td></td>
<td>Corn tortilla</td>
<td>99</td>
</tr>
<tr>
<td>3</td>
<td>Sweeteners</td>
<td></td>
<td>Sugar</td>
<td>93</td>
<td>3</td>
<td>Legumes, seeds and nuts</td>
<td></td>
<td>Black beans</td>
<td>96</td>
</tr>
<tr>
<td>4</td>
<td>Sweetened beverages</td>
<td></td>
<td>Coffee</td>
<td>93</td>
<td>4</td>
<td>Condiments and spices</td>
<td></td>
<td>Salt</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>Legumes, seeds and nuts</td>
<td></td>
<td>Black beans</td>
<td>89</td>
<td>5</td>
<td>Sweeteners</td>
<td></td>
<td>Sugar</td>
<td>94</td>
</tr>
<tr>
<td>6</td>
<td>Oils and fats</td>
<td></td>
<td>Oil</td>
<td>88</td>
<td>6</td>
<td>Oils and fats</td>
<td></td>
<td>Oil</td>
<td>73</td>
</tr>
<tr>
<td>7</td>
<td>Other Vegetables</td>
<td></td>
<td>Tomatoes</td>
<td>85</td>
<td>7</td>
<td>Cereal</td>
<td></td>
<td>Sweet bread</td>
<td>65</td>
</tr>
<tr>
<td>8</td>
<td>Other Vegetables</td>
<td></td>
<td>Onions</td>
<td>82</td>
<td>8</td>
<td>Eggs</td>
<td></td>
<td>Chicken egg</td>
<td>54</td>
</tr>
<tr>
<td>9</td>
<td>Eggs</td>
<td></td>
<td>Chicken egg</td>
<td>71</td>
<td>9</td>
<td>Other Vegetables</td>
<td></td>
<td>Tomatoes</td>
<td>52</td>
</tr>
<tr>
<td>10</td>
<td>Cereals</td>
<td></td>
<td>Sweet bread</td>
<td>58</td>
<td>10</td>
<td>Other Vegetables</td>
<td></td>
<td>Onions</td>
<td>38</td>
</tr>
</tbody>
</table>

<sup>1</sup>Indicates the percentage of households that reported consuming each individual food item the previous day.
Our findings are in agreement with two studies conducted in the last decade. A study in 2011 looked at the top-ten foods consumed by rural and urban populations in Guatemala; seven of them coincide with those described in our study (in decreasing ranked order): sugar, tortillas, coffee, sweet bread, vegetable oil, eggs, and black beans (Soto-Méndez et al., 2011). An earlier study on the food consumption patterns and dietary diversity of pregnant women living in a peri-urban area of Guatemala City reported that the greatest cumulative intakes, in order of decreasing amounts, were liquid coffee, tortillas, white bread, milk, sweet bread, soft drinks, sugar, bananas, tomatoes, and plantain (Fitzgerald et al., 1992).

In our study, although the items at the top of the consumption list were the same across groups, their relative contribution to the whole diet varies remarkably. As presented in Figures 21 and 22, the average consumption across different food groups varied significantly between cohorts. Moreover, the total number of individual food items consumed in P4P households was considerably higher (125/152, 82%) compared to those consumed in control households (73/152, 48%). Based on the dietary offering captured by HDDS, twice as many food items are found as part of the overall diet (diversity) in P4P households compared to the controls. The food groups described in Figures 21 and 22 are the main drivers of the higher dietary diversity observed in P4P households. The next section describes in more detail the linear correlations among these and other variables.
3.3.4. Relationship among variables evaluated

Linear correlations for food security, overall and normalized dietary diversity and selected household variables are presented in Table 13. Data included in this analysis are for households in both P4P and control cohorts. Food insecurity was negatively correlated (P<0.05) with overall and normalized dietary diversity, housing quality, educational level, and educational attainment. A positive, but not significant (P=0.08) correlation was observed between food insecurity and fertility rate. Overall and normalized dietary diversity were both positively correlated (all P<0.05) with housing quality, and educational level; and negatively correlated with fertility rate.

Table 13. Linear correlation\(^1\) food insecurity and/or dietary diversity and selected household variables: P4P and control combined.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Food Insecurity(^2)</th>
<th>Overall Dietary Diversity</th>
<th>Normalized Dietary Diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Dietary Diversity</td>
<td>337</td>
<td>-0.24*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normalized Dietary Diversity</td>
<td>337</td>
<td>-0.23*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing Quality Score (HQS)</td>
<td>153</td>
<td>-0.24*</td>
<td>0.17*</td>
<td>0.21*</td>
</tr>
<tr>
<td>Education level</td>
<td>299</td>
<td>-0.39*</td>
<td>0.40*</td>
<td>0.41*</td>
</tr>
<tr>
<td>Educational attainment</td>
<td>218</td>
<td>-0.24*</td>
<td>0.34*</td>
<td>0.31*</td>
</tr>
<tr>
<td>Household occupancy</td>
<td>372</td>
<td>0.25*</td>
<td>-0.22*</td>
<td>-0.21*</td>
</tr>
<tr>
<td>Fertility rate</td>
<td>299</td>
<td>0.09</td>
<td>-0.32*</td>
<td>-0.31*</td>
</tr>
</tbody>
</table>

\(^1\)Spearman correlation coefficient. \(^2\)Food insecurity measured only in households that included minors (0-15). *Indicates a statistically significant linear correlation (P<0.05)

Linear correlation analyses are presented independently for P4P and control cohorts in Table 14. Household data from each cohort were analyzed separately.
For P4P households, food insecurity was negatively correlated (P<0.05) with educational level. Overall and normalized dietary diversity scores were both positively correlated (P<0.05) with educational level; and negatively correlated with fertility rate. For the control group, food insecurity was positively correlated with household occupancy and negatively correlated with housing quality, overall and normalized dietary diversity scores. Overall dietary diversity was positively correlated with educational level. Normalized dietary diversity was positively correlated with educational level and negatively correlated with household occupancy and housing quality.

Table 14. Linear correlation\(^1\) food insecurity and/or dietary diversity and selected household variables: P4P and control cohorts.

<table>
<thead>
<tr>
<th></th>
<th>Food Insecurity (^2)</th>
<th>Overall Dietary Diversity</th>
<th>Normalized Dietary Diversity</th>
<th>Food Insecurity (^2)</th>
<th>Overall Dietary Diversity</th>
<th>Normalized Dietary Diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P4P (N=271)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>CONTROL (N=101)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Insecurity</td>
<td></td>
<td>-0.11</td>
<td>-0.07</td>
<td></td>
<td>-0.44*</td>
<td>-0.50*</td>
</tr>
<tr>
<td>Education Level</td>
<td>-0.23*</td>
<td>0.24*</td>
<td>0.23*</td>
<td></td>
<td>-0.08</td>
<td>0.45*</td>
</tr>
<tr>
<td>Household occupancy</td>
<td>0.14</td>
<td>-0.08</td>
<td>-0.10</td>
<td></td>
<td>0.25*</td>
<td>-0.35*</td>
</tr>
<tr>
<td>Fertility rate</td>
<td>0.01</td>
<td>-0.22*</td>
<td>-0.23*</td>
<td></td>
<td>0.11</td>
<td>-0.15</td>
</tr>
<tr>
<td>Housing Quality Score (HQS)</td>
<td>-0.13</td>
<td>0.16</td>
<td>0.16</td>
<td></td>
<td>-0.60*</td>
<td>0.19</td>
</tr>
</tbody>
</table>

\(^1\)Spearman correlation coefficient. \(^2\)Food insecurity measured only in households that included minors (0-15). *Indicates a statistically significant linear correlation (P<0.05)
Food insecurity and dietary diversity. Research on the relationship and complementarity between indicators of food security and dietary diversity is still ongoing. Our results are consistent with those reported by several researchers who have studied this topic. A recent study conducted in 10 developing countries in Africa, Asia and Latin America evaluated the use of dietary diversity as a proxy indicator of food security. Researchers reported a positive linear association between dietary diversity and different indicators of food security. For example, a 1% increase in dietary diversity was associated with a 1% increase in household per capita consumption, a 0.7% increase in household per capita caloric availability, a 0.5% increase in household per capita availability from staples and 1.4% from non-staples (Hoddinott & Yohannes, 2002). A study by Lo and others indicated that higher dietary diversity was significantly associated with higher total household food expenditure (NTD\(^4/g\), a proxy indicator of food security, among free-living elderly in rural Taiwanese communities. Moreover, dietary diversity alone explained 21.4% of the total expenditure variance in their linear regression model (Lo, Chang, Lee, & Wahlqvist, 2012). Similarly, a study in urban settings in Burkina Faso assessed the external validity of the complementarity of the household food insecurity access scale (HFIAS) and an index-member’s dietary diversity score (IDDS) to measure household food insecurity and household diet adequacy. Similar to our results, HFIAS was negatively associated with the mean adequacy ratio (MAR) whereas IDDS was positively associated with it. Authors concluded that HFIAS and IDDS performed well in approximating adequacy of urban households’ diets (Becquey et al., 2010). Finally, a study by Kennedy and others in three developing countries looked at

\(^4\) NTD = New Taiwan Dollars.
the association between household dietary diversity (HDDS) and food consumption scores (FCS), a proxy indicator of food security. Pearson correlation coefficients between FCS and HDDS were significant in all three countries included in the study, indicating substantial agreements between the two measures (G. Kennedy et al., 2010).

**Food insecurity-dietary diversity and education.** Overall, education level was associated with food security (negatively; P<0.05) and dietary diversity (positively; P<0.05). Food insecurity was higher among those with lower educational level and educational attainment. The opposite was observed for dietary diversity, which was higher among those with higher educational level and attainment. There is growing evidence of the connections between food insecurity, especially early in life, and impaired health and educational and economic performance later in life. A longitudinal study in rural Guatemala examined the effects of an early childhood nutritional intervention on adult educational outcomes. The results were significant, indicating an increase of 1.2 grades completed for women and one quarter SD on standardized reading comprehension and non-verbal cognitive ability tests for both women and men (Dewey & Begum, 2011; Hoddinott, Maluccio, Behrman, Flores, & Martorell, 2008; Maluccio et al., 2009). Further research with these dataset has demonstrated that improvements in nutrition also led to greater economic productivity, stratified by educational attainment, as reflected in higher wages for men (Hoddinott et al., 2008). Another study in Mozambique looked at the main determinants of food security and nutritional status in rural and urban populations. Using multivariate analysis to explain calories/adult/day, authors found this parameter was negatively associated with educational level for adult males, but not adult females (Garrett & Ruel, 1999). In other studies in populations from
rural Malaysia (Mohamadpour, Sharif, & Keysami, 2012) and Bangladesh (Thorne-Lyman et al., 2010) found that the mean years of schooling significantly decreased as food insecurity increased. Consistent with our findings, this might suggest a negative association between educational level and/or attainment and food insecurity. Overall, households with lower educational levels and/or attainment exhibited higher levels of food insecurity. The opposite was evident for dietary diversity, household with higher levels of educational level and attainment had higher dietary diversity. One plausible explanation suggests that improvements in education lead to better opportunities for employment, which eventually could improve household food security and dietary diversity.

**Food insecurity-dietary diversity and housing quality and occupancy.** Housing quality, a proxy indicator of socioeconomic status, was positively correlated with HDDS and negatively correlated with food insecurity when analyzing data from both cohorts (Table 11). This association was observed when dissecting the data for P4P households, but it remained strong for those in the control. This suggests that the strong linear correlation between HQS and indicators of food security and dietary diversity in control households was the main driver behind the significant correlation observed when combining data from both cohorts. The same applies for household occupancy, even though the linear correlation is not significant when combining data from both cohorts, a weak but significant correlation was observed in control households. Overall, greater household occupancy had a negative impact on food security and dietary diversity, especially among control households. Others have reported similar findings related to household size and different indicators of food security (Garrett & Ruel, 1999). Garrett
and others observed an interesting phenomenon in which larger households (10 or more) had declining rates of calorie availability. This reflects the ability of larger households to begin to mitigate the negative effects additional household members through exploiting economies of scale in consumption. In our study less than 2% of households in the control and 1% in P4P have 10 or more occupants, the majority being in the 6-8 occupants/household range. A number of studies have looked at the relationship between socioeconomic status and food insecurity and dietary diversity, although the number of studies in developing countries is reduced. Huet and others studied the main correlates of food security among members of several Inuit communities. Consistent with our results, they found that proxy indicators of socioeconomic disadvantage such as crowded households (household occupancy), having only a single adult in the household, having any household member on income support, and public housing were significantly associated with food insecurity (Huet, Rosol, & Egeland, 2012). Findings on household income are supported by several studies in developing and developed countries that found that income, a significant determinant of socioeconomic status, is an important determinant of household food insecurity (Bhattacharya, Currie, & Haider, 2004; Kinsey, 1994; Olson, Rauschenbach, Frongillo Jr, & Kendall, 1996; Susilowati & Karyadi, 2002). Overall, lower food security and dietary diversity among low socioeconomic status households could be partially explained by the well documented fact that inadequate income is an important contributing factor and greatly decreases the ability of economically active members to provide sufficient and diverse foods for the household.

**Food insecurity-dietary diversity and fertility rate.** In our study, we found a negative, but not significant (P=0.08) linear relationship between fertility rate and food
security. Fertility is negatively correlated with household dietary diversity in P4P households but not in the control. Our results are consistent with those in several studies indicating that food security and dietary diversity are inversely correlated with fertility rates in developing countries. For example, an exploratory study by Combs and others concluded that food and shelter insecurity are considered to be causally related to the high birth rates in poor and underdeveloped countries (Combs, Welch, Duxbury, Uphoff, & Nesheim, 1996; Kinsey, 1994). A study by Ruel and others found that households with large children occupancy rates, especially those less than five years old, negatively affected nutritional status as indicated by height-for-age scores. A 10% increase in this percentage was related to a 3.7% deterioration in height-for-age Z-scores (Garrett & Ruel, 1999). This could reflect the increased demand for resources that a larger number of small children exerts, the shorter periods between births, which can result in lower birth weights and poorer postnatal growth and eventually decreased physical and cognitive development. An extensive study in 11 different countries used data from recent Demographic and Health Surveys (DHS) to examine the association between dietary diversity and height-for-age Z-scores (HAZ) for children 6–23 and 24-48 months old. The number of children (< 5 years) in the household was a significant factor that helped explained the association between dietary diversity and HAZ in all three Latin American countries included in the study (Arimond & Ruel, 2004). Concurrent with our findings, it is suggested that there is an association between dietary diversity and nutritional status that is interdependent with socioeconomic factors like fertility rate. The number of children conceived and birth rate was a strong theme identified in MSC interview data (Chapter 4). Subjects often associated high fertility rates and the presence
of more than five children in the household with scarcity of resources, food insecurity, and nutrition and health problems. The association specifically indicated that the presence of a large number of children in the household is a common element among families facing harsh socioeconomic conditions. Specific references pointed to the fact that, having already limited means, these households could not access resources to properly support a growing family and this usually lead to worsening socioeconomic conditions in the long term. Most problems of underdevelopment are more difficult to resolve if a population has high growth rates. A growing population increases the demand for food and other resources; this phenomenon puts enormous pressure on the natural environments that support food production systems. Water supplies, the quality and availability of arable land, the world’s forests, and the biological diversity of the planet are under a tremendous burden in part due to a growing population. This pressure on natural resources also increases the burden of assuring food security for the entire world’s population. Over the next 50 years the world population is set to increase by 3 billion, and possibly by as much as 4.5 billion (FAO et al., 2012). To meet the market demand of a growing and urbanizing population, most experts believe cereal production needs to be increased by about 35 percent and meat production by over 55 percent in the next 20 years (Leisinger, Schmitt, & Pandya-Lorch, 2002). The need to improve productivity of traditional food systems will require important investments from government and global agencies. Small farmers will play a fundamental role in this process; improving their production efficiency and productivity will prove fundamental in achieving global food security in the long term. Productivity improvements among P4P’s farmers in Guatemala are discussed more in detail in the next section.
3.3.5. Productivity

Reported average (range) productivity (qq/mz) from P4P farmers (Canada) for corn (Figure 23) and black beans (Figure 24) is presented for baseline (before P4P) and year 3 of the program (2012). Average corn productivity went from 43-50 qq/mz (1.45 - 1.77 t/ha) at baseline to 91-101 qq/mz (3.09 – 3.44 t/ha) in year 3 of the program. This represents a two-fold increase in productivity on a per area basis (P<0.05). Productivity data were not available but according to the latest national agricultural survey in Guatemala, the national average corn yield ranged from 0.90 t/ha - 1.77 t/ha for the 2007/2008 crop (ENA, 2008). According to the SICTA (Sistema de Integración Centroamericano de Tecnología Agrícola) network and the Inter American Institute for Cooperation in Agriculture (IICA) Guatemala’s national average yield for corn went from 2.34 t/ha in the 2005/2006 to 1.96 t/ha in 2011/20012 (SICTA and IICAA, 2013).

Figure 23. Reported average yield (range) for corn at project baseline and year 3 (2012). Bars (±SD) with different letters are statistically different (Fisher’s LSD, P<0.05). Black arrow and red box represents average productivity increase.
Similarly, average productivity for black beans went from 12-14 qq/mz (0.41 - 0.48 t/ha) at baseline to 25-28 qq/mz (0.86 – 0.95 t/ha) in year 3 of the program. This represents a two-fold increase in productivity on a per area basis (P<0.05). According to the latest national agricultural survey in Guatemala, the national average yield for black beans ranged from 0.55 t/ha - 0.77 t/ha for the 2007/2008 crop (ENA, 2008). According to the SICTA (Sistema de Integración Centroamericano de Tecnología Agrícola) network and the Inter American Institute for Cooperation in Agriculture (IICA) Guatemala’s national average yield for black beans have increased from 0.71 t/ha in 2000 to 0.82 t/ha in 2010 (SICTA and IICAA, 2013; SICTA and IICAB, 2013).

![Figure 24](image.png)

**Figure 24.** Reported average yield (range) for black beans at project baseline and year 3 (2012). Bars (±SD) with different letters are statistically different (Fisher’s LSD, P<0.05). Black arrow and red box represents average productivity increase.

From a food security (food availability) perspective, these are very important program achievements. Staple grains like corn and beans are the main carbohydrate
(65%) and protein (71%) sources in the Guatemalan diet (ENA, 2008). The most widely cultivated of all staple crops is corn. The contribution of maize to the per capita intake of energy and protein is high: 37.7% and 36.5%, respectively, compared with black beans which have values of 9.5% and 22.9% (López, 2002). The average per capita consumption of corn per year is 114 kg. However, this value can be twice as much for lower income families (Baumeister, 2010), especially in rural areas (ENA, 2008). The changes in crop productivity for P4P farmers are an indicator of the different agro, socioeconomic, cultural and environmental factors that influence the levels of production and productivity of corn and beans for smallholder farmers in Guatemala. This implies the program has achieved improvements related to access to technology, use of marginal areas unsuitable for production, improvements in vulnerability to climate change, recurrent drought, lack of infrastructure, access to markets, agricultural credit and organization, among others. From an entrepreneurial perspective, the use of technology and the promotion of knowledge transfer as cross-cutting elements of the program warrant that smallholder farmers can achieve profitability levels to ensure sustainability of their crops. There is a strong body of evidence in the literature highlighting the importance of these factors in improving smallholder productivity, food security and livelihoods around the world. For example, the integrated use of zero-tillage cultivation practices, improved varieties and other agricultural technologies for soybeans in Argentina and rice in the Indo-Gangetic plains significantly enhanced yields, boosted production, and conserved soil fertility (Erenstein, 2009; Trigo, Cap, Malach, & Villarreal, 2010). Through improved soil conservation and modern irrigation techniques, smallholder farmers in Burkina Faso and Niger have transformed large swaths of the
region’s arid landscape intro productive agricultural land, improving food security for about 3 million people in the Sahel region (Reij, Tappan, & Smale, 2009). The use of super hybrid rice and improved varieties in China has pushed the yield of this staple crop to over 10 t/ha. By pushing rice yields steadily and dramatically upward, the development of hybrid rice has allowed China to feed an additional 60 million people a year while reducing the land allocated to rice production by 14 percent since 1978 (Li JiMing et al., 2009). In Kenya, synergies between the liberalization of input and maize markets and public investments in support of smallholder agriculture, leading to tangible private-sector investment in fertilizer retailing and maize marketing, resulted in an impressive increase in fertilizer use and maize yields on smallholder farms over between 1997 and 2007 (Ariga & Jayne, 2009). Finally, the introduction of improved mungbean varieties as a major crop has brought many benefits to Asia, including new income streams for small-scale farmers and new sources of dietary protein and iron for the poor, especially children and women (Shanmugasundaram, Keatinge, & Hughes, 2009). Knowledge transfer, organizational strengthening, technology transfer, crop diversification, access to credit, stable markets, and fair prices were dominant themes identified from MSC interview data (Chapter 4). Subjects associated these prevailing themes with program benefits, and significant changes brought about by P4P. Program beneficiaries associated specific elements within each category with improvements in productivity, for example, the notion that improvements in fertilization practices lead to improved yields for both corn and beans. Furthermore, smallholder farmers in the control group identified most of the same themes as the “most significant challenges” faced by smallholder farmers in Guatemala, thus highlighting the impact and importance of a program like P4P.
3.3.6. Income

Average income for P4P and control households recorded at baseline and year 3 of the program is presented in Table 15. Based on data quality and reliability, P4P chose to only use income data from the Canada (East) cohort. For P4P households, net annual income in year 3 rose by 14% (GTQ 3,221.00 / US$ 411.36) compared to baseline, whereas income from agricultural activities rose by 24% (GTQ 1,565.00 / US$ 199.87). Interestingly, net income from crop sales fell by 25% (GTQ 636 / US$ 81.22). This can be explained in part by looking at the value of crops for self-consumption, which rose by 50% (GTQ 1,421 / US$ 181.48) during the same period. The self-consumption value reflects the net value of crops consumed by the household on a per year basis. Meeting household demands first is a core guiding principle at P4P. The program emphasizes growing crops to meet anticipated household demands and using surplus crop for commercialization purposes. As discussed in the previous section, productivity rose significantly for both corn and beans during the same time period (Baseline → Y3), suggesting P4P families improved significantly on their availability to meet their household demands and had surplus product for sale. Both of these activities promote food security, especially the availability and access dimensions. In one hand, improved productivity leads to more food available for consumption within the household. Similarly, improved productivity leads to surplus crops for sale, thus increasing household income and promoting improved access to food and other basic needs. This is consistent with the concept that lower-income households first fulfill their basic calorie requirements through domestic food production, before rising incomes eventually lead to more diverse diets (Headey, 2012). Qualitative information from MSC interviews
(Chapter 4) corroborates these findings. Specific references from P4P beneficiaries indicated that actually income has improved and the fact that additional income had been used to fulfill basic needs like health, education, clothing and a more diverse diet. For example, specific references indicated that consumption of red meat in the past was unusual, and with the new income level, this and other food items can now be afforded on a regular basis and in larger quantities. From a food and nutrition security perspective, this has important implications.

For control households, net annual income in year 3 rose by 12% (GTQ 1,883.00 / US$ 240.49) compared to baseline; and income from agricultural activities rose by 12% as well (GTQ 589 / US$ 75.22). Although, percentage-wise net annual income improved similarly (14% vs. 12%) in P4P and control households, the overall differences among cohorts were significant. P4P households on average improved their net annual income by more than GTQ 3,000 ($411), whereas control household improved by almost GTQ 1,900 (US$ 241). This represents a 71% difference between cohorts, where P4P households had an additional $170 annually, compared to the control. This difference appears to be small in macroeconomic terms but it is significant in the context of smallholder farmers in rural Guatemala. According to the Guatemala’s ministry of labor, minimum monthly wages for agricultural workers are GTQ 2,421.75 (US$ 309.29), which represents an annual income (14 salaries) of GTQ 33,904.25 (US$ 4,330.07). Guatemala’s latest national employment and income survey (2011) indicates that the average monthly wage for agricultural workers is GTQ 1,123.00 (US$ 143.42), which represents an annual income of GTQ 15,722.00 (US$ 2,007.91) (ENEI, 2012). However,
other sources suggest that annual income for agricultural workers in rural areas in Guatemala is significantly lower (Baumeister, 2003; Baumeister, 2010).

As part of overall economic growth, agricultural growth has an especially important role in reducing food and nutrition insecurity. Increased income through agricultural growth increases the household’s ability to purchase and produce more nutritious foods, lowers food prices due to increased local, regional and national production, and increases government revenues to fund health, infrastructure, and nutrition intervention programs (Fan & Brzeska, 2012). Both P4P and control households experienced income growth derived from agricultural and non-agricultural activities. Current research shows that increased agricultural growth has a very large effect on average calorie availability. On the other hand, non-agricultural growth seems to have larger effects on dietary diversity (Headey, 2012), although research has also shown that integrated community programs focused on diversifying crops (Attig, Smitasiri, Ittikom, & Dhanamitta, 1993; Brun, Geissler, & Kennedy, 1991; Girard, Self, McAuliffe, & Olude, 2012) and promoting small-scale animal husbandry (Ahmed, Jabbar, & Ehui, 2000; Ayele & Peacock, 2003; Burchi, Fanzo, & Frison, 2011) for local consumption also lead to improved dietary diversity and economic growth. Finally, a study in Tanzania found that aggressive government policies supporting smallholder agriculture led to sustained agriculture-led economic growth for the period of 1998-2007. This resulted in significant reductions to poverty and under-nutrition rates, especially among lower-income populations (Pauw & Thurlow, 2011).
Table 15. Average income at baseline and year 3 P4P and Control farmers, Canada cohort¹.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Net annual income</td>
<td>193</td>
<td>22,883</td>
<td>15,294</td>
<td>Net annual income</td>
<td>135</td>
<td>26,104</td>
<td>15,909</td>
<td>3,221</td>
<td>14.08</td>
</tr>
<tr>
<td>Income from agricultural activities</td>
<td>193</td>
<td>6,441</td>
<td>5,119</td>
<td>Income from agricultural activities</td>
<td>135</td>
<td>8,006</td>
<td>4,929</td>
<td>1,565</td>
<td>24.30</td>
</tr>
<tr>
<td>Net income from crop sales</td>
<td>193</td>
<td>2,481</td>
<td>2,465</td>
<td>Net income from crop sales</td>
<td>135</td>
<td>1,845</td>
<td>7,475</td>
<td>-636</td>
<td>-25.63</td>
</tr>
<tr>
<td>Self-consumption value¹</td>
<td>193</td>
<td>2,825</td>
<td>2,249</td>
<td>Self-consumption value</td>
<td>135</td>
<td>4,246</td>
<td>4,560</td>
<td>1,421</td>
<td>50.30</td>
</tr>
<tr>
<td>Net income from cattle sales</td>
<td>193</td>
<td>1,124</td>
<td>394</td>
<td>Net income from cattle sales</td>
<td>135</td>
<td>1,931</td>
<td>6,793</td>
<td>807</td>
<td>71.80</td>
</tr>
<tr>
<td>Self-consumption value</td>
<td>193</td>
<td>488</td>
<td>327</td>
<td>Self-consumption value</td>
<td>135</td>
<td>676</td>
<td>1,864</td>
<td>188</td>
<td>38.52</td>
</tr>
<tr>
<td>Income from non-agricultural activities</td>
<td>193</td>
<td>16,441</td>
<td>17,677</td>
<td>Income from non-agricultural activities</td>
<td>135</td>
<td>18,097</td>
<td>24,082</td>
<td>1,656</td>
<td>10.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of Income</th>
<th>CONTROL N</th>
<th>Mean²</th>
<th>SD</th>
<th>Net annual income</th>
<th>168</th>
<th>17,177</th>
<th>12,409</th>
<th>1,883</th>
<th>12.31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income from agricultural activities</td>
<td>228</td>
<td>5,119</td>
<td>9,340</td>
<td>Income from agricultural activities</td>
<td>168</td>
<td>5,708</td>
<td>10,876</td>
<td>589</td>
<td>11.51</td>
</tr>
<tr>
<td>Net income from crop sales</td>
<td>228</td>
<td>2,465</td>
<td>8,207</td>
<td>Net income from crop sales</td>
<td>168</td>
<td>2,064</td>
<td>8,415</td>
<td>-401</td>
<td>-16.27</td>
</tr>
<tr>
<td>Self-consumption value</td>
<td>228</td>
<td>2,249</td>
<td>2,385</td>
<td>Self-consumption value</td>
<td>168</td>
<td>2,628</td>
<td>3,404</td>
<td>379</td>
<td>16.85</td>
</tr>
<tr>
<td>Net income from cattle sales</td>
<td>228</td>
<td>394</td>
<td>1,496</td>
<td>Net income from cattle sales</td>
<td>168</td>
<td>1,041</td>
<td>5,489</td>
<td>647</td>
<td>164.21</td>
</tr>
<tr>
<td>Self-consumption value</td>
<td>228</td>
<td>327</td>
<td>702</td>
<td>Self-consumption value</td>
<td>168</td>
<td>440</td>
<td>664</td>
<td>113</td>
<td>34.56</td>
</tr>
<tr>
<td>Income from non-agricultural activities</td>
<td>228</td>
<td>10,175</td>
<td>12,167</td>
<td>Income from non-agricultural activities</td>
<td>168</td>
<td>11,469</td>
<td>14,705</td>
<td>1,294</td>
<td>12.72</td>
</tr>
</tbody>
</table>

¹Data provided by P4P Guatemala, modified and analyzed by the author. ²Income is per household/year and it’s expressed in Guatemalan Quetzales [GTQ, 1 GTQ = 7.83 US$ as of 07/26/2013 (Banco de Guatemala, 2013)]. ³Represents the value of own crop consumed at the household.
3.3.7. Organizational strength

P4P-Guatemala conducted in 2011 an evaluation among participant farmer’s organizations (FO’s) in the Canada cohort to assess the level of organizational strength. Details of the methodology used for this evaluation are presented in Appendix Q. Food insecurity and dietary diversity scores were paired with organizational strength levels (Table 16). Results from this evaluation showed that the majority (65%) of P4P organizations within the Canada cohort had an intermediate (integration) level of organizational strength. Organizations that have reached this level of development share the following characteristics: 1) cooperation exists among individuals that belong to the organization; 2) there is a distinct organizational structure; 3) common objectives and interests are well defined; 4) there is an overarching set of bylaws that describes the functions for each one of the members of the organization; 5) there is a strong sense of pertinence; 6) leadership roles within the organization are well-defined; 7) there is a governing board of directors; 8) opinions, ideas and suggestions are freely interchanged. No organizations were classified into the lowest or highest development levels.

Table 16. Household food security and dietary diversity among FO’s with different organizational strength levels.

<table>
<thead>
<tr>
<th>Organizational Strength Level</th>
<th>Organizational Development Phase</th>
<th>N</th>
<th>Percentage (N=20)</th>
<th>Food Insecurity (0-15)</th>
<th>Dietary Diversity (0-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Formation</td>
<td>0</td>
<td>0</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Identification</td>
<td>10</td>
<td>10</td>
<td>5.56 ± 2.72</td>
<td>7.07 ± 2.45</td>
</tr>
<tr>
<td>3</td>
<td>Integration</td>
<td>69</td>
<td>65</td>
<td>4.29 ± 1.72</td>
<td>8.13 ± 1.87</td>
</tr>
<tr>
<td>4</td>
<td>Maturity</td>
<td>27</td>
<td>25</td>
<td>3.11 ± 2.06</td>
<td>9.93 ± 1.66</td>
</tr>
<tr>
<td>5</td>
<td>Sustainability</td>
<td>0</td>
<td>0</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Organizational strength levels/phases are explained in detail in Appendix Q. A value of 1 and 5 represents lowest and highest levels of organizational strength, respectively. Represents total number of subjects on each category from which food security and dietary diversity data was collected. Data on food security and dietary diversity is presented as mean ± SD.
In our results, we found that farmer organizations with higher organizational strength have lower food insecurity and higher dietary diversity scores (Table 16 and Figure 25a). Using the previously described food insecurity classification, we found that organizations that have achieved a higher level of integration (3) and maturity (4) were classified into the mildly food insecure category (1-5). Organizations in the lower development phase (identification) were classified as moderately food insecure (6-10). Similarly, organizations with higher development were classified in the highest tertiles of dietary diversity. This trend is clearly visible in Figures 25a and 25b.

**Figure 25a.** Household food security among farmer organizations with different strength levels. Bars (±SD) are level averages. Red dotted line represents trend in food insecurity scores.
Figure 25 (Continued)

Figure 25b. Household dietary diversity among farmer organizations with different strength levels. Bars (±SD) are level averages. Red dotted line represents trend in dietary diversity scores.

Linear correlation analyses for organizational strength, food security, dietary diversity and selected household variables are presented in Table 17. Data included in this analysis are for households in the Canada cohort only. Organizational strength was negatively correlated (P<0.05) with food insecurity and positively correlated (P<0.05) with housing quality. No associations were observed for other socioeconomic variables.

A negative correlation between organizational strength and food insecurity is consistent with data presented in previous sections. Higher levels of food insecurity were observed amongst less developed organizations (lower organizational strength).
The linkages between organizational strength or collective action and food security are not fully understood. A study conducted in Tanzania looked at how small farmers improved their ability to market their products through collective action (associativity). In agreement with our findings, this study suggested that mature groups with strong internal institutions, functioning group activities, and a good asset base of natural capital were more able to improve their market competitiveness and their overall food security (Barham & Chitemi, 2009).

A positive correlation between organizational strength and housing quality was observed. Housing quality, a proxy indicator of socioeconomic status, was on average higher among more developed organizations (higher organizational strength). This suggests that smallholder farmers that are part of a well-structured organization are more likely to achieve better socioeconomic status. Farmer organizations offer a venue for smallholders to participate in the market more effectively. Acting collectively, smallholders may be in a better position to reduce transaction costs of accessing inputs and outputs, obtain the necessary market information, secure access to new technologies, and tap into high value markets, allowing them to compete with larger farms.

### Table 17. Linear correlation$^1$ organizational strength and food insecurity, dietary diversity and selected household variables: Canada.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Organizational Strength (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Dietary Diversity (0-12)</td>
<td>106</td>
<td>-0.07</td>
</tr>
<tr>
<td>Normalized Dietary Diversity (0-17)</td>
<td>106</td>
<td>-0.05</td>
</tr>
<tr>
<td>Food Insecurity (0-15)</td>
<td>106</td>
<td>-0.21*</td>
</tr>
<tr>
<td>Housing Quality Score (HQS)</td>
<td>44</td>
<td>0.61*</td>
</tr>
<tr>
<td>Educational attainment</td>
<td>47</td>
<td>0.07</td>
</tr>
<tr>
<td>Household occupancy</td>
<td>26</td>
<td>-0.09</td>
</tr>
<tr>
<td>Fertility rate</td>
<td>71</td>
<td>-0.03</td>
</tr>
</tbody>
</table>

$^1$Spearman correlation coefficient. *Indicates a statistically significant linear correlation (P<0.05)
and agribusinesses (Stockbridge, Dorward, & Kydd, 2003). In addition, there is evidence that collective action can help smallholders reduce entry barriers into markets by improving their bargaining power with buyers and intermediaries (Gouet, Paassen, & van Paassen, 2012; Markelova, Meinzen-Dick, Hellin, & Dohrn, 2009). These findings are consistent with those presented in Chapter 4. Qualitative data from MSC interviews indicated that organizational strength was a dominant theme across interviews. P4P beneficiaries described several benefits perceived from having stronger, more organized farmer associations. These were: improved ability to commercialize their products, better pricing for selling outputs and purchasing inputs, improved communication with other organizations, access to credit and special assistance programs, improved bargaining power with buyers, and more cohesive communities. Research conducted in Mexico and Central America explored these issues for commodity maize and high value vegetables, respectively. In agreement with our findings this evidence suggested that the benefits of farmer organization are clearer when it comes to accessing inputs such as credit, seed and fertilizer (Gutiérrez, 2011; Hellin, Lundy, & Meijer, 2009).

3.3.8. Associations among variables: multiple linear regression

The results for the multivariate linear regression model using food insecurity and dietary diversity as response variables are presented in Table 18. Models for food security and dietary diversity are also presented in Equations 2 and 3, respectively. Data included in this analysis are for households in both P4P and control groups.

Food Insecurity = 6.57 + 1.55 Program Intervention + 0.53 HQS – 1.32 Education Level + 0.29 Household Occupancy + 0.05 Fertility Rate - 0.04 Org. Strenght – 0.11 HDDS [Equation 2]

Dietary Diversity = 11.24 – 2.44 Program Intervention + 0.21 HQS + 1.19 Education Level + 0.09 Household Occupancy - 0.05 Fertility Rate - 0.08 Org. Strenght – 0.17 Food security [Equation 3]
The model was statistically significant (P<0.05) for both response variables, food insecurity (R-Sq=0.37) and dietary diversity (R-Sq=0.31). Program intervention was a significant factor for both food insecurity and dietary diversity models. This suggests a possible program effect on both variables, which is consistent with cohort differences observed for both ELCSA and HDDS scores. The model suggests a positive difference of 1.5 points in food insecurity scores when participating in the program (Table 18). The average difference observed between groups (P4P vs. control) in household food security scores (ELCSA) was 1.77 points (in section 3.3.2). Similar results were observed for dietary diversity scores. The model suggests an overall difference in HDDS scores of 2.44 when participating in the program (table 15a). The average difference between groups (P4P vs. control) observed in household dietary diversity scores (HDDS) was 2.46 points (in section 3.3.3). It is important to caution that this study used a cross-sectional design. Statistical theory suggests that this is not the most suitable design when trying to establish causality.

