## CHILD SELF PROVISIONING IN A MARGINAL URBAN ENVIRONMENT

by

## SARAH ELISABETH LEE

#### (Under the Direction of TED GRAGSON)

## ABSTRACT

The project presented in this dissertation investigates how children's investments in food- and other resource-seeking behaviors external to the household influence their dietary quality. The three articles represent aspects of the same issue concerning children's ability to function in a marginal urban environment. I document child foraging in an urban environment, measuring and describing children's foraging activities. Urban children forage without adult supervision and in groups. Both boys and girls forage, but boys allocate more time to foraging, and girls were more frequently engaged in sibling care activities. Urban children share foraged food with their household and with siblings and peers. Children contribute to the household by engaging in childcare, housework, provisioning activities (including foraging, working for food or money and begging). Children's monetary contributions to the household are many times their own food budget (if calculate household food budget by number of people in the household). I test the idea that children's food- and other resource-seeking behaviors might make a difference to their nutritional wellbeing under the extremely marginal conditions associated with urban poverty in many developing world regions. However, provisioning status was not associated with variation in either longer-run (height-for-age) or shorter run (weight-for-age) nutritional status. A comparison of provisioning and nonprovisioning children showed that they had similar mean weight for age z-scores and mean height for age z-scores. Both foraging and other provisioning failed to predict the presence of anemia in children. The hypothesis that provisioning status will not greatly affect anthropometric markers of generalized caloric and protein sufficiency was supported. There was no significant difference between groups for any measures of dietary quality (including Dietary Diversity Score, Food Variety Score and caloric intake).

INDEX WORDS: Children, urban environment, foraging, diet, child labor, provisioning activities, time allocation, dietary analysis, Behavioral Ecology, Anthropology of Poverty, Nutritional Anthropology, Xalapa, Mexico

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## DOCTOR OF PHILOSOPHY

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## INTRODUCTION AND LITERATURE REVIEW

The project presented in this dissertation<sup>1</sup> investigates how children's investment in resource-seeking behavior influences their dietary quality and health. The overarching issue is in what ways children can benefit from self-provisioning behavior. This dissertation research is based on data collected from a sample of ninety-six children from Xalapa, Mexico over a thirteen month period. It documents child foraging in an urban environment, measuring and describing children's foraging activities. It examines the health consequences of child's time allocation to household provisioning. Finally, it tests the consequences of children's resource seeking behavior in the specific marginal conditions in Xalapa, under the guise that it informs on well-being of other children living under comparable circumstances.

The first article is concerned with better understanding the forms and patterns of urban child foraging, the characteristics, and the predictors of child foraging. This descriptive study documents how children forage in urban environments, specifically what form children's urban foraging takes, such as who forages, and what and how they collect food, the caloric value of foraged food, and more generally identifying aspects of the adaptive contexts of urban child foraging.

The second article addresses how children living in a marginal urban environment allocate their time, and whether differences in time allocation have implications for children's health in a marginal urban environment. In other words, can time allocation to childcare, self-provisioning (working, foraging, begging), or household

<sup>&</sup>lt;sup>1</sup> Funding was generously provided by Wenner-Gren Foundation for Anthropological Research, National Science Foundation grant #0350119, and the University of Georgia, Athens

work (house work, participation in household based business) have costs to a child's

nutritional health status? I specifically address the following hypotheses:

- Girls will engage in less provisioning activity than boys, and engage in more child care activity.
- Boys will have more leisure time and engage in more self-provisioning activities.
- Boys will have better nutritional status than girls due to more leisure and opportunities in provisioning time.

OR

 Girls will have better nutritional status than boys due to increased access to household resources.

The third and final article addresses the diet of self-provisioning children.

Children employed a range of behaviors to convert their free-time to food-getting, such

as scouring trees for fruit, running errands or working for money or food, or begging. I

defined children's provisioning as activities with the potential to increase access to food

or resources. I considered the dietary consequences of children's own provisioning

strategies (working and foraging) to their diets in the contexts of resource limited urban

environments, comparing children engaged in self-provisioning to those who were not.