**Table 18.** Determinants of food security and dietary diversity: multiple linear regressions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Insecurity</th>
<th>Dietary Diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β Coefficient</td>
<td>P-value</td>
</tr>
<tr>
<td>Intercept</td>
<td>6.57</td>
<td>0.0039</td>
</tr>
<tr>
<td>Program intervention</td>
<td>1.55</td>
<td>0.0206</td>
</tr>
<tr>
<td>Food security</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dietary diversity</td>
<td>-0.11</td>
<td>0.0312</td>
</tr>
<tr>
<td>Organizational strength</td>
<td>-0.04</td>
<td>P&gt;0.05</td>
</tr>
<tr>
<td>Housing quality score (HQS)</td>
<td>0.53</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td>Education level</td>
<td>-1.32</td>
<td>0.0193</td>
</tr>
<tr>
<td>Household Occupancy</td>
<td>0.29</td>
<td>0.0198</td>
</tr>
<tr>
<td>Fertility rate</td>
<td>0.05</td>
<td>P&gt;0.05</td>
</tr>
</tbody>
</table>

1Model was statistically significant (P<0.05, r²=0.37; N=140). 2Model was statistically significant (P<0.05, r²=0.31; N=140). *Indicates a statistically significant factor in the model (P < 0.05).
Neither fertility rate nor organizational strength were significant factors in the model for either food insecurity or dietary diversity. Organizational strength was significantly associated with food security for farmers in the Canada cohort (P4P). Data did not exist for farmers in the Buffet or control groups. Thus, it is possible that this effect was “diluted” after combining both cohorts for analysis.

Some of the beta coefficients for the other variables were significant, consistent with bivariate linear correlations presented earlier in this Chapter. In the food insecurity model, housing quality score, education level, dietary diversity and household occupancy were significant factors; which is consistent with results from correlation analyses (Tables 13 and 14). The significant association between food security and dietary diversity scores was apparent in both models. For example, food security remained a significant factor in the dietary diversity model, even when correcting for initial differences in food insecurity. The same was observed when food insecurity was the response variable. This suggests complementarity between these two indicators. The same relationship has been observed by other authors (Arimond et al., 2009; Kennedy et al., 2010; Steyn, Nel, Nantel, Kennedy, & Labadarios, 2006). It is important to note that, when correcting for initial differences in certain variables (e.g., education level), the fit of the model slightly declined (from 0.37 to 0.27) but remained statistically significant. This is expected in models with a limited number of predictor variables (Frongillo & Nanama, 2006).
3.4. Summary and conclusions

Selected household variables, such as food security and dietary diversity were studied in a representative sample of smallholder farmers benefiting from an agricultural market development program (P4P) and a quasi-control cohort in rural Guatemala.

Significant differences in educational attainment and fertility rate were observed between cohorts. Household food security, overall, normalized, women’s and children’s dietary diversity were higher among P4P farmers. Even when differences between cohorts were significant, both the control and P4P households were classified as being moderately food insecure. P4P households consume on average two additional food groups and 75% of the available dietary diversity offering captured by HDDS; compared to control households who consume 58% of the available dietary diversity offering. For both cohorts, food insecurity was negatively correlated with overall and normalized dietary diversity, housing quality, education level, and educational attainment. A positive, but not significant (P=0.08) correlation was observed between food insecurity and fertility rate. Overall and normalized dietary diversity were both positively correlated with housing quality, and education level; and negatively correlated with fertility rate.

For P4P (Canada), reported average productivity for corn and black beans doubled from baseline (before P4P) to year 3 of the program. Net annual income and income from agricultural activities rose by 14% and 24%, respectively during the same period. For control households, net annual income and income from agricultural activities both rose by 12% during the same period. P4P households on average improved their net annual income by more than US$411 per household compared to US$ 241 in the control. This represents a net annual difference of $170 (+71%) for P4P households.
Among P4P households (Canada), higher levels of food insecurity were observed among less developed organizations (lower organizational strength), indicating a negative correlation between those indicators. Also, a positive correlation between organizational strength and housing quality was observed. Housing quality, a proxy indicator of socioeconomic status, was on average higher among more developed organizations (higher organizational strength).
References


CHAPTER 4

PROGRAM COMPONENTS AND DETERMINANTS OF HOUSEHOLD FOOD SECURITY AND DIETARY DIVERSITY AMONG SMALLHOLDER FARMERS IN GUATEMALA

4.1. Introduction

Smallholders farmers manage over 80% of the world’s estimated 500 million small farms and provide over seventy percent of the food consumed in a large part of the developing world, contributing significantly to poverty reduction and food security (IFAD & UNEP, 2013). Food insecurity and dietary diversity are both linked to the quantity and quality of food that is globally produced but also to poverty (Adams et al., 2004; Sachs et al., 2009).

Recent spikes in food prices, concerns about climate change, and the global economic recession have pushed food and nutrition security to the top of the global policy and research agendas. Increases in the price of staple foods have mixed effects on poverty and hunger: They increase the cost of food for consumers but increase incomes of farmers, who represent the bulk of the world’s poor (Swinnen & Squicciarini, 2012). The majority of poor people live in rural areas with little or no access to productive agricultural lands (Braun & Kennedy, 1994; Marsh, 1998). Hence, food and nutrition insecurity is linked to farm size: 90% of farmers’ worldwide farm on <2 ha, producing food where it is needed – in much of the developing world. Eighty percent of the hungry live in developing countries with 50% being smallholders (World Bank, 2007). If smallholder agriculture is the backbone of global food security in the developing world (Tscharntke et al., 2012), it could open the door to significant and lasting improvements provided it is adequately supported by policy, public and private investments (HLPE, 2013).

Implementation of well-designed agricultural interventions targeting small-holder farmers, especially women, increases productivity and food availability, intuitively it is also
assumed that they lead to better nutritional outcomes (Arimond et al., 2011; Berti, Krasevec, & FitzGerald, 2004; FAO, 2011c; FAO et al., 2012). This link seems to be so apparent that there has not been extensive research to test this hypothesis. It is understood that an intricate relationship exists between production, income and nutrition (Ramirez, 2002). There is also growing consensus that the link between agriculture and nutrition demands a better understanding of the main cultural, economic and social conditioning factors that impact it (Berti et al., 2004; Braun & Kennedy, 1994; Marsh, 1998). Thus, to start there is a need to include qualitative methods to address the relationship between food insecurity experienced by smallholder farmers and nutrition for example, which can add information to help enrich our understanding of these factors (Coates et al., 2006a; Frongillo et al., 2003). This information is intended to complement rather than replace commonly used quantitative indicators of food security and dietary diversity.
4.1.1. Overview

In this chapter, the author applied qualitative methods to further understand the food insecurity experience in rural households. More specifically, how food security relates to changes experienced by beneficiaries of the Purchase for Progress (P4P) program in Guatemala and the current challenges experienced by smallholder farmers of similar characteristics in a quasi-control group. Information presented in this chapter aims to answer the following research questions:

1. How do the stakeholders of the P4P Program perceive its purported benefits through the different established components?
2. How do these components relate to and help explain household food security and dietary diversity in this context?

Interviews using the Most Significant Change (MSC) methodology were administered in a subset sample of 57 households (46 P4P; 11 controls). Sample was compromised of at least one representative of all 46 farmer organizations included in this study. Reported narratives (in a field story format) on perceived significant changes, household food security, dietary diversity and other domains of change were collected. Stories were also collected from other key program stakeholders along the P4P program structure. MSC interviews were analyzed and coded according to the principles of grounded theory. Results are presented in three sections:

1. The most significant changes. A description of the most significant changes experienced by beneficiaries of the P4P initiative as a result of their participation in the program. Most significant challenges experienced by smallholder farmers in the control group are also presented.
2. **Determinants of food security and dietary diversity.** The experience of household food security in the context of the P4P program is presented. Also, the experience of household food insecurity for farmers in the control group is also discussed. Significant changes and challenges, as well as important P4P components associated with food security and dietary diversity are also presented.

3. **Empowerment.** Specific P4P components that promote empowerment of individuals and organization are presented. Particular empowerment strategies for women are also discussed. This topic is presented to illustrate how traditional agricultural development strategies promoted by P4P contribute to empower both individuals and organizations. The impact of these intended and “unintended” outcomes and their influence on food security and dietary diversity is also discussed. As a future research topic, we hypothesize that agricultural and market development programs such as P4P promote intrinsic empowerment, and this has a positive impact on smallholder farmer’s livelihoods and in improving food and nutrition security.

For each section, interview excerpts are presented to illustrate the topic being discussed. It is important to caution that information presented in this chapter comes from interviews in a subset sample of farmers from P4P and the control group. In this sample, all P4P’s farmer organizations and control groups were represented by at least one member. Although P4P and control farmers share similar socioeconomic and agricultural characteristics based on the program’s inclusion criteria (Chapter 1), caution is suggested when generalizing results to the rest of program participants and to smallholder farmers in general. It is also important to note that discussions through this chapter referring to P4P farmers are for those included in the MSC sample. The term is used to differentiate between program participants and control farmers when discussing results and making inferences to this specific group.
4.2. Methods

4.2.1. Ethics approval

Approval for this research project was obtained from the Institutional Review Board (IRB) at the University of Illinois Urbana-Champaign and from the Center for Studies of Sensory Impairment, Aging and Metabolism (CeSSIAM) in Guatemala. A copy of all research protocols, instruments, informed consent forms and sampling strategy were provided to and discussed with members of the Purchase for Progress (P4P) team in Rome (world headquarters), Panama (regional headquarters) and Guatemala (country office). Visits to each farmer organization were planned in advance with the assistance of program’s field staff. Researchers interviewed only adult members (older than 18 years at the moment of the interview) from each farmer organization visited. Prior to conducting the interview, each researcher obtained consent verbally and in writing by completing the following protocol: 1) explained the purpose of the study; 2) described the research activities to be performed; 3) provided a copy of the consent letter (in Spanish); 4) read and discussed the consent form; 5) answered any questions; 6) obtained from each consenting participant their name and signature; 7) dated the consent form and stored it in a dedicated and secured container; 8) asked for approval to start using a voice recorder to document the interview. In cases in which subjects did not consent to participate or were unable to do so, researchers acknowledged them for their time and refrained from collecting or recording any information. Signed consent forms were kept separate from completed research surveys at all times and were stored in a locked cabinet. At the end of each day, audio files were transferred to a field laptop computer and kept in a password-protected folder. Each audio file was then permanently deleted from the recorder. Only the research team had direct access to the data collected. Copies of consent forms used in this study are presented in Appendices A-D.
4.2.2. Sampling

Sampling methods for this study were based on P4P’s monitoring and evaluation (M&E) sampling manual (P4P, 2011), recommendations from P4P’s M&E unit in Guatemala (Palencia, M.E. 2012; personal communication, January 6, 2012) and the Most Significant Change (MSC) methodology described by Davies and Dart (2007). MSC is a novel participatory methodology that uses an inductive approach that comprises the systematic collection, analysis and selection of “significant change” stories from groups of designated program stakeholders (Dart & Davies, 2003; Davies & Dart, 2007b). It focuses on what and why most significant changes have occurred. The methodology has been successfully applied in the context of different development organizations where there is a strong focus on learning (Brough & Lapsansky, 2010; Choy & Lidstone, 2011; Davies & Dart, 2007b; Davies & Pierce, 2011; Heck & Sweeney, 2013; Romeo, Lloyd, & Downes, 2012; Wilder & Walpole, 2008; Wrigley, 2009).

MSC interviews were compiled based on the sampling frame described in Chapter 3. Stories were collected from a purposive subset sample consisting of a total of 57 households; 46 in P4P and 11 in the control group. At least one member from each of the farmer organizations (FOs) included in this study was included in this sample. Respondents included either regular members or those who held leadership positions in the governing board of their organizations. Interviews were administered after survey information was collected (general, food security and dietary diversity). Each respondent voluntarily agreed to participate in MSC interview. Additionally, MSC interviews were administered to seven members of the technical team from both P4P and six trainers from IICA\(^5\). Finally, MSC interviews were conducted with four members of P4P’s administrative (implementing) team in Guatemala and the regional manager in

\(^5\) Inter-American Institute for Cooperation in Agriculture (IICA)
Panama. In total, 74 MSC interviews were completed. Figure 26 shows a summary of the sampling procedures.

**Figure 26.** Sampling strategy for most significant change (MSC) interviews.

### 4.2.3. Data collection

Data were collected between June-August, 2012 according to the sampling strategy described in section 4.2.2. All MSC interviews were conducted by the first author. General information, food security and dietary diversity surveys were administered prior to MSC interviews according to the methodology described in Chapter 3. Data from MSC interviews were collected from at least one member of each farmer organization (FO) included in this study, along with field staff and administrative personnel (Figure 26). This was done to incorporate and contrast their views with those of the beneficiaries.

Similar MSC interview guides (with minor contextual differences) were used for each one of these groups. All versions consisted of two open-ended questions administered in a conversational mode (Appendices I-L). The first question was used as a starting point to the
interview process, and to create rapport and a comfortable environment between the researcher and the interviewee. For P4P (organizations and team members), the first question asked was about the subject’s/organization’s involvement with P4P (When, how and why).

Then, the second query was the core element of the MSC interview and asked the question: ¿What has been the most significant change you have observed since joining P4P in relation to…….? For control organizations, the first question asked was about the subject’s experience and history as a smallholder farmer (When, how and why). The second posed the question: ¿What has been the most significant challenge you have observed in the last three years in relation to….?

For members of the P4P team, the second question asked: ¿In the last three years, what has been the most significant change you have observed in members of your organizations in relation to….?

For all groups, the core MSC question was asked for each one of the four domains of change described in Table 19 (Davies and Dart, 2007). Domains of change were established prior to data collection based on interviews with key informants from P4P, field experts and based on published peer-reviewed sources. For each domain of change, the interview focused on the different thematic areas (focal points) outlined in Table 19.

Due to the open nature of the inquiry process, additional topics (domains/categories) emerged during the different interviews. Information on these new emerging topics was duly noted and recorded. When needed, participants were asked to further explain and expand on these topics. Personal sessions lasted on average forty-five minutes to an hour. For some farmer organizations, personal interviews were followed by group discussions. These adhered to the same structure outlined in the MSC interview guide and were based on open-ended questions.
described above. Information generated in group discussions was also transcribed and clearly identified. It was then added at the end of the corresponding interview for each corresponding farmer organization. All information was documented using a digital voice recorder; this was supplemented with written notes taken by the first author. The researcher also maintained field notes on contextual details and impressions that were not captured in the interview transcripts.

Table 19. Domains of change and thematic areas.

<table>
<thead>
<tr>
<th>Domains of Change</th>
<th>Thematic Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural production practices and livestock</td>
<td>Yields / Income</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
</tr>
<tr>
<td></td>
<td>Diversification</td>
</tr>
<tr>
<td>Food security and dietary diversity</td>
<td>Vulnerability / Seasonality</td>
</tr>
<tr>
<td></td>
<td>Access / availability</td>
</tr>
<tr>
<td></td>
<td>Diversity</td>
</tr>
<tr>
<td></td>
<td>Nutrition perception</td>
</tr>
<tr>
<td>Household information and assets</td>
<td>Family composition</td>
</tr>
<tr>
<td></td>
<td>Access to public and private services and goods</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
</tr>
<tr>
<td>Livelihood activities and expenditures</td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>Alternative economic activities</td>
</tr>
<tr>
<td></td>
<td>Expenditures composition and frequency</td>
</tr>
<tr>
<td></td>
<td>Food expenditures</td>
</tr>
</tbody>
</table>

4.2.4. Data analysis

MSC interviews were transcribed verbatim in Spanish. Interview transcripts were analyzed according to the principles of grounded theory using open, axial and selective coding (Connell, Lofton, Yadrick, & Rehner, 2005; Creswell, 2013; Dillon, 2013; A. M. Hamelin et al., 2002; Norhasmah, Zalilah, Nasir, Kandiah, & Asnarulkhadi, 2010; Quandt, Arcury, McDonald, Bell, & Vitolins, 2001; Strauss & Corbin, 1990). Thematic coding involved breaking down, examining, comparing, labeling, categorizing and integrating data into pre-determined and emerging categories.
Connections among categories were established according to a coding paradigm comprising observed conditions, context, action/interactional strategies and consequences (A. M. Hamelin et al., 2002; Weiser et al., 2010). Categories and sub-categories were revised and refined by successive returns to the data until all information was coded and no new categories emerged. Consultation with key informants, members of the research group and in peer-reviewed sources were conducted to assist in refining the coding strategy (Weiser et al., 2010).

Content coded into each category was compared among groups (e.g., field staff X beneficiaries) using three different indexes: 1) Jaccard, and 2) Sorensen’s similarity indexes, and Pearson’s product-moment correlation (Dalirsefat, da Silva Meyer, & Mirhoseini, 2009; Ellis, Furner-Hines, & Willett, 1993). All analyses and text interpretation were facilitated by NVivo qualitative data analysis software (v. 9.2/10, QSR International).

**Story selection:** members of P4P’s administrative team in Guatemala were asked to conduct a story selection process (Davies and Dart 2007). In brief, coded interviews and a guide (Appendices O-P) were provided to each team member. Individually, each team member read and selected MSC stories based on the parameters outlined in the guide (individual selection). All team members then met to discuss the stories they had each chosen and the reasons as to why they were selected. The group then reached a consensus on the stories that better described the program’s outcomes and achievements so far (group selection). This process was led by P4P’s country director. The group discussion was documented using written notes and a digital voice recorder.

A copy of the audio files and meeting transcripts were given to the first author for further analysis. Copies of all instruments used in this study are presented in Appendices E-N.
4.3. Results and discussion

Content analysis of respondent statements led to an in-depth description of the most significant changes and the overall experience from participants of the P4P program in Guatemala. Perspectives from program administrators’ and field staff were also included. Narratives from the control group provided in-depth accounts of the most significant challenges faced by smallholder farmers working within organizations, but with no assistance from a formal program. Further analysis in the food security and dietary diversity domain led to a comprehensive description of these phenomena grounded in the experience of the household in the context of an agricultural and market development program. This information also offered insights into specific program components that have direct and indirect impact on household food security and dietary diversity. Respondents’ perceptions regarding food security and dietary diversity are organized and presented based on the four conceptual categories included in the current definition of food security: availability, access, utilization and vulnerability (Habicht et al., 2004). Additional information in this category includes accounts on the issues of dietary diversity, challenges and difficulties and coping strategies. Other emerging and pre-set categories identified in MSC interviews included: women empowerment, agricultural practices and production techniques, program benefits, livelihood activities, and empowerment.

A total of 12 conceptual categories encompassing 37 sub-categories of concepts were generated from participant’s statements (Table 20). The information in the following five conceptual categories was most relevant to the objectives of this research: most significant changes, food security and dietary diversity, program benefits, empowerment and women empowerment. Relevant text excerpts from selected interviews are included for illustration.
purposes and to present participant's perspectives in their own words (Ford & Beaumier, 2011; Weiser et al., 2010).

Selected concepts included on each category were quantified and ranked based on response frequency (RF). For other concepts, quantification was avoided because questions asked varied by interview. While key domains of change were covered in all interviews, the exact nature of questioning depended on associations identified by the participant. A combination of standard (e.g., the most significant change) and open-ended questions allowed for a better understanding of the complex group of factors that determine food security and dietary diversity in the context of an agricultural and market development program.

Table 20. Response frequency for pre-set and emerging categories/sub-categories from MSC interviews in the P4P cohort.

<table>
<thead>
<tr>
<th>Conceptual Category</th>
<th>Sub-category</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agricultural production practices</strong>*</td>
<td>Increased productivity</td>
<td>38</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Practice Change or technology adoption</td>
<td>34</td>
<td>74</td>
</tr>
<tr>
<td><strong>Challenges or difficulties</strong></td>
<td>Financial</td>
<td>26</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Production</td>
<td>22</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Market</td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Political or government related</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Organizational</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td><strong>Illustrative stories</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Food security and dietary diversity</strong>*</td>
<td>Availability</td>
<td>39</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Diversity</td>
<td>25</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Access</td>
<td>23</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Problems, challenges and difficulties</td>
<td>19</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Coping strategies</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Utilization</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Vulnerability</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Household information and assets</strong>*</td>
<td>Access to private and public services</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>and goods</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Family Composition</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

(Continues)
### Livelihood activities and expenditures*

*Indicates pre-set category (domain of change)

<table>
<thead>
<tr>
<th>Table 20</th>
<th>(Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Livelihood activities and expenditures</strong></td>
<td>Alternative economic activities 17 37</td>
</tr>
<tr>
<td></td>
<td>Food expenditures 1 2</td>
</tr>
<tr>
<td><strong>Most Significant Change</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Personal life and family dynamics</strong></td>
<td>Education 11 24</td>
</tr>
<tr>
<td></td>
<td>Health 4 9</td>
</tr>
<tr>
<td></td>
<td>Immigration 4 9</td>
</tr>
<tr>
<td><strong>Program benefits</strong></td>
<td>Education or knowledge 45 98</td>
</tr>
<tr>
<td></td>
<td>In kind donations 35 76</td>
</tr>
<tr>
<td></td>
<td>Organizational strengthening 28 61</td>
</tr>
<tr>
<td></td>
<td>Price 27 59</td>
</tr>
<tr>
<td></td>
<td>Income 26 57</td>
</tr>
<tr>
<td></td>
<td>Collaborations, networking and alliances 25 54</td>
</tr>
<tr>
<td></td>
<td>Crop diversification 21 46</td>
</tr>
<tr>
<td></td>
<td>Technical assistance 21 46</td>
</tr>
<tr>
<td></td>
<td>Market or sales 17 37</td>
</tr>
<tr>
<td><strong>Program perceptions</strong></td>
<td>Negative 20 43</td>
</tr>
<tr>
<td></td>
<td>Positive 22 48</td>
</tr>
<tr>
<td><strong>Women empowerment</strong></td>
<td>Challenges 11 24</td>
</tr>
<tr>
<td></td>
<td>Personal development 5 11</td>
</tr>
<tr>
<td></td>
<td>Productivity 3 7</td>
</tr>
<tr>
<td></td>
<td>Self-awareness or improved confidence 3 7</td>
</tr>
<tr>
<td><strong>Empowerment and agency</strong></td>
<td>Overall 4 9</td>
</tr>
</tbody>
</table>

4.3.1. Most Significant Change (MSC)

Farmer perceptions of the most significant changes experienced as a result of their participation in P4P were classified into 10 conceptual categories (Table 21). Response frequencies indicate that the acquisition of new knowledge, improved crop productivity, stronger and better organizations, improved prices and exposure or access to new technologies were the most important changes for program beneficiaries. Further analysis of each individual group revealed similar response patterns, except on the price and new technology categories. Nineteen percent of participants in the Canada cohort considered improved product prices as the most
significant change they had experienced in P4P, compared to less than one percent of those in the Buffett cohort.

Table 21. Most significant changes by participants of the P4P program, overall and by funding agency.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Category</th>
<th>Overall (N=92)</th>
<th>Buffett (N=50)</th>
<th>Canada (N=42)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>%</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>Education / Knowledge</td>
<td>29</td>
<td>32</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>Improved productivity</td>
<td>15</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Organizational</td>
<td>12</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Improved price</td>
<td>8</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>New technology adoption</td>
<td>7</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Women empowerment</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>In-kind donations</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Technical assistance</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Agency / Empowerment</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Crop diversity</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Results are ranked based on overall (%) response frequency (RF). The N denotes total number of coded responses, not necessarily number of participants.

Results also showed similar perceptions from those in charge of the program, both administrators and field personnel (Table 22). Field and administrative staff considered new knowledge transfer, organizational strengthening, improved crop productivity, and the introduction/adoption of new technologies as the most significant changes experienced by P4P beneficiaries. Additionally, field staff considered improved access to markets and credit among the top categories of change. In contrast, less than one percent of program beneficiaries considered the latter as significant changes. Technical field staff included members from P4P and IICA working together within designated geographical zones. Each team is responsible for a certain number of farmer organizations in its respective areas. Technicians from IICA are responsible for all agricultural operations, these include: technical assistance, training, procurement of production inputs, etc. P4P technicians also provide support on these areas but
are more focused on business operations and logistics. P4P’s administrative team is composed of a country coordinator, measuring and evaluation specialist and field operations coordinator. P4P is also supported by other organizations as part of the United Nations system in Guatemala. Additionally, P4P sub-contracts with a series of service providers for tasks like specific training programs, purchasing operations and others. Program beneficiaries interact with these and other strategic partners too. Overall, technical education or knowledge acquisition was the most important category across groups (Tables 21 and 22).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Category</th>
<th>Administration (N=38)</th>
<th>Field Personnel (N=74)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Education or knowledge</td>
<td>13 34</td>
<td>13 18</td>
</tr>
<tr>
<td>2</td>
<td>Organizational</td>
<td>8 21</td>
<td>13 18</td>
</tr>
<tr>
<td>3</td>
<td>Improved productivity</td>
<td>6 16</td>
<td>11 15</td>
</tr>
<tr>
<td>4</td>
<td>New technology adoption</td>
<td>1 3</td>
<td>8 11</td>
</tr>
<tr>
<td>5</td>
<td>Improved market access</td>
<td>0 0</td>
<td>3 4</td>
</tr>
<tr>
<td>6</td>
<td>Improved price</td>
<td>0 0</td>
<td>7 9</td>
</tr>
<tr>
<td>7</td>
<td>Improved access to credit</td>
<td>0 0</td>
<td>2 3</td>
</tr>
<tr>
<td>8</td>
<td>In-Kind donations</td>
<td>2 5</td>
<td>4 5</td>
</tr>
<tr>
<td>9</td>
<td>Increased income</td>
<td>0 0</td>
<td>3 4</td>
</tr>
<tr>
<td>10</td>
<td>Technical assistance</td>
<td>2 5</td>
<td>2 3</td>
</tr>
<tr>
<td>11</td>
<td>Women empowerment</td>
<td>4 11</td>
<td>2 3</td>
</tr>
<tr>
<td>12</td>
<td>Crop diversity (beans)</td>
<td>2 5</td>
<td>2 3</td>
</tr>
<tr>
<td>13</td>
<td>Agency / Empowerment</td>
<td>0 0</td>
<td>4 5</td>
</tr>
</tbody>
</table>

1Results are ranked based on overall (%) response frequency (RF). The N denotes total number of coded responses, not necessarily number of participants.

To evaluate response patterns across different food insecurity levels, households were classified into different categories using food insecurity (ELCSA) scores. Sample sizes (N) were considerably reduced when looking at each individual food insecurity category. Because of this, responses from those in the food secure and mildly food insecure groups were merged into a
single category (Table 23). Food insecurity levels were on average lower for households included in this group. Likewise, responses from moderately and severely food insecure households were also compounded into a single category. Food insecurity levels were higher for households in this group compared to the merged food secure/mildly insecure group.

For food secure/mildly food insecure households the most significant changes (in descending order of importance) were: education/knowledge, organizational, increased productivity and women’s empowerment. For moderately/ severe food insecure households the most significant changes were: education/knowledge, increased productivity, agency/empowerment, improved price and organizational. Although education or knowledge was considered the most significant change for both groups, the percentage of households (37%) who cited this concept is higher among those with greater food insecurity compared to those in the lower food insecurity category (19%). This is consistent with prior findings in similar studies that indicate that food insecure individuals associate education or gaining technical abilities as a feasible strategy to improve their livelihoods and hence their food security (Mjonono, Ngidi, & Hendriks, 2012; Norhasmah et al., 2010). Overall “empowerment” was considered an important change for those with lower food insecurity; whereas women empowerment was considered most important for those with higher food insecurity. Improved price was considered a significant change among low food insecurity households but it’s not considered at all for those with higher food insecurity. The same was observed for the “improved market and credit access” categories, whereas the perceived importance of “increased income” was similar for both groups. Food secure households seem to be more receptive to programs that have a direct impact on economic factors (e.g., market access) that eventually lead to improvements in food security. This highlights the importance of interventions that play a significant role in promoting not only the
availability but also the access dimensions of food security. Conversely, improvements in the economic status of poor households have been linked directly to improvements in dietary diversity (Hatløy, Hallund, Diarra, & Oshaug, 2000), confirming the close association that exists between these indicators.

Table 23. Most significant changes from P4P beneficiaries by food security level.

<table>
<thead>
<tr>
<th>Rank^3</th>
<th>Category</th>
<th>FS + MiFI^1 (N=59)</th>
<th>MoFI + SeFI^2 (N=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Education / Knowledge</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Increased productivity</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Agency / Empowerment</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Improved price</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Organizational</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>Improved market access</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Increased income</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>In-Kind donations</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Technical assistance</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Improved access to credit</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>New technology adoption</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>Women’s empowerment</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>13</td>
<td>Crop diversity</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

^1Indicates households classified as either food secure or mildly food insecure. ^2Households classified as moderately / severely food insecure. ^3Results are ranked based on overall (%) response frequency (RF).

A summary of the most significant changes and challenges for smallholder farmers is presented in Figure 27. Smallholder farmers in the control group, who have no formal program support considered the following as the most significant challenges they face (in descending order): absence of technical assistance or support, outdated technical knowledge, nonexistent informal or formal (government) institutional support, lack of access to new or updated technologies, and inadequate access to formal and lucrative commercial markets for their products. In contrast, two of the top five challenges faced by those in the control group were
perceived as the most significant changes by farmers benefiting from P4P. This highlights the importance of programs like P4P in promoting development strategies for smallholder farmers.

![Graph showing significant changes and challenges for P4P beneficiaries vs control farmers.]

**Figure 27.** Most significant challenges (Control) and changes (P4P) for smallholder farmers.

A summary of the most significant challenges encountered by control farmers and perceived program benefits for P4P beneficiaries is presented in Table 24. Consistent with the most significant changes, P4P farmers considered new knowledge or education, increased productivity, improved food security, donations, technical support and new technologies to be the main benefits derived from P4P. Knowledge, productivity and technology coincided with those outlined as significant changes. As previously discussed, challenges faced by control farmers coincided with the main benefits perceived by P4P members. Food security and in-kind donations were not mentioned as significant changes but were considered important program benefits. P4P provides farmers with small donations to support agricultural production activities. In addition to all materials needed for the establishment and maintenance of demonstration plots, the program provides small-scale application equipment (knapsack sprayers), grain silos and educational materials (posters, flipcharts, etc.). A limited number of farmer organizations in the Buffett cohort have received donations of large/medium-scale farming machinery from the HGB
Food security was also perceived as an important program benefit. Farmers associated improved food security with higher food availability derived from increased productivity levels. In this category, and consistent with our previous results, farmers associated increased income levels with improved access to food. Additionally, farmers indicated that new crop introductions (e.g., beans) and reduced crop losses were important factors contributing to household dietary diversity and food security. Food security and dietary diversity in the context of the P4P program are discussed in more detail in section 4.3.2.

Table 24. Most Significant challenges/needs and perceived program benefits for smallholder farmers.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Significant Challenge/Need</th>
<th>Rank</th>
<th>Program Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>Technical assistance</td>
<td>1</td>
<td>Knowledge</td>
</tr>
<tr>
<td>2*</td>
<td>Knowledge</td>
<td>2</td>
<td>Increased productivity</td>
</tr>
<tr>
<td>3</td>
<td>Institutional support</td>
<td>3</td>
<td>Food security</td>
</tr>
<tr>
<td>4*</td>
<td>New technology adoption</td>
<td>4</td>
<td>In-kind donations</td>
</tr>
<tr>
<td>5</td>
<td>Market access</td>
<td>4</td>
<td>Technical assistance</td>
</tr>
<tr>
<td>5*</td>
<td>Increased productivity</td>
<td>5</td>
<td>New technology adoption</td>
</tr>
</tbody>
</table>

*Results are ranked based on overall (%) response frequency (RF). *Indicates common factor in both group.

**Education / Knowledge and new technology adoption.** Education or new knowledge transfer is a core component of P4P. Program beneficiaries have access to an on-going training program that focusses on both technical and administrative areas. The training program is conducted in two ways: traditional classroom instruction (theoretical) and hands-on teaching (experiential learning). The main areas covered in the program are: agricultural production practices and technologies, post-harvest management, organizational management, business administration, finance, taxation and accounting. Experiential learning is conducted using demonstration plots as teaching laboratories. Each farmer organization has one or more demonstration plots depending on group size. P4P provides all production inputs for the establishment and management of the
plots and the organization provides labor. Additionally, the program facilitates technical visits and field days with service providers and other companies. The training program is focused on the introduction of new knowledge and technologies in agricultural production, post-harvest management and education in business management practices. New technologies are introduced as part of the training program, especially through demonstration plots. New technologies include: new varieties and hybrids (corn and beans), fertilization programs, pest management, soil conservation technologies and others. A program beneficiary discusses new practices and technologies:

“I think the most significant change is what they have taught us. For example, in the past we used to plow our land and burned all crop stubbles at the end of the season. They told us not to plow and try to incorporate the stubble because when they decompose it turns into a natural fertilizer that helps our crops grow. We also noticed that our soils are healthier now and they don’t ‘wash away’ during the rainy season.”

P4P Beneficiary, Male.

A summary of new or improved technologies and practices reported by P4P farmers is presented in Table 25.

Table 25. New technology adoption and improved practices by P4P beneficiaries.

<table>
<thead>
<tr>
<th>New Technology</th>
<th>Improved practices / Expected benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>New crop varieties and hybrids</td>
<td>• Better product quality (grain size and density in cob)</td>
</tr>
<tr>
<td></td>
<td>• Better nutritional profile (QPM corn)</td>
</tr>
<tr>
<td></td>
<td>• Improved crop adaptability</td>
</tr>
<tr>
<td></td>
<td>• Improved resistance:</td>
</tr>
<tr>
<td></td>
<td>• Pests</td>
</tr>
<tr>
<td></td>
<td>• Environmental constraints</td>
</tr>
<tr>
<td></td>
<td>• Soil fertility and other soil constraints</td>
</tr>
<tr>
<td>Fertilization practices</td>
<td>• Incorporated into soil</td>
</tr>
<tr>
<td></td>
<td>• Improved fertilizers</td>
</tr>
<tr>
<td></td>
<td>• Application frequency</td>
</tr>
<tr>
<td></td>
<td>• Based on soil analysis</td>
</tr>
<tr>
<td></td>
<td>• Needs-based applications</td>
</tr>
<tr>
<td>Crop density</td>
<td>• Reduced number of seed per hill</td>
</tr>
</tbody>
</table>

(Continues)
Program beneficiaries emphasized the benefits of learning using demonstration plots. They provide hands-on experiences and a visible platform to showcase results to all members of the organization and the community, thus adding credibility and facilitating the adoption of new technologies and practices. Several members mentioned a “paradigm shift” in the way they cultivate their crops. Visible results in demonstration plots and later in members’ farm promoted a switch from “Grandpa” or traditional practices to “modernized” ones brought by the program. Through this, beneficiaries were able to establish a clear connection between new practices/technologies and increased productivity and product quality. As a beneficiary pointed out:

“We know that these new products are more expensive, a liter of insecticide now costs about twice as much as the old one we used before. My grandfather, my uncle, my father, all of them used these old products. But with the new products the program has brought to use I can see the difference. Yield has doubled or tripled for some of us, we don’t see a lot of rotted corn in the fields and in our silos. I now believe not because someone told me about this and that, it’s because I’ve seen it with my own eyes.”

P4P Beneficiary, Male.

New practices or technologies shown in demonstration plots and member’ farms also contributed to the dissemination of new knowledge within farmer families (inter-generational), to other members of the organization, and to the rest of the community. Those who experienced the
benefits of new technologies/knowledge reported being motivated to showcase these new benefits and expressed their willingness to show others so they can also improve.

For P4P beneficiaries, new knowledge and technologies contributed to food security and dietary diversity in several ways. Increased productivity due to better practices (e.g., fertilization) and technologies (e.g., improved varieties) meant there was more food available for own consumption and surplus product for sale. This directly impacted the availability and access domains of food security. Additional sales from surplus crop improved the household access to better quality foods and increased dietary diversity. The introduction of new crops (e.g., beans) also contributed to dietary diversity and surplus sales generated additional household income. Introduction of new varieties, like quality protein maize\(^6\) (QPM), brought better nutrition for the household and the community. Finally, improved post-harvest management practices contributed to reduced crop losses and improved product quality. This resulted in a larger percentage of harvested crops available for self-consumption and for surplus sale. Better quality grains also resulted in premium pricing, hence increased income.

“They taught us how to properly cultivate our sacred land. We now know the right way to apply our fertilizers, to use less harmful chemicals, how to store our grains and all of this is good for us because we now have more food. In the past we wasted so much corn because we didn’t know how to properly store it. They even taught us how to cultivate beans, that is something we never did before.”

P4P Beneficiary, Female.

Our results are consistent with those in the literature. Tefera and others reported on the implementation of new or improved metal silo technologies in Africa, Asia and Latin America. Positive results from the use of this post-harvest equipment included, improving food security,

\(^6\) Quality protein maize (QPM) is a nutritionally superior maize cultivar. Compared with traditional maize types, QPM has twice the amount of lysine and tryptophan, as well as protein bioavailability (Nuss & Tanumihardjo, 2011; Zarkadas, Yu, Hamilton, Pattison, & Rose, 1995).
empowering smallholder farmers, enhancing income opportunities and job creation, and safeguarding local agro-ecosystems (Tefera et al., 2011).

**Improved productivity.** On average, P4P farmers were able to double their yields by year 3 of the program (Chapter 3). Productivity improvements were significant for corn and bean growers alike.

Yield improvement accounts were a recurrent topic in MSC interviews and were deemed as the second most significant change for program beneficiaries (Table 23).

“Before P4P, the most we harvested was 30 - 40 quintales. Now, thanks to the program and God, we are now harvesting between 90 - 100 quintales. Can you imagine what that means to us? We are poor and having twice as much product feels like being in heaven.”

P4P Beneficiary, Female.

“One of the most significant benefits we have obtained is the trainings. Through them we have learned new things and this has resulted in yield improvements for us.”

P4P Beneficiary, Male.

“For me this project has been a blessing. The most significant change for our organization has been the demonstration plots. We thought that these lands were no good, they produced nothing. Then the program came and on the same useless lands about they were able to produce corn and beans. I’m telling you, they brought the right seeds, fertilizers and we did things how they taught us to and at the end we were amazed to see how much the plots produced.”

P4P Beneficiary (GD), Female.

Beneficiaries expressed that improvements in productivity were associated with the introduction and adoption of new technologies, acquired knowledge, improved practices and technical assistance provided by field technicians. They considered that the use of demonstration plots as a teaching tool along with technical field visits were particular effective in this process.

Field technicians also concurred on these associations.

“I think the most important change that people have had has been the way in which they grow their crops. Now they already know that using the right variety and fertilization plan it can produce up to 100 quintales per manzana. That to me is very important, the improvements in productivity based on the adoption of these new technologies.”

Field technician, male.

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7 A quintal is a weight measurement unit commonly used in Guatemala and is equivalent to 100 pounds or 48 kilograms.
8 GD = Group Discussion
Improved productivity is an important element for food security and dietary diversity. For P4P farmers, the benefits of increased productivity were most often associated with food availability and increased income (food access). In this context, increased income was also associated with overall livelihood improvements, especially on the health and education domains. There were multiple references on how increased productivity led to improved food availability (corn and beans) for the household’s own-consumption. In addition to having more food available for consumption, surplus production was sold and generated additional income for the household. Several farmers mentioned that the additional income was most often used to purchase more or better quality food, and for expenses related to health care, education and other basic needs (e.g., clothing). This is consistent with results discussed in the previous section on the association between new technology/knowledge and increased productivity.

“I think people are very happy because they have seen that the teachings have worked, we now produce more on the same piece of land we have used all of our lives. Our yields have increased and that means that people have more for food and other expenses.”

P4P Beneficiary, Male.

“The teachings they have provided us with have worked because we can clearly see that our yields have improved. This helps a great deal because now at least we have more corn to eat in our homes.”

P4P Beneficiary, Female.

“Before I used to harvest about 40 quintales per manzana, now I’m close to 80 quintales. I always save 20 quintales for own-consumption in my home, which is usually enough for my entire family for the whole year. The other 60 I sell to the program or in the market. You see the difference? Before I only had 20 quintales for sale, but with the yield improvements now I have 60 quintales, which means I’m tripling what I have to sell…. And that means more money in my pocket. So over these last three years I have seen a constant increase in my income. That additional income we use for our food, to afford things we were not able to before. For example, you know that red meat is very expensive, especially those fancy cuts like “lomito and puyazo”\textsuperscript{9}. Now I can afford them, once in a while I can buy a few extra pounds of those cuts; plus some Vegetables and other things. Also, additional income is used for savings, especially for those occasions in which an emergency could show itself…. Like a medical emergency. YES, YES I have seen the change, the most significant one being in my pocket.”

P4P Beneficiary, Female.

\textsuperscript{9} Lomito and puyazo are common Guatemalan names for especial meat cuts similar to flank and round steak cuts in the US.
Improved productivity was also associated with improved price. Beneficiaries highlighted the importance of having more crop volume to harvest, but also being able to sell it for a better price. This topic is disused in more detail in the following section.

“They have taught us how to properly care for our plants so they grow strong. In the beginning we were skeptical but we have seen the change with our own eyes. In previous years I harvested 40-50 quintales per manzana\(^{10}\), now I’m getting 60-80 quintales. I am very happy because of that, other members in the organization have expressed how happy they are to see these changes. They said investments are higher but also the results are better, they can sell their beans and corn for a better price now and on top of that they get more per manzana. We are blessed with this program; they have changed our vision for the future.”

P4P Beneficiary, Male.

Improved price. Beneficiaries perceived this to be one of the top five most significant changes experienced in P4P. However, there were marked differences between funding agencies. Price improvements were considered one of the most significant changes for those in the Canada cohort, but a non-important change for those in the Buffett cohort (Table 21). This is explained in part by differences in funding mechanisms between the two agencies (Palencia, 2012). The strategy from the Canadian Agency for Development has a component with dedicated funds used for direct product purchases from P4P farmers. In contrast, there are no dedicated funds from the Howard G. Buffett (HGB) Foundation for this purpose; it funds only operational expenses. Farmers on the Buffett cohort rely on the procurement (food purchases) strategy managed by WFP-Guatemala. This has important implications because procurement funds vary by year depending on country-specific conditions. Purchasing operations through the main WFP-offices are coordinated for all country-wide actions, not only for P4P farmers. This makes the process lengthier and more complex, with longer response windows. This is consistent with results outlined in Table 20, where MSC perceptions on categories like improved price and market access were completely absent in the Buffett cohort. Coincidentally, the lack of improved price or market access responses was not reflected in the administration interviews. Overall, this

\(^{10}\) A manzana is an area measurement unit equivalent to 0.704 ha
suggests farmers in the Canada cohort had better commercialization experiences than those on the Buffett cohort based donor-specific funding strategies. Interview excerpts on improved price discussed in this section came from farmers in the Canada cohort and from field technicians only.

“I think the most significant change for us has been increased income. For example, I used to harvest around 70 quintales per year and this year I got 75, it’s not a big improvement. The difference is that I sold those 75 quintales for a better price, almost double of what I got last year. For us this is great because now we can move forward and this will open new pathways for our family, organization and community.”

P4P Beneficiary, Male

Farmer perceptions on better selling prices were often associated with improvements over a traditional system of prices determined by coyotes\(^{11}\) or informal traders. For most agricultural products, prices on this economic system are often set below market price and tend to fluctuate constantly. Beneficiaries highlighted that they found prices paid by P4P to be fair/just, meaning they were usually higher than those paid by informal traders. They also perceived the additional advantage that P4P prices were stable and payments were secure once a contract was signed. P4P uses a system based on international corn and bean market prices from the Chicago stock exchange as reference. WFP uses a competitive bidding system for food purchases and the futures contract modality (P4P, 2011).

“These women before P4P, they sold their maize to the trader, to the coyote, the price was set by the trader and they sold it in the farm. Right now because of the trainings and the technical assistance they receive, through better practices they now sell their maize in a collective way, they know how to storage and they negotiate with WFP and other industries to receive better prices and better incomes for their families. You know that with.”

P4P Field technician, Male.

“Prices have improved significantly; it’s not what the coyotes used to pay us… unfair and ever-changing prices. Because prices from WFP are better and stable this has had a positive impact in our communities. Coyotes now pay better prices for our beans because they know that we have the knowledge and product quality to negotiate with them, now they can’t fool us.”

P4P Beneficiary, Female.

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\(^{11}\) Coyote is the common name given to intermediaries or informal grain traders in Guatemala.
Beneficiaries reported corn and bean prices were on average 30% higher when sold to P4P compared to national and informal markets. For the 2011 – 2012 seasons, corn prices paid by coyotes or informal markets varied between Q 75-110\(^{12}\) per quintal (ENCÖVI, 2012).

For the same period, prices paid by P4P fluctuated between Q 80-200 per quintal; the program paid on average Q 30-75 more per quintal compared to informal traders / markets (Palencia, 2012). The combined effects of higher yield (improved productivity) coupled with better prices have a positive effect on food security and dietary diversity. The perception of higher income as a result of yield improvements and better prices was a recurring topic in MSC interviews. Beneficiaries associated higher income with their improved ability to afford a better quality / more diverse diet and other basic needs. They felt their situation improved as a result of changes brought by the program and saw this as the way to move forward into the future.

Associations between the three categories presented above were apparent for P4P beneficiaries. The adoption of new technologies and knowledge was directly associated with increased productivity and better quality products. Prices paid by the program were higher, constant and secure. Either or ideally both of these conditions resulted in progressively higher household earnings. Additional income allowed P4P families to afford a more nutritious and diverse diet and access to basic needs and services such as health, education, clothing and better housing.

Our findings are consistent with those of numerous authors. Growth in small-scale agriculture has twice the effect on the poorest people as growth in other sectors (Vorley, Cotula, & Chan, 2012; HLPE, 2013). Appropriate investments in small-scale producers in developing

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\(^{12}\) The Quetzal (Q) is Guatemala’s national currency. One US$ = 7.63 Quetzales (Banco de Guatemala, 2013).
countries can lead to major gains in agricultural productivity, and hence poverty and food insecurity reductions can be achieved.

In developing nations, much-needed increases in household income for improving food security must come from gains in agricultural productivity through better technology and more profitable crops (Zeller, Diagne, & Mataya, 1998). Inferior yields are a direct result of technical limitations that prevent smallholder farmers from increasing productivity or for economic reasons arising from market conditions. For example, farmers may not have access to the technical knowledge and skills required to increase production or the finances required to invest in higher production (Cleaver, 2012; Godfray et al., 2010; Rosegrant & Cline, 2003). Increased productivity that can be obtained from smallholder farmers depends on their capacity to access and use up-to-date knowledge and improved production technologies such as seeds, water, nutrients, pest management, soils, biodiversity (Godfray et al., 2010). Achieving food security demands active development of the agricultural and rural economies. Improvements in household income are related to stronger coping mechanisms to face food insecurity; highlighting the potential for income- and employment-based interventions to positively affect the severity of household food insecurity (Loopstra & Tarasuk, 2013). When price and market conditions are favorable smallholders respond positively, they innovate, organize joint market channels, and gain market power (HLPE, 2013). Improvements in smallholder agricultural systems that are stimulated by research and extension, appropriate price incentives and agricultural market development contribute directly to economic growth, poverty alleviation, and stability (Timmer, 2000; Timmer, 2012) and have great potential in promoting food and nutrition security.
4.3.2. Determinants of food security and dietary diversity

4.3.2.1. P4P participants

Narratives from MSC interviews highlighted important elements of the experience of food insecurity and its association with dietary diversity in the context of the P4P initiative. Respondents statements were grouped into ten conceptual categories along with themes (significant changes) associated with each category and the corresponding food security dimension (Table 26). The majority (>60%) of P4P beneficiaries reported that the most significant changes associated with food security and dietary diversity were increased crop diversity, improved productivity or yields and increased household income.

**Improved crop diversity** was associated almost entirely with the introduction of new corn varieties (e.g., QPM) and black beans into certain regions. Participants reported that the introduction of these new crops provided them with enough food for self-consumption and in some cases surplus product for sale. Although at the start of the program, some farmers were skeptical about the feasibility of growing black beans in certain areas, after some trials in demonstration plots it was clear to them that this was a viable option to improve their food security, the diversity of their diets and to generate additional income. Participants reported that new corn varieties not only had better performance (e.g., yield) but were more nutritious. For example, quality-protein maize (QPM) was introduced into some regions, and farmers noted the importance of the added nutritional benefits in these varieties.

“The program has helped us a lot; it has taught us about corn that has more protein. We have not heard of these new varieties because prices are always what we’re concerned about. But after learning that this corn has more protein, we thought we could buy a little bit of seed and try it out. So we followed the technician’s advice, she told us “you need to calculate how much corn you need to feed your family and that much you should plant. At the end of the season that will be your family’s food, instead of buying milk you will have this improved corn that will give you the nutrition you and your family need”. She said three tortillas made of this corn are equivalent to a glass of milk.”

P4P Beneficiary, Male.
“I will tell you a story. We had this friend in the organization that used to send her kids to get a nutritional supplement to the nearest health clinic, but she also had a small plot of this QPM corn. After six or eight months I really saw the change. I was in charge of nutritional monitoring here in the community and checked her kids regularly. Her two children grew more rapidly and were healthier compared to the other kids that were only consuming the nutritional supplement. This is very important because in addition to the supplement, she gave them this QPM corn... her own corn. This a good example in which we can see that we should not depend on donations only, we can also improve by using the food we produce ourselves.”

P4P Beneficiary (GD), Female.

“Through the trainings and demonstration plots, we learned about this high-protein corn, the HRQ\textsuperscript{13} corn. I can tell you this, maybe we don’t have enough money to buy milk and eggs but with this corn and our sacred beans, we are fine. Close by there are a lot of people and communities that don’t have the blessing of having this new knowledge that we now have.”

P4P Beneficiary (GD), Female.

Crop diversity directly impacts household dietary diversity and the availability domain of food security. When additional income is generated from surplus sales, it also has an important effect on the access domain. Moreover, interventions that generate added income for the household have the potential to impact the utilization domain of food security (Coates et al., 2006b; A. M. Hamelin et al., 2002). As mentioned by P4P participants, besides facilitating access to a more nutritious and diverse diet, additional income was utilized to procure basic services like sanitation and medical care, both of them needed to achieve optimum health.

“I think the most important change is the fact that this past year they brought black beans for us to cultivate. We didn’t know we could grow them in these coastal areas. This is the first time ever that you will see black beans growing in this community. The nice thing about it is that at the end of the season we have some beans left for our own consumption, to eat them... and that is the most important thing for us.”

P4P Beneficiary, Female.

I feel our food security has improved, I think that perhaps variety is what has improved the most. For example, we now have enough corn and beans for our household. Other food products we buy in town, but at least we don’t have to buy corn and beans anymore because we grow them ourselves. Some other members in the organization even had enough for sale, the sold to the program and got really good money for their product. That’s what I’m hoping for next year, to be able to have enough crops to be able to sell it. I know it’s not easy but we’re working towards that goal, with help from the technicians and God’s blessing.

P4P Beneficiary, Male.

\textsuperscript{13} HRQ is the acronym for QPM corn in Spanish.
Table 26. Conceptual categories and themes associated with food security and dietary diversity for P4P beneficiaries.

<table>
<thead>
<tr>
<th>Rank</th>
<th>RF (%)</th>
<th>Conceptual Category</th>
<th>Theme(s) (MSC)</th>
<th>Food Security Dimension&lt;sup&gt;14&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>82</td>
<td>Crop diversity: beans</td>
<td>1. Have enough to consume</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Have enough to consume and sell</td>
<td>Access</td>
</tr>
<tr>
<td>2</td>
<td>62</td>
<td>Increased productivity</td>
<td>1. Have enough to consume</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Have enough to consume and sell</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Increased income</td>
<td>Utilization&lt;sup&gt;15&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Job creation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Surplus used to feed livestock for home consumption</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>61</td>
<td>Increased income</td>
<td>1. Improved food quantity, quality and diversity</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Investments in basic needs (e.g., health)</td>
<td>Utilization</td>
</tr>
<tr>
<td>5</td>
<td>53</td>
<td>Improved price</td>
<td>1. Increased household income</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vulnerability</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>Education / Knowledge:</td>
<td>1. Increased productivity</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Experiential learning through</td>
<td>2. Increased home production, consumption and sales of:</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>demonstration plots</td>
<td>a. Hort. Products</td>
<td>Vulnerability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Improved food safety</td>
<td>b. Livestock</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Reduced aflatoxins and other contaminants</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>23</td>
<td>Improved nutrition</td>
<td>1. Improved variety in our diet</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. We can afford to buy more food</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Our children eat better, they are healthier</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. If we eat well, we can perform our work better.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. If we have corn and beans, we’re in a good position</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>22</td>
<td>Networking</td>
<td>1. Homestead horticultural plots from other programs (e.g., FAO)</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Collective purchasing of production inputs (DISAGRO)</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Credit and other financial services</td>
<td>(Continues)</td>
</tr>
</tbody>
</table>

<sup>14</sup> Indicates direct or indirect impact.

<sup>15</sup> Food utilization is defined as the proper biological use of food. It can be affected by health/status or illness, food safety and preparation practices, the diversity of the diet, sanitation practices and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals.
Increased productivity was the second most important change associated with food security and dietary diversity. Farmers reported that improved productivity resulted in having more crops (corn and beans) available to consume at home, and to sell in the marketplace. Beneficiaries also reported that increased sales resulted in additional income for the household, and job creation in their communities. Some farmers reported using surplus crop, especially corn, to feed homestead livestock and other animals for household consumption. Increased productivity partially impacts the availability domain of food security because added quantities of two important staple foods (corn and beans) are available on a consistent basis for P4P households. Productivity also impacts the access and utilization domains because supplementary income is generated in the household.

Increased household income was directly associated with improved productivity and crop diversity and as a result of higher prices paid for corn and beans. Respondents reported using additional income to purchase larger quantities or better quality foods and to improve dietary diversity. Red meat, fruits and vegetables were the food groups most frequently mentioned. Frequency of consumption was also reported to have increased for these and other food groups. Furthermore, additional income was destined to meet basic needs of the household. These included health services, clothing, education, housing improvements, recreational activities and others.

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</thead>
<tbody>
<tr>
<td>8</td>
<td>22</td>
<td>Crop diversity: QPM corn</td>
<td>1. Improved nutrition</td>
<td>Utilization</td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>Improved product quality</td>
<td>1. Increased availability due to reduced losses</td>
<td>Availability</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>Technical assistance</td>
<td>1. Increased productivity</td>
<td>Access</td>
</tr>
</tbody>
</table>

Results are ranked based on overall (%) response frequency (RF).
As discussed before, **knowledge** was associated with farm improvements and enhanced productivity. Farmers also reported applying newly acquired knowledge and production techniques to other crops, most frequently under the homestead system. Fruits, vegetables and even livestock related knowledge were most often reported. Beneficiaries would plant these crops as part of a home gardening system and used them to supplement their food intake. This has important implications for food security and dietary diversity. In certain communities, other assistance programs (e.g., FAO) were present and supported the establishment of these homestead plots. Farmers reported complementary synergies between P4P and these programs. For example, FAO’s initiative offered beneficiaries tools and the materials needed for the establishment of home gardens, but did not provided training. Farmers reported using the technical knowledge facilitated by P4P to properly establish and care for their home gardens.

Capacity for **Networking** to learn from different sources was perceived to be important. Farmers reported obtaining benefits from collective purchases of production inputs (e.g., pesticides) and other collaborations. P4P fostered several strategic alliances with providers of agricultural services and products. One such alliance was established between P4P and DISAGRO, one of the largest stores for agricultural products and services in Guatemala. P4P farmers had access to a credit line to purchase products with lower interest rates and special financing conditions. Additionally, specific credit lines were open to P4P farmers in association with BANRURAL, one of the largest banks in Guatemala specializing in the agricultural sector. P4P organizations had access to financing opportunities through BANRURAL to support their farming and for post-harvest operations. Because of their involvement with P4P, certain farmer organizations reported having access to other assistance programs (e.g., FAO). As P4P organizations were legally constituted and part of a large program opened the door for additional
support from other governmental and non-governmental organizations. Improved knowledge and networking had in general a positive impact on farming operations for P4P beneficiaries. Increased productivity, higher prices, reduced production costs, improved product quality and better networking were perceived to have had a positive effect on the overall profitability of their operations, thus positively impacting food security and dietary diversity.

More than 20% of farmers said direct nutritional benefits were obtained as a result of their participation in the program. Most of them referred to an increased variety in their diets and the possibility to afford more nutritious foods. Furthermore, they noted improvements in their children’s health as a result of having better diets. This also seemed to have impacted worker’s performance. Respondents indicated they felt healthier and with more energy when working in the fields. Farmers reported being in a “good nutrition state” or felt “peace of mind” as they had more corn and beans available for the household. They constantly associated this with improved productivity and reduced crop losses.

Better product quality was also mentioned in MSC interviews. Good agricultural practices coupled with better post-harvest management led to reduced crop losses. Farmers reported significant reductions in product damages due to environmental degradation, or the activity of physical, chemical and biological vectors. This resulted in more crops available for consumption and surplus sales.

**Technical assistance** had a positive impact on beneficiaries’ agricultural operations. Farmers associated this benefit with improved productivity and reduced losses. Respondents highlighted the importance of field staff and their role in providing advice and guidance. Respondents said this led to better crop management, improved productivity and decreased losses and a direct impact on food security and dietary diversity.
“One of the goals of the project is that at the end of every season families manage to build their food (maize and beans) reserves. We define that as having at least 30 quintales for a family of five people for four months. With this, reserves they partially guarantee their food security. People say they feel reassured when they know they stored grain and feel confident they can go out and do ambulatory work after the harvest. We know P4P has achieved this; it has contributed to increase food stocks for these families with food products cultivated by them.”

P4P Program administrator, Female.

Narratives from MSC interviews highlighted significant challenges associated with the experience of food insecurity and lack of dietary diversity. For P4P households (Table 27), respondents’ statements were grouped into seven conceptual categories and fifteen themes. The majority (> 50%) of program beneficiaries reported that among the most important difficulties were not having sufficient nutritional knowledge, socio-cultural issues, environmental constraints and family dynamics. A smaller percentage of respondents (< 50%) also perceived time or financial constraints and income to be important factors affecting food security and dietary diversity.

Not having enough or adequate nutrition knowledge was perceived as the most important issue associated with food insecurity and dietary diversity in P4P households. Beneficiaries reported not having enough knowledge to procure the right type of foods needed for a nutritious diet. Not having enough nutrition knowledge was an important concern, especially among mothers. This group was particularly worried that current food choices were not the best for their children, mostly due to limited budgets. Being confused about “good” and “bad” food was also a preoccupation for them. They knew for example to eating more fruits and vegetables was good for their family’s health but didn’t know what specific quantities were ideal or if the use of locally available products (e.g., yerbamora) was as good as the “traditional” ones (e.g., carrots). Respondents voiced their desire to know more how to use locally available food products, especially those they might be able to find in the wild.
Table 27. Themes and conceptual categories associated with food insecurity and lack of dietary diversity for P4P beneficiaries.

<table>
<thead>
<tr>
<th>Rank</th>
<th>RF (%)</th>
<th>Theme(s)</th>
<th>Conceptual Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>94</td>
<td>Don’t know:</td>
<td>1. Nutrition knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. How to procure the right type of foods</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. How to use local ingredients readily available</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. What food is good and bad for us</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Food aid or nutritional supplements are not properly utilized</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>82</td>
<td>1. People reject things they don’t know about, like vitamin pills</td>
<td>2. Socio-cultural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Men insist in having more and more children… even if women doesn’t want to</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>67</td>
<td>1. Food availability and access are limited due to environmental problems</td>
<td>3. Environmental constraints</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Own production decreases significantly due to bad weather</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>54</td>
<td>1. Not enough resources to feed large number of people</td>
<td>4. Family dynamics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. If you have less children you can provide for them</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>37</td>
<td>1. Mother works and chooses to provide “bad” foods (e.g., coca cola) because she doesn’t want to cook</td>
<td>5. Time constraints</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>1. Additional resources are invested in production, less availability for food and other basic needs</td>
<td>6. Financial constraints</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. When economic resources are limited, forced to choose between food, education, health, etc.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>1. People migrate to Mexico and the United States to procure additional income</td>
<td>7. Income</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Reduced income due to scarce job opportunities</td>
<td></td>
</tr>
</tbody>
</table>

1Results are ranked based on overall (%) response frequency (RF).

A number of herbs and other foods are readily available in these communities and local (folk) knowledge indicated they tend to have nutritional or health benefits. In some communities nutritional supplements or food aid was available, mostly through schools, government-operated health clinics and a wide array of assistance programs (e.g., USAID). Respondents who had access to aid reported that often these products were not properly used. For example, corn soy blends (CSB) are fortified flours used extensively by USAID and other implementing partners as complementary foods throughout the world, including Guatemala. Some accounts from program beneficiaries and control households indicated that in some cases CSB, a product intended for
human consumption, was used to feed homestead animals, mainly because people dislike the taste. Other examples included the use of Coca Cola to feed infants and children.

“The main problem is when the mother doesn’t have the knowledge to properly feed her kids. My heart aches when I see some of these kids drinking Coca Cola, I tell them that it’s like drinking pure poison. What we really need is a massive education campaign, starting with the mothers because they’re in charge of food preparation at home. We need to teach them about proper food choices, to use the local herbs that are widely available here or the foods they get for free in the school.”

P4P Beneficiary, Female.

Socio-cultural issues were also an important matter associated with food insecurity. Two main themes emerged from respondents narratives. Farmers reported being distrustful of new things, especially of those intended for personal use. For example, numerous beneficiaries said that vitamin pills and other nutritional supplements were occasionally available at local clinics but people rarely used them because they were concerned about their safety and intended use. There is a widespread cultural belief in certain areas in Guatemala that any kind of pill is associated with birth control supplements (Jamali, 2012). People have a natural tendency to avoid any supplement delivered in a pill format (Khan, Schroeder, Martorell, & Rivera, 1995), including nutritional supplementation. This has a negative impact on food and nutrition security, especially among vulnerable populations.

The main problem I think is education. I know in this community multiple projects have come and distributed pills, chispitas, folate for pregnant women and other supplements. But people don’t want to use them or they do it incorrectly. Some of them say they’re more used to healing themselves with herbs and other natural remedies... honestly I don’t know if they work. Without educating people first I think is very difficult to change their mentality.

Beneficiary, female.

A second theme in the socio-cultural category was directly associated with family dynamics. Multiple accounts from P4P farmers alluded to direct associations between family size and food insecurity. Respondents mentioned that large families often struggled to procure

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16 Chispitas is the name in Spanish of a powdered nutritional supplement called “Sprinkles”
enough resources, especially food. Inversely, references also indicated that smaller families, usually five or fewer members, were more able to provide for the basic needs of the household (e.g., food and health care). References were specific to the number of children conceived: the larger the number, the harder it was to procure for them. High fertility rates are common in Guatemala, especially in rural areas (Abom, 2004). Cultural perception, notably among Mayan-descendants, indicates that a large progeny is a strategic investment for the future.

Children eventually are “employed” for family-farming operations and other activities (Dudgeon & Inhorn, 2004); this is perceived to be of further importance in families dedicated exclusively to agriculture or for subsistence farmers. Some references also indicated that women lack control and decision-making in family planning. Some even referenced pressure from house partners insisting in having more children even if women didn’t want to. This also derives from the cultural perception described above, and the notion that male fertility is directly associated with a position of power in society (Dudgeon & Inhorn, 2004). Quantitative results for P4P households (Chapter 3) indicate that fertility rate was negatively correlated (P<0.05) with dietary diversity. This is consistent with respondents’ statements from MSC narratives; where an upward change in fertility rates was associated with a downward change in dietary diversity. A linear association, although not significant, was observed between fertility rate and food security for P4P households.

“In my case I had twelve children in total, but two of them died at birth…. So I really only have ten. Thanks to God I have my land and my husband has a good job so we were able to provide for our kids. All of them went to school and work in Guatemala\(^\text{17}\) now, they have good jobs. But I also see in this community that the average family has 8-10 kids. You will see all of them sick, skinny, all dirty. I really don’t understand how you can provide for so many kids if you don’t have the necessary resources. Sometimes I think that maybe I should’ve had less children, could have given them even more of what I did.”

P4P Beneficiary, Female.

\(^{17}\) Making reference to Guatemala’s capital, Guatemala City.
Environmental constraints were also associated with food security and dietary diversity. Due to recurrent environmental phenomena (e.g., storms); farmers reported having limited food availability and diminished productivity in their own farms. This negatively impacts food security and dietary diversity at the household and regional levels. Research on the effects of climate change in food and nutrition security is limited. There is consensus that some of the greatest impacts of global climate change will be felt among smallholder farmers, predominantly in developing countries (Morton, 2007). Guatemala is among the top 10 countries most vulnerable to climate change and the fourth most susceptible nation to natural disasters (IADB, 2010; UNICEF, 2011). Although P4P farmers live in a country particularly vulnerable to the effects of climate change, specific components of the P4P initiative are contributing to improve resilience and to reduce the negative effects of this phenomenon. For example, new knowledge and the introduction of new technologies like the use of soil conservation techniques, drought and flood resistant varieties, better post-harvest practices, environmentally-friendly pesticides and strong organizations all contribute to mitigate the effects of climate change. These actions are consistent with those recommended by the Commission on Sustainable Agriculture and Climate Change (Beddington, Asaduzzaman, & Clark, 2012).

“When the “Agatha” storm came we were cut-off from the world because a bridge in the main road fell. Our entire community could not go to town or anywhere else to buy food and medicines. We also lost a lot of fields because it was all flooded. We spent several days with nothing to eat, whole days with not even a single tortilla and salt.”

P4P Beneficiary, male.

Time and financial constraints along with income were also considered significant factors affecting food security and dietary diversity. Time constraints were associated with food insecurity in cases in which women had to work to support their family, thus limiting their

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18 Tropical Storm Agatha was a tropical cyclone that brought widespread floods to much of Central America in May of 2010.
availability for food preparation in the household. Specific references were made to the provision of “bad” foods (e.g., soda and snacks) to children instead of fully prepared meals. This is a problem observed even in developed countries where time constraints, coupled with an income pattern where wages are earned and spent daily, often compel lower-income households to buy more readily available foods that require no preparation time but have lower nutritional quality (M. T. Ruel et al., 1998). Limited financial resources were listed as an important factor considered when deciding between investing in production activities or basic family needs. In some cases, farmers reported having to use additional resources to procure services and products destined to farming activities, thus limiting their ability to purchase food, clothing and providing for other primary needs. Moreover, in times when limited financial resources were available, beneficiaries reported having to choose between food, health, education and other services. Often, the choice favored purchasing food items and the provision of essential health services. Limited income was directly associated with these factors. Some farmers reported having periods of scarce job opportunities in the farms, mostly during the off-season. This situation forced some workers to temporarily migrate to Mexico or the United States to procure supplemental income. Short-term migration among agricultural workers and even smallholder farm owners is a common phenomenon in Guatemala (ENA, 2008; ENCOVI, 2012) and is directly associated with the seasonal nature of production cycles in certain crops (e.g., corn). The relationship between income and food security was previously discussed. In general, households with lower incomes or those who face financial constraints are more likely to experience food insecurity and an overall reduction in the quality of their diets.

“We definitely had many improvements with the project but these are also difficult times. Right now it’s a very difficult time for us in the community. We are concerned because we can see we’re investing a lot of money in production, all of our resources are tied-up in the fields. When you invest all you have in your crops, there is little left to eat and for other needs.”

P4P Beneficiary, Male.
4.3.2.2. Control households

Respondent statements were grouped into nine conceptual categories and twenty-seven themes (Table 28). The majority (> 50%) of farmers reported that the most important challenges associated with food insecurity were financial constraints, food shortages, unsuitability of food and diet, lack of control and issues related to family dynamics. A smaller percentage of respondents (< 50%) also perceived the lack of a support system, limited knowledge, socio-cultural and geo-political issues to be key factors affecting food security and dietary diversity.

Financial constraints were among the most important factors associated with food insecurity and dietary diversity for control households. Farmers reported multiple instances in which income was either reduced or there was none at all. Respondents associated this problem with the seasonal nature of job opportunities for agricultural workers. It was also connected to lower productivity rates in their own farms, lower prices for their products and limited or restricted market opportunities. The high cost of food and life in general were also noted as having a negative impact on their financial situation. Similarly to P4P households, not having enough financial resources impacted the farmer’s ability to invest in improving their farming operations. It was also perceived to limit their ability to procure food and other basic resources.

“Malnutrition rates are severe in this area, over 90% I would say. For a period of 5-6 months in the year, Escuintla is the richest state in Guatemala; this is during the sugar cane season. When harvest is over, Escuintla becomes the poorest state in the country. Right then is when malnutrition and other social problems become rampant. There are no jobs opportunities for a period of up to five months or longer. People become desperate because they run out of money and food and you can see it in their faces, especially now that everything is so expensive. People start to steal food from farms or some of them migrate to other regions and even to Mexico and the United States.”

Control farmer, Male.

“I have my own little farm in which I plant corn, but the problem is always the same. I don’t have enough money to buy fertilizers or pesticides to properly care for my crop. Because of this, production is low and if we have other issues like storms we end up losing all of it. On top of that there is the issue of the price for corn; coyotes will pay you whatever they want to. They don’t care and we don’t have the means to sell our product somewhere else. We need for the government to regulate prices and to support us, to provide technical assistance and some sort of credit so we can improve our farms.”

Control farmer, Male.
Table 28. Themes and conceptual categories associated with food insecurity and lack of dietary diversity in control households.

<table>
<thead>
<tr>
<th>Rank</th>
<th>RF (%)</th>
<th>Theme(s)</th>
<th>Conceptual Category</th>
</tr>
</thead>
</table>
| 1    | 99     | 1. Reduced or no income  
2. Scarce financial means for food and other basic needs  
3. High cost of food and life in general | 1. Financial constraints                      |
| 2    | 94     | 1. Low food supply  
2. Reduced productivity in own farms | 2. Shortage of food                           |
| 3    | 87     | 1. Low dietary diversity  
2. Food safety issues  
3. Nutritional inadequacies | 3. Unsuitability of food and diet             |
| 4    | 73     | 1. Cannot control high cost of foods  
2. Guilt – family dynamics  
3. Can’t control own fate | 4. Lack of control                            |
| 5    | 59     | 1. Scarcity of resources for large families  
2. Lack of family planning  
3. High fertility rates | 5. Family dynamics                            |
| 6    | 47     | 1. Lack of government support  
2. Exclusion from development agenda  
3. Organizational weakness  
4. Lack of interest in own development | 6. Lack of support system                     |
| 7    | 28     | Don’t know:  
1. Which are the right foods for us  
2. How to cultivate for own consumption  
| 8    | 12     | 1. Fear to be identified  
2. Feels of inequity or injustice  
3. Distrust in foreign institutions and the government | 8. Socio-cultural                             |
| 9    | 5      | 1. Expansion of industrial farming  
2. Violence  

1Results are ranked based on overall (%) response frequency (RF).

Food shortage was the second most important category associated with food insecurity in control households, and it was often connected to financial constraints. Farmers described having recurrent occurrences of low food supplies for their households, especially during difficult financial times. Food shortage was manifested through low household food supply and reduced intake. Adult respondents indicated that they tend to protect their children’s food intake
by either reducing their own consumption or by re-distributing resources among all family members, prioritizing minors. Respondents associated lower farm productivity with food shortages, especially for main staple foods like corn and beans. Farmers indicated that lower productivity in their farms was mostly due to environmental factors (e.g., drought or flooding), outdated technologies and lack of financial resources for investing in farming operations (e.g., fertilizer).

“We don’t always have enough food to eat because times are difficult. Sometimes we only have the corn and beans we plant in our own farms. So we have to tighten-up our belts and make sure that we all have enough to at least calm our hunger. Sometimes I prefer to see my children eat before I do, if we have enough left, then my husband and I can eat. We are willing to make those sacrifices because we know children are the ones that suffer the most.”

Control farmer, Female.

**Unsuitability of food and diet** is closely related to the previous category. Respondents referred mainly to the monotony or lack of diversity in their diets. There were also references on the lack of freshness, safety or nutritional value of their food supply. Lack of diversity was reflected through accounts detailing the lack of intra and inter-meal variety. Farmers also associated this with a sense of restriction and lack of choice that resulted in nutritionally deficient diets.

“Besides working in my own land I’m also a part-time school teacher. I see how much this community is suffering because I see the children I teach at the school. This is a small community and I know that the diet that most people have at home is extremely deficient. Normally what they eat is corn, beans and sometimes rice. Sometime they don’t even have that; they only eat corn tortillas with salt and drink coffee. Meat, chicken or eggs are a luxury around here… maybe once every three months they consume those foods. These people live small humble houses, their hygiene practices are deficient too.”

Control farmer, Female.

In terms of food safety, there were specific references to the use of stale grains (e.g., corn) and to the lack of a constant fresh food supply. A female farmer described using corn that was of a “dark green-grey” color to make tortillas: “I noticed that the corn in the bottom of the silo was of a different color, it looked grey… almost green. That was the last of our corn so I had no choice but to use it as it was. The tortillas I made out of it had a dark grey color but tasted the
same”. This account most likely referred to the use of corn contaminated with mold. In addition to infection and allergy, molds can produce mycotoxins (e.g., aflatoxins) and organic chemicals that are responsible for various toxicological and adverse human health effects to many organ systems (Fung & Clark, 2004).

The fourth category includes references associated with lack of control over the food situation and in general. Farmers voiced their concerns about not being able to control the high cost of foods and of life in general. This was conveyed by a sense of guilt for not being able to properly provide for their families. The feeling was particularly strong among male respondents; they felt guilty for not being able to satisfy basic needs (e.g., food or health) for their wife and children. Overall, there was also a fatalistic view that their fate depended entirely on their financial circumstances.

“There are certain crises you don’t have control over and they come without asking for them, yes little by little we get out of them, but it’s not easy. Sometimes you have to limit yourself to one thing instead of other; health or food for example. Sometimes we have to eat the same thing over and over, beans for example; we always have those. But sometimes you would like to buy fish, chicken, meat, etc. But I also know sometimes that is not possible because we don’t have enough resources or because things are simply too expensive. How do you control for that? You cannot tell the store clerk to bring down the prices of things.”

Control farmer, Male.

“I have five male children and two daughters and always tell them to attend school, to take advantage of opportunities in life. I never finished school and I’m merely a “campesino”, I can read and write but only that. I tell them, don’t be like me, always poor and unable to give them all they wanted. When some of them were little, we barely had food to feed them. I sold the land that my father gave to me to be able to pay for their food, clothing, health and education… but I didn't have enough for all of them. I feel bad because I know that if would’ve finished school maybe things could have been different for us. I know you cannot have everything in life but the basic things you need to provide for your family. That’s how a man is supposed to act; otherwise people say “that man is useless.”

Control farmer, Male.