The hypotheses are:

• Provisioning status will not greatly affect anthropometric markers of generalized caloric and protein sufficiency.

However, controlling for such factors as household food budgets, and child's gender:

- Foraging children will have a greater amount and diversity of fruit and vegetables in their diet than other children.
- Otherwise-provisioning children (those working formally or informally for money) will have a greater variety of food items, but lower overall dietary quality than other children, and eat more nutritional empty foods such as candy).
- Children who share the most will have higher dietary quality measures of sugar, fried food and sugared beverages than children who do not share.

Millions of children worldwide living under conditions of poverty regularly search

for food (forage), or work (see Figure 1.1 for example) or beg for money that can be

used to obtain food. Children of the poor begin at a young age to assume

responsibilities both inside and outside the home, and their participation is both needed and valued (Baker and Hinton 2001). Nepali families consider children to be capable of adult work around the age of twelve. A four culture study (Kenya, Belize, American Samoa, and Nepal) found that by the age of nine, the average time devoted to chores or work outside the home was twenty-three percent (Munroe et al. 1984). This is not limited to agricultural or industrial societies. Children in traditional foraging societies contribute independently to family diet as well as their own at early ages (see Draper and Cashdan 1988, Hawkes et al. 1995, Blurton Jones et al. 1994a). Given that children are capable of adult responsibilities, they must be credited with the ability to make decisions about their resources. This study seeks to document the dietary and monetary choices that children make in Xalapa, Mexico, a marginal urban environment.

#### Literature Review

The three articles in this dissertation represent aspects of the same issue concerning children's ability to function in a marginal urban environment. This dissertation followed the admonishment by Hirschfeld (2002) in an article entitled "Why don't anthropologists like children?" that children should be studied as themselves, not as adults interact with them or perceive them. More generally, anthropologists increasingly appreciate the important role of childhood to the human experience (Hirschfeld 2002). This research contributes to a growing recognition of the need to properly document and understand the role of children in human affairs, especially children as actors in their own lives (e.g., Scheper-Hughes and Sargent 1998, Panter-

Brick 2002). This idea strongly influences the rationale of this study as self-provisioning is seen as an autonomous behavior of children.

The term childhood refers both to a life phase, and to a set of economic, cultural, and social structures (Frones 1994). Length of childhood is culturally defined, as well as the rights and responsibilities of being a child. The institution of childhood varies cross-culturally, even as it forms a specific component of every known society (Behera and Trawick 2001). Qvortrup (2000) argues that children must not be viewed as miniature adults. This dissertation research drew on four areas of research: children in behavioral ecology, time allocation research, children in urban anthropology or the anthropology of poverty, and nutritional anthropology.

#### Children in behavioral ecology

Historically, children as foragers have not received a great deal of attention from anthropologists. Recently, behavioral ecologists interested in testing Optimal Foraging Theory have examined child foraging tactics (Winterhalder and Smith 2000). The general thinking on children as foragers is that they are efficient foragers in a manner very different from adults. This could be due to their smaller stature, decreased upper body strength, etc. However, most agree that it is not due to a cognitive difference. Children are extremely knowledgeable about the resources in their environment and methods of extraction. Their resource choices differ from adults, but usually provide optimal returns per energy invested. The type of environment will have a direct effect on whether a child forages (Blurton Jones et al. 1994b, Draper and Cashdan 1988). Research also suggests that children can contribute to a family's food through their efforts, even if it is only by aiding in processing (Hawkes et al. 1995).

Chapter 2, "Urban Child Foraging in Mexico: Do Hunter-Gatherer Models of Childhood Food Gathering Apply?", addresses the question that if there are rules that apply to child foraging, as is suggested in the hunter-gatherer literature, do they apply regardless of the child's context. Provisioning children that live at home have very similar patterns of behavior to foraging children also living at home. Studies with street children show that they might actually do better if not living at home. However, foragers in urban and traditional foraging environments show some similar characteristics, perhaps because foraged foods make up a part of the diet for both groups, but not the most significant part. This raises fascinating questions, for future research, about what are children actually getting out of foraging? Some possible answers might be social networking and a further development of the culture of childhood.