**Family dynamics** were also considered important for control households. Similarly to P4P households, control farmers indicated that larger families found it difficult to reconcile the needs all of their members. Respondents associated higher fertility rates with food insecurity, food shortages and dietary monotony. A female farmer reflected on this issue “in this community
you have families that have 10-12 children and they suffer, especially all those kids. Not even with a president’s salary you could afford to support so many kids”. Quantitative results for control households (Chapter 3) indicated that fertility rate was negatively correlated (P<0.05) with food security and dietary diversity. This is consistent with P4P beneficiaries, where an upward change in fertility rates was associated with a downward change in dietary diversity and food security.

Control farmers also indicated that they had no support, either from government or non-governmental associations. This made them feel excluded from the development agenda in Guatemala. If organized, they felt their associations were not strong. Probably due to the lack of involvement on their own development and a structured support system. Respondents felt this situation caused a negative impact on their farming operations and compromised their food security and dietary diversity. Similarly to P4P counterparts, control farmers thought they didn’t have the right knowledge to make informed decisions about their own nutrition. Additionally, they thought sanitation practices at home were not proper and that this causes a negative impact on their health. A male farmer reflected on this issue:

“People would like to know more how to grow their own food. In a neighboring community they have a project that promotes the establishment of homestead gardens. People are happy with that project because they know how to grow food for their own consumption and they also sell some of it for additional income. Not only they eat more foods, they can also afford to buy other things like eggs and sugar.”

Control farmer, Male.

Some socio-cultural and geopolitical issues were associated with the experience of food insecurity. Several farmers voiced their concerns about being identified as food insecure or
malnourished. They associated this condition with a state of extreme poverty and lower socioeconomic status. A female farmer reflected on this issue:

“The other day some people from Guatemala came to offer us some bags of food, that famous “Bolsa solidaria”19 from the government. I told them, sometimes I don’t have enough food but I’m no beggar. I have my milpa20 and I can find herbs and other foods in the wild. If people see you with those bags, immediately they start talking behind your back and I don’t like that. I am poor but I also have my pride.”

Control farmer, Female.

Other accounts talked about feelings of inequity or injustice. Guatemala is among the most unequal countries in the world in terms of wealth distribution. There are significant inequities across ethnic groups and geographic areas (Jamali, 2012). Control farmers felt they had no access to all resources needed to achieve development and that only “certain segments” of Guatemala’s society were privileged with these. A male farmer reflected on this:

“Our association was born out of conflict. I used to be part of the ‘guerrilla’ because I believe in social justice. More than 40 years later I’m still fighting. The problem now is that we’re losing this war, the new battle is against corruption, and people who want to take advantage of our ‘campesinos’. As a small farmer I cannot compete against the large farms, these are people with means and connections in the government.”

Control farmer, Male.

Respondents associated social inequality with limited opportunities for growth. They also expressed their distrust of foreign institutions and the government. This is mostly due to a large number of failed or false initiatives from different groups. There are over 16,000 thousand non-governmental organizations working in Guatemala (Abom, 2004), this makes for a very complex and compartmentalized development scenario. A male farmer reflected:

“Many institutions have come to this community and never came back. They said, “We will bring you development and will lift you out of poverty. Some of them were international organizations, some of them candidates for public office. None of them came back, they only gave us hope.”

Control farmer, Male.

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19 Bolsa solidaria (solidarity bag) it’s a government-run food assistance program in Guatemala modeled after the “fome zero” (zero hunger) program in Brazil. On a regular basis, it provides poor families with a bag of assorted food items.

20 Milpa is the traditional Guatemalan name for a small plot planted with corn.
Other geopolitical issues associated with food insecurity were the expansion of industrial crops (e.g., sugar cane), violence rates and a sense of government oppression. Control farmers talked about the negative effects of large-scale farming, specifically sugar factories. Guatemala is the fifth largest exporter of cane sugar in the world. The last ten years have seen a progressive expansion of the area dedicated to cultivate sugar cane (Cutz, Sanchez-Delgado, Ruiz-Rivas, & Santana, 2013). Sugar mills have implemented an aggressive strategy to purchase or rent large extensions of land, putting a great deal of pressure onto smallholder farmers. Several accounts from control farmers talked about the negative impacts this has had on their own farms: increased pressure for the use of natural resources, especially water, pesticide cross-contamination from aerial applications, loss of biodiversity and soil degradation due to intensive farming practices, and higher rental fees. This has resulted in reduced productivity for small farmers and thus reduced food output for consumption and sale. Higher rental prices also have had a negative impact on the overall profitability of small-scale farming operations, thus reducing household income. This is exemplified in the following:

“Food production in this region has decreased significantly and that’s one of the reasons why we have some nutritional problems. One of the main problems are sugar mills, ninety percent of land in this community is planted with sugar cane. The big corporations come and they rent-out small pieces of land from small farmers. The problem is that if you don’t have land and want to rent, you have to pay what the sugar mills pay… and that’s just too expensive for us. The other issue is that they only rent during the first part of the year, for the cropping season. The rest of the year those who rented don’t have any income and people are out of the job. Additionally, they have “dried-out” the only river around here. The soil around my farm is contaminated with the chemicals they use for the cane. My milpa doesn’t grow as much as before and I’m sure it’s their fault. What we need is for the government to do its job, they only think of stealing people’s money and to do what it is best for them. They should come here and build a development center to help small farmers like me. They should give us technical assistance and credit, that’s what we need. That would mean more jobs are created and people wouldn’t suffer as much”.

Control farmer, Male.
4.3.3. **Empowerment**

Empowerment and development are inter-related concepts. Empowerment is defined as a “group’s or individual’s capacity to make effective choices, that is, to make choices and then to transform those choices into desired actions and outcomes” (Alsop & Heinsohn, 2005; Pick, Beers, & Grossman-Crist, 2011). Central to this process are actions which both build individual and collective assets, and improve the efficiency and fairness of the organizational and institutional context which govern the use of these assets. Agency in development is defined as what a person is free to do and achieve in pursuit of whatever goals or values he or she regards as important (Pick et al., 2011; Sen, 2006). In the context of agricultural and other development initiatives, empowerment is defined as the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their lives (Narayan-Parker, 2002). Empowered people have freedom of choice and action. This in turn enables them to better influence the course of their lives and the decisions which affect them.

Narratives from MSC interviews highlight important empowerment strategies and the development of agency of beneficiaries of the P4P initiative in Guatemala. Respondents statements associated with empowerment were grouped into four conceptual categories and fourteen themes based on the framework proposed by Narayan-Parker and others. The main categories included are: access to information; inclusion and participation; accountability; and organizational capacity (Table 29). As discussed in previous sections, P4P promotes **education and technical training** as one of its core components. The program also provides market and pricing information as part of its commercialization strategy. Access to this information expands
the capacities and assets available for P4P farmers and has a direct impact on improving their farming operations as well as their business practices.

Table 29. Themes and conceptual categories associated with agency and empowerment for P4P beneficiaries.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Conceptual Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Technical information or knowledge</td>
<td>1. Access to information</td>
</tr>
<tr>
<td>2. Market information</td>
<td>2. Inclusion and participation</td>
</tr>
<tr>
<td>1. Organizational dynamics</td>
<td>3. Accountability</td>
</tr>
<tr>
<td>2. Community</td>
<td>4. Organizational capacity</td>
</tr>
<tr>
<td>3. Women</td>
<td></td>
</tr>
<tr>
<td>1. Local, regional and national authorities</td>
<td></td>
</tr>
<tr>
<td>1. Production</td>
<td></td>
</tr>
<tr>
<td>2. Commercialization</td>
<td></td>
</tr>
<tr>
<td>3. Development</td>
<td></td>
</tr>
<tr>
<td>2. Intra and inter-association networking</td>
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</tbody>
</table>

Knowledge or information was perceived as the most significant change and one of the top three benefits from P4P. Farmers associated knowledge and information with sustainability and improved livelihoods. They saw the information provided by P4P as a platform for continuous improvement and as a tool that could be used in other endeavors. There were numerous stories in which beneficiaries said they felt empowered “to do” or “act upon” something because of the new information they now had. For example:

“I will use my own case as an example of what I’m trying to tell you. After working with the program for three years, I feel I am the same person as always… but with new ideas and knowledge. First of all, I feel I’m capable of planting and growing different types of crops. Additionally, I also know how to properly run an organization, the practical and the business side of it. Through the program I learned about the different governmental and non-governmental organization that could help us. I feel I can go to them and ask for a project or assistance that could bring benefits to my community. I think I’ve obtained many valuable experiences by taking part in this project and that makes me feel we can continue even after they move on”.

P4P Beneficiary, Male.

“The moment this program leaves we are left with something that no one can take away from us, knowledge. They taught us many things, how to care for our products, how to manage our grains and prepare them to be sold for a good price, how to be organized and work together. They didn’t bring us food or fertilizers or even a hat, those things are gone after a while; but knowledge stays with us forever. After the project concludes, we will use what they have thought us to continue to improve as an organization and as individuals”.

P4P Beneficiary, Male.
A critical factor in meeting the challenge of ensuring food security in developing nations is achieving development through knowledge building and information sharing. This means putting strategic knowledge and information at the center of agricultural and rural development efforts (FAO, 1998). In the context of P4P, access to information and knowledge contributes to food security and dietary diversity by its direct impact on farm productivity and profitability. Improved productivity directly affects the availability dimension of food security and profitability has a higher impact on the access dimension through income-generating pathways. Knowledge also allows for the expansion of production activities to other crops and food systems, thus increasing the farmer’s portfolio of activities.

Empowerment based on inclusion and participation and organizational capacity were most often associated with improvements in practices within farmer organizations, a positive impact on target communities and the inclusion of women in decision-making and production roles. Beneficiaries also valued benefits that resulted from inter and intra-association networking. A core component of P4P is capacity building and strengthening of farmers’ organizations. This includes providing groups with assistance and training in a variety of topics: development and management of governing structures, gender equality and administrative processes. Respondents indicated that their organizations had improved and were functioning better as a result of P4P. Some of the added benefits reported by P4P beneficiaries associated with stronger organizations were: savings in production inputs due to strategic alliances and collective purchasing; access to credit; capacity for aggregation; and better sale prices based on product quality and volume. Intra-association networking allowed for better communication and stronger ties among members of the same organization. Inter-association networking was an added benefit from training seminars, field days and other group activities involving multiple P4P organizations.
Both intra and inter-association networking facilitated communications, and the exchange of experiences and knowledge among farmers within and across groups. This process also allowed for strategic alliances, resources sharing and business transactions between organizations. The benefits or stronger associations and collective action are highlighted in the literature. For example, the “Campesino a Campesino (CAC)” movement in Latin America promoted horizontal process of exchange of ideas and innovations among smallholder farmers. It was via the CAC method that soil conservation practices were introduced in Honduras, and hillside farmers adopting the various techniques tripled or quadrupled their yields from 400 kg/ha to 1,200–1,600 kg. This tripling in per-hectare grain production ensured that the 1,200 families that participated in the program had ample grain supplies on a yearly basis (Altieri, Funes-Monzote, & Petersen, 2012). A second case-study compared the benefits associated with practices and collaborations in organic agriculture vs. conventional agriculture. Researchers found that food security is significantly higher for organic farmers operating under an associative system. These farmers also had considerably higher on-farm crop diversity, better soil fertility, less soil erosion, increased tolerance of crops to pests and diseases, and better farm management skills. The group also had, on average, higher net incomes (Altieri et al., 2012). Quantitative results for P4P households indicate that both food security and dietary diversity were higher for farmer organizations with greater organizational development (Chapter 3). Furthermore, organizational strength was negatively correlated (P<0.05) with food insecurity. These results are in-line with respondent statements from MSC narratives, where an upward change in organizational strength is expected to be associated with a downward change in food insecurity. Stronger organizations play a critical role for smallholder farmers not only as an underpinning system for production activities, but also supporting commercial operations by pooling financial
and labor resources and collective bargaining. P4P farmers benefit from these actions by accessing preferential pricing markets, select commercialization channels, training resources and technical assistance. This model has proven effective in increasing profitability of smallholder farming operations and improved livelihoods elsewhere (Markelova et al., 2009).

**Women Empowerment.** Women make essential contributions to agriculture and rural enterprises across the developing world (Doss, 2011) and play a key role in promoting food and nutrition security (FAO, 2012). Actively promoting the participation of women in economic, social and productive roles is a strategic objective of the Purchase for Progress initiative. MSC narratives highlighted women empowerment strategies promoted by P4P. Statements from female beneficiaries were grouped into six conceptual categories and fourteen themes based on the “Women’s Empowerment in Agriculture Index” (Alkire et al., 2012). The main categories considered were: agricultural production; resources; income; leadership; time; and personal development (Table 30).

**Production.** Narratives in this category included references related to sole or joint decision-making over food and cash-crop farming, as well as autonomy in agricultural production. This group also included accounts of improved technical or production abilities and skills. P4P dynamically promotes the participation of women in production and decision-making roles and contributes to foster women’s technical capabilities and skills. Female farmers recognized the importance new knowledge from P4P’s training program in improving their production abilities and skills. There were numerous references describing how beneficiaries have moved from a passive to a more active role in agricultural production; either in their own farms or within their associations. This allowed female farmers to have a more autonomous role in food production and an active engagement in income-generating activities. Respondents also
described a dynamic process involving knowledge transfer among household members. This process usually took place between husband and wife, and in some cases extended to other relatives and community members. Overall, increased access to production resources and decision-making resulted in added benefits in food production for women participating in P4P.

“As women we feel good, before we didn’t know a lot of things. For example, proper methods to fertilize our crops or to combat pests. Because of WFP’ trainings we now know how to do that and many other things. I feel happy because now I go to the field and know exactly what I have to do. I can even teach my husband new things. Of course at the beginning he was very skeptical and he used to tell me “I’m not so sure about those things they’re teaching you in those trainings, I’ve been doing this for a long time and they can’t fool me”. But after seeing the good results we got in the demonstration plot, he started to change the way he did things”.

P4P Beneficiary, Female.

As women we have seen the changes, we have come to the conclusion that we can take on this project ourselves. I tell the program’ technicians that we can also carry the backpack sprayer and fumigate or apply fertilizers under the sun for hours just like men do. This makes us feel good because we have seen that we can do things as well or better than men and grow our own crops and also provide food for our families.

P4P Beneficiary, Female.

Studies in developing countries indicate that if given equal access to resources and capital, women farmers can achieve yields that are equal or even higher than those of men. Some studies calculate that if women had the same experience, education and inputs as men, agricultural productivity would increase by 9-24 percent (Doss, 2011; Quisumbing, Brown, Feldstein, Haddad, & Peña, 1995).

**Resources.** With improved knowledge and skills and as women began having a more autonomous role in their own production, they also started to acquire their own resources. Other themes in this category included accounts of ownership, access to, and decision-making power over productive resources such as land, livestock, agricultural equipment, consumer durables, and credit. Control over production resources included decisions associated with the acquisition of production inputs, financial resources and the use of land. P4P also fostered strategic alliances with credit institutions, especially those focused on micro-credit. Additionally, women reported taking leadership positions within their own organizations and being involved in decision-
making processes regarding credit and financial matters. This category is closely linked to improvements in **Income**. Female farmers reported sole or joint control over income and expenditures linked to production activities and household expenditures. Increased income was associated with improved agricultural productivity, better price of agricultural products (corn and beans), and improved market access. Respondents reported using additional income to improve the quality and diversity of the diet in their household, and to invest in other basic necessities like education, health and clothing. Additionally, female farmers described using financial resources to invest back in their productive plots. Our results are concurrent with those in other studies that show that more control over or increased income in the hands of women yields beneficial results for household food security, child nutrition, health and education (FAO, 2011a; Quisumbing et al., 1995). Furthermore, research shows that women with access to credit and other financial resources help households diversify and raise incomes and is associated with other benefits such as increased livelihood diversification, greater labor market participation, more education and better health (FAO, 2011a). Quantitative results for P4P households in the Canada cohort indicated that overall, beneficiaries experienced a moderate increase in their yearly household income between baseline to year three of the program (Chapter 3). However, this analysis didn’t differentiate between income improvements in male vs. female-headed households. Research conducted in Ghana showed that household food security in the study area significantly depended on backyard gardening by women, the number of crops cultivated by women, farm income obtained by women and income generated from off-farm activities by women. Authors recommended that diversification in the roles of women at the household level should be encouraged to improve household food security (Boakye-Achampong, Mensah, Aidoo, & Osei-Agyemang, 2012).
Narratives in the **leadership and participation** category included accounts associated with active participation or membership in economic and/or social groups. Women indicated increased participation in farmer and community organizations, religious groups, and others. Female respondents reported actively participating in different roles within their farmer organizations, either in general or in leadership positions. This category also contained references from women who expressed renewed trust and comfort when speaking in public gatherings. Respondents indicated that the program aggressively promoted the inclusion of women as part of governing boards in farmers associations.

“We are very thankful to all women who are part of this organization. I feel they have played an important role in this project. They have great capacity, organizational skills and a lot of them are educated in these processes. They have actively participated in all activities in the organization and we’re thankful for that”.

P4P Beneficiary, Male.

“At a certain point someone suggested that the president of this organization should be a woman. That didn’t sit very well with a lot of the members, especially men. And that’s part of the problem; men don’t want to open-up to new ideas. But as a forward-thinking organization we decided we were going to give a try. I strongly believe that women should be part of any project and should have equal rights as men. After a lot of discussions and fighting a woman was elected president of our Organization. That has been the best decision we have ever taken, it was a wonderful experience for our organization. She was so dedicated and organized and opened-up a lot of opportunities for us. She always came from the training and meetings with new ideas and her enthusiasm was contagious. She’s no longer the president but it is a member the governing board, along with two more women”.

P4P Beneficiary, Male.

“I am 19 years old and the program has helped me a great deal. I used to be very shy and nervous, but because I’ve going to the trainings and meetings, I don’t feel so nervous anymore. I’m not afraid to speak in public anymore or talking to other people I don’t know. Because of the project I know like to go out to trainings and meet more people, express what feel and speak out. I am a person that likes to be honest and do things the right way. Other women in the organization said they’re happy too. I think we all have the same rights and obligations, women and men alike”.

P4P Beneficiary, Female

The incorporation of women in decision-making processes at the household, community and national levels also should be reflected in policy-making processes and laws which are important for poverty reduction, food security and environmental sustainability. The causes of women's exclusion from decision-making processes are closely linked to their additional reproductive roles and their household workload, which account for an important share of their
time (FAO, 2011a). References related to the Time category specified how much of this asset women allocated to productive or domestic tasks and to the organization. One generalization that does hold is that women usually allocate time to food preparation, child care and other household responsibilities in addition to the time they spend in agriculture or the organization. P4P respondents indicated that they have progressively increased the time dedicated to the organization and program activities, which included training sessions, meetings, field work in demonstration plots and others. Disrupted household dynamics were reported as a result of women dedicating more time to activities outside home. A female beneficiary shares:

“In my case my husband always complains. He always asks me, what are you doing with all those women? Leaving your home unattended, they don’t appreciate what you do for them”.

P4P Beneficiary, Female.

Given a certain basic level of food acquirement, a household’s food security level would depend on how well this food is utilized. Perhaps the most important determinant of food utilization is women’s time constraints. Poor rural women are severely pressed for time – much more so than men (FAO, 2011a; IFAD, 2013). A study conducted in Nepal and India found that counting the time devoted to production-related work, market transactions and domestic chores, wives worked for more than 16 hours a day, compared with their husbands’ 8-9 hours. Moreover, the difference is not explained away entirely by the addition of domestic work, as women seem to spend more time on productive activities also (IFAD, 2013). It is important to note that the high demand placed on women’s time may not only be detrimental to their health, but it may also have an adverse effect on household food security by forcing them to compromise in terms of the quality of food preparation. For these reasons, anything that eases women’s time constraints has the potential to improve household’s food security, especially that of young children.
Agricultural interventions should advocate for women’s access to land, livestock, education, childcare, financial services, extension services, technology, markets and employment (Dioula, Deret, & Morel, 2013). However, programs should include or start with building and strengthening personal development. The key to an uncompromised rise in women’s productivity in agriculture may lie in educating women and increasing their human and physical capital.

In this sense, P4P actively contributes to women’s personal development by providing technical knowledge, training, and improved networking capabilities. Respondents indicated this has resulted in improved self-efficacy and self-confidence. Self-efficacy refers to an individual’s confidence in her/his ability to plan and follow through with a series of actions that will result in desired outcomes or achievements (Bandura, 1998). Without a sense of self-efficacy, individuals will not feel compelled to change their behavior, believe in themselves, or persevere through challenges to reaching their goals (Bandura, 2004; Colantonio, 2013). Evidence on the association between food insecurity and self-efficacy in developing countries is limited. A study among low-income women in peri-urban areas in Hartford, CT found a significant association between self-efficacy and food security. Participants with low self-efficacy were more likely to be food insecure and participants with high self-efficacy were more likely to be food secure (Colantonio, 2013).
Table 30. Themes and conceptual categories associated with women empowerment for P4P beneficiaries

<table>
<thead>
<tr>
<th>Theme</th>
<th>Conceptual Category</th>
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<tbody>
<tr>
<td>1. Input in productive decisions</td>
<td>1. Production</td>
</tr>
<tr>
<td>2. Autonomy in production</td>
<td></td>
</tr>
<tr>
<td>3. Improved technical or production abilities and skills</td>
<td></td>
</tr>
<tr>
<td>1. Ownership of assets</td>
<td>2. Resources</td>
</tr>
<tr>
<td>2. Purchase, sale or transfer of assets</td>
<td></td>
</tr>
<tr>
<td>3. Access to and decisions on credit</td>
<td></td>
</tr>
<tr>
<td>1. Control over use of income</td>
<td>3. Income</td>
</tr>
<tr>
<td>2. Increased income</td>
<td></td>
</tr>
<tr>
<td>1. Group member</td>
<td>4. Leadership and participation</td>
</tr>
<tr>
<td>2. Speaking in public</td>
<td></td>
</tr>
<tr>
<td>3. Leadership/general position in organization</td>
<td></td>
</tr>
<tr>
<td>1. Work and personal allocation</td>
<td>5. Time</td>
</tr>
<tr>
<td>1. Networking</td>
<td>6. Personal development</td>
</tr>
<tr>
<td>2. Acquired technical knowledge and training</td>
<td></td>
</tr>
<tr>
<td>3. Improved self-efficacy and confidence in self</td>
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</table>

1Adapted from Alkire et al., 2013

The following MSC story summarizes most of the factors discussed in this section that associate specific P4P strategies, women empowerment and food security.

My experience is a little bit different than my colleague’s. I am a single mother with three beautiful children. My mom’s brothers are all farmers, but my dad never was a farmer. I was thirteen years old when he died; agriculture was definitely not a part of my life. Up until recently I didn’t know anything nor was I involved with agricultural activities. When I first started coming to meetings here in the organization, I began learning about seed names and formulas, pesticides and other things that seemed strange to me. It’s still a world that I find it hard to grasp, but now I feel I know a lot more than what I knew before. I have attended all trainings provided by WFP and this has increased my interest in agriculture. I own a small plot of land, and its extension might sound odd for some, but it’s about 0.5 acres in total. I know it’s a small plot, but it’s mine and I really wanted to do this experiment last year (2011). I don’t own any spray pumps, planting spears or anything like that. But I went to see one of my cousins and I told him I had the desire to plant corn because I want to learn by doing things … not only by listening to them. The funny thing is that he sent me right away to buy herbicides to kill all weeds in my plot. He told me “go ahead and buy herbicides to eliminate all weeds and then we can start preparing the terrain”. I went to the “agroservicio” (store specialized in agro-products) and explained what I needed. The store clerk gave me this product that came in a little orange bottle which name I can’t recall right now (Rafaga21! Answered in unison other members present during the group discussion). Then I gave this product to my cousin and he told me he was going to help me out. I decided to go with him to the field because I really wanted to learn how to do things. The funny thing was that the product didn’t work at all; very few weeds were killed… so this was my first real disappointment in agriculture. I told my cousin about this and said he would re-apply

21 Rafaga (Paraquat) is the commercial name (Spanish) of an herbicide used for selective weed control in corn and other crops. Chemical base: 1,1’-dimetil-4,4’-bipiridilio; 3-(3,4-diclorofenil)-1,1-dimetilurea (Ruano, 2010).
it again. That did it!! It turns out you needed at least two applications for it to work. You see, I was learning already! After that I knew that the “Rafaga” herbicide worked only after two applications. After we killed all weeds, I started looking at the proper seeds to plant. I began to investigate who had some leftover seed from last year. Nobody had any, but I finally found a gentleman who sold me Q 20 ($2.75) worth of seed. Sometimes you shouldn’t do things without knowing. I was very happy to be able to plant my recently acquired seeds… but it turns out not a single corn plant came out of it; that was my second disappointment in the agricultural world. Later, I found out from the field technician that the problem with some seeds is that if they’re old, they will never sprout. After that problem, my neighbor came over and asked me what would I do now? Will you replant? He asked. I told him “I don’t think so; I’m really disappointed in me… I’m not even capable of planting the seed”. Then he told me he was able to get me some additional seeds. I instantly recognized the name from the WFP trainings, it was the H5 hybrid. I ended up planting those seeds and with my neighbor’s help the “milpa” grew and it looked really nice. I also knew from the talks that fertilizer was required at several crop stages. So I headed back to the “agroservicio” store to buy some fertilizer. The person in charge told me that sulfate will suffice. But from what I learned in trainings and what I had discussed with field technicians I knew that “triple quince” was a better choice. So I went ahead and bought two bags of this fertilizer and was able to see the results in the quality of my corn.

What I’m trying to tell you with this tale is that even as a woman who never knew anything about agriculture, I was able to discover and to apply new knowledge. Your learn by listening but also by doing things on your own. Being part of this association has helped me a great deal, through them I obtained access to all the benefits that the program has brought us. I went from being someone that knew nothing to someone that wanted to do something for herself… to me that is coming a long way forward. In the end my “milpita” (small corn plot) is there, it has suffered a little bit because of my mistakes and because of droughts we recently experienced; but it will survive and it will produce. I will have corn mostly to eat at home but maybe in the future I can even sell it to the organization. What will happen next year? With this experience I know I can, so of course I will do it again.

P4P Beneficiary, Female.

Women produce between 60 and 80% of the food in most developing countries and are responsible for half of the world’s food production (Rengam, 2001). Women comprise about 43% of the agricultural labor force globally in developing countries. They make essential contributions to agriculture and rural enterprises across the developing world. Efforts by national governments and the international community to achieve their goals for agricultural development, economic growth and food security will be strengthened and accelerated if they build on the contributions that women make and take bold steps to alleviate constraints preventing them to reach their full potential (Doss, 2011). Closing the gender gap in agriculture would generate significant gains for the sector and for society. If women had the same access to productive resources as men, they could increase yields on their farms by 20–30 percent. This

22 Triple quince (triple fifteen) is the common name (Spanish) of a popular fertilizer used in several crops worldwide. It provides: Nitrogen (15%) + Phosphorous (15%) + Potassium (15%), hence the “triple-fifteen” name.
could raise total agricultural output in developing countries by 2.5–4 percent, which could in turn reduce the number of hungry people in the world by 12–17 percent. This highlights the synergies that exist between promoting gender equality and reducing extreme poverty and hunger (FAO, 2011a).

4.4. **Summary and conclusions**

In depth interviews were conducted using the Most Significant Change Methodology (MSC) among stakeholders of the Purchase for Progress program (P4P) and a control group in rural Guatemala. Content analysis of respondent statements led to a comprehensive description of the most significant changes, perceived benefits and the overall experience by participants of the P4P initiative. Narratives from control households provided detailed accounts of the most significant challenges faced by smallholder farmers with no formal support. Analysis from narratives in the food security and dietary diversity domain led to a comprehensive description of these phenomena grounded in the experience of the household. This information also offered insights into specific P4P components that have direct and indirect impacts on household food security and dietary diversity. Stories from control households provided comprehensive accounts on the experience of food insecurity and dietary diversity for smallholder farmers. New knowledge or training, improved crop productivity, stronger and improved organizations, higher sale prices and exposure or access to new technologies were the most significant changes for program beneficiaries. In addition to these, administrators and field staff also considered improved access to commercial markets and credit among the top changes for P4P farmers. Most significant changes were analyzed by household food insecurity level. For food secure/mildly food insecure households: education/knowledge, organizational, increased productivity and women’s empowerment were significant changes. For moderately/ severe food insecure
households: education/knowledge, increased productivity, empowerment, improved price and organizational development were important factors. In contrast, for control farmers the most significant challenges were: absence of technical assistance or support, outdated technical knowledge, nonexistent informal or formal (government) institutional support, lack of access to new or updated technologies, and inadequate access to formal and lucrative commercial markets for their products. Three of the top five challenges faced by farmers in the control group are perceived as most significant changes by P4P beneficiaries. P4P beneficiaries reported that the most significant changes associated with food security and dietary diversity were increased crop diversity, improved productivity or yields and increased household income. Conversely, the most important challenges were insufficient nutritional knowledge, socio-cultural issues, environmental constraints and family dynamics. For control households the experience of food insecurity was associated with financial constraints, food shortages, unsuitability of food and diet, lack of control and issues related to family dynamics. MSC narratives also highlighted important empowerment pathways for beneficiaries of the P4P initiative in Guatemala.

Important determinants of food security and dietary diversity in the context of the P4P program in Guatemala were identified from MSC interviews. Improved productivity, higher income and increased diversity of staple crops had a positive impact on food availability. Productivity was associated with increased knowledge, technical assistance and training. Higher income was linked to increased productivity and higher sale prices for corn and beans. Increased income has a positive impact on the access domain of food security and improves dietary diversity. Improved dietary diversity and diet quality both have a positive effect on the food utilization domain of food security. Improved market access and higher prices were also important contributing factors to higher household income for P4P beneficiaries. Organizational
development and empowerment strategies are important factors in promoting capacity building for both individuals and associations. Organizations are important support platforms and play a key role in providing services and services for smallholder farmers in the context of programs such as P4P.
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CHAPTER 5

HOUSEHOLD FOOD SECURITY AND DIETARY DIVERSITY IN THE CONTEXT OF AN AGRICULTURAL AND MARKET DEVELOPMENT PROGRAM IN GUATEMALA: PROGRAM IMPACT PATHWAYS

5.1. Introduction

Agriculture systems have a crucial role in provision of food, livelihoods, and income (Pinstrup-Andersen, 2010; Pinstrup-Andersen, 2013a; M. T. Ruel & Alderman, 2013a). Agriculture is the main occupation of 80% of poor populations in rural areas, including women (M. T. Ruel & Alderman, 2013a). The purpose of agriculture is not just to grow crops and livestock for food and raw materials, but to grow healthy, well-nourished individuals (Fan & Pandya-Lorch, 2012; Fan, Pandya-Lorch, & Fritschel, 2012). Agricultural activities are the primary source of livelihood for the majority of the world’s poor (Gillespie, Ruel, & von Braun, 2008). The sector contributes to livelihoods and food security through direct production of food and by generating income that can be spent on food, education, and health care that benefit nutrition (Gillespie, Egal, & Park, 2013). “Nutrition-sensitive interventions, including agricultural development programs, are multi-sectorial and target the main determinants of food and nutrition insecurity (Pinstrup-Andersen, 2013a).” “These interventions aim to address poverty, gender inequality, health, clean water and other basic services (Mucha, 2012).” Nutrition-sensitive interventions and programs in agriculture, social safety nets, early child development, and education have enormous potential to enhance the scale and effectiveness of nutrition-specific interventions; improving nutrition can also help nutrition-sensitive programs achieve their own goals (M. T. Ruel & Alderman, 2013a).” Evidence of the effectiveness of targeted agricultural programs on maternal and child nutrition, with the exception of vitamin A, is limited; strengthening of nutrition goals and actions and rigorous effectiveness assessments are
needed (Arimond et al., 2011; M. T. Ruel & Alderman, 2013a). Evaluation of agricultural development programs that directly or indirectly promote nutrition and health is still an area of critical need. “Focusing on mechanisms and pathways is important for demonstrating the connections between activities and program outcomes. Also, understanding program logic that focuses on the mechanisms and pathways may help identify whether impact was achieved despite (or perhaps because of) failure to implement the program as conceptualized and designed (Kim, Habicht, Menon, & Stoltzfus, 2011).” Strengthening the policy and programmatic links between agriculture and health and nutrition requires means of seeing how their numerous links fit together (Hoddinott, 2011; Hoddinott, 2012). Emerging evidence from well-conducted agriculture interventions shows it effect on increasing productivity and food availability (Berti et al., 2004). However, there is also growing consensus that a better understanding is needed of the different cultural, economic and social conditioning factors that affect the dynamic nature of this association (Berti et al., 2004; E. T. Kennedy & Bouis, 1993). In light of dearth of appropriate approaches to understand the linkages between agricultural development programs and nutrition, the author contends that using a systematic approach that includes the combination of quantitative and qualitative measurements could be a feasible strategy.

In this chapter, the author describes a methodology that bridges the results from Chapters 3 and 4 and current literature in an attempt to create a conceptual framework on the role of agricultural and market development program, such as the P4P, and food security. This study focuses on the integration of qualitative and quantitative information generated and presented in components one and two of this project. It also identifies how this information complements and converges. In addition, this study seeks to generate new insights or identify areas that warrant further exploration through future research.
5.2. Methods

The following key steps were followed to analyze, integrate, and link data:

1. Weighting, which specifies the weight given to each of the data sources from each component;
2. Data entry, which integrates data into one matrix using the NVivo v.10 software; and,
3. Analysis, which interprets and integrates results.

Using this approach to study the evidence underpinning each factor, the capacity for each component (data source) to contribute to our understanding of that factor and the methodological limitations of this research to interpret the contribution of the purchase for progress program on household food security and dietary diversity in Guatemala was possible.

5.2.1 Weighting.

The analysis approach used for this study emphasizes some data more than others when generating inferences and interpreting findings (Greene, 2007). For this study, challenges to interpretation were posed when there was insufficient evidence (e.g., surveys) to adequately assess the contribution of certain factors. To address this challenge, the literature underpinning the subject was given slightly greater weighting, as this evidence was drawn from a larger body of research. Also, statistical evidence from survey data was assigned greater weight when illustrating impact factors or relationships (linear associations).

5.2.2 Data entry.

Prior to data entry, a MS Excel file was prepared to input data from four key sources of evidence including surveys\textsuperscript{23}, the most significant change interviews, secondary data from P4P’s measuring and evaluation (M&E) unit, and relevant literature. The key findings from each

\textsuperscript{23} It includes data from four different surveys used in this study: general information, food security (ELCSA) and dietary diversity (HDDS) surveys.
source were then entered into separate columns in the worksheet. A column was also added for relationships between factors, as evidence from MSC interviews often highlighted relationships between the factors. The data sets were not integrated in their raw form; rather, the key findings from each data source were entered into NVivo to develop an integrated display of the data. For example, Table 31 highlights the information used for the integration process. This example is built on throughout this Chapter to help communicate the data entry, preparation, weighting, and analysis and interpretation process.

Table 31. Integrated data display: data entry example.

<table>
<thead>
<tr>
<th>Evidence Sources</th>
<th>Survey</th>
<th>MSC Interviews</th>
<th>P4P’s M&amp;E¹</th>
<th>Literature</th>
<th>Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increased productivity</strong></td>
<td>1. Increased yield (P&lt;0.05)</td>
<td>1. Most significant change for P4P beneficiaries (78%)</td>
<td>1. Documented quantitative and qualitative evidence of increased productivity (2X)</td>
<td>1. Empirical</td>
<td>1. Food availability</td>
</tr>
<tr>
<td></td>
<td>2. Higher food security (P&lt;0.05) and dietary diversity (P&lt;0.05) vs. control</td>
<td>2. Most significant constraint/challenge for control group (59%)</td>
<td>2. Theoretical</td>
<td>2. Increased income</td>
<td>2. Increased income</td>
</tr>
<tr>
<td></td>
<td>3. Frequent theme across program levels:</td>
<td>3. Frequent theme across program levels:</td>
<td>3. Dietary diversity</td>
<td>3. Dietary diversity</td>
<td>3. Dietary diversity</td>
</tr>
<tr>
<td></td>
<td>• Beneficiaries</td>
<td>• Beneficiaries</td>
<td>• Beneficiaries</td>
<td>• Beneficiaries</td>
<td>• Beneficiaries</td>
</tr>
<tr>
<td></td>
<td>• Field team</td>
<td>• Field team</td>
<td>• Field team</td>
<td>• Field team</td>
<td>• Field team</td>
</tr>
<tr>
<td></td>
<td>• Administration</td>
<td>• Administration</td>
<td>• Administration</td>
<td>• Administration</td>
<td>• Administration</td>
</tr>
</tbody>
</table>

¹Measuring and Evaluation (M&E) unit, Purchase for Progress (P4P) Guatemala.

5.2.3 Levels of evidence.

The levels of evidence were hierarchical and represented the strength or amount of evidence behind each factor. The levels of evidence were determined by the assumptions underpinning the original analysis that was used for each information source (component). For example, for the surveys, statistical significance was the highest level of evidence. Levels of evidence were developed for all sources and are identified in Table 32.
Table 32. Levels of evidence for each of the data sources.

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Evidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Level</td>
</tr>
<tr>
<td>Literature</td>
<td>Empirical evidence¹</td>
</tr>
<tr>
<td>(Chapter 1 and other sources)</td>
<td></td>
</tr>
<tr>
<td>Surveys</td>
<td>Statistically significant factor (P&lt;0.05)</td>
</tr>
<tr>
<td>(Component 2)</td>
<td></td>
</tr>
<tr>
<td>MSC Interviews</td>
<td>High impact factor for program stakeholders³ – P4P</td>
</tr>
<tr>
<td>(Component 3)</td>
<td>High impact constraint/challenge for subjects in control group</td>
</tr>
<tr>
<td>P4P’s M&amp;E</td>
<td>Documented quantitative (statistically significant) and qualitative evidence of improvement⁴</td>
</tr>
<tr>
<td>Relationships</td>
<td>Impacts on</td>
</tr>
</tbody>
</table>

¹From published peer-reviewed sources. ²Published materials at the institutional level (e.g., P4P); and personal communication from experts in the field. ³Program stakeholders = beneficiaries, field staff, program administration. ⁴Improvement from baseline to midterm evaluation (year 3). ⁵Qualitative data from P4P includes: case studies, interviews, press releases, and other sources.
To support the integrity of the analysis, it was important that each one of the levels in Table 32 were defined. Equally, these definitions were important for guiding the analysis. Definitions were based on the analysis that was undertaken for the food security and dietary diversity surveys, the MSC interviews, secondary data from P4P and the literature. Table 33 provides the definitions for each of the levels of evidence.

Table 33. Definition for the levels of evidence.

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Evidence Level</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature</td>
<td>Empirical</td>
<td>Published literature that presents evidence that has resulted from research undertaken by the authors of the literature. No discriminations are made based on the research methods used.</td>
</tr>
<tr>
<td></td>
<td>Theoretical</td>
<td>Published literature that presents theoretical propositions relevant to food security and dietary diversity in the context of agricultural interventions in developing countries</td>
</tr>
<tr>
<td>Surveys</td>
<td>Statistically significant (P&lt;0.05)</td>
<td>Statistically significant bivariate association.</td>
</tr>
<tr>
<td></td>
<td>Numerical association</td>
<td>Moderate to strong linear association.</td>
</tr>
<tr>
<td></td>
<td>No statistical significance</td>
<td>Weak linear association.</td>
</tr>
<tr>
<td>MSC interviews</td>
<td>High impact factor</td>
<td>Theme was noted as most significant change(^1) by all P4P stakeholders.</td>
</tr>
<tr>
<td></td>
<td>Moderate impact factor</td>
<td>Theme was noted as most significant challenge by at least beneficiaries and field staff - P4P.</td>
</tr>
<tr>
<td></td>
<td>Low impact factor</td>
<td>Theme was noted in MSC interviews in both P4P and control groups, but was not a frequent reference</td>
</tr>
<tr>
<td></td>
<td>Not noted on interviews</td>
<td>Theme was not present in MSC interviews or had a response frequency below 5%</td>
</tr>
</tbody>
</table>

\(^1\) A theme was noted in MSC interviews in both P4P and control groups, but was not a frequent reference

Continues
Data integration, analysis and interpretation were based on identifying crucial evidence and common patterns within the data, while also recognizing the contribution of contextual factors to the findings. The methodology only offers a broad framework for integration and does not stipulate any specific analytical strategy (Appleton-Dyer, 2012). While data sets were weighted and rated, the integration process was largely interpretative, and drew on the author’s skills and knowledge of the data sets. This naturally poses some limitations, which are recognized in the discussion. To address these limitations and support the development of mixed methods inferences, the following steps were undertaken:

- Review the levels of evidence;
- Review the capacity for each data source to contribute to our understanding of that factor;
- Reviewing evidence based on methodological limitations; and
- Interpretation and final integration of the information.
Review the levels of evidence. The levels of evidence were used to assign the degree of importance of each factor in the proposed program-impact pathways and final conceptual framework. Factors were defined as critical, of high importance, moderate importance, low importance, not important or insufficient evidence. For example, factors that had high levels of evidence from three of the four data sources (e.g., literature, surveys, and MSC interviews) were considered to be critical factors. Table 34 defines the generic criteria behind each of the levels of importance.

Table 34. Levels of importance for data integration and generic criteria.

<table>
<thead>
<tr>
<th>Importance level</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Highest level of evidence from three or more data sources</td>
</tr>
<tr>
<td>High</td>
<td>High level of evidence from two or more data sources, plus moderate levels of evidence from two or more data sources</td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate level of evidence from two or more data sources, without any high level of evidence</td>
</tr>
<tr>
<td>Low</td>
<td>Low level of evidence from two or more data sources</td>
</tr>
<tr>
<td>Not important</td>
<td>Low level of evidence from one source, plus no evidence from two or other sources</td>
</tr>
<tr>
<td>Insufficient evidence</td>
<td>Insufficient evidence to assess the contribution of this factor</td>
</tr>
</tbody>
</table>

Review the capacity of each data source to contribute to the development program-impact pathways and integrative conceptual framework. The data integration and analysis were informed by the capacity for each data source to contribute to our understanding of each factor. For example, the MSC interviews offered greater insight into the role of newly acquired technical knowledge and practical training in improving beneficiaries’ capacities to increase productivity of their crops, which influenced food security and dietary diversity.

Review evidence based on methodological limitations. When conducting the data integration analysis, it is important to recognize the limitations that underpin each data source and its
application in this research. These limitations can help to inform the interpretation of the mixed methods analysis, as they may highlight some data sources as being more useful than others.

**Interpretation and final integration of the information.** Each of the steps described above is used to interpret the findings from the data integration analysis. This analysis defined the factors as either critical, of high importance, low importance, not important or insufficient evidence. The summary information was then used in describing the role of these factors or determinants in different program-impact pathways and a proposed conceptual framework. The interpretation is also designed to address the research objectives by identifying the levels of evidence on the main determinants of household food security and dietary diversity in the context of an agricultural and market development program in Guatemala.
5.3. **Results and discussion**

This section presents the integration of data generated in components one (Chapter 2) and two (Chapter 3) of this study, and other relevant sources. First, data was integrated into four program-impact pathways (PIP) describing the main determinants of food security and dietary diversity in the context of the Purchase for Progress initiative in Guatemala. Evidence for the different factors included on each program-impact pathway is presented. In the next section, data included on each PIP and additional information are integrated into a conceptual framework. The proposed conceptual framework illustrates the main elements associated with food security and dietary diversity in the context of an agricultural and market development program in Guatemala. Finally, a general summary and conclusions for the chapter are presented. Table 35 provides a summary of the main evidence sources included in this study. For each data source, evidence levels are presented for relevant factors associated with food security and dietary diversity. For example, variables from food security and dietary diversity surveys are presented to illustrate important linear associations within and across groups and clusters. Limitations for each data source are also discussed.

**General information, food security and dietary diversity surveys.** Information regarding socioeconomic variable, the current food security and dietary diversity status among smallholder farmers was presented in Chapter 3. There was strong evidence indicating that household food security and dietary diversity was higher among P4P farmers compared to controls. Statistical evidence also indicated that education (level and attainment), fertility rate, socioeconomic status (HQS), household occupancy, and organizational strength were important determinants associated (linear association) with food security and dietary diversity. There was also high evidence of positive changes in productivity from baseline to year 3 (2012) of the project, data
were for P4P farmers in the Canada cohort. Evidence was moderate (numerical trend) for positive changes in income among P4P (Canada) and control farmers. Changes in income were slightly higher for P4P farmers, especially in the “self-consumption” category. Significant associations among indicators of food security and dietary diversity add to the body on knowledge and support the use of these measures as complementary indicators of household food security. Overall, surveys were important in describing key determinants associated with food security in the context of smallholder agriculture. For example, fertility rate, socioeconomic status (HQS) and productivity were important indicators associated with the availability and access dimensions (macro) of food security and have been previously reported in similar studies (Ahmed et al., 2000; Bhattacharya et al., 2004; Fan & Brzeska, 2012). Although a growing body of evidence proves the value of survey data to capture objective dietary, economic, and other indicators (Barrett, 2010), this methodology also poses some limitations. Surveys in a cross-sectional design allow for multiple comparisons within and across groups of similar characteristics, but this only offers a snapshot in time of their current situation. Objective measures of food insecurity are important instruments in estimating prevalence and in determining numerical associations among quantitative variables; this is especially useful when assessing risks and in developing predictive models. Information presented in Chapter 3 could be of importance in the design of future initiatives based on the P4P model. The interpretation of the observed associations among these variables could be especially useful in designing more “tailored” programs for smallholder farmers in countries like Guatemala. However, this analysis offered little insight into key elements such as intra-household dynamics and the perception and feelings associated with hunger and food insecurity. Finally, this methodology offered limited insights into specific program components impacting food security and dietary diversity.
Table 35. Summary of main evidence sources and levels for factors associated with food security and dietary diversity.

<table>
<thead>
<tr>
<th>EVIDENCE SOURCE</th>
<th>EVIDENCE LEVEL</th>
<th>EVIDENCE SOURCE</th>
<th>EVIDENCE SOURCE</th>
<th>EVIDENCE SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Food insecurity(^1,2)</td>
<td>Income(^7)</td>
<td>Education / knowledge</td>
<td>Organizational</td>
<td>In-kind donations</td>
</tr>
<tr>
<td>Dietary diversity(^1,2)</td>
<td>Productivity</td>
<td>Price</td>
<td>Market access</td>
<td>Organizational</td>
</tr>
<tr>
<td>Educational attainment(^1,2)</td>
<td>Income</td>
<td>Technology</td>
<td>Networking</td>
<td>Sustainability</td>
</tr>
<tr>
<td>Educational level(^2)</td>
<td>Crop diversity</td>
<td>Empowerment</td>
<td>Labor practices</td>
<td>Product quality</td>
</tr>
<tr>
<td>Fertility rate(^1)</td>
<td>Changes in crops</td>
<td>Technical assistance</td>
<td>Product quality</td>
<td>Price</td>
</tr>
<tr>
<td>Household occupancy(^2)</td>
<td>New crop varieties</td>
<td>Purchasing structure</td>
<td>Technical assistance</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Org. Strength(^1,2,3)</td>
<td>Technology</td>
<td>Market access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity(^3)</td>
<td></td>
<td></td>
<td>Empowerment</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Indicates statistically significant difference between groups (P4P vs. Control). \(^2\)Indicates a statistically significant linear association with food security and/or dietary diversity (Chapter 3). \(^3\)Indicates a statistically significant difference (baseline vs. Year 3). Analysis based on secondary data provided by P4P’s M&E unit in Guatemala.
**Most Significant Change (MSC) interviews.** Although used in other applications, to the best of the researchers’ knowledge, MSC has not been previously used to evaluate food security and dietary diversity or the role of agricultural and market development programs. Information regarding the most significant changes experienced by beneficiaries the Purchase for Progress program and their experience associated with food security and dietary diversity was presented in Chapter 4. Content analysis of respondent’s statements led to an in-depth description of the most significant changes and the overall experience from participants of the P4P program in Guatemala. Perspectives from program administrators’ and field staff were also included. Narratives from the control group provided in-depth accounts of the most significant challenges faced by smallholder farmers working with no assistance from a formal program. Further analysis in the food security and dietary diversity domain led to a comprehensive description of these phenomena grounded in the experience of the household in the context of an agricultural and market development program. This information also offered insights into specific program components that had direct and indirect impact on household food security and dietary diversity. There was strong evidence (high) that factors such as technical knowledge, increased productivity and income, crop diversity, changes in crops and production practices were perceived either as significant changes or were frequently associated with improved food security by beneficiaries of the P4P program. In contrast, there was also strong evidence that some of these factors were perceived as significant challenges faced by smallholder farmers in the control group (e.g., low productivity). There was moderate evidence on the significance of factors such as organizational development, improved price, new technology, empowerment, technical assistance and sustainability of farming practices. Finally, evidence was low for factors such as market access, networking, labor practices and purchasing structure.
Overall, MSC narratives provided context-specific accounts of the most significant changes experienced by those benefiting from an agricultural and market development program and also contrasting views of challenges faced by control farmers of similar characteristics. Moreover, it allowed for the analysis of specific program components that play a significant role in improving livelihoods, and promoting food security and dietary diversity. MSC interviews were used to create a platform for multiple program stakeholders and others to reflect and express themselves and share their overall experiences both within and outside the P4P program. We hope results from this component will later facilitate a dynamic dialogue among these stakeholders. Qualitative methodologies, like MSC, complemented by quantitative data are well suited to be used in programs like P4P that have a diverse and complex set of outcomes (e.g., increasing income, reducing poverty, support food security, etc.) with multiple stakeholders groups and financing agencies (Davies and Dart, 2007; Kotvojs and Lasambouw, 2009). Data integration with quantitative surveys posed some limitations. Quantitative data presented in Chapter 3 provided a detailed characterization of the food security and dietary diversity status for beneficiaries of the P4P program and control farmers. Information generated from the surveys highlighted relevant socio-economic variables associated with food security and dietary diversity but offered little insight into specific program components affecting food security and dietary diversity. Qualitative information from MSC interviews contributed in this respect by providing detailed information on the most significant changes brought about the Purchase for Progress Program but also provided additional information on the context-specific reality of those benefiting from this intervention. This is complemented by evidence from P4P’s measuring and evaluation (M&E) system and from several sources relevant to this research study.
**Measuring and Evaluation (M&E)–P4P.** Secondary information provided by P4P’s measuring and evaluation unit in Guatemala is incorporated in this study. M&E data collection for P4P Guatemala is conducted by third party services. Data collected included: quantitative information based on the program’s Logical Framework (LogFrame), qualitative information from case studies, interviews and focus groups. Data collection points included baseline data for Buffett and Canada cohorts and follow-up data at year 3 (2012) of the program for the Canada cohort. Data were collected from both P4P and control organizations. P4P Guatemala reported that the quality and integrity of quantitative data collected from farmers in the Buffett cohort were low and for this reason the data were not included in their overall assessment (Palencia, 2013). Qualitative data collected from farmers in the Buffett cohort was included in progress reports and other materials. Data from the Canada cohort were used for both baseline and follow-up evaluations. No statistical analyses (Pre – Post) were included as part of their overall program evaluation, except for productivity (yield) data. This poses some limitations in terms of the generalizability of conclusions and adds to the limitations imposed by data quality and geographical coverage of the collection process. Evidence was strong (high) for productivity data as there were significant differences in yield from baseline to year 3 (2012) of the program. Statistical analyses also showed differences in productivity between P4P and control farmers. Evidence was moderate for other factors such as changes in crops and production practices, sustainability of farming practices, product quality, price, and others. Evidence of improved crop diversity, income and labor practices was low for these factors. It is important to note that P4P is currently conducting a second wave of data collection in both Canada and Buffett cohorts. We expect to have access to this information once is processed so it can be further analyzed and included in future publications.
5.3.1. Program-impact pathways

Table 36 presents a summary of the four program-impact pathways (PIP) proposed in this study: 1) increased income; 2) changes in crops and agricultural production practices; 3) market access; and 4) empowerment. Evidence for the different factors included on each PIP is also presented in the following sections. Table 36 also presents a summary of the different factors each PIP has an impact on; as well as elements impacting each pathway. Expected outcomes for food security and dietary diversity as well as the main food security dimension (s) impacted on each program-impact pathway are also presented.

**Program-impact pathway #1: increased income.** Increasing income and improving livelihoods for smallholder farmers is one of the main objectives of the Purchase for Progress initiative (Aker, 2008; P4P, 2011). The evidence supporting this impact pathway was high, with low evidence from P4P-M&E sources, but high evidence from MSC interviews. This, coupled with high evidence from existing literature provides support for the impact of programs such as P4P in increasing household income. There was high evidence from MSC interviews and the literature, along with moderate evidence from P4P-M&E that increased income has an impact on agricultural production. Multiple accounts from MSC interviews and other qualitative sources from P4P indicate that additional income is re-directed mainly to purchase additional or better-quality production inputs and to hire additional labor (Table 37). There was also moderate evidence that additional income was used to invest in basic needs like food, health, clothing and others. MSC interviews indicated that program beneficiaries frequently cited using additional income to improve the variety and quality of their diets, acquiring higher quality (higher price) food products not previously purchased (e.g., red meat, fruits and vegetables), or acquiring these food products more frequently.
Table 36. Program-impact pathways affecting food security and dietary diversity in the context of the purchase for progress program in Guatemala.

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Impact on</th>
<th>Impacted by</th>
<th>Expected FS and DD Outcomes</th>
<th>Food Security Dimension(s)$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Increased income</td>
<td>1. Agricultural production</td>
<td>1. Productivity</td>
<td>1. Increased physical and economic access to food</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td>2. Household income</td>
<td>2. Market access</td>
<td>2. Increased dietary diversity</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Price</td>
<td>3. Improved food utilization</td>
<td>Utilization</td>
</tr>
<tr>
<td>2. Changes in crops and production practices</td>
<td>1. New or improved varieties</td>
<td>1. Knowledge and training</td>
<td>1. Increased physical and economic access to food</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td>2. Crop diversity</td>
<td>2. Technical assistance</td>
<td>2. Increased dietary diversity</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td>3. Improved productivity</td>
<td>3. New or improved technology</td>
<td>3. Improved food utilization</td>
<td>Vulnerability</td>
</tr>
<tr>
<td></td>
<td>4. Increased income</td>
<td>4. Networking</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Sustainability of farming practices</td>
<td>5. Organizational strength</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Labor dynamics (time)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Product quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. Improved price</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Market access</td>
<td>1. Household income</td>
<td>1. Program’s purchasing structure</td>
<td>1. Increased physical and economic access to food</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td>2. Price</td>
<td>2. Organizational strength</td>
<td>2. Increased dietary diversity</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td>4. Agricultural production</td>
<td>4. Technical assistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Empowerment</td>
<td>1. Agricultural production</td>
<td>1. Knowledge and training</td>
<td>1. Increased physical and economic access to food</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td>2. Household income</td>
<td>2. New or improved technology</td>
<td>2. Increased dietary diversity</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td>3. Organizational strengthening</td>
<td>3. Improved food utilization</td>
<td>3. Improved food utilization</td>
<td>Utilization</td>
</tr>
</tbody>
</table>

$^1$Expected impact on one or more of the four dimension of food security (Chapter 1). FS = Food Security. DD = Dietary Diversity
Increased household income in the context of the Purchase for Progress Program was impacted mainly by three factors: increased productivity, improved price and market access for program beneficiaries (Table 37). There was high evidence from MSC interviews and P4P-M&E of improved productivity from baseline to year 3 of the program (2012) for farmers in the Canada cohort. There was also ample evidence in the literature of the positive impact of agricultural development programs on increased productivity due to improved yields, reduced losses or lower per unit production costs (Burchi et al., 2011; Fan et al., 2012; Fan & Brzeska, 2012; FAO, 2011a; FAO et al., 2012; Hoddinott, 2012; Ogat, Boon, & Subramani, 2009; Pauw & Thurlow, 2012; Pinstrup-Andersen, 2013b; M. T. Ruel & Alderman, 2013b). In MSC interviews, increased productivity was the second most important change associated with food security and dietary diversity. Farmers reported that higher productivity resulted in improved food availability (corn and beans) for household consumption, as well as surplus crop for external sale. Beneficiaries also reported that increased sales resulted in additional household income, and job creation within their communities, especially for harvest and crop conditioning operations. Increased productivity had an impact on the availability domain of food security because added quantities of two important staple foods (corn and beans) were readily available on a consistent basis for P4P households. Productivity also impacts the access and utilization domains because supplementary income is generated for the household. Literature suggests that when changes in agricultural production lead to increases in household income, this can then be used to purchase additional goods and services that have an effect on health status (FAO et al., 2012; Hoddinott, 2012).

Improved market access and prices are core components of the Purchase for Progress Program (Aker, 2008; P4P, 2011). P4P promotes market access by leveraging WFP’s purchasing
power on each of the pilot countries. In Guatemala, P4P provides market access through direct crop purchases that support local WFP operations, and by using dedicated procuring funding for farmers in the Canada cohort. Additionally, P4P actively seeks to promote commercial partnerships between program beneficiaries and the local food industry as well as other potential buyers, thus, promoting sustainability and long-term impacts.

**Table 37.** Increased income program-impact pathway: integrated data sources and evidence levels.

<table>
<thead>
<tr>
<th>PATHWAY</th>
<th>EVIDENCE SOURCES</th>
<th>Survey</th>
<th>MSC Interviews</th>
<th>P4P’s M&amp;E</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased income</td>
<td></td>
<td>N.E.¹</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Food security</td>
<td></td>
<td>High²</td>
<td>Moderate</td>
<td>N.E.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Dietary diversity</td>
<td></td>
<td>High²</td>
<td>Low</td>
<td>N.E.</td>
<td>High</td>
</tr>
<tr>
<td>Impact on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Agricultural production</td>
<td></td>
<td>N.E.</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>2. Household income</td>
<td></td>
<td>N.E.</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Impacted by</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Productivity</td>
<td></td>
<td>N.E.</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>2. Market access</td>
<td></td>
<td>N.E.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>3. Price</td>
<td></td>
<td>N.E.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
</tr>
</tbody>
</table>

¹N.E. = No evidence. ²Indicates higher household food security and dietary diversity among P4P beneficiaries compared to controls.

P4P promoted better prices for corn and beans using an integrated strategy. Field staff (WFP and partners) regularly provides farmers with data on prices, to illustrate market reality and to convey the “cost efficiency” message. For P4P Guatemala, this included data on farm-gate prices, local market prices and trader prices. Trader prices are established based on the international market price for agricultural commodities determined at the Chicago Stock Exchange (CSE). Evidence for improved market access and price was moderate from MSC interviews, P4P-M&E, and the literature (Table 37). MSC interviews indicated that beneficiaries perceived this among the top
five most significant changes experienced by their participation in P4P. Farmer’s perceptions on price were often associated with improvements over a traditional pricing system determined by informal trade markets. Prices paid for corn and beans were, on average, 30% higher for P4P beneficiaries. Evidence from the literature was high and indicates that when price and market conditions are favorable, smallholders respond positively; they innovate, organize joint market channels, and gain market power (HLPE, 2013). Improvements in smallholder agricultural systems that are stimulated by research and extension, appropriate price incentives and agricultural market development contribute directly to economic growth, poverty alleviation, and stability (Timmer, 2000; Timmer, 2012) and have great potential in reducing food and nutrition insecurity. A summary of the effects of improved price, market access and productivity on increased income is presented in Figure 28.

**Figure 28.** Increased income program-impact pathway, effect of improved price, market access and productivity.
**Program-impact pathway #2: changes in crops and production practices.** The Purchase for Progress Program actively promotes the introduction of improved crop varieties and new agricultural production technologies and practices (Aker, 2008; P4P, 2011). Evidence for changes in crops and production practices was high in MSC interviews and from the literature (Table 38). Evidence from P4P-M&E was moderate and consisted mostly of historical records of new crop introductions and the use of new agricultural production technologies in demonstration plots. Evidence was mostly from qualitative sources and included several case studies and field interviews conducted by external partners involved in M&E operations.

**Table 38. Changes in crops and production practices program-impact pathway: integrated data sources and evidence levels.**

<table>
<thead>
<tr>
<th>PATHWAY</th>
<th>Summary</th>
<th>EVIDENCE SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in Crops and Production Practices</td>
<td>Changes in crops and production practices</td>
<td>N.E. ¹</td>
</tr>
<tr>
<td>Food security</td>
<td>N.E. ¹</td>
<td>High</td>
</tr>
<tr>
<td>Dietary diversity</td>
<td>High²</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Impact on</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. New varieties</td>
<td>N.E.</td>
<td>Moderate</td>
</tr>
<tr>
<td>2. Crop diversity</td>
<td>High²</td>
<td>Moderate</td>
</tr>
<tr>
<td>3. Productivity</td>
<td>N.E.</td>
<td>High</td>
</tr>
<tr>
<td>4. Income</td>
<td>N.E.</td>
<td>High</td>
</tr>
<tr>
<td>5. Sustainability</td>
<td>N.E.</td>
<td>Moderate</td>
</tr>
<tr>
<td>6. Labor</td>
<td>N.E.</td>
<td>Low</td>
</tr>
<tr>
<td>7. Product quality</td>
<td>N.E.</td>
<td>Low</td>
</tr>
<tr>
<td>8. Price</td>
<td>N.E.</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Impacted by</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Knowledge</td>
<td>N.E.</td>
<td>High</td>
</tr>
<tr>
<td>2. Technical assistance</td>
<td>N.E.</td>
<td>Moderate</td>
</tr>
<tr>
<td>3. Technology</td>
<td>N.E.</td>
<td>Moderate</td>
</tr>
<tr>
<td>4. Networking</td>
<td>N.E.</td>
<td>Low</td>
</tr>
<tr>
<td>5. Organizational</td>
<td>High</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

¹N.E. = No evidence. ²Indicates higher household food security and dietary diversity among P4P beneficiaries compared to controls. ³As indicated by overall higher dietary diversity among P4P households compared to controls.
Improved productivity was considered a critical factor as indicated by high evidence levels from three data sources. Data from MSC interviews highlighted the positive impact of several changes in crops and production practices on improved productivity. Moreover, accounts of productivity improvement were a recurrent theme in MSC interviews across all groups and were deemed as the second most significant change for P4P beneficiaries. Beneficiaries indicated that improvements in productivity were mostly due to the introduction and adoption of new agricultural production technologies. These included new or improved fertilizers, soil conservation techniques, improved pesticides and others. Productivity was also linked to changes in crops, mostly the introduction of improved corn and bean varieties such as drought-resistant, high-yield or improved nutrition breeds. A summary of the proposed connections between changes in crops / production practices and increased productivity and other factors is presented in Figure 29.

**Figure 29.** Changes in crops and production practices program-impact pathway, effect on increased productivity.
There was high evidence from MSC interviews and the literature, along with moderate evidence from P4P-M&E, that knowledge / technical training has an impact on changes in crops and agricultural production. P4P provided extensive training and knowledge on topics such as improved production techniques, farm management, and other administrative topics. According to P4P’s measuring and evaluation unit, adoption rates and knowledge retention of new concepts and techniques was acceptable (P4P, 2013). MSC interviews provided multiple accounts on the use of newly acquired knowledge to improve current production practices. There were also several references of new knowledge being applied to the introduction of novel technologies as well as new or improved crop varieties. The literature on this subject suggests that the implementation of new or improved technical knowledge applied to agricultural production has positive results such as improving food security, empowering smallholder farmers, enhancing income opportunities and job creation, and safeguarding local agro-ecosystems (Tefera et al., 2011). Evidence was moderate to low on the impact of factors such as organizational development and improved networking on changes in crops and production practices. There was high evidence from MSC interviews and the literature on the impact of changes in crops and production practices on income, mostly due to significant improvements in crop productivity and reduced pre- and post-harvest losses. Hoddinott (2012) suggested that changes in agricultural production could result in the introduction of new foods into diets. At the farm level, the introduction of new crops as a result of new knowledge and innovations in crop breeding (e.g., biofortified foods) has the potential to improve both health and nutrition. Evidence was moderate to low on the impact of changes in crops and production practices in sustainability of farming and labor practices, quality of the product and price (Table 38).
Program-impact pathway #3: market access. Improving access to markets for smallholder farmers is one of the main objectives of the Purchase for Progress Program. In the context of this initiative, improving market access refers to a group of factors that have a direct impact on how commodity markets operate. These include: infrastructure (transportation, storage, and commodity handling capacity), systems of price discovery and transmission, market information, and the level of competition in the market or cultural barriers restricting women’s access to markets (P4P, 2011). Overall, evidence of improved market access was moderate. There was high evidence in the literature of the positive effects of agricultural and market development programs on improved market access, both at the national and international (export markets) levels (Hoddinott, 2011; Hoddinott, 2012; Vorley et al., 2012; Zeller et al., 1998). Evidence from P4P-M&E was moderate and it came mostly from qualitative sources and personal communications from program personnel. Evidence from MSC interviews was low. On this respect, it is important to mention that P4P uses different procuring strategies that vary by funding agency. The Canadian Agency for Development (Canada farmers) has dedicated funds for direct food purchases from P4P farmers. In contrast, there are no dedicated funds from the Howard G. Buffett foundation (Buffett farmers) for this purpose. Evidence from MSC indicated that there were a very limited number of references on factors such as improved price and market access from farmers in the Buffett cohort, field staff and program administrators. These themes were more frequently cited by those beneficiaries in the Canada cohort, thus suggesting that this group had a better experience when selling their product to P4P and considered improved market access as a significant factor. This is consistent with evidence from MSC interviews (Canada), P4P-M&E and literature indicating that those with access to adequate assets and infrastructure
and faced with appropriate incentives engage actively in lucrative markets, while those who lack one or more of those three essential ingredients largely do not.

Table 39. Market access program-impact pathway: integrated data sources and evidence levels.

<table>
<thead>
<tr>
<th>PATHWAY</th>
<th>Summary</th>
<th>EVIDENCE SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Access</td>
<td></td>
<td>Survey MSC P4P’s M&amp;E Literature</td>
</tr>
<tr>
<td>Food security</td>
<td>High^2</td>
<td>Low Moderate N.E. High</td>
</tr>
<tr>
<td>Dietary diversity</td>
<td>High^2</td>
<td>Low N.E. High</td>
</tr>
<tr>
<td>Impact on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Income</td>
<td>N.E.</td>
<td>Low Moderate High</td>
</tr>
<tr>
<td>2. Price</td>
<td>N.E.</td>
<td>Moderate Moderate Moderate</td>
</tr>
<tr>
<td>3. Market modeling</td>
<td>N.E.</td>
<td>Low N.E. Low</td>
</tr>
<tr>
<td>Impacted by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Organizational</td>
<td>High</td>
<td>Moderate N.E. Low</td>
</tr>
<tr>
<td>2. Technical assistance</td>
<td>N.E.</td>
<td>Moderate Moderate Moderate</td>
</tr>
<tr>
<td>3. Technology</td>
<td>N.E.</td>
<td>Moderate Moderate High</td>
</tr>
<tr>
<td>4. Networking</td>
<td>N.E.</td>
<td>Moderate N.E. Low</td>
</tr>
<tr>
<td>5. Purchasing structure</td>
<td>N.E.</td>
<td>Low N.E. Low</td>
</tr>
</tbody>
</table>

^1N.E. = No evidence. ^2Indicates higher household food security and dietary diversity among P4P beneficiaries compared to control. ^3As indicated by overall higher dietary diversity among P4P households compared to controls.

Evidence from different sources was low to moderate on the impact of market access on factors such as income, market modeling and improved price (Table 39). Conceptual and empirical evidence from eastern and southern Africa suggests that “interventions aimed at facilitating smallholder market organization, reducing the costs of inter-market commerce, and especially improving poorer households’ access to improved technologies and productive assets are central to stimulating smallholder market participation and the transition from semi-subsistence markets (Barrett, 2008)”. Literature also indicated that “at the level of local, regional, or national food markets, actions by the private sector, governments, or other actors can make existing foods
produced within a country available to new markets (Hoddinott, 2012). This, in turn, could have a positive impact on food availability and improve physical access to a wide variety of products, thus improving regional and national food security. A summary of the impact of improved market access on price and increased income is presented in Figure 30.

There was low to moderate evidence on the impact of factors such as organizational strength, technical assistance, new technologies, networking capabilities and purchasing structures on improved market access. Providing capacity for aggregation and commercialization for individual beneficiaries is one of the key roles played by farmer organizations in facilitating market access. Additionally, a strong organization is important in facilitating networking among farmers and institutions. Technical assistance and technology were important in ensuring product quality.

![Market Access Diagram](image)

**Figure 30.** Market access program-impact pathway: effects on improved price and income.

Evidence from MSC interviews and P4P-M&E indicated that field staff plays a fundamental role in teaching beneficiaries techniques that improve product quality and reduce
losses. P4P also provides limited in-kind donations, like improved grain silos, which are also important in achieving these objectives.

**Program-impact pathway #4: Empowerment.** In the context of agricultural development programs such as P4P, empowerment is defined as the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their lives (Narayan-Parker, 2002). Empowered people feel they have freedom of choice and action. This enables them to better influence the course of their own lives and the decisions that ultimately affect them. Overall, evidence of empowerment from MSC interviews and P4P-M&E was moderate (Table 40). Thematic analysis on MSC interviews highlighted some of the “potential” empowerment strategies promoted by the Purchase for Progress initiative in Guatemala. These included: improved access to information, inclusion and participation, accountability and organizational capacity. In the literature, the amount of evidence of empowerment strategies in the context of agricultural development programs was low. We hypothesized that P4P initiative in Guatemala actively promotes internal empowerment. However this is still an area for further research. Studies by Pick and others contend that “intrinsic empowerment is a formula for sustainable, internally motivated change that is derived from a sense of freedom to choose and from personal agency, present in the individual (Pick & Poortinga, 2005).” Internal empowerment is based on the development of individual tools of which the person takes ownership and therefore through a voluntary and personal process leads to new behaviors (Pick et al., 2011; Samman & Santos, 2009).

The study of empowerment strategies and the development of individual agency in the context of agricultural and market development initiatives such as P4P is proposed as a follow-up research topic for this study. The Purchase for Progress initiative in Guatemala has expressed
special interest on studying the effectiveness of these empowerment strategies among female
beneficiaries.

Table 40. Empowerment program-impact pathway: integrated data sources and evidence levels.

<table>
<thead>
<tr>
<th>PATHWAY</th>
<th>Summary</th>
<th>EVIDENCE SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Survey</td>
</tr>
<tr>
<td>Empowerment</td>
<td>Empowerment</td>
<td>N.E.¹</td>
</tr>
<tr>
<td>Impact on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Production practices</td>
<td>N.E.</td>
<td>High</td>
</tr>
<tr>
<td>2. Income</td>
<td>N.E.</td>
<td>High</td>
</tr>
<tr>
<td>3. Organizational</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Impacted by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Knowledge</td>
<td>N.E.</td>
<td>High</td>
</tr>
<tr>
<td>2. Technology</td>
<td>N.E.</td>
<td>Moderate</td>
</tr>
<tr>
<td>3. Organizational</td>
<td>High</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

¹N.E. = No evidence. ²Indicates higher household food security and dietary diversity among P4P beneficiaries compared to control.

5.3.2. Summary of mixed methods integration

The data integration and analysis sought to strike a balance between building up levels of
evidence behind each factor in the different proposed program-impact pathways, and using
available information to facilitate interpretation and understanding. The use of the existing
literature and secondary data from P4P-M&E was particularly important here, as it offered
additional sources of evidence from which to review the findings. In addition, the levels of
evidence were important for providing an overview of the amount of evidence behind each factor
and from each data source. The potential for each data sources to contribute to our understanding
of that factor, taking into account methodological limitations, was then used to interpret and
understand these levels of evidence and the contribution that each factor made to understanding
food security and dietary diversity in the context of the P4P program in Guatemala.
Crucial factor. Increased productivity was a critical determinant of food security and dietary diversity in the context of the Purchase for Progress program in Guatemala (Table 32). There was a high level of evidence of significant changes in crop productivity from three different data sources: MSC interviews, P4P-M&E and from the literature. There was also statistical evidence of changes in productivity from baseline to year 3 of the program (2012) based on analysis of secondary data from P4P-M&E. Evidence from MSC interviews and evaluation data from P4P indicated that productivity had increased due to specific program interventions, among these: the application of new technical knowledge and training, technical assistance, the introduction of new or improved technologies and changes in production practices. There was also ample evidence in the literature of positive impacts on productivity in the context of agricultural development initiatives, the green revolution being a notable example.

High importance factors. Changes in crops and production practices, income, new knowledge and organizational development are factors of high importance in the context of the Purchase for Progress Program in Guatemala. Overall, the level of evidence from two or more sources was high for these factors. Evidence of changes in crops and production practices was high from both MSC interviews and the literature. Evidence is moderate from P4P-M&E. Narratives from MSC interviews, and qualitative data from P4P-M&E indicated that program beneficiaries implemented changes in crops and production practices such as soil conservation techniques, the use of new or improved varieties and other production inputs. Technical education and training as well as organizational development were also factors of high importance. Evidence from the literature, MSC interviews and P4P-M&E indicated that these factors were important in improving crop productivity and product quality. Farmer organizations played an important role as a support platform in collective commercialization and purchasing operations. This translated
into added benefits in pricing for both products and production inputs. Additionally, there was strong evidence from secondary data analyses that organizational strength was significantly associated with food security and dietary diversity among beneficiaries of the P4P program in Guatemala. Evidence also suggested that these factors had a positive impact on overall crop productivity. Benefits of increased productivity included increased household food availability and income. Evidence from MSC interviews indicated that additional income was generated through sales of surplus crop production (improved productivity), improved access to markets and higher product prices. There was ample evidence in the literature that increased household income has a direct impact on the access dimension of food security and in dietary diversity. Moderate evidence from MSC and P4P-M&E data indicated that increased income was also important in overall livelihood improvements, especially on the health and education domains. Additional income was most often used to purchase more or better quality food; and for expenses related to health care, education and other basic needs (e.g., education).

**Factors of moderate importance.** Improved market access and price, technical assistance, new or improved production technologies, crop diversity and empowerment strategies were factors of moderate importance in the context of the Purchase for Progress Program in Guatemala. Narratives from MSC interviews and qualitative data from P4P-M&E, along with evidence from the literature indicated that technical assistance and the introduction of new production technologies were important elements associated with improvements in smallholder’s agricultural production operations. Evidence from MSC interviews and P4P-M&E indicated that the P4P initiative provides technical assistance and actively promotes the introduction of new production technologies. Evidence from MSC interviews also indicated that these changes had a positive effect on improving agricultural productivity. Overall evidence for improved market
access and prices was moderate. Data from MSC interviews and P4P-M&E indicated that the program provided direct access to purchasing platforms from WFP and P4P in Guatemala. MSC interviews indicated that on average, prices paid by P4P were 30% higher. The combined impacts of improved productivity, market access and better prices had a positive effect on food security and dietary diversity by increasing household food availability and income. In the following section, These factors are integrated into a conceptual framework that illustrates the impact of the Purchase for Progress Program in Guatemala on food security and dietary diversity.