The study contributes to current debates in behavioral ecology in several different regards. First, it expands consideration of children's "foraging" to contemporary environments, such as urban areas. Almost all child foraging research has been conducted in rural environments (Blurton Jones et al. 1994 a, b, Draper and Cashdan 1988, Hawkes et al. 1995). Second, it contributes to a small but growing body of research on children as foragers.

A current debate in contemporary behavioral ecology concerns the adaptive function of child foraging behavior. By focusing on the comparative nutritional and health status of self-provisioning children, this study contributes to this debate. It is now increasingly recognized that children's foraging among hunter-gatherers is possibly productive in itself and not just a training exercise in preparation for productive foraging in adulthood (Bird and Bliege Bird 2000). Also, child foraging is different in form than

adult foraging in terms of items selected and processing methods, but nevertheless provides positive returns for effort (Bird and Bliege Bird 2002). Recent research indicates that child foraging is perhaps constrained not by intellect or training, but by the upper body strength needed to exploit some adult resources. This is demonstrated by Meriam children's ability to quickly reach adult efficiency for relatively complicated line fishing, but fail to do so in shellfish collecting which requires more strength (Bird and Bliege Bird 2002). MacDonald (1997) notes that malnutrition and environmental stressors slow physical maturation; therefore, children who provision may be counteracting the effects of a poor diet in order to achieve maturation. A few studies suggest that in some environments children may even contribute to family diet as well as their own (Draper and Cashdan 1988, Hawkes et al. 1995, Blurton Jones et al. 1994a), thus possibly contributing to their sibling's reproductive fitness (Kramer 2002).

Behavioral ecologists have begun to realize the importance of children's own contributions to their subsistence (Bird and Bliege Bird 2000, Blurton Jones et al. 1994a,b, Hawkes et al. 1995). For example, Hawkes et al. (1995) demonstrated that Hadza children provide a significant proportion of their daily caloric needs through foraging, even as young as age five. Although studies are few, it is also possible that young children in contemporary environments could significantly contribute to their own subsistence. Such self-provisioning might be expected to be most beneficial (i.e., adaptive) for children living under severe resource stress, such as the urban poor in developing countries (Baker et al. 1997, Panter-Brick et al. 1996a,b, Panter-Brick 2000).

This question of the function of child foraging or provisioning articulates with more general concerns of human life history, including whether childhood can be

viewed as a unique period of intellectual development (Bogin 1997, 1998), a strategy to extract more parental investment (Haig 1999), a period of waiting in a protected state of lower nutritional requirements (Mace 2000), or unnecessarily prolonged relative to achieving adult subsistence proficiency (Blurton Jones and Marlowe 2002) (see especially Bock and Sellen 2002).

#### Time allocation research

Chapter 3, "Health consequences of urban children's time allocation to selfprovisioning, household work, and child care in Xalapa, Mexico", addresses how and why children allocate the precious and finite resource of time. An unresolved issue in time allocation research is whether the adaptive contexts of time allocation in children might operate similarly or very differently from that of adults. Bock (2002) documented working versus school time allocation of children in Botswana. He notes a potentially crucial aspect of gender on time allocation, and its adaptive consequences. In his study, girls allocate much more time to household chores than boys. Educational consequences include the finding that first born girls are less likely to attend or complete school whereas first born boys are more likely to attend school than later born siblings. In another study, rural Nepali girls spent twice as much time engaged in heavy work than boys (Yamanaka and Ashworth 2002). Surprisingly, this differential time allocated to heavy work did not influence health status as much as location; children living in the mountainous region were more stunted than those living in the plains. Frequently, children are the primary caregivers for younger siblings (Weisner and Gallimore 1977); however, in urban areas this behavior may have negative health consequences, as suggested (but not tested) by Stansbury et al. (2000). Time allocated directly or

indirectly to sibling care may have complex and crucial adaptive consequences for the family and household, as was seen in the findings of Kramer's (2002) study among the Maya. She found that older children produce more than they consume for many years before leaving home and parent's production is not sufficient for the traditional large Mayan family without assistance (usually provided by their older children). Mayan children's age of net production is 15 for girls and 16 for boys. The children in this dissertation contributed to households substantively, allocating time to childcare, household chores, and family enterprise. In addition, a majority of children who worked contributed some or all of their income to the household, easily paying for their food budget per person. Continued research may reveal a similar pattern to Kramer's Mayan agricultural studies in terms of age of net production.