5.3.3. Conceptual framework

Relevant factors of the purchase for progress initiative in Guatemala were integrated into a conceptual framework to illustrate the program’s impact on household food security and dietary diversity (Figure 31). Agriculture is of fundamental importance to food and nutrition security, both as a direct determinant of household food consumption and through its role in livelihoods and food systems. There is a growing understanding that agricultural development provides an obvious and needed entry point for efforts to improve food and nutrition security (Herforth, 2013). It is also understood that an intricate connection exists between agricultural production, income and nutrition (Arimond et al., 2011; E. T. Kennedy & Bouis, 1993), and that there has not been extensive research done to test these relationships (Fan & Brzeska, 2012). The objective of this final section is to integrate information on important factors that had an impact on food security and dietary diversity in the context of the Purchase for Progress Program in Guatemala. Evidence for these factors was discussed in previous sections of this chapter. The proposed conceptual framework was based on evidence presented in this study and utilizes the approach proposed by several authors (Arimond et al., 2011; Herforth, 2013; Hoddinott, 2012; E.
T. Kennedy & Bouis, 1993). This information will contribute to a limited body of knowledge on this emerging research area. The framework has four components: contextual settings, resources, agricultural processes and empowerment (Figure 31). For each one of these factors, categories and factors within each category are also identified; a summary is presented in Table 41.

**Contextual settings.** Refers to the physical and economic settings in which individuals live and work. The *physical* category includes elements that have an impact on agricultural production such as rainfall, soil fertility, infrastructure and others. The Purchase for Progress Program in Guatemala had a modest impact on the *physical* category by improving smallholder’s agricultural infrastructure. Although not the main focus of the initiative, the program facilitated a limited number of in-kind donations of agricultural equipment and utensils; these included items such as backpack sprayers and grain silos. By doing this, P4P improved farmer’s abilities to produce, store and commercialize their products. Additionally, the program provided production inputs (seed, fertilizers, etc.) for all demonstration plots. The program also contributed to strengthen farmer’s infrastructure by promoting the use of sustainable farming practices such as soil conservation techniques. Technical assistance, training, new technical knowledge and the introduction of new or improved technologies were important elements in improving beneficiaries’ infrastructure for agricultural production. The *economic* category refers to elements that affect the level, returns, and variability of returns on agricultural assets and investments. The program impacted this category by improving smallholder’s access to markets and credit. It also had an impact by paying higher prices\(^{24}\) for certain agricultural products such as corn and beans.

\(^{24}\) Compared to informal markets.
P4P actively promoted the integration of farmers to formal markets by leveraging WFP’s purchasing power in countries such as Guatemala. Improved credit access was facilitated by strategic alliances between P4P and several financial institutions in Guatemala (e.g., BANRURAL). Currently, this initiative only works with a small number of program beneficiaries. Evidence from MSC interviews from those in this group and from control farmers indicated that this was a very positive and much needed element for smallholder farmers. As mentioned in previous sections, the price paid by P4P for corn and beans is higher than those in informal and national markets since these were set based on international commodities markets.
Improved access to markets and higher prices had a positive impact on household income. Improved access to credit was important in providing a constant influx of capital for agricultural operations, and facilitated access new technologies and improved production inputs.

**Resources.** Households have different resources; time and capital are two of them. Time refers to the availability of physical labor for work and other activities. Capital includes assets such as land, tools, financial resources and human capital in the form of knowledge. Resources are allocated to several agricultural production activities and other non-agricultural activities that generate income. The program had dual impacts on the *time* category, both of which were associated with program activities. In one hand, P4P promoted increased participation of its beneficiaries, especially women on agricultural and other activities (e.g., leadership roles in farmer organizations). For example, when women increased the time devoted to agricultural activities (physical labor), this decreased the time dedicated to other activities such as home tasks (e.g., child care). This could have a negative impact on the health status of individuals due to intensified physical labor and by compromising the quality of time dedicated to other tasks (e.g., food preparation). Conversely, P4P also had a positive impact on the time management for its beneficiaries, mainly through the introduction of new technologies and knowledge that helped decrease the time dedicated to agricultural activities. For example, the introduction of new or improved herbicides that reduced application time and frequency had a positive impact by decreasing time spent on this specific activity. P4P also had a positive impact on the *capital* category. As presented in previous sections, there was evidence that increased income lead to investments in production activities. Additional income is re-directed (re-purposed) into new or improved technologies (e.g., post-harvest technologies) of production assets (e.g., seeds) that in turn had a positive impact on production performance. The program also promoted capacity
building in human capital by providing technical training, new knowledge and technical assistance. New knowledge was applied to improve existing agricultural operations and other activities. P4P also promoted capacity building at the organization level. There was evidence that organizational development was significantly associated with food security and dietary diversity. Those who participated in MSC interviews indicated that organizational strengthening was a significant change and had many positive implications.

Table 41. Components, categories and factors of the conceptual framework: agricultural and market development program (P4P) impact on food security and dietary diversity in Guatemala.

<table>
<thead>
<tr>
<th>Component</th>
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<td>Contextual Settings</td>
<td>Physical</td>
<td>1. Infrastructure</td>
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<td>Economic</td>
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<td>Resources</td>
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<td>Empowerment</td>
<td>Overall</td>
<td>1. Improved access to information</td>
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<td>6. Personal development</td>
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**Agricultural processes.** Agricultural production, including food and other crops, was affected by many factors, including availability and quality of resources and specific production practices. Agricultural production was also affected by how the farmer interacted with these factors and other agricultural systems. The Purchase for Progress program had a significant impact on agricultural resources by systematically increasing farmer’s actionable knowledge and training, providing technical assistance, investing in human capital through technical education and strengthening farmer’s organizations. Additionally, P4P also had a positive impact on household income; part of this capital was invested back to improve agricultural operations. The program also had a positive impact on agricultural production practices by promoting the introduction and adoption of new or improved production technologies and by increasing technical knowledge. There was high evidence of the use of new production technologies and the incorporation of new knowledge to improve or change traditional agricultural production systems. There was also strong evidence that these factors had a positive impact on crop productivity, product quality and reduced losses. Higher crop productivity significantly improved food availability at the household level and was a critical income-generating factor in the context of the Purchase for Progress initiative. Improving product quality was an important factor that has allowed program beneficiaries to gain access into more lucrative markets, where quality product is paid at a premium. Reduced pre- and post-harvest losses also had a positive effect on food availability and surplus crop available for sale. P4P actively promoted the implementation of good agricultural practices (GAPs) and improved post-harvest practices and technologies. Evidence from MSC interviews and P4P-M&E indicated that these new practices had dramatically reduced crop losses, especially at the post-harvest stage. Overall, improvements in production practices, production resources and changes in crops had positive implications for
household food security and dietary diversity among beneficiaries of the Purchase for Progress initiative in Guatemala.

**Empowerment.** As indicated in the previous section, there was moderate evidence of the positive impact of the P4P initiative on overall and women empowerment. *Overall,* P4P promoted empowerment of individuals by increasing access to information, especially technical information related to agricultural production. The program also promoted inclusion and participation of individuals, especially women. Participation was also promoted by strengthening farmer organizations and building their capacities to serve their members. Additionally, there was moderate evidence that the program promoted the *empowerment of women.* Using the women’s in agriculture empowerment index, five strategies were identified. P4P promoted women’s empowerment by supporting women participation and control over production activities and resources. Women who participate directly on agricultural activities have increased control over the income that is generated. There was substantial evidence from emerging research confirming the impact on health and nutritional outcomes of strengthening the position of women, both in terms of control of resources and agricultural productivity, and in terms of relative bargaining power within the household (Boakye-Achampong et al., 2012; Meinzen-Dick, Behrman, Menon, & Quisumbing, 2012). Additionally, the program promoted the participation of women in farmer organizations and encouraged them to do so in leadership roles. As women increased their participation in production and leadership activities within their organizations, more time was devoted to these tasks. As explained before, this had positive and negative connotations. Finally, P4P promoted personal development of women by providing technical knowledge, training, increased involvement and networking within and among organizations and by promoting their active participation in income-generating activities. There
is strong evidence in the literature that if women had the same level of participation and access to resources as men, they could significantly contribute to improve agricultural productivity and thus increase yields on their farms (Doss, 2011). This could raise total agricultural output in developing countries by 2.5–4 percent, which could in turn reduce the number of hungry people in the world by 12–17 percent. This highlights the need to develop further evidence on the full impacts of agricultural development, both on women’s control over income and assets, and on food and nutrition security.

5.4. **Summary and conclusions**

The data integration and mixed methods analysis were a valuable step in addressing the aim and objectives of this research. Specifically, it was possible to identify four program-impact pathways associated with food security and dietary diversity in the context of the Purchase for Progress initiative in Guatemala. This analysis has also provided useful insights that have not only identified important factors but shed light onto the dynamic connections among these factors within each pathway. Final data integration resulted on a conceptual framework that illustrated important determinants of food security and dietary diversity in the context of an agricultural and market development program in Guatemala.

Jointly, the levels of evidence presented in Tables 37 – 40 highlight the importance of specific contextual and program factors (determinants) and their influence on household food security and dietary diversity. Program-impact pathways illustrate the dynamic relationships among these factors and their specific impacts on food security and dietary diversity. The integrated data analysis presented in the conceptual framework (Figure 31) builds on these pathways by presenting an inter-connected set of factors that collectively had an effect on
household food security and dietary diversity in the context of an agricultural and market development program in Guatemala.

Evidence from all four data sources indicated that improved agricultural productivity was a critical factor promoted by the Purchase for Progress Program that had direct impact on household food security and dietary diversity. Integrated data analysis also identified high importance factors that had a direct impact on productivity and other important determinants of food security and dietary diversity. These factors included changes in crops and production practices, increased household income, new technical knowledge or training and organizational development.

Contextual settings and socio-economic variables of importance for food insecurity and dietary diversity among smallholder farmers in Guatemala included education, socioeconomic status, fertility rate, and household occupancy. Household food security and dietary diversity in the context of the Purchase for Progress initiative in Guatemala was primarily impacted by increased productivity and income, changes in crops and production practices, improved market access and price and empowerment strategies.

Overall, the mixed methods analysis was instrumental to highlight a variety of factors influencing food security and dietary diversity in the context of an agricultural and market development program in a developing nation such as Guatemala. The exploration of the specific components within the proposed pathways and conceptual framework has also highlighted the role of specific program components and contextual factors in promoting food security and dietary diversity. In this respect, this integrated analysis provides support for the proposed conceptual framework, while also highlighting areas that require further exploration.
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HLPE. (2013). Investing in smallholder agriculture for food security. A report by the high level panel of experts on food security and nutrition of the committee on world food security. (). Rome, Italy: Food and Agriculture Organization of the United Nations (FAO).


CHAPTER 6

STUDY STRENGTHS AND LIMITATIONS, FUTURE DIRECTIONS AND OVERALL CONCLUSIONS

6.1. Strengths and limitations

This section identifies the key strengths and limitations of this research. Specifically, the limitations relating to the design of each of the study components, instruments and the data integration approach are discussed.

6.1.1. Food security, dietary diversity and general information surveys

The food security, dietary diversity and general information surveys used in Component 1 (Chapter 3) were appropriate for addressing the research questions, and were particularly useful in characterizing food security and dietary diversity among smallholder farmers benefiting from the Purchase for Progress Program in Guatemala and a quasi-control group of similar characteristics. Information generated with these surveys was also useful in comparing, contrasting and associating relevant socioeconomic variables with indicators of food security and dietary diversity, in particularly for exploring important socioeconomic determinants of food security and dietary diversity. This component of the study, however, was not without its limitations. Limitations related to the study design, and measurement issues are discussed.

Study design. As with many survey-based designs it was challenging to balance the cost, time and logistics constraints, and the burden on the participants with the need to gain the level of information required to answer the research questions. The cross-sectional study design did not allowed us to reach conclusions about causal effects but only about temporal differences and associations among socioeconomic variables, food security and dietary diversity between
farmers benefiting from P4P and those in the control group. In this sense, caution must be exerted when interpreting the results from this study when applied to other farmer’s groups, different locations (even within Guatemala) and different seasons than those described in this research.

**Measurement.** The surveys were useful for exploring relevant socioeconomic variables, food security and dietary diversity among smallholder farmers. However, exploring specific program influences was more challenging. Although the focus of this component was to assess and associate food security and dietary diversity among the target groups, it would have been beneficial to generate more quantitative evidence of program impacts and other relevant variables. For example, a question addressing income changes would have been useful in establishing the quantitative association between this factor and food security or dietary diversity. It is important to note that a more complex survey also would have had an impact on participant’s burden and most likely would have increased the time needed to apply these instruments.

### 6.1.2. The Most Significant Change (MSC) methodology

To the best knowledge of the author, this is the first time the Most Significant Change (MSC) methodology was used to study food security and dietary diversity in the context of an agricultural and market development initiative. Information generated in this study illustrates the applicability, strengths and limitations of the MSC methodology when applied to the study of food security and dietary diversity. MSC methodology was important for addressing the research questions in the qualitative component (Chapter 4). Results provided contextual knowledge and rich descriptions on the most significant changes experienced by beneficiaries of the Purchase for Progress Program and challenges faced by farmers in the control group. MSC narratives also
provided detailed descriptions of the experience of food security for P4P farmers and food insecurity for control farmers, as well as accounts of different challenges associated with food security and dietary diversity faced by members of both groups. Additionally, MSC stories provided detailed information about expected and unexpected program benefits and other relevant information. Moreover, the methodology allowed for the comparison of multiple perspectives from different stakeholders along the program’s structure. Still there were a number of strengths and limitations inherent to the MSC methodology that related to researcher bias and the validity of generalizing the findings.

**Researcher influence and bias.** During the MSC interviews, P4P beneficiaries were asked about the most significant changes experienced as a result of their participation in the program. Control farmers were asked about the most significant challenges they faced as smallholder farmers. The interview was focused on significant changes in general and also those specifically related to the domains of change described in Chapter 4. The open-ended nature of the interview process and the focus on different changes may have transferred onto the participants in a manner that impacted on the recall of their overall experiences, and possibly have prompted them to identify a broader range of changes. Exploring complex phenomena such as food security, however, is challenging. While a more structured approach to the interviews was possible, it would have been harder to engage the interviewees in discussing the different elements associated with food security and dietary diversity in the context of the P4P initiative. Furthermore, this component was designed to explore relevant changes in the context of the Purchase for Progress Program and more specifically, determinants associated with food security and dietary diversity. It is hoped that this was achieved without overly influencing the responses to the interviews. Conversely, rich descriptions from MSC interviews provided important
contextual elements and additional information that added to the discussion of food security and dietary diversity in the context of the Purchase for Progress initiative in Guatemala.

**Generalizability.** A common critique of qualitative methodologies such as MSC is the generalizability of their findings, as it is assumed that the findings from these studies are only valid for the context of the particular case studies. However, authors such as Kvale (1996) and Appleton-Dryer (2012) have expanded the definition of generalizability to include analytical generalizability rather than just statistical generalizability. This “involves a reasoned judgment about the extent to which the findings from one study can be used as a guide to what might occur in another situation,” and puts a particular onus on the reader “to judge the soundness of the generalization claim” (Appleton-Dryer, 2012; Kvale, 1996). The sample for MSC interviews comprised participants from all P4P organizations included in this study and from control organizations in the same locations. A variety of geographical regions, production systems, climate patterns, and other elements were represented in the sample. Additionally, the contributions of multiple perspectives beyond program beneficiaries make our findings relevant for the study of food security and dietary diversity in the context of similar programs. Further support for the findings is also provided from the complementarity and data integration between MSC, secondary data from P4P’s M&E, the surveys and the existing literature.

6.1.3. **The mixed methods approach**

The use of mixed methods in this research was extremely valuable for exploring the main determinants of food security and dietary diversity. The surveys offered an initial overview of the current situation for beneficiaries of the P4P program and compared them with a control group of similar characteristics. It also provided important information of key socioeconomic determinants associated with food security and dietary diversity. The MSC methodology then
provided a more in-depth insight into significant changes experienced by those benefiting from an agricultural and market development program and which of these factors are important in the experience of food security. It also provided a contrasting view of the most significant challenges faced by smallholder farmers in similar conditions as those benefiting from P4P. The information was especially useful in describing the experience of food insecurity among these participants. This was important in proposing specific program-impact pathways and a conceptual framework that illustrates food security and dietary diversity in the context of P4P. It was the integration of data from several sources that allowed for a better understanding of how a program such as P4P can impact food security and dietary diversity. The use of mixed methods also substantiated the proposed program-impact pathways and conceptual framework.

The mixed methods approach was not without its challenges. While data from P4P-M&E and the literature were extremely useful, it was the ability and willingness of participants to identify significant changes in the context of the P4P program, especially those associated with the experience of food security and dietary diversity. More specifically, an important component of this research included the ability of the participants to identify significant changes experienced as a result of their participation in P4P, as opposed to other processes. This required the creation of rapport between the researcher and the interviewee, and the process of strategically prompting during the interviews to support the participants while promoting an open dialogue. The capacity to extract this information is a potential limitation of this research. Frongillo and others (2006) argue that it can be difficult for people to talk about intimate or personal topics such as hunger and food security. The participants in this research did not appear to face such challenges and provided highly valuable insights into their experiences. Thus, the strength of this approach also
reflects the participants’ ability to identify and share their experiences with the Purchase for Progress initiative in Guatemala.

6.1.4. Ethical issues

The key ethical issues for this research were recognized and addressed previously to conducting this study. Ethics approval was sought and obtained from the Institutional Review Board (IRB) at The University of Illinois Urbana-Champaign and by the Center for the Study of Sensory Impairment, Aging and Metabolism (CeSSIAM) in Guatemala. Specific ethics procedures are explained in detail in the methods section in chapters three and four of this document.

6.2. Future directions

The findings from this research have raised additional questions and ideas that warrant exploration through further research. These areas are empowerment strategies and the development of agency, further refinement of survey instruments and the integration of data from P4P’s measuring and evaluation (M&E) unit in Guatemala.

Although, this research identified potential empowerment strategies promoted by the Purchase for Progress initiative, future research would benefit from exploring if and what specific program components are responsible for the development of intrinsic empowerment. Strategies that are particularly effective with or specifically target women would be of special interest. Additionally, it will be important to further explore if, and how, these empowerment strategies contribute to the development of individual and collective agency and how the Purchase for Progress initiative provides the “opportunity structure” to achieve this. Agency is the ability of an individual’s or a group to make purposeful choices (Chapter 4). Agency is
strongly determined by people’s individual and collective assets (e.g. land, savings) and capabilities (human, social and psychological). The opportunity structure refers to the broader institutional, social, and political context of formal and informal rules and norms within which actors pursue their interests. In other words, the opportunity structure is what enables (or not) agents to become effective. This information would be important for those responsible for designing and implementing future agricultural development initiatives. This research would also serve those involved in the development of agricultural, food security and nutrition policies.

Integrating quantitative and qualitative data was especially challenging when trying to identify certain program components and its impact on food security and dietary diversity. Future research should also seek to further refine the instruments and the data integration framework implemented in this research. This framework could be used by other researchers to inform and refine its development. The use of the framework by other researchers would also highlight the ways in which the framework does and does not support the study of food security and dietary diversity in the context of agricultural development initiatives.

As the final program evaluation process is completed in Guatemala, more data will be available from P4P’s measuring and evaluation unit. When available, this data will be used to make pre-post program comparisons with existing baseline data. This analysis could be important in establishing program causality and effectiveness. Detailed income and socioeconomic data using farmer organizations as the main unit of analysis would be of especial interest. This information could be included in future analyses to expand the reach of conclusions achieved in this study. Along with additional qualitative information, it will also contribute to strengthen existing quantitative evidence for the proposed program-impact pathways and conceptual framework.
A better understanding of the social nature of agricultural development initiatives and the nature of human interactions and socio-psychological barriers among program stakeholders is needed if agricultural interventions are to be effective in addressing the underlying causes of food and nutrition security. Data from MSC interviews and contextual observations on the implementation and overall dynamics of the Purchase for Progress initiative in Guatemala led to the desire to further explore how psychosocial barriers, especially those among field staff members, affect program outcomes. Specifically, data from MSC interviews indicated that field staff frequently encounters assistance requests that fall outside their area of expertise (agriculture). These include requests on issues such as health, nutrition, family conflicts, legal matters and others. This research would be useful in the design and implementation of future initiatives and could provide further insights on factors that are not well known and might play an important role in determining the success of agricultural and market development programs.
6.3. Conclusions

The findings have provided valuable insight into important determinants of food security and dietary diversity in the context of an agricultural and market development program. More specifically, the research suggests that household food security and dietary diversity were positively associated and higher among beneficiaries of the Purchase for Progress Program compared to controls. Farmers in P4P households consume on average two additional food groups compared to control households. Education, fertility rate, socioeconomic status and organizational development were important socioeconomic determinants associated with food security and dietary diversity for smallholder farmers in this study. These would be important variables to consider when designing future agricultural and market development interventions focused on smallholder agriculture.

New technical knowledge and training, increased productivity, stronger farmer organizations, better prices and access to new technologies were significant changes promoted by the purchase for Purchase for Progress initiative in Guatemala. More specifically, integrated data analysis suggests that increased income, empowerment, changes in crops and production practices and improved market access were important program-impact pathways that promoted food security and dietary diversity among smallholder farmers. Furthermore, increased agricultural productivity was identified as a critical factor for food security and dietary diversity in this context. A conceptual framework was proposed. Contextual settings, resources, agricultural production and empowerment group a series of factors affecting food security and dietary diversity in the context of the Purchase for Progress Program in Guatemala.
References


Dear head of household, sir (a),

Hello! My name is [introduce yourself] and I come from the Department of Food Science and Human Nutrition at the University of Illinois at Urbana-Champaign (UIUC), in the United States. My research group and I want to conduct a research study on food security and the diversity of diets in families of farmers who are beneficiaries of the P4P program. The main objective of this study is to understand the reality of household food security and its association with dietary diversity in Guatemalan families like yours. To accomplish this we will conduct two surveys through a short interview. The first survey relates to food security, the second, with diet diversity. We estimate that it will take between 30-40 minutes to complete the two surveys. If it’s all right with you we can conduct the interview out here or at any place in your home you feel comfortable with. Now, I will read to you the most important elements of this study:

1. **Surveys.** Surveys are related to food security and dietary diversity. These will take ~ 15 min each. Surveys will be conducted orally and questions will be read out loud to you. We will not record your name in these surveys. Surveys will be coded.

2. **Voluntarism.** Your participation in this study is completely voluntary. Any participant is free to withdraw from the study, at any time, for any reason, and without consequences. These decisions will not affect your current or future relationships with our research group or the P4P Program. During this interview, you can answer each question fully or partially with no consequences.

3. **Benefits.** Your participation in this study has no direct benefits to you. But your opinion is very valuable and could potentially help us demonstrate that diet diversity is associated with food security among rural populations.

4. **Risks.** There are no risks to you beyond those of everyday life. A potential risk associated with your participation in this study is that your information could be shared (without prior consent) to others. However, as surveys are coded, we hope to reduce this risk. Also, as the interviews are conducted between you and the researcher (1 person), we hope that this will contribute to safeguard your privacy and the confidentiality of your information.

5. **Confidentiality.** The information obtained during this research project will be kept strictly confidential, meaning it will be kept secret. Only the research team will handle this information. Any sharing or publication of the research results will be available to you and will not identify any of the participants by name. Results will be shown as a group means or aggregates only.

6. **Costs and remuneration.** Your participation in this study will have no cost to you. Also, you will not receive any monetary compensation for your participation.

7. **Consent.** We look forward to working with you. We think that our research will be enjoyable to you and will help us better understand food security and diet diversity. At the end of this letter, please indicate whether you consent to participate in this study. Please keep the second copy of this form for your records.

If you have any questions about this project, please contact:

**In Guatemala:**

Ing. Julio R. Lopez
Field Research Coordinator
University of Illinois Urbana-Champaign
Phone: 7832-3484
Email: jrlopez@illinois.edu

**In the United States:**

Dr. Juan E. Andrade
Assistant Professor and Principal Investigator
University of Illinois Urbana-Champaign
Phone: +01-(217) 333-9653
Email: jandrade@illinois.edu

(Continues)
APPENDIX A (Continued)

If you have any questions about your rights as a participant in research involving human subjects, please feel free to contact the University of Illinois Institutional Review Board (IRB) Office at +01-(217) 333-2670 or irb@uiuc.edu. You are welcome to call this number collect if you identify yourself as a research participant.

Sincerely,

Juan E. Andrade, Ph.D.
Assistant Professor and Principal Investigator
Universidad de Illinois en Urbana-Champaign, USA
Bevier Hall, Office 457
905 S Goodwin Ave
Urbana, IL 61801

******************************************************************************

Check Only One

☐ YES ☐ NO

I have read and understand the conditions and risks described above.

☐ YES ☐ NO

I consent my participation in this study

******************************************************************************************

Your name (please print) ___________________________ Signature and Date ___________________________
Informed Consent – Household Food Security and Diet Diversity Surveys - Control

Dear head of household, sir (a),

Hello! My name is [introduce yourself] and I come from the Department of Food Science and Human Nutrition at the University of Illinois at Urbana-Champaign (UIUC), in the United States. My research group and I want to conduct a research study on food security and the diversity of diets in families of farmers in Guatemala. The main objective of this study is to understand the reality of household food security and its association with dietary diversity in Guatemalan families like yours. To accomplish this we will conduct two surveys through a short interview. The first survey relates to food security, the second, with diet diversity. We estimate that it will take between 30-40 minutes to complete the two surveys. If it’s all right with you we can conduct the interview out here or at any place in your home you feel comfortable with. Now, I will read to you the most important elements of this study:

1. **Surveys.** Surveys are related to food security and dietary diversity. These will take ~ 15 min each. Surveys will be conducted orally and questions will be read out loud to you. We will not record your name in these surveys. Surveys will be coded.

2. **Voluntarism.** Your participation in this study is completely voluntary. Any participant is free to withdraw from the study, at any time, for any reason, and without consequences. These decisions will not affect your current or future relationships with our research group. During this interview, you can answer each question fully or partially with no consequences.

3. **Benefits.** Your participation in this study has no direct benefits to you. But your opinion is very valuable and could potentially help us demonstrate that diet diversity is associated with food security among rural populations.

4. **Risks.** There are no risks to you beyond those of everyday life. A potential risk associated with your participation in this study is that your information could be shared (without prior consent) to others. However, as surveys are coded, we hope to reduce this risk. Also, as the interviews are conducted between you and the researcher (1 person), we hope that this will contribute to safeguard the confidentiality of your information.

5. **Confidentiality.** The information obtained during this research project will be kept strictly confidential, meaning it will be kept secret. Only the research team will handle this information. Any sharing or publication of the research results will be available to you and will not identify any of the participants by name. Results will be shown as a group means or aggregates only.

6. **Costs and remuneration.** Your participation in this study will have no cost to you. Also, you will not receive any monetary compensation for your participation.

7. **Consent.** We look forward to working with you. We think that our research will be enjoyable to you and will help us better understand food security and diet diversity. At the end of this letter, please indicate whether you consent to participate in this study. Please keep the second copy of this form for your records.

If you have any questions about this project, please contact:

**In Guatemala:**
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Phone: 7832-3484  
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Assistant Professor and Principal Investigator  
University of Illinois Urbana-Champaign  
Phone: +01-(217) 333-9653  
Email: jandrade@illinois.edu

(Continues)
APPENDIX A (Continued)

If you have any questions about your rights as a participant in research involving human subjects, please feel free to contact the University of Illinois Institutional Review Board (IRB) Office at +01-(217) 333-2670 or irb@uiuc.edu. You are welcome to call this number collect if you identify yourself as a research participant.

Sincerely,

Juan E. Andrade, Ph.D.
Assistant Professor and Principal Investigator
Universidad de Illinois en Urbana-Champaign,
USA
Bevier Hall, Office 457
905 S Goodwin Ave
Urbana, IL 61801

******************************************************************************************

Check Only One

I have read and understand the conditions and risks described above. □ YES □ NO

I consent my participation in this study □ YES □ NO

Your name (please print) ________________________________ Signature and Date ________________________________
APPENDIX B

Informed Consent – MSC Interview+Food Security and Diet Diversity Surveys – P4P

Dear head of household, sir (a),  

Hello! My name is [introduce yourself] and I come from the Department of Food Science and Human Nutrition at the University of Illinois at Urbana-Champaign (UIUC), in the United States. My research group and I want to conduct a research study on food security and the diversity of diets in families of farmers who are beneficiaries of the P4P program. The main objective of this study is to understand the reality of household food security and its association with dietary diversity in Guatemalan families like yours. To accomplish this we will conduct two surveys through a short interview. The first survey relates to food security, the second, with diet diversity. We estimate that it will take between 30-40 minutes to complete the two surveys. [Follow-up for MSC interviews] In addition to this, we would also like to conduct an additional interview. This interview is about important topics agricultural production practices, food production, food security and diet diversity. We estimate that it will take between 30-40 minutes to complete this interview. If it’s all right with you we can conduct the interviews out here or at any place in your home you feel comfortable with. Now, I’d like to read to you the most important elements of this study:

1. **Surveys.** Surveys are related to food security and dietary diversity. These will take ~ 15 min each. Surveys will be conducted orally and questions will be read out loud to you. We will not record your name in these surveys. Surveys will be coded.

2. **MSC Interview.** The interview is about significant changes in areas like agricultural production practices, food production, food security and dietary diversity. The interview will take 30-40 minutes and it will be conducted orally. We will ask you to provide us with a first name, yours or a pseudonym. If this is not possible, we will code the interview form.

3. **Voluntarism.** Your participation in this study is completely voluntary. Any participant is free to withdraw from the study, at any time, for any reason, and without consequences. These decisions will not affect your current or future relationships with our research group or the P4P Program. During this interview, you can answer each question fully or partially with no consequences.

4. **Benefits.** Your participation in this study has no direct benefits to you. But your opinion is very valuable and could potentially help us demonstrate that diet diversity is associated with food security among rural populations.

5. **Risks.** There are no risks to you beyond those of everyday life. A potential risk associated with your participation in this study is that your information could be shared (without prior consent) to others. However, as surveys and interview forms are coded, we hope to reduce this risk. Also, as the interviews are conducted between you and the researcher (1 person), we hope that this will contribute to safeguard the confidentiality of your information.

6. **Voice recording.** During the interview I would like to write down some of your answers and take some notes about certain information you share with me. I would also like to use a voice recorder [show voice recorder] this tool will help me obtain a better registry of your answers and a more detailed account of your answers. If you don’t want for this interview to be recorded, I will only take written notes.

7. **Confidentiality.** The information obtained during this research project will be kept strictly confidential, meaning it will be kept secret. Only the research team will handle this information. Any sharing or publication of the research results will be available to you and will not identify any of the participants by name. Results will be shown as a group means or aggregate results only.

8. **Costs and remuneration.** Your participation in this study will have no cost to you. Also, you will not receive any monetary compensation for your participation.

(Continues)
APPENDIX B (Continued)

9. **Consent.** We look forward to working with you. We think that our research will be enjoyable to you and will help us better understand food security and diet diversity. At the end of this letter, please indicate whether you consent to participate in this study. Please keep the second copy of this form for your records.

If you have any questions about this project, please contact:

**In Guatemala:**
Ing. Julio R. Lopez  
Field Research Coordinator  
University of Illinois Urbana-Champaign  
Phone: 7832-3484  
Email: jrlopez@illinois.edu

**In the United States:**  
Dr. Juan E. Andrade  
Assistant Professor and Principal Investigator  
University of Illinois Urbana-Champaign  
Phone: +01-(217) 333-9653  
Email: jandrade@illinois.edu

If you have any questions about your rights as a participant in research involving human subjects, please feel free to contact the University of Illinois Institutional Review Board (IRB) Office at +01-(217) 333-2670 or irb@uiuc.edu. You are welcome to call this number collect if you identify yourself as a research participant.

Sincerely,

Juan E. Andrade, Ph.D.  
Assistant Professor and Principal Investigator  
Universidad de Illinois en Urbana-Champaign, USA  
Bevier Hall, Office 457  
905 S Goodwin Ave  
Urbana, IL 61801

******************************************************************************************

Check Only One

I have read and understand the conditions and risks described above.  □ YES □ NO

I consent to the use of a voice recorder during the interview  □ YES □ NO

I consent my participation in this study  □ YES □ NO

Your name (please print) _______________________________  Signature and Date _______________________________

(Continues)
APPENDIX B (Continued)

Informed Consent – MSC Interview + Food Security and Diet Diversity Surveys – Control

Dear head of household, sir (a),

[To be read out loud by researcher]
Hello! My name is [introduce yourself] and I come from the Department of Food Science and Human Nutrition at the University of Illinois at Urbana-Champaign (UIUC), in the United States. My research group and I want to conduct a research study on food security and the diversity of diets in families of farmers in Guatemala. The main objective of this study is to understand the reality of household food security and its association with dietary diversity in Guatemalan families like yours. To accomplish this we will conduct two surveys through a short interview. The first survey relates to food security, the second, with diet diversity. We estimate that it will take between 30-40 minutes to complete the two surveys. [Follow-up for MSC interviews] In addition to this, we would also like to conduct an additional interview. This interview is about important topics agricultural production practices, food production, food security and diet diversity. We estimate that it will take between 30-40 minutes to complete this interview. If it’s all right with you we can conduct the interviews out here or at any place in your home you feel comfortable with. Now, I’d like to read to you the most important elements of this study:

1. Surveys. Surveys are related to food security and dietary diversity. These will take ~ 15 min each. Surveys will be conducted orally and questions will be read out loud to you. We will not record your name in these surveys. Surveys will be coded.

2. MSC Interview. The interview is about significant changes in areas like agricultural production practices, food production, food security and dietary diversity. The interview will take 30-40 minutes and it will be conducted orally. We will ask you to provide us with a first name, yours or a pseudonym. If this is not possible, we will code the interview form. Voluntarism. Your participation in this study is completely voluntary. Any participant is free to withdraw from the study, at any time, for any reason, and without consequences. These decisions will not affect your current or future relationships with our research group. During this interview, you can answer each question fully or partially with no consequences.

3. Benefits. Your participation in this study has no direct benefits to you. But your opinion is very valuable and could potentially help us demonstrate that diet diversity is associated with food security among rural populations.

4. Risks. There are no risks to you beyond those of everyday life. A potential risk associated with your participation in this study is that your information could be shared (without prior consent) to others. However, as surveys and interview forms are coded, we hope to reduce this risk. Also, as the interviews are conducted between you and the researcher (1 person), we hope that this will contribute to safeguard the confidentiality of your information.

5. Voice recording. During the interview I would like to write down some of your answers and take some notes about certain information you share with me. I would also like to use a voice recorder [show voice recorder] this tool will help me obtain a better registry of your answers and a more detailed account of your answers. If you don’t want for this interview to be recorded, I will only take written notes.

6. Confidentiality. The information obtained during this research project will be kept strictly confidential, meaning it will be kept secret. Only the research team will handle this information. Any sharing or publication of the research results will be available to you and will not identify any of the participants by name. Results will be shown as a group means or aggregate results only.

7. Costs and remuneration. Your participation in this study will have no cost to you. Also, you will not receive any monetary compensation for your participation.

8. Consent. We look forward to working with you. We think that our research will be enjoyable to you and will help us better understand food security and diet diversity. At the end of this letter, please indicate whether you consent to participate in this study. Please keep the second copy of this form for your records.

If you have any questions about this project, please contact:

(Continues)
APPENDIX B (Continued)

In Guatemala:
Ing. Julio R. Lopez  
Field Research Coordinator  
University of Illinois Urbana-Champaign  
Phone: 7832-3484  
Email: jrlopez@illinois.edu

In the United States:
Dr. Juan E. Andrade  
Assistant Professor and Principal Investigator  
University of Illinois Urbana-Champaign  
Phone: +01-(217) 333-9653  
Email: jandrade@illinois.edu

If you have any questions about your rights as a participant in research involving human subjects, please feel free to contact the University of Illinois Institutional Review Board (IRB) Office at +01-(217) 333-2670 or irb@uiuc.edu. You are welcome to call this number collect if you identify yourself as a research participant.

Sincerely,

Juan E. Andrade, Ph.D.  
Assistant Professor and Principal Investigator  
Universidad de Illinois en Urbana-Champaign, USA  
Bevier Hall, Office 457  
905 S Goodwin Ave  
Urbana, IL 61801

******************************************************************************************
Check Only One

I have read and understand the conditions and risks described above.  □ YES □ NO

I consent to the use of a voice recorder during the interview  □ YES □ NO

I consent my participation in this study  □ YES □ NO

Your name (please print) ____________________________________________________________  
Signature and Date ____________________________
APPENDIX C

Consentimiento – Cuestionarios de Seguridad Alimentaria y Diversidad de Dieta en el Hogar – P4P

Estimado Jefe(a) de casa, señor(a),

[A leerse en voz alta por el investigador]

Hola! Mi nombre es [diga su nombre] y vengo del Departamento de Ciencia de Alimentos y Nutrición Humana de la Universidad de Illinois en Urbana-Champaign (UIUC), en Estados Unidos. Mi grupo y yo estamos interesados en realizar un estudio de investigación sobre la seguridad alimentaria y diversidad de dietas en familias de agricultores que son beneficiarios del programa P4P. Este estudio tiene como objetivo principal entender la realidad de la seguridad alimentaria y su asociación con la diversidad de la dieta en hogares como el suyo en Guatemala. Para llevar a cabo este estudio le haremos dos encuestas por medio de una entrevista corta. La primera se relaciona con la seguridad alimentaria; la segunda, con diversidad de dieta. Estimamos que nos tomará entre 30-40 minutos para completar las dos encuestas. Si a Ud. le parece podemos llevar a cabo la entrevista aquí mismo o en otro lugar que sea más conveniente para Ud. A continuación le explicaré los puntos más importantes de este estudio:

1. **Encuestas.** Las encuestas son sobre seguridad alimentaria y diversidad de dieta. Estas tomarán ~15 min cada una. Las encuestas se harán oralmente. Las encuestas no llevarán su nombre, únicamente un código numérico.

2. **Participación Voluntaria.** Su participación en este estudio es completamente voluntaria. Todo participante tiene la libertad de abandonar el estudio en cualquier momento, por cualquier motivo y sin consecuencias si así lo desea. Estas decisiones NO afectarán su relación presente y futura con nuestro grupo de investigación o el Programa P4P. Durante la entrevista, Ud. podrá contestar las preguntas total o parcialmente, sin ninguna consecuencia.

3. **Beneficios.** Su participación en este estudio no le generará ningún beneficio directo. Sin embargo su opinión es muy valiosa y la información que nos provea nos puede ayudar a entender mejor la situación de seguridad alimentaria y diversidad de dieta en poblaciones rurales.

4. **Riesgos.** No existen riesgos más allá de los de la vida cotidiana. Un riesgo potencial asociado con su participación en este estudio es que su información podría ser compartida (sin el previo consentimiento) a terceras personas. Ud. Debe saber que la información recolectada en este estudio puede ser compartida con otras personas y/o publicada. Sin embargo, como las encuestas se codifican, se espera reducir este riesgo. Sin embargo, como las encuestas usan un código y su nombre no se utiliza, esperamos que esto nos ayude a reducir este riesgo.

5. **Confidencialidad.** La información que se obtenga durante la investigación será manejada bajo estrictas medidas de confidencialidad; esto significan que se mantendrán en secreto. La información sólo será utilizada por el equipo de investigación. Los resultados no identificarán a ninguno de los participantes por su nombre. Los resultados serán presentados como promedios o en agregados usando códigos y como resultados grupales.

6. **Costos y remuneración.** La participación en este estudio NO tiene ningún costo para Ud. Así mismo, Ud. NO recibirá ninguna remuneración monetaria por su participación, pero estará contribuyendo con una investigación que esperamos sea de utilidad para todas las comunidades en Guatemala.

(Continues)
APPENDIX C (Continued)

Si Ud. tiene cualquier pregunta acerca del estudio, puede comunicarse con las siguientes personas:

En Guatemala:
Ing. Julio R. Lopez  
Coordinador de Investigación  
Universidad de Illinois Urbana-Champaign  
Teléfono: 7832-3484  
Correo electrónico: jrlopez@illinois.edu

En Estados Unidos:
Dr. Juan E. Andrade  
Profesor Asistente e Investigador Principal  
Universidad de Illinois Urbana-Champaign  
Teléfono: +01-(217) 333-9653  
Correo electrónico: jandrade@illinois.edu

Si Ud. tiene preguntas acerca de sus derechos como participante en este estudio de investigación, siéntase libre de contactar a la oficina del Comité Institucional de Revisiones (IRB) en la Universidad de Illinois en Urbana-Champaign al +01-(217) 333-2670 o al correo electrónico irb@uiuc.edu. También, Ud. puede llamar a este número de teléfono por cobrar si se identifica como participante en el estudio de investigación.

Con todo respeto,

Juan E. Andrade, Ph.D.  
Profesor Asistente e Investigador Principal  
Universidad de Illinois en Urbana-Champaign, USA  
Bevier Hall, Oficina 457  
905 S Goodwin Ave  
Urbana, IL 61801

******************************************************************************
Marque Sólo Una Casilla

Yo he leído y comprendido las condiciones y riesgos descritos en este documento.  ☐ SÍ ☐ NO

Con todo uso de mis facultades, Yo consiento mi participación en este estudio.  ☐ SÍ ☐ NO

Su nombre (letra molde)  
Su firma y la fecha del día de hoy  
(Continues)
APPENDIX C (Continued)

Consentimiento – Cuestionarios de Seguridad Alimentaria y Diversidad de Dieta en el Hogar - Control

Estimado jefe de casa, señor(a),

Hola! Mi nombre es [diga su nombre] y vengo del Departamento de Ciencia de Alimentos y Nutrición Humana de la Universidad de Illinois en Urbana-Champaign (UIUC), en Estados Unidos. Mi grupo y yo estamos interesados en realizar un estudio de investigación sobre la seguridad alimentaria y diversidad de dietas en familias de agricultores en Guatemala. Este estudio tiene como objetivo principal entender la realidad de la seguridad alimentaria y su asociación con la diversidad de la dieta en hogares como el suyo en Guatemala. Para llevar a cabo este estudio le haremos dos encuestas por medio de una entrevista corta. La primera se relaciona con la seguridad alimentaria; la segunda, con diversidad de dieta. Estimamos que nos tomará entre 30-40 minutos para completar las dos encuestas. Si a Ud. le parece podemos llevar a cabo la entrevista aquí mismo o en otro lugar que sea más conveniente para Ud. A continuación le explicaré los puntos más importantes de este estudio:

1. **Encuestas.** Las encuestas son sobre seguridad alimentaria y diversidad de dieta. Estas tomarán ~15 min cada una. Las encuestas se harán oralmente. Las encuestas no llevarán su nombre, únicamente un código numérico.

2. **Participación Voluntaria.** Su participación en este estudio es completamente voluntaria. Todo participante tiene la libertad de abandonar el estudio en cualquier momento, por cualquier motivo y sin consecuencias si así lo desea. Estas decisiones NO afectarán su relación presente y futura con nuestro grupo. Durante la entrevista, Ud. podrá contestar las preguntas total o parcialmente, sin ninguna consecuencia.

3. **Beneficios.** Su participación en este estudio no le generará ningún beneficio directo. Sin embargo su opinión es muy valiosa y la información que nos provea nos puede ayudar a entender mejor la situación de seguridad alimentaria y diversidad de dieta en poblaciones rurales.

4. **Riesgos.** No existen riesgos más allá de los de la vida cotidiana. Un riesgo potencial asociado con su participación en este estudio es que su información podría ser compartida (sin el previo consentimiento) a terceras personas. Sin embargo, como las encuestas se codifican, se espera reducir este riesgo. No existen mayores riesgos por su participación en estas encuestas. Ud. Debe saber que la información recolectada en este estudio puede ser compartida con otras personas y/o publicada. Sin embargo, como las encuestas usan un código y su nombre no se utiliza, esperamos que esto nos ayude a reducir este riesgo. Así mismo, como las entrevistas se hacen entre Ud. y el encuestador (1 persona), esperamos que esto nos ayude a mantener este proceso de la forma más privada y confidencial posible.

5. **Confidencialidad.** La información que se obtenga durante la investigación será manejada bajo estrictas medidas de confidencialidad; esto significan que se mantendrán en secreto. La información sólo será utilizada por el equipo de investigación. Los resultados no identificarán a ninguno de los participantes por su nombre. Los resultados serán presentados como promedios o agregados grupales.

6. **Costos y remuneración.** La participación en este estudio NO tiene ningún costo para Ud. Así mismo, Ud. NO recibirá ninguna remuneración monetaria por su participación.

7. **Consentimiento.** Estamos muy interesados en trabajar con Ud. y pensamos que esta investigación podrá ser de utilidad para promover los principios de una alimentación sana y variada. Por favor, al final de este documento conteste las preguntas y provea su consentimiento por escrito. Guarde una copia de este documento para sus archivos.

Si Ud. tiene cualquier pregunta acerca del estudio, puede comunicarse con las siguientes personas:

(Continúa)
**APPENDIX C (Continued)**

*En Guatemala:*
Ing. Julio R. Lopez  
Coordinador de Investigación  
Universidad de Illinois Urbana-Champaign  
Teléfono: 7832-3484  
Correo electrónico: jrllopez@illinois.edu

*En Estados Unidos:*
Dr. Juan E. Andrade  
Profesor Asistente e Investigador Principal  
Universidad de Illinois Urbana-Champaign  
Teléfono: +01-(217) 333-9653  
Correo electrónico: jandrade@illinois.edu

Si Ud. tiene preguntas acerca de sus derechos como participante en este estudio de investigación, síéntase libre de contactar a la oficina del Comité Institucional de Revisiones (IRB) en la Universidad de Illinois en Urbana-Champaign al +01-(217) 333-2670 o al correo electrónico irb@uiuc.edu. También, Ud. puede llamar a este número de teléfono por cobrar si se identifica como participante en el estudio de investigación.

Con todo respeto,

[Handwritten signature]

Juan E. Andrade, Ph.D.  
Profesor Asistente e Investigador Principal  
Universidad de Illinois en Urbana-Champaign,  
USA  
Biever Hall, Oficina 457  
905 S Goodwin Ave  
Urbana, IL 61801

******************************************************************************************  
*Marque Sólo Una Casilla*

| Yo he leído y comprendido las condiciones y riesgos descritos en este documento. | □ SÍ □ NO |
| Con todo uso de mis facultades, Yo consentí mi participación en este estudio. | □ SÍ □ NO |

______________________________  ______________________________
Su nombre (letra molde)       Su firma y la fecha del día de hoy
ESTIMADO JEFE DE CASA, SEÑOR(A),

[A leerse en voz alta por el investigador]


1. **Encuestas.** Las preguntas del estudio son sobre seguridad alimentaria y diversidad de dieta. Estas tomarán ~15 min cada una. Las preguntas se harán oralmente. Las encuestas no llevarán su nombre, únicamente un código numérico.

2. **Entrevista MSC.** Esta visita es para buscar información importante sobre aspectos como producción agrícola, producción de alimentos, seguridad alimentaria y diversidad de dieta. La entrevista tomará aproximadamente 30-40 minutos. La entrevista será oral. Le pediremos que nos proporcione un nombre, el suyo o un seudónimo. Si esto no es posible, vamos a codificar la entrevista.

3. **Participación Voluntaria.** Su participación en este estudio es completamente voluntaria. Todo participante tiene la libertad de abandonar el estudio en cualquier momento, por cualquier motivo y sin consecuencias si así lo desea. Estas decisiones NO afectarán su relación presente y futura con nuestro grupo y el Programa P4P. Durante la entrevista, Ud. podrá contestar las preguntas total o parcialmente, sin ninguna consecuencia.

4. **Beneficios.** Ud no recibirá nada a cambio por su participación. Sin embargo su opinión es muy valiosa y la información que nos provea nos puede ayudar a entender mejor la situación de seguridad alimentaria y diversidad de dieta para participantes de poblaciones rurales.

5. **Riesgos.** No existen riesgos más allá de los de la vida cotidiana. Un riesgo potencial asociado con su participación en este estudio es que su información podría ser compartida (sin el previo consentimiento) a terceras personas. Ud. Debe saber que la información recolectada en este estudio puede ser compartida con otras personas y/o publicada. Sin embargo, como no aparecen los nombres, no hay chance de que su nombre sea divulgado. Sin embargo, como las encuestas usan un código y su nombre no se utiliza, esperamos que esto nos ayude a reducir este riesgo.

6. **Grabación de entrevista.** Durante la entrevista me gustaría tomar algunas notas sobre sus respuestas y otra información que Ud. me provea. También me gustaría grabar la entrevista usando un grabador de voz [Enseñe la grabadora]. Esto me ayudará a tener un registro más adecuado de sus respuestas y de la información que discutamos entre nosotros. Si Ud. no desea que esta entrevista sea grabada, procederemos a tomar notas escritas únicamente.

7. **Confidencialidad.** Cualquier información recolectada será confidencial; esto significa que se mantendrá en secreto. La información sólo será utilizada por el equipo de investigación. Los resultados no identificarán a ninguno de los participantes por su nombre. Los resultados serán presentados usando promedios y agregados grupales.

8. **Costos y remuneración.** La participación en este estudio NO tiene ningún costo para Ud. Así mismo, Ud. NO recibirá ninguna remuneración monetaria por su participación.

9. **Consentimiento.** Estamos muy interesados en trabajar con Ud. y pensamos que este estudio podría ayudar a la gente a consumir una dieta más balanceada. Por favor, al final de este documento conteste las preguntas y provea su consentimiento por escrito. Guarde una copia de este documento para sus archivos.

(Continúa)
APPENDIX D (Continued)

Si Ud. tiene cualquier pregunta acerca del estudio, puede comunicarse con las siguientes personas:

En Guatemala:
Ing. Julio R. Lopez
Coordinador de Investigación
Universidad de Illinois Urbana-Champaign
Teléfono: 7832-3484
Correo electrónico: jlopez@illinois.edu

En Estados Unidos:
Dr. Juan E. Andrade
Profesor Asistente e Investigador Principal
Universidad de Illinois Urbana-Champaign
Teléfono: +01-(217) 333-9653
Correo electrónico: jandrade@illinois.edu

Si Ud. tiene preguntas acerca de sus derechos como participante en este estudio de investigación, síntase libre de contactar a la oficina del Comité Institucional de Revisiones (IRB) en la Universidad de Illinois en Urbana-Champaign al +01-(217) 333-2670 o al correo electrónico irb@uiuc.edu. También, Ud. puede llamar a este número de teléfono por cobrar si se identifica como participante en el estudio de investigación.

Con todo respeto,

Juan E. Andrade, Ph.D.
Profesor Asistente e Investigador Principal
Universidad de Illinois en Urbana-Champaign, USA
Bevier Hall, Oficina 457
905 S Goodwin Ave
Urbana, IL 61801

************************************************************************************
*****
Marque Sólo Una Casilla

Yo he leído y comprendido las condiciones y riesgos descritos en este documento. □ Sí □ NO
Estoy de acuerdo con que se utilice una grabadora de voz durante la entrevista. □ Sí □ NO
En completo uso de mis facultades, Yo consiento mi participación en este estudio. □ Sí □ NO

______________________________ ________________________________
Su nombre (letra molde) Su firma y la fecha del día de hoy

(Continues)
APPENDIX D (Continued)

Consentimiento – Cuestionarios de Seguridad Alimentaria y Diversidad de Dieta en el Hogar - Control

Estimado Jefe de casa, señor(a),

[A leerse en voz alta por el investigador]

Hola! Mi nombre es [diga su nombre] y vengo del Departamento de Ciencia de Alimentos y Nutrición Humana de la Universidad de Illinois en Urbana-Champaign (UIUC), en Estados Unidos. Mi grupo y yo estamos interesados en realizar un estudio de investigación sobre la seguridad alimentaria y la variedad de alimentos en la dieta de familias de agricultores en Guatemala. Este estudio tiene como objetivo principal entender la realidad de la seguridad alimentaria y su asociación con la diversidad de la dieta en hogares como el suyo en Guatemala. Para llevar a cabo este estudio, primero nos gustaría realizar dos encuestas. La primera se relaciona con la seguridad alimentaria; la segunda, con la variedad de alimentos en su dieta. Estimamos que nos tomará entre 30-40 minutos para completar las dos encuestas. [Entrevista MSC] Adicionalmente a estas dos encuestas nos gustaría hacerle una entrevista corta. La entrevista es sobre temas importantes como practicas agrícolas, producción de alimentos, seguridad alimentaria y variedad de alimentos en su dieta. Estimamos nos tomará entre 30-40 minutos para completar esta entrevista. Si a Ud. le parece podemos llevar a cabo las encuestas y la entrevista aquí mismo o en otro lugar que sea conveniente más para Ud. A continuación le explicaré otros de los puntos importantes de este estudio:

1. **Encuestas.** Las preguntas del estudio son sobre seguridad alimentaria y diversidad de dieta. Estas tomarán ~15 min cada una. Las preguntas se harán oralmente. Las encuestas no llevarán su nombre, únicamente un código numérico.

2. **Entrevista MSC.** Esta visita es para buscar información importante sobre aspectos como producción agrícola, producción de alimentos, seguridad alimentaria y diversidad de dieta. La entrevista tomará aproximadamente 30-40 minutos. La entrevista será oral. Le pediremos que nos proporcione un nombre, el suyo o un seudónimo. Si esto no es posible, vamos a codificar la entrevista.

3. **Participación Voluntaria.** Su participación en este estudio es completamente voluntaria. Todo participante tiene la libertad de abandonar el estudio en cualquier momento, por cualquier motivo y sin consecuencias si así lo desea. Estas decisiones NO afectarán su relación presente y futura con nuestro grupo. Durante la entrevista, Ud. podrá contestar las preguntas total o parcialmente, sin ninguna consecuencia.

4. **Beneficios.** Ud no recibirá nada a cambio por su participación. Sin embargo su opinión es muy valiosa y la información que nos provea nos puede ayudar a entender mejor la situación de seguridad alimentaria y diversidad de dieta en poblaciones rurales.

5. **Riesgos.** No existen riesgos que no van más allá de los de la vida cotidiana. Un riesgo potencial asociado con su participación en este estudio es que su información podría ser compartida (sin el previo consentimiento) con terceras personas. Sin embargo, como no aparecen los nombres, no hay chance de que su nombre sea divulgado. Sin embargo, como las encuestas usan un código y su nombre no se utiliza, esperamos que esto nos ayude a reducir este riesgo.

6. **Grabación de la entrevista.** Durante la entrevista me gustaría tomar algunas notas sobre sus respuestas y otra información que Ud. me provea. También me gustaría grabar la entrevista usando un grabador de voz [Enseñe la grabadora]. Esto me ayudará a tener un registro más adecuado de sus respuestas y de la información que discutamos entre nosotros. Si Ud. no desea que esta entrevista sea grabada, procederemos a tomar notas escritas únicamente.

7. **Confidencialidad.** Cualquier información recolectada será confidencial; esto significa que se mantendrán en secreto. La información sólo será utilizada por el equipo de investigación. Los resultados no identificarán a ninguno de los participantes por su nombre. Los resultados serán presentados usando promedios y agregados grupales.

8. **Costos y remuneración.** La participación en este estudio NO tiene ningún costo para Ud. Así mismo, Ud. NO recibirá ninguna remuneración monetaria por su participación.

(Continues)
9. **Consentimiento.** Estamos muy interesados en trabajar con Ud. y pensamos que este estudio podría ayudar a la gente a consumir una dieta más balanceada. Por favor, al final de este documento conteste las preguntas y provea su consentimiento por escrito. Guarde una copia de este documento para sus archivos.

Si Ud. tiene cualquier pregunta acerca del estudio, puede comunicarse con las siguientes personas:

**En Guatemala:**
Ing. Julio R. Lopez  
Coordinador de Investigación  
Universidad de Illinois Urbana-Champaign  
Teléfono: 7832-3484  
Correo electrónico: jlopez@illinois.edu

**En Estados Unidos:**
Dr. Juan E. Andrade  
Profesor Asistente e Investigador Principal  
Universidad de Illinois Urbana-Champaign  
Teléfono: +01-(217) 333-9653  
Correo electrónico: jandrade@illinois.edu

Si Ud. tiene preguntas acerca de sus derechos como participante en este estudio de investigación, síéntase libre de contactar a la oficina del Comité Institucional de Revisiones (IRB) en la Universidad de Illinois en Urbana-Champaign al +01-(217) 333-2670 o al correo electrónico irb@uiuc.edu. También, Ud. puede llamar a este número de teléfono por cobrar si se identifica como participante en el estudio de investigación.

Con todo respeto,

[Signature]

Juan E. Andrade, Ph.D.  
Profesor Asistente e Investigador Principal  
Universidad de Illinois en Urbana-Champaign, USA  
Bevier Hall, Oficina 457  
905 S Goodwin Ave  
Urbana, IL 61801

***************************************************************************
*****

**Marque Sólo Una Casilla**

Yo he leído y comprendido las condiciones y riesgos descritos en este documento.  
Estoy de acuerdo con que se utilice una grabadora de voz durante la entrevista.  
En completo uso de mis facultades, Yo consiento mi participación en este estudio.

[ ] Sí [ ] NO  
[ ] Sí [ ] NO  
[ ] Sí [ ] NO

______________________________  ______________________________
Su nombre (letra molde)  Su firma y la fecha del día de hoy
APPENDIX E

The Latin American and Caribbean Food Security Scale

INSTRUCTIONS FOR THE INTERVIEWER
Please read the whole question first and correctly mark the answer. If the respondent has questions or does not understand your inquiry, make sure you repeat and fully explain the question. Use examples if necessary.

OPENING SENTENCE
I have some general questions about your and you family’s diet over the last three months. There are no right or wrong answers, please feel free to ask me any question you might have.

1. During the last three months, were you worried that your household would run out of food because of lack of money or other resources to obtain food?
   Yes [   ]
   No [   ]

2. During the last three months, did your household run out of food because of lack of money or other resources to obtain food?
   Yes [   ]
   No [   ]

3. During the last three months, did your household lack of enough money or other resources to obtain a nutritious and varied diet?
   Yes [   ]
   No [   ]

4. During the last three months, did you or any adult in your household have to consume just one or two kinds of food because of lack of money or other resources to obtain food?
   Yes [   ]
   No [   ]

5. During the last three months, did you or any adult in your household not eat breakfast, lunch or dinner because of lack of money or other resources to obtain food?
   Yes [   ]
   No [   ]

6. During the last three months, did you or any adult in your household eat less than you thought you should because of lack of money or other resources to obtain food?
   Yes [   ]
   No [   ]

7. During the last three months, did you or any adult in your household feel hungry but couldn’t eat because there was neither food nor any way to obtain it?
   Yes [   ]
   No [   ]

(Continues)
APPENDIX E (Continued)

8. During the last three months, did you or any adult in your household go without eating for a whole day? there was neither food nor any way to obtain it?
   Yes [ ]
   No [ ]

___ASK THE FOLLOWING QUESTIONS ONLY IF CHILDREN ARE PART THE HOUSEHOLD_____

9. During the last three months, did any child in your household not receive a nutritious and varied diet because of lack of money or other resources to obtain food?
   Yes [ ]
   No [ ]

10. During the last three months, did any child in your household have to consume just a few types of food because of lack of money or other resources to obtain food?
    Yes [ ]
    No [ ]

11. During the last three months, any child in your household eat less than you thought they should because of lack of money or other resources to obtain food?
    Yes [ ]
    No [ ]

12. During the last three months, did you have to serve less food to any child in your household because of lack of money or other resources to obtain food?
    Yes [ ]
    No [ ]

13. During the last three months, any child in your household feel hungry but you could not get more food because of lack of money or other resources to obtain food?
    Yes [ ]
    No [ ]

14. During the last three months, any child in your household go to bed hungry because of lack of money or other resources to obtain food?
    Yes [ ]
    No [ ]

15. During the last three months, any child in your household go without eating for a whole day there was no food nor you had the possibility of obtain it?
    Yes [ ]
    No [ ]

---

1Acker, 2011; Pérez-Escamilla I and II, 2007
APPENDIX F

Escala Latinoamericana y Caribeña de Seguridad Alimentaria (ELCSA)\(^1\)

**INSTRUCCIONES PARA EL ENTREVISTADOR**
Por favor lea toda la pregunta primero y marque correctamente la respuesta. Si el entrevistado tiene dudas o no entiende su pregunta, asegúrese de explicar claramente la pregunta, utilice ejemplos si fuese necesario.

**FRASE INTRODUCTORIA**
Quisiera hacerle algunas preguntas generales sobre su alimentación y la de su familia en los últimos tres meses. NO hay respuestas correctas o incorrectas.

1. En los últimos 3 meses en su hogar por falta de dinero, producción propia o recursos, alguna vez ¿Usted se preocupó que la comida se acabara?
   Si [ ]
   No [ ]

2. En los últimos 3 meses en su hogar por falta de dinero, producción propia o recursos, alguna vez ¿Se quedaron sin qué comer?
   Si [ ]
   No [ ]

3. En los últimos 3 meses en su hogar, alguna vez ¿Se quedaron sin dinero, producción propia o recursos para obtener una alimentación nutritiva? (*Describir o presentar en forma gráfica lo que se consideraría una alimentación nutritiva*)
   Si [ ]
   No [ ]

4. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Usted o algún adulto en su hogar tuvo una alimentación basada en muy poca variedad de alimentos (*explicar variedad*)?
   Si [ ]
   No [ ]

5. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Usted o algún adulto en su hogar dejó de desayunar, almorzar o cenar?
   Si [ ]
   No [ ]

6. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Usted o algún adulto en su hogar comió menos de lo que usted piensa debía comer (*Usar ejemplos*)?
   Si [ ]
   No [ ]

7. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Usted o algún adulto en su hogar sintió hambre pero no comió?
   Si [ ]
   No [ ]

*(Continues)*
APPENDIX F (Continued)

8. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Usted o algún adulto en su hogar sólo comió una vez al día o dejó de comer todo un día?
   Si [ ]
   No [ ]

   ________________PREGUNTAR ÚNICAMENTE SI HAY NIÑOS EN EL HOGAR____________________

9. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Algún niño o niña en su hogar dejó de tener una alimentación nutritiva?
   Si [ ]
   No [ ]

10. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Algún niño o niña en su hogar tuvo una alimentación basada en muy poca variedad de alimentos?
        Si [ ]
        No [ ]

11. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Algún niño o niña en su hogar dejó de desayunar, almorzar o cenar?
         Si [ ]
         No [ ]

12. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Algún niño o niña en su hogar comió menos de lo que debía?
            Si [ ]
            No [ ]

13. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Tuvieron que disminuir la cantidad servida en las comidas a algún niño o niña del hogar?
                Si [ ]
                No [ ]

14. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Algún niño o niña sintió hambre pero no comió?
            Si [ ]
            No [ ]

15. En los últimos 3 meses por falta de dinero, producción propia o recursos, alguna vez ¿Algún niño o niña sólo comió una vez al día o dejó de comer todo un día?
        Si [ ]
        No [ ]

1 Acker, 2011; Pérez-Escamilla I and II, 2007
**APPENDIX G**

**Household Dietary Diversity Score (HDDS)**

**INSTRUCTIONS FOR THE INTERVIEWER**

Read the list of foods. Write down a **one** in the box if anyone in the household ate any of the foods listed; write down a **zero** in the box if no one in the household ate any of the foods listed.

I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and night. [read list, prompt this question for each food group]

<table>
<thead>
<tr>
<th>HDDS</th>
<th>FOOD GROUP</th>
<th>EXAMPLES</th>
<th>CODING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cereals</td>
<td>¿Corn tortilla, flour tortilla, tamales, tamalitos, corn atole, white porridge, noodles, bread, sweet bread, cookies, white rice or other food made from corn, sorghum, or wheat?</td>
<td>A…………….[ ]</td>
</tr>
<tr>
<td>B</td>
<td>Roots and white tubers</td>
<td>¿Potatoes, cassava, taro or other root crops or white tubers?</td>
<td>B……………..[ ]</td>
</tr>
<tr>
<td>C¹</td>
<td>Vitamin A rich vegetables and tubers</td>
<td>¿Carrots, sweet potato, red pepper or any other vegetable that is orange?</td>
<td>C……………..[ ]</td>
</tr>
<tr>
<td></td>
<td>Leafy vegetables</td>
<td>¿Lettuce, spinach, chard, chipilin, yerbamora or any other leafy vegetable?</td>
<td>C……………..[ ]</td>
</tr>
<tr>
<td></td>
<td>Other vegetables</td>
<td>¿Tomato, onion, peas, cauliflower, cucumber, cabbage, green beans, broccoli or any other vegetable?</td>
<td>C……………..[ ]</td>
</tr>
<tr>
<td>D²</td>
<td>Vitamin A rich fruits</td>
<td>Ripe mango, cantaloupe, peach, papaya, guava, grapefruit or juices from any of these fruits?</td>
<td>D……………..[ ]</td>
</tr>
<tr>
<td></td>
<td>Other fruits</td>
<td>Orange, blackberry, pear, pineapple, banana, strawberry, watermelon, apple, tangerine, grape, other fruits?</td>
<td>D……………..[ ]</td>
</tr>
<tr>
<td>E³</td>
<td>Meet (organs)</td>
<td>¿Liver, kidney, heart, tripe, sausage, intestines, stomach, blood, ear, tail, feet, testicles, leather, other organ?</td>
<td>E……………..[ ]</td>
</tr>
</tbody>
</table>

¹ El grupo de los vegetales (C) es una combinación del los subgrupos: raíces y vegetales ricos en vitamina A, vegetales de hoja obscura y otros vegetales.

² El grupo de las frutas es una combinación de los subgrupos: frutas ricas en vitamina A y otras frutas.

³ El grupo de las carnes es una combinación de los subgrupos: Carne de órganos y carne de musculo.

(Continues)
### Meet (muscle)
- Beef: tenderloin, jab, etc.
- Pork, chicken, rooster, duck, turkey, sheep, goat, rabbit, wild animals, other?

### Eggs
- Eggs from: chicken, duck, turtle, etc.
- Any other type of egg?

### Fish, fresh or dry seafood
- Any type of fish or shellfish, fresh or dried? E.g. shrimp, lobster, conch, etc.

### Legumes, seeds and nuts
- Beans (cooked or fried), bean soup, bean tamales, lentils, peanuts, habas, macadamias, cashews, or any other type of seeds, legumes or nuts?

### Milk and Dairy foods
- Milk, cheese, curd, fresh cheese, sour cream, yogurt or other dairy products?

### Oils and fats
- Oils, margarine, butter, lard or any other product for cooking or frying?

### Sweeteners
- White sugar, brown sugar, panela, sugar cane syrup, honey or other sweetener?
- Sweetened beverages such as juices, soda, coffee, tea, porridge, Incaparina, smoothies, or any beverage that contains a sweetener. Alcoholic beverages: beer, liquor, cusha, chicha, etc. Candy, chocolates, cookies, cakes, etc.?

### Spices and condiments
- Salt, pepper, cinnamon, cardamom, or any type of spice used for cooking. Sauces like hot sauce, ketchup, mayonnaise, mustard, etc.

---

**APPENDIX G (Continued)**

| F | Eggs | F
|---|---|---
| G | Fish, fresh or dry seafood | G
| H | Legumes, seeds and nuts | H
| I | Milk and Dairy foods | I
| J | Oils and fats | J
| K | Sweeteners | K

---

**APPENDIX G (Continued)**

| K | Candy and Sugary drinks | K
|---|---|---
| L | Spices and condiments | L

---

*Did you or any member of your family eat in a restaurant or from street vendors yesterday? Did you buy anything from the store as a soda, cookies, bread, etc.? (Describe)*

---

*Hoddinott and Yohannes, 2002; Kennedy et al. 2011; Swindale and Bilinsky, 2006. Food groups and examples adapted specifically for Guatemala based on the work by Soto-Mendez et al. 2011 and INCAP, 2008.*
**APPENDIX H**

**Puntaje de Diversidad Dietética en el Hogar (HDDS)**

**INSTRUCCIONES PARA EL ENTREVISTADOR**

Lea la lista de alimentos en cada grupo alimenticio. Escriba **uno** en la casilla si algún miembro del hogar consumió el (los) alimento(s) mencionado(s); escriba **cero** en la casilla si ningún miembro de del hogar consumió el (los) alimento(s) mencionado (s).

**INICIO:** Quisiera preguntarle sobre alimentos que usted o cualquiera de los miembros de su familia comieron durante todo el día de ayer y por la noche. Ayer durante el día o la noche comió UD o alguien en su casa______? [read list, prompt this question for each food group]

<table>
<thead>
<tr>
<th>HDSS</th>
<th>GRUPO ALIMENTICIO</th>
<th>EJEMPLOS</th>
<th>CODIFICACION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SI=1 NO=0</td>
</tr>
<tr>
<td>A</td>
<td>Cereales</td>
<td>¿Tortilla de maíz, tortilla de harina, tamales, tamalitos, atol de elote, atol blanco, fideos, pan, pan dulce, , galletas, arroz blanco o cualquier otro alimento hecho de maíz, sorgo, o trigo?</td>
<td>A……………[   ]</td>
</tr>
<tr>
<td>B</td>
<td>Raíces y Tubérculos blancos</td>
<td>¿Papas, yuca, malanga o cualquier otro tipo de raíces o tubérculos blancos?</td>
<td>B……………..[   ]</td>
</tr>
<tr>
<td>C¹</td>
<td>Vegetales y tubérculos ricos en Vitamina A</td>
<td>¿Zanahorias, camote, chile dulce rojo o cualquier otro vegetal que sea anaranjado?</td>
<td>C……………..[   ]</td>
</tr>
<tr>
<td></td>
<td>Vegetales de hoja</td>
<td>¿Lechuga, espinaca, acelga, chiplín, yerbamora, o cualquier otro vegetal de hoja?</td>
<td>C……………..[   ]</td>
</tr>
<tr>
<td></td>
<td>Otros vegetales</td>
<td>¿Tomate, cebolla, arvejas, coliflor, pepino, repollo, ejotes, brócoli o cualquier otro vegetal?</td>
<td>C……………..[   ]</td>
</tr>
<tr>
<td>D²</td>
<td>Frutas ricas en Vitamina A</td>
<td>Mango maduro, melón anaranjado, durazno, papaya, melocotón, guayabas, toronjas o jugos de estas frutas?</td>
<td>D……………..[   ]</td>
</tr>
<tr>
<td></td>
<td>Otras frutas</td>
<td>Naranjas, moras, pera, piña, banano, fresa, sandias, manzana, mandarinas, uvas o cualquier otra fruta?</td>
<td>D……………..[   ]</td>
</tr>
<tr>
<td>E³</td>
<td>Carne (órganos)</td>
<td>¿Hígado, riñón, corazón, tripa, morcilla, intestinos, panza, sangre, oreja, cola, patas, criadillas, cuero, otro órgano?</td>
<td>E……………..[   ]</td>
</tr>
</tbody>
</table>

¹ El grupo de los vegetales (C) es una combinación del los subgrupos: raíces y vegetales ricos en vitamina A, vegetales de hoja obscura y otros vegetales. ²El grupo de las frutas es una combinación de los subgrupos: frutas ricas en vitamina A y otras frutas. ³El grupo de las carnes es una combinación de los subgrupos: Carne de órganos y carne de musculo.

Continues
### APPENDIX H (Continued)

<table>
<thead>
<tr>
<th>Carne (musculo)</th>
<th>Pura carne de vaca: lomito, puyazo, etc. Carne de coche, de pollo, de gallina, de pato, chompipes, de oveja, de cabra, de conejo, de animal de monte? Otro tipo?</th>
<th>E………………[ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F</strong> Huevos</td>
<td>Huevo de gallina, pato, tortuga o cualquier otro tipo de huevo?</td>
<td>F………………[ ]</td>
</tr>
<tr>
<td><strong>G</strong> Pescado y mariscos frescos o secos?</td>
<td>Cualquier tipo de pescado o mariscos frescos o secos? Ej. Camarón, langosta, caracol, concha, etc.</td>
<td>G………………[ ]</td>
</tr>
<tr>
<td><strong>H</strong> Legumbres, semillas y nueces</td>
<td>¿Frijol (cocido o frito), sopa de frijol, tamales de frijol, lentejas, habas, manías, macadamias, marañón, o cualquier otro tipo de semillas?</td>
<td>H………………[ ]</td>
</tr>
<tr>
<td><strong>I</strong> Leche y productos lácteos</td>
<td>Leche, queso, quajada, queso fresco, crema, yogurt, u otros productos lácteos?</td>
<td>I………………[ ]</td>
</tr>
<tr>
<td><strong>J</strong> Aceites y grasas</td>
<td>Aceites, margarinas, mantequilla, manteca o cualquier otro producto para cocinar o freír?</td>
<td>J………………[ ]</td>
</tr>
<tr>
<td><strong>K</strong> Edulcorantes</td>
<td>Azúcar blanca, azúcar morena, panela, miel de cania, miel de abeja o cualquier otro endulzante.</td>
<td>K………………[ ]</td>
</tr>
<tr>
<td><strong>Confites y bebidas</strong></td>
<td>Bebidas endulzadas como jugos, gaseosas, café, te, atoles, Incaparina, licuados, o cualquier bebida que contenga algún endulzante. Bebidas alcohólicas: cerveza, guaro, cusha, chicha, etc. Dulces, dulces típicos, chocolates, galletas dulces, pasteles, etc.?</td>
<td>K………………[ ]</td>
</tr>
<tr>
<td><strong>L</strong> Especias y Condimentos</td>
<td>Sal, pimienta, canela, cardamomo, o cualquier tipo de especia usada para cocinar. Salsas como chile picante en bote, salsa de tomate, mayonesa, mostaza, etc.?</td>
<td>L………………[ ]</td>
</tr>
</tbody>
</table>

Comió UD. O algún miembro de su familia en un restaurante o en la calle el día de ayer? Compro algo en la tienda como una agua gaseosa, galletas, pan, etc.? *(Describir)*

---

*aHoddinott and Yohannes, 2002; Kennedy et al. 2011; Swindale and Bilinsky, 2006. bFood groups and examples adapted specifically for Guatemala based on the work by Soto-Mendez et al. 2011 and INCAP, 2008.*
APPENDIX I

Most Significant Change (MSC) Story Collection Form – P4P

First Name or MS Code:
Date:
Interviewer:

INSTRUCTIONS:
1. Create an environment of relaxation and cordiality that will allow your subjects to feel comfortable
2. Be respectful and always keep track of time, don’t force answers and always be polite in answering questions

DESCRIPTION OF INTERVIEW PROCESS AND OPENING QUESTION
1. General instructions and interview description
2. Can you please tell me how long have you been part of P4P, why did you decide to become part of P4P and how did you become part of P4P?

MAIN QUESTION
1. What has been the most significant change you have observed since joining P4P in relation to……? [Audio recording starts-if applicable]

NOTE: Always ask for examples and illustrations describing the most significant changes. The MAIN OBJECTIVE is to elicit a story related to those significant changes. Use the domains of change and discussion prompts below to guide your interview process

<table>
<thead>
<tr>
<th>Domains of Change</th>
<th>Thematic Areas / Discussion Prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural production practices and Livestock</td>
<td>Yields / Income</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
</tr>
<tr>
<td></td>
<td>Diversification</td>
</tr>
<tr>
<td>Food security and Diet Diversity</td>
<td>Vulnerability / Seasonality</td>
</tr>
<tr>
<td></td>
<td>Access / availability</td>
</tr>
<tr>
<td></td>
<td>Diversity</td>
</tr>
<tr>
<td></td>
<td>Nutrition perception</td>
</tr>
<tr>
<td>Household Information and assets</td>
<td>Family composition</td>
</tr>
<tr>
<td></td>
<td>Access to public and private services and goods</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
</tr>
<tr>
<td>Livelihood activities and expenditures</td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>Alternative economic activities</td>
</tr>
<tr>
<td></td>
<td>Expenditures composition and frequency</td>
</tr>
<tr>
<td></td>
<td>Food expenditures</td>
</tr>
</tbody>
</table>

CLOSING REMARKS AND FINAL QUESTIONS
1. Of all we have discussed today, which do you think has been the most significant change you have experienced in your life since joining P4P? Can you elaborate?
2. Is there anything else you would like to add?
3. I would like to thank you very much Mr. / Mrs. / Ms. ___ for taking the time to meet with me and discuss your experience with P4P............
APPENDIX J

Most Significant Change (MSC) Story Collection Form - Control

First Name or MS Code:

Date:

Interviewer:

INSTRUCTIONS:
1. Create an environment of relaxation and cordiality that will allow your subjects to feel comfortable
2. Be respectful and always keep track of time, don’t force answers and always be polite when answering questions

DESCRIPTION OF INTERVIEW PROCESS AND OPENING QUESTION
1. General instructions and interview description
2. Can you please tell me how long have you been a farmer, why did you decide to become a farmer?

MAIN QUESTION
1. What has been the most significant change you have observed in the last three years in relation to…. [Audio recording starts-if applicable]

NOTE: Always ask for examples and illustrations describing the most significant changes. The MAIN OBJECTIVE is to elicit a story related to those significant changes.
Use the domains of change and discussion prompts below to guide your interview process

<table>
<thead>
<tr>
<th>Domains of Change</th>
<th>Thematic Areas / Discussion Prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural production practices and Livestock</td>
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<td>Technology</td>
</tr>
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<td></td>
<td>Diversification</td>
</tr>
<tr>
<td>Food security and Diet Diversity</td>
<td>Vulnerability / Seasonality</td>
</tr>
<tr>
<td></td>
<td>Access / availability</td>
</tr>
<tr>
<td></td>
<td>Diversity</td>
</tr>
<tr>
<td></td>
<td>Nutrition perception</td>
</tr>
<tr>
<td>Household Information and assets</td>
<td>Family composition</td>
</tr>
<tr>
<td></td>
<td>Access to public and private services and goods</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
</tr>
<tr>
<td>Livelihood activities and expenditures</td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>Alternative economic activities</td>
</tr>
<tr>
<td></td>
<td>Expenditures composition and frequency</td>
</tr>
<tr>
<td></td>
<td>Food expenditures</td>
</tr>
</tbody>
</table>

CLOSING REMARKS AND FINAL QUESTIONS
1. Of all we have discussed today, which do you think has been the most significant change you have experienced in the last three years? Can you elaborate?

2. Is there anything else you would like to add?

3. I would like to thank you very much Mr. / Mrs. / Ms. ___ for taking the time to meet with me and discuss your experience as a farmer in Guatemala............
APPENDIX K

El Cambio Mas Significativo (MSC) Recolección de Historias - P4P

Primer nombre o código MS:

Fecha:

Entrevistador:

INSTRUCCIONES:
1. Crear un ambiente relajado, de calma y cordialidad que le permita a su entrevistado sentirse cómodo
2. Sea respetuoso y mantener siempre la noción del tiempo, no forzar las respuestas y siempre ser educado al responder las preguntas

DESCRIPCIÓN DE LA ENTREVISTA Y PREGUNTAS INICIALES
1. Instrucciones generales y descripción de la entrevista
2. ¿Puede usted por favor decirme ¿desde cuándo forma parte del P4P, ¿qué lo motivó a formar parte del P4P y cómo se integro al P4P?

PREGUNTA PRINCIPAL
1. ¿Cuál ha sido el cambio más significativo/Importante que ha observado Ud. desde que forma parte de P4P en relación a. [Audio recording starts-if applicable]

NOTA: Trate de preguntar por ejemplos e ilustraciones que describen los cambios más significativos.
El OBJETIVO PRINCIPAL es obtener historias relacionadas con los cambios mas significativos.
Utilice los dominios de cambio y los temas sugeridos de discusión descritos en la tabla a continuación para guiar su entrevista

<table>
<thead>
<tr>
<th>Dominios de cambio</th>
<th>Áreas Temáticas / Guías de Discusión</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practicas de produccion agrícola y pecuaria</td>
<td>Rendimientos o ingresos&lt;br&gt;Tecnología&lt;br&gt;Diversificación de la producción</td>
</tr>
<tr>
<td>Seguridad alimentaria y diversidad de dieta</td>
<td>Vulnerabilidad / La estacionalidad&lt;br&gt;Acceso / Disponibilidad&lt;br&gt;Diversidad&lt;br&gt;Percepción de la nutrición</td>
</tr>
<tr>
<td>Información del hogar y bienes</td>
<td>Composición familiar&lt;br&gt;Acceso a servicios públicos y privados&lt;br&gt;Bienes&lt;br&gt;Infraestructura</td>
</tr>
<tr>
<td>Actividades económicas y gastos</td>
<td>Ingresos&lt;br&gt;Otras actividades económicas alternativas&lt;br&gt;Estructura de gastos composición y frecuencia&lt;br&gt;Gastos en alimentos</td>
</tr>
</tbody>
</table>

COMENTARIOS Y PREGUNTAS FINALES
1. De lo que hemos discutido hoy, ¿cuál cree Ud. que ha sido de todos el cambio más significativo/importante desde que se incorporó a P4P? [Try to elucidate/identify the most significant] ¿Puede elaborar un poco más?
2. ¿Hay algo más que le gustaría agregar como comentario final?
2. Me gustaría agradecerle mucho Sr./Sra./Srta. Por haberse tomado el tiempo de reunirse conmigo y discutir sus experiencias como beneficiario de P4P....
### APPENDIX L

**El Cambio Mas Significativo (MSC) Recolección de Historias – Control**

<table>
<thead>
<tr>
<th>Primer nombre o código MS:</th>
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<tr>
<td>Fecha:</td>
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<td>Entrevistador:</td>
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### INSTRUCCIONES:

1. Crear un ambiente relajado, de calma y cordialidad que le permita a su entrevistado sentirse cómodo
2. Sea respetuoso y mantener siempre la noción del tiempo, no forzar las respuestas y siempre ser educado al responder las preguntas

### DESCRIPCIÓN DE LA ENTREVISTA Y PREGUNTAS INICIALES

**1. Instrucciones generales y descripción de la entrevista**

¿Puede usted por favor decirme ¿cuánto tiempo ha sido un agricultor, ¿qué lo motivó a convertirse en un agricultor?

### PREGUNTA PRINCIPAL

**1. ¿Cuál ha sido el cambio más significativo/Importante que ha observado Ud. en los últimos tres años en relación a.... [Audio recording starts-if applicable]**

**NOTA:** Trate de preguntar por ejemplos e ilustraciones que describen los cambios más significativos. El OBJETIVO PRINCIPAL es obtener historias relacionadas con los cambios mas significativos. Utilice los dominios de cambio y los temas sugeridos de discusión descritos en la tabla a continuación para guiar su entrevista

<table>
<thead>
<tr>
<th>Dominios de cambio</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Prácticas de producción agrícola y pecuaria</td>
<td>Rendimientos o ingresos</td>
</tr>
<tr>
<td></td>
<td>Tecnología</td>
</tr>
<tr>
<td></td>
<td>Diversificación de la producción</td>
</tr>
<tr>
<td>Seguridad alimentaria y diversidad de dieta</td>
<td>Vulnerabilidad / La estacionalidad</td>
</tr>
<tr>
<td></td>
<td>Acceso / Disponibilidad</td>
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<td></td>
<td>Diversidad</td>
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<tr>
<td></td>
<td>Percepción de la nutrición</td>
</tr>
<tr>
<td>Información del hogar y bienes</td>
<td>Composición familiar</td>
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<tr>
<td></td>
<td>Acceso a servicios públicos y privados</td>
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<td>Bienes</td>
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<tr>
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<td>Otras actividades económicas alternativas</td>
</tr>
<tr>
<td></td>
<td>Estructura de gastos composición y frecuencia</td>
</tr>
<tr>
<td></td>
<td>Gastos en alimentos</td>
</tr>
</tbody>
</table>

### COMENTARIOS Y PREGUNTAS FINALES

1. De lo que hemos discutido hoy, ¿cuál cree Ud. que ha sido de todos el cambio más significativo/importante en los últimos tres años? *[Try to elucidate/identify the most significant]* ¿Puede elaborar un poco más?
2. ¿Hay algo más que le gustaría agregar como comentario final?
3. Me gustaría agradecerle mucho Sr./Sra./Srta. Por haberse tomado el tiempo de reunirse conmigo y discutir sus experiencias como un agricultor en Guatemala...
APPENDIX M

General Information Survey

Now to finish the interview, I would like to ask you a few general-information questions about yourself, and your family.

INSTRUCTIONS FOR THE INTERVIEWER
Please read all questions loud and clear, mark with an X or record the answers. Make sure you take the time to answer any questions the participant might have. PLEASE THANK THE PARTICIPANT AT THE END OF THE INTERVIEW.

1. **Age range** (years) [Don’t ask for an specific age]
   a. 18 – 29 ____
   b. 50 – 59 ____
   c. 30 – 39 ____
   d. 60 – 69 ____
   e. 40 – 49 ____
   f. > 60 _____

2. **Education** [Highest completed]
   a. None ____
   b. Elementary school ____
   c. Graduate ____
   d. High school ____
   e. Bachelor’s degree ____
   f. Other (specify) ______

3. **Number of family members currently in household**
   a) 1-3 ____
   b) 4-6 ____
   c) >6 ____ Please specify ________

4. **Estimated annual household income** (2011) in Guatemalan Quetzales (GQT)¹ [Please be aware of the sensitive nature of this information, ask for income ranges not for an specific number. THE INTERVIEWEE HAS THE RIGHT TO DECLINE TO ANSWER THIS QUESTION]
   a) 1 – 30,000 ____
   b) 31,000 – 50,000 ____
   c) 51,000 – 70,000 ____
   d) 71,000 – 100,000 ____
   e) 101,000 – 150,000 ____
   f) 150,000 – 200,000 ____
   g) >200,000 Please specify __________________________

5. **Gender** [Answer this question based on observation – NO NEED to ASK]
   a. Male ____
   b. Female ____

¹ Ask for total household income. Make sure the interviewee understand that the approximate number should reflect all combined household income.

(Continues)
APPENDIX M (Continued)

**Rapid Visual Assessment – Housing Quality**

This rapid visual assessment of the physical quality of different elements of the household has been previously used as an indirect indicator of socioeconomic status in developing countries\(^2\)\(^-\)\(^4\). Please carefully read the following directions before starting.

**INSTRUCTIONS**
1. Please fill this questionnaire based on your own observations.
2. Do so immediately after you complete your interview, but do it **after** you leave the household.
3. This is not a questionnaire, **do not ask** any questions regarding these indicators.
4. Mark with an X or write down the required information. If you are not able to determine one of the characteristics based on your observation, leave blank.

<table>
<thead>
<tr>
<th>Were you able to observe the housing premises?</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES (If yes, please complete the housing quality scale)</td>
<td></td>
</tr>
</tbody>
</table>

**HOUSING QUALITY SCALE**

**WALL (Predominant material of external walls)**
- Masonry (brick, cement, block, cemented adobe, stone, gravel, etc.)
- Wood, un-cemented adobe
- Cane, palm, mud-straw, leaves, other non-durable plant material
- Metallic sheet (zinc, other), sticks, refuse, plastic sheets, cardboard

**FLOOR (Predominant material of floors)**
- Ceramic, marble tiles, cement blocks, bricks, wood, carpeting, vinyl tile
- Dirt, non-durable plant material, plastic sheets, cardboard

**ROOF (Predominant material on roof)**
- Baked clay roof tiles, asphalt, cement, gravel, other durable roof tile
- Wood, asbestos, fiber-cement
- Straw, cane, plantain/palm leaves
- Metallic sheet, canvas, cardboard, plastic sheets, other refuse

**ELECTRICITY (Electrical service to housing unit)**
- Yes
- No

**SEWERAGE (Type of sewerage system)**
- Piped system (public/private), piped septic tank
- Black water well, cesspool, latrine, outhouse
- No system, other (river, canal, other natural outlet), free-flowing sewage

**PIPE (Water supply system and indoor/outdoor access)**
- Piped indoor from (public/private) aqueduct or other similar system
- Piped to outdoor location from (private/public) aqueduct or other similar system
- Well, spring (with or without pump) not piped
- Public fountain, river, canal, water truck, cistern

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\(^2\) Arias and De Vos, 1996. \(^3\) Fiadzo et al. 2001. \(^4\) Mosley and Chen, 1984

\(^3\) Predominant is defined as covering more than 50% of the surface.
APPENDIX N

Cuestionario de Información General

Ahora, para finalizar la entrevista, me gustaría hacerle algunas preguntas de información general sobre usted y su familia.

INSTRUCCIONES PARA EL ENCUESTADOR
Por favor, lea todas las preguntas con voz fuerte y clara, marcar con una X o anotar las respuestas. Asegúrese de tomarse el tiempo para contestar cualquier pregunta que el participante pueda tener. POR FAVOR, AGRADEZCA DE MANERA CORDIAL AL PARTICIPANTE AL FINAL DE LA ENTREVISTA.

1. **Rango de edad** (años). [Don’t ask for an specific age]
   - a. 18 – 29  _____
   - b. 50 – 59  _____
   - c. 30 – 39  _____
   - d. 60 – 69  _____
   - e. 40 – 49  _____
   - f. > 60    _____

2. **Nivel educativo** [Highest completed]
   - a. Ninguno  _____
   - b. Escuela primaria  _____
   - c. Post-grado  _____
   - d. Escuela secundaria  _____
   - e. Grado universitario  _____
   - f. Otro (especificar)  _____

3. **Número de miembros que actualmente viven en el hogar:**
   - a) 1-3  _____
   - b) 4-6  _____
   - c) >6  _____ Especifique el número  _____

4. **Género** [Answer this question based on observation – NO NEED to ASK]
   - a. Masculino  _____
   - b. Femenino  _____
**Rapid Visual Assessment – Housing Quality**

This rapid visual assessment of the physical quality of different elements of the household has been previously used as an indirect indicator of socioeconomic status in developing countries. Please carefully read the following directions before starting.

**INSTRUCTIONS**
1. Please fill this questionnaire based on your own observations.
2. Do so immediately after you complete your interview, but do it after you leave the household.
3. This is not a questionnaire, do not ask any questions regarding these indicators.
4. Mark with an X or write down the required information. If you are not able to determine one of the characteristics based on your observation, leave blank.

---

### Were you able to observe the housing premises?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES (If yes, please complete the housing quality scale)</td>
<td>NO</td>
</tr>
</tbody>
</table>

### HOUSING QUALITY SCALE (Mark with an X the observable characteristic)

#### WALL (Predominant material of external walls)
- Masonry (brick, cement, block, cemented adobe, stone, gravel, etc.)
- Wood, un-cemented adobe
- Cane, palm, mud-straw, leaves, other non-durable plant material
- Metallic sheet (zinc, other), sticks, refuse, plastic sheets, cardboard

#### FLOOR (Predominant material of floors)
- Ceramic, marble tiles, cement blocks, bricks, wood, carpeting, vinyl tile
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- Wood, asbestos, fiber-cement
- Straw, cane, plantain/palm leaves
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#### ELECTRICITY (Electrical service to housing unit)
- Yes
- No

#### SEWERAGE (Type of sewerage system)
- Piped system (public/private), piped septic tank
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- Well, spring (with or without pump) not piped
- Public fountain, river, canal, water truck, cistern

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1. Arias and De Vos, 1996.
2. Predominant is defined as covering more than 50% of the surface.
APPENDIX O

Disertación: Seguridad Alimentaria y Diversidad de Dieta en el Marco de Proyectos de Desarrollo Agrícola y de Mercados

El Cambio Más Significativo (MSC) - INSTRUCCIONES1,2

Evaluación y Selección Grupal de Entrevistas de Campo: Equipo de Programación y Ejecución P4P-Guatemala

RESUMEN

El proceso de evaluación y selección de entrevistas de campo se puede resumir en los siguientes pasos:

1. Pre-selección y distribución de historias
2. Lectura, análisis y calificación individual (2-3 semanas)
3. Discusión y selección grupal (1 semana)
4. Documentación del proceso de selección grupal

Este proceso se repite en cada nivel ascendente de la organización. A continuación se describe cada paso en detalle.

INTRODUCCIÓN

El cambio mas significativo (MSC por sus siglas en ingles) es un metodología de investigación que facilita la participación activa de diversos actores y provee información sobre los resultados, efectos o impactos de un programa. Este enfoque se basa en el análisis, valoración y selección de testimonios y vivencias de diversos actores en un programa o proyecto. Estos testimonios se enfocan en cambios significativos, positivos o negativos, ocurridos en un periodo determinado. MSC es un método subjetivo que rescata vivencias y valoraciones personales, así como la sabiduría popular. Toma en cuenta el entorno social, político, económico y cultural de una región o país. MSC utiliza un conjunto de reflexiones personales para llegar a reflexiones colectivas facilitando la participación de todos los actores de un programa y promoviendo un proceso de aprendizaje interno y externo.

OBJETIVO

El objetivo principal de este ejercicio es facilitar un proceso de análisis, reflexión y aprendizaje, a través de la sistemática discusión y selección de entrevistas de campo recolectadas con MSC.

INSTRUCCIONES

El proceso de selección de entrevistas de campo será llevado a cabo por miembros del equipo de programación y ejecución de la iniciativa P4P-Guatemala. El proceso será liderado por la coordinadora P4P-Guatemala. El proceso de selección se divide en dos etapas: 1) Lectura, análisis y calificación individual; 2) Discusión y selección grupal de entrevistas.

1. Lectura, análisis y calificación individual

1.1. Entrevistas de campo pre-seleccionadas serán proporcionadas por el investigador principal y distribuidas a cada uno de los miembros del equipo. Cada entrevista será identificada con un código numérico (único) de tres dígitos

1.2. Se proporcionara un tiempo determinado (2-3 semanas como máximo) para que todos los miembros del equipo puedan leer, analizar y calificar cada una de las entrevistas

(Continues)
1.3. Cada uno de los miembros del equipo hará un análisis personal de las entrevistas proporcionadas y seleccionará aquellas que cree mejor representan el trabajo realizado por P4P. Durante este proceso de análisis y selección personal es importante tratar de contestar las siguientes preguntas:\(^3\):

\begin{enumerate}
\item Que información contenida en esta entrevista representa los logros, objetivos (esperados y no esperados) y la labor realizada por P4P hasta la fecha?
\item Palabras clave o frases que ejemplifican cambios significativos asociados con los objetivos (esperados y no esperados) de P4P (subrayar o resaltar)
\item Que elementos de esta entrevista llamaron más mi atención? Y porque?
\end{enumerate}

1.4. Una vez contestadas estas preguntas para cada una de las entrevistas, se pide a cada miembro del equipo que asigne una calificación de 1→5 (o cualquier número intermedio) a cada entrevista seleccionada: siendo uno la calificación más baja y cinco la más alta. Una calificación de cinco representa entrevistas con el mas alto índice de preferencia y una calificación de uno representa aquellas entrevistas que han sido seleccionadas pero tienen un menor índice de preferencia. Estas calificaciones se asignan de acuerdo a las preferencias personales de cada miembro del equipo y se utilizarán luego para facilitar la discusión grupal.

1.5. Una vez se ha completado este proceso se recomienda separar las entrevistas en dos grupos: seleccionadas y no seleccionadas. Se recomienda también ordenar las entrevistas seleccionadas de mayor (5) a menor (1) calificación. Esto ayudará en el siguiente paso que consiste en una discusión grupal y selección final de entrevistas. Para cada entrevista seleccionada, notas personales sobre las razones por las cuales fue seleccionada dicha entrevista pueden ser de utilidad durante la discusión grupal.

2. **Discusión y Selección grupal de entrevistas**

2.1. Este es uno de los pasos más importantes de esta metodología. El objetivo principal es desarrollar una discusión grupal entre los miembros del equipo de programación P4P-Guatemala con el fin de escoger un grupo de entrevistas que representen el trabajo realizado por P4P\(^3\) (ver numeral 1.3). Esta dinámica también facilita el proceso de aprendizaje interno. Las entrevistas seleccionadas son en su conjunto una representación de lo que, a criterio de los miembros del equipo, es el programa P4P-Guatemala. Las entrevistas seleccionadas durante este proceso serán trasladadas a los equipos de coordinación general en Panamá y Roma para replicar este mismo proceso.

2.2. Esta etapa de la metodología se iniciará una vez todos los miembros del equipo (individualmente) hayan leído, analizado, calificado y seleccionado cada una de las entrevistas de campo.

2.3. Idealmente el equipo se debe reunir en un salón privado, alejado del ruido y que permita desarrollar la discusión sin interrupciones.

2.4. Cada miembro del equipo presenta las entrevistas que ha escogido (en orden descendente de calificación) y las razones por las cuales escogió cada una de ellas. Se recomienda que la persona que lidera el ejercicio tome notas detalladas y documente este proceso; el uso de una grabadora de voz es recomendado.

---

\(^3\)Es importante destacar que tanto información positiva como negativa puede encontrarse en el texto de cada entrevista. Es importante mantener la perspectiva de que las entrevistas contienen información acerca de los logros y objetivos (esperados y no esperados) de P4P que ha sido cumplidos y/o incumplidos durante el desarrollo de la iniciativa.
APPENDIX O (Continued)

3.1. La calificación que cada miembro asigna a cada entrevista debe ser anotada, esto facilitara el proceso de selección final (ver formato recomendado).

<table>
<thead>
<tr>
<th>Código - Entrevista</th>
<th>Calificación</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Miembro 1</td>
</tr>
</tbody>
</table>

3.2. Al finalizar la presentación de cada miembro del equipo se procede a desarrollar una discusión grupal para escoger aquellas entrevistas que el grupo considera representan mejor el trabajo de P4P

Las entrevistas seleccionadas deben representar el consenso grupal y deben ir acompañadas de razones específicas por las cuales fueron escogidas por el grupo. Las preguntas sugeridas en 1.3.1 – 1.3.3 pueden servir de guía en este proceso. La calificación promedio de cada historia puede también ayudar en el proceso de selección. Aquellas entrevistas con mayor calificación promedio muy probablemente representan el consenso grupal.

3.3. Una vez el grupo ha logrado un consenso y ha finalizado el proceso de selección de entrevistas; se hace una lista con los códigos y la calificación final de las entrevistas seleccionadas. Esta lista acompañara el documento que detalla el proceso de selección de entrevistas.

3.4. El documento que detalla el proceso de la selección grupal y la lista final de las entrevistas seleccionadas se enviara por vía electrónica al investigador.

3.5. El investigador enviara las entrevistas seleccionadas al equipo de coordinación en Panamá para replicar este mismo ejercicio.

3.6. El paso final es replicar el ejercicio de selección con el grupo de coordinación a nivel mundial en Roma. Esto se hará una vez el proceso en Panamá haya sido completado.

EJEMPLO

El siguiente segmento de un ejemplo real puede ser útil para ilustrar el valor del proceso de selección grupal de historias de campo. En este caso, la historia que se estaba discutiendo había sido contada por un miembro de sexo masculino que había cambiado su actitud hacia sus compañeras en la organización.

"En mi organización una mujer fue escogida como secretaria de la directiva. Al principio pensé, '¿cómo es posible que una mujer pueda ser miembro de la directiva? Yo tenía actitudes negativas. Aún así, yo la ayudé. Yo la acompañaba cuando ella visitaba a otros miembros de la organización y les llevaba correspondencia. Me sentía incómodo cuando iba con ella. Me atormentaba pensando ¿cómo es posible que una mujer este en la directiva, al mismo nivel en el que yo estoy?'(...) A principios de 2010, se llevo a cabo un taller GMLT (Gender Mainstreaming and Leadership Trajectory) en mi organización. Ese taller fue excepcional para mí. Aprendí sobre equidad de género, aumentó mi conocimiento sobre el tema y cambio mi percepción, mi punto de vista. Me brindó claridad sobre los roles y responsabilidades de los seres humanos. Pude entonces entender que había interpretado mal las cosas". (Bangladesh)

4 Learning about Gender Equality: Testing the ability of the Most Significant Change methodology to make cultural changes visible and learn about gender equality. OXFAM-NOVIB. 2012.
APPENDIX O (Continued)

Análisis Grupal - Ejemplo
“La discusión sobre el significado de esta historia reveló que la gestión de la organización había pasado por un drástico cambio de actitud hacia el papel de las mujeres en la organización. Las mujeres tenían ahora autorización para tomar decisiones sobre cuestiones administrativas. Los hombres se habían dado cuenta de que las mujeres eran capaces de tomar decisiones importantes dentro de la estructura administrativa de la organización”

Análisis Individual - Ejemplo (historias no incluidas)

Participante 1: "Creo que la segunda historia de la chica que comenzó su propio negocio es más importante. Ella recibió ayuda de trabajadores de la ONG para administrar su negocio y fue un éxito. Ella fue exitosa en una forma que requería un enfoque poco convencional. El rol de la organización en este proceso es evidente”.

Participante 2: "Estoy de acuerdo que es una historia importante, pero a mí no me queda claro como pudo ella contradecir a su familia y romper las normas sociales tradicionales. Creo que la tercera historia es por lo tanto más relevante. En ella se explica cómo una niña, después de que ella fue acosada por los niños de su escuela, encontró el coraje para tomar parte en una protesta contra la violencia contra las mujeres. Sus compañeros de clase fueron inspirados por ella. Ella se convirtió en un modelo a seguir”.

Participante 1: "Lo que me parece más significativo de esta historia es que promueve la no violencia. La historia también describe cómo la chica finalmente perdonó a sus agresores y no era agresiva”.

Participante 3: "Yo también creo que la tercera historia es importante, pero no porque ella perdonó a sus atacantes. Creo que eso no es más que otro ejemplo de la predominancia de valores patriarcales. Es otra forma de mantener a nuestras niñas y mujeres calladas. Como diciendo: 'Ellas No deben causar problemas ”".

(Transcripción de un proceso de selección, Bangladesh)
APPENDIX P

El Cambio Más Significativo (MSC)

Evaluación y Selección de Entrevistas de Campo: Equipo de Programación y Ejecución P4P-Guatemala

INSTRUCCIONES: Lectura, Análisis y Selección Individual

Las entrevistas de campo MSC (por sus siglas en inglés) contienen opiniones, comentarios y anécdotas compartidas por los miembros de distintas organizaciones de agricultores entrevistados durante el desarrollo del presente proyecto de investigación. Adicionalmente a esta información primaria, el investigador ha editado mínimamente el texto con el objetivo de darle un formato de historia. Las opiniones y comentarios de las personas entrevistadas representan la visión que cada uno de ellas tiene sobre su experiencia con la iniciativa P4P y el impacto que el programa ha tenido a nivel personal y de las organizaciones a las que pertenecen. El proceso de selección de estas entrevistas de campo será llevado a cabo por miembros del equipo de programación y ejecución de la iniciativa P4P-Guatemala. El proceso será liderado por la coordinadora nacional P4P-Guatemala. El proceso de selección se divide en dos etapas: 1) Lectura, análisis y calificación individual; 2) Discusión y selección grupal de entrevistas.

1. **Lectura, análisis y calificación individual**
   
   1.1. Entrevistas de campo pre-seleccionadas serán proporcionadas por el investigador principal y distribuidas a cada uno de los miembros del equipo. Cada entrevista será identificada con un código numérico (único) de tres dígitos.
   
   1.2. Se proporciona un tiempo determinado (2-3 semanas como máximo) para que todos los miembros del equipo puedan leer, analizar y calificar cada una de las entrevistas.
   
   1.3. Cada uno de los miembros del equipo hará un análisis personal de las entrevistas proporcionadas y seleccionará aquellas que cree mejor representan el trabajo realizado por P4P. Durante este proceso de análisis y selección personal es importante tratar de contestar las siguientes preguntas:
   
   1.3.1. Que información contenida en esta entrevista representa los logros, objetivos (esperados y no esperados) y la labor realizada por P4P hasta la fecha?
   
   1.3.2. Palabras clave o frases que ejemplifican cambios significativos asociados con los objetivos (esperados y no esperados) de P4P (subrayar o resaltar)
   
   1.3.3. Que elementos de esta entrevista llamaron mas mi atención? Y porque?
   
   1.4. Una vez contestadas estas preguntas para cada una de las entrevistas, se pide a cada miembro del equipo que asigne una calificación de 1→5 (o cualquier número intermedio) a cada entrevista seleccionada: siendo uno la calificación mas baja y cinco la mas alta. Una calificación de cinco representa entrevistas con el mas alto índice de preferencia y una calificación de uno representa aquellas entrevistas que han sido seleccionadas pero tienen un menor índice de preferencia. Estas calificaciones se asignan de acuerdo a las preferencias personales de cada miembro del equipo y se utilizaran luego para facilitar la discusión grupal.
   
   1.5. Una vez se ha completado este proceso se recomienda separar las entrevistas en dos grupos: seleccionadas y no seleccionadas. Se recomienda también ordenar las entrevistas seleccionadas de mayor (5) a menor (1) calificación. Estoy ayudará en el siguiente paso que consiste en una discusión grupal y selección final de entrevistas. Para cada entrevista seleccionada, notas personales sobre las razones por las cuales fue seleccionada dicha entrevista pueden ser de utilidad durante la discusión grupal.

1 Es importante destacar que tanto información positiva como negativa puede encontrarse en el texto de cada entrevista. Es importante mantener la perspectiva de que las entrevistas contienen información acerca de los logros y objetivos (esperados y no esperados) de P4P que ha sido cumplidos y/o incumplidos durante el desarrollo de la iniciativa.
APPENDIX P (Continued)

NOTAS ADICIONALES
a) Las entrevistas MSC utilizan un formato de “conversación abierta” por lo cual no existe un cuestionario con preguntas pre-determinadas por lo cual la progresión lógica de las historias varía de entrevista a entrevista. Algunas preguntas generales fueron usadas en la mayoría de las entrevistas MSC.

b) Los personajes en cada entrevista están identificados por los nombres genéricos Pedro (Masculino) y María (Femenino) en concordancia con las regulaciones de confidencialidad del IRB (Institutional Review Board). Lo mismo aplica a la ubicación y características específicas de cada organización.

c) Texto contenido entre comillas (“A”) representa citas textuales del entrevistado(a).
INFORME FINAL

Capacitación para el Fortalecimiento a organizaciones de pequeña producción agrícola del oriente de Guatemala (Departamentos de El Progreso, Zacapa, Chiquimula, Jalapa y Jutiapa)

Iniciativa P4P del PMA Guatemala.

Consultora responsable:

Asesoría y Asistencia Técnica En Procesos De Desarrollo Social

Karina P. Marroquín Whigte

Guatemala, 28 de Junio del 2011.

(Continues)
1.1. IDENTIFICACION DEL NIVEL ORGANIZACIONAL:

Las personas asistentes a las sesiones, discutieron y analizaron sobre cada una de las Fases o etapas de una organización, haciendo su propio diagnóstico, teniendo como resultado la siguiente información:

De las 23 organizaciones capacitadas, 16 organizaciones se ubicaron en la fase IV de madurez, y 5 en la fase V de Sostenibilidad y 1 organización consideró que estaba en la Fase III de Integración y IV de madurez. Esto debido a que se evidencia que existe buena comunicación entre sus miembros, manifiestan mucha experiencia en procesos de capacitación, organización, manejo de proyectos y capacidad de gestión. Sin embargo es importante mencionar que las organizaciones están consientes que deben fortalecer la dinámica interna en función de la estructura organizativa, y la distribución de tareas con un enfoque más incluyente de mujeres y jóvenes, ya que según la experiencia de quienes se ubican en las Fases IV y V, se han movido de una a otra fase, debido al nivel de motivación y participación de las personas socias. Esperan llegar y mantenerse en la fase V de Sostenibilidad, y en lo menos posible, evitar estar a la Fase VI, de Conflicto.
PARAMETROS QUE DETERMINAN FASES O ETAPAS DE UNA ORGANIZACIÓN:

<table>
<thead>
<tr>
<th>PRIMERA FASE</th>
<th>SEGUNDA FASE</th>
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<tr>
<td><strong>“FASE DE FORMACIÓN”</strong></td>
<td><strong>“FASE DE IDENTIFICACIÓN”</strong></td>
</tr>
<tr>
<td>● Se comienzan las relaciones dentro de la organización que se está creando.</td>
<td>● Las personas que integran la organización se sienten bien en un ambiente de grupo y perciben que su participación tiene un propósito y un valor.</td>
</tr>
<tr>
<td>● Hay más intereses individuales que colectivos.</td>
<td>● Se alcanzan acuerdos en las relaciones grupales.</td>
</tr>
<tr>
<td>● Poca comunicación entre las personas que han integrado la organización.</td>
<td>● Mejora la comunicación entre las personas que integran la organización.</td>
</tr>
<tr>
<td>● Liderazgos no definidos.</td>
<td>● Se reconocen liderazgos dentro del grupo.</td>
</tr>
<tr>
<td>● No hay suficiente confianza entre todas las personas.</td>
<td>● Empiezan a reconocer intereses comunes.</td>
</tr>
<tr>
<td>● Los objetivos comunes todavía no están bien definidos.</td>
<td>● Identifican metas de trabajo.</td>
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<tr>
<td>● Las funciones aún no han sido definidas con claridad.</td>
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<tr>
<th>TERCERA FASE</th>
<th>CUARTA FASE</th>
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<tr>
<td><strong>FASE DE INTEGRACIÓN</strong></td>
<td><strong>“FASE DE MADUREZ”</strong></td>
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<tr>
<td>● Existe cooperación entre las personas que integran la organización.</td>
<td>● Cada persona que integra la organización tiene funciones definidas.</td>
</tr>
<tr>
<td>● Se establece una estructura grupal definida.</td>
<td>● Elaboran su plan de trabajo.</td>
</tr>
<tr>
<td>● Definen objetivos e intereses comunes.</td>
<td>● Existe buena comunicación.</td>
</tr>
<tr>
<td>● Se realiza una división de funciones y se define un reglamento.</td>
<td>● Resuelven conflictos a nivel colectivo.</td>
</tr>
<tr>
<td>● Aumenta el sentido de pertenencia a la organización.</td>
<td>● Se toman decisiones en grupo, incluyendo todas las opiniones.</td>
</tr>
<tr>
<td>● Se definen los Liderazgos</td>
<td>● Se auto gestionan necesidades, incluyendo las de las mujeres para la participación.</td>
</tr>
<tr>
<td>● Se desarrolla la Organización interna (nombramiento de junta directiva)</td>
<td>● Hay solidaridad y apoyo mutuo e identificación de intereses y objetivos comunes.</td>
</tr>
<tr>
<td>● Se intercambian ideas y opiniones.</td>
<td>● El clima del grupo es agradable para todas las personas que lo integran.</td>
</tr>
</tbody>
</table>
| **QUINTA FASE**  
**“FASE DE SOSTENIBILIDAD”** | **SEXTA FASE**  
**“FASE DE CONFLICTO”** |
| --- | --- |
| • Existen liderazgos compartidos y positivos para la organización.  
• Hay democracia, es decir, se toman en cuenta las opiniones y necesidades de todas las personas que participan en la organización de manera equitativa  
• Se han creado relaciones con instituciones y organizaciones nacionales e internacionales.  
• Hay equidad en las funciones que realizan todas las personas en la organización.  
• Existe reconocimiento de la organización en la comunidad.  
• Las personas integrantes pueden opinar sin ser censuradas.  
• Hay interdependencia, es decir, dependen una personas de otras.  
• El grupo se convierte en un espacio de confianza para las personas que lo integran.  
• Existe más preocupación por el trabajo en equipo, que por intereses personales. | • El grupo adquiere características de conformismo.  
• Las personas que integran el grupo comienzan a sentirse exhaustas tanto emocional y físicamente por el trabajo en equipo y la fuerte presión externa y abandonan el grupo.  
• El grupo se vuelve cerrado a la participación y acción externa (grupo centrista).  
• No hay proyectos innovadores, ni les interesan las actividades de fortalecimiento organizacional.  
• Las personas que lo integran se acomodan en sus funciones y desarrollan poca creatividad en su realización.  
• Hay recarga de trabajo y burocracia en la toma de decisiones en las personas directivas o con responsabilidades en el fortalecimiento interno.  
• Las personas integrantes del grupo se aprovechan de este grupo para hacer campaña política partidista o resolver problemas particulares.  
• Las personas en puestos directivos se prolongan en los mismos por varios periodos (se mantienen en el poder, sin dar oportunidad a otras personas con habilidades de liderazgo). |
Figure 32. Household-level consumption of selected individual food items in the cereals, seeds and nuts group. Only food items consumed in or above 5% of households in either group are presented. *Represents percentage of households in our sample that reported consuming each item.
Figure 33. Household-level consumption of selected individual food items in the meat, dairy and egg groups. Only food items consumed in or above 5% of households in either group are presented. *Represents percentage of households in our sample that reported consuming each item.