This study also documents gender based differences in time allocation: boys spend more time in informal provisioning and foraging activities than girls and tend to go further for longer periods of time for resources, and girls devote more time to child care However, none of the differences in time allocation is statistically significant. It is possible, but untested, that girls that stay home do have more access to the household resources, and boys that have more provisioning activities do benefit nutritionally, and they cancel each other out in terms of significant differences in health. These findings are inconsistent with findings of time-allocation studies with agriculturists (Bock 2002, Draper and Cashdan 1988, Yamanaka and Ashworth 2002), which found significant gender differences in time allocation. Some foraging research has noted that boys and girls appear to be able to contribute more-or-less equally to their own diet, even though boys forage farther afield than girls (Blurton Jones et al.1994 a, b, Hawkes et al. 1995).

This notion of possible gender differences in the local adaptive contexts of behavior fits with the view that even though boys and girls live in the same households and can be in the same peer groups, they inhabit local socio-ecologies or "developmental niches" that are unique from each other. These are in part created by the gender norms imposed by other social actors (Worthman 1994, Super and Harkness 1986, 1994).

## Children in urban anthropology or the anthropology of poverty

The idea of studying children in poverty is not new, but encouraging anthropologist to consider the biological dimensions of poverty in their studies is (Leatherman and Goodman 1997). These anthropologists describe the importance of incorporating biocultural approaches to biological effects of poverty (such as hunger). Dufour et al. (1997) examined the coping and behavioral strategies employed by women to adequately feed themselves and their families. Also relevant are the behavioral changes considered the first line of defense to maintain energy levels and prevent the body from going into biological changes brought on by malnutrition. Even if a child's dietary needs are satisfied, there are psychological and socioemotional problems that can develop due to poverty (Eamon 2001). Eamon (2001) also advocates a systems approach to studying children in poverty, as there are many layers of factors that affect a child's emotional and physical well-being. She notes that a child whose father is out of work will experience greater emotional disruption than from grinding poverty alone. Scheper-Hughes (1992) demonstrates a deep understanding of how poverty and hunger affects behavior. This study contributes to an increasing awareness of the importance of understanding human biology and adaptability in urban contexts, including how urban contexts constitute distinct adaptive environments and how this

affects child health (e.g. Schell et. al 1993, Schell and Ulijaszek 1999, Schell 2002). Historically, the vast majority of studies of human adaptability, including growth and nutrition, are based in rural or semi-rural populations. The majority of the world's children now live in urban settings, many of them in poverty. A full and proper understanding of contemporary human biology requires more sustained research on human adaptability to marginal urban ecosystems. Appropriately, research on children's adaptability in urban contexts now often takes the form of the 'biology of poverty' (Leatherman and Goodman 1997) and seeks to identify specific stressors in children's environment (Schell 1997).

### Nutritional anthropology

Relevance to nutritional anthropology includes a broader understanding of how children's activities outside of the household might form a substantive and even crucial portion of their diet and nutrition. Chipeniuk (1995) has documented the strong disposition for children to forage for a wide variety of items, even when it is not encouraged by parents and under unfavorable environmental conditions. This is supported by this dissertation: children who foraged did so without any direction or supervision by adults. Such self-provisioning has been essentially hidden to researchers because of the limits of standard nutritional methods in this regard (Quandt 1986). By using ethological observation of children's behavior, this study will be better able to document and explain the relevance of children's own activities for their nutrition. In addition, researchers may have missed the importance of child self-provisioning because these foods are often not classified culturally as 'food' (Fleuret 1979, Huss-Ashmore and Johnston 1997). Rather these items are 'children's food' that all adults ate

at one time, but do so no longer since they have access to different resources (Bliege Bird and Bird 2002). Fleuret (1979) noted that opportunistic snacking of wild fruits and greens accounted for a significant portion of Shamba children's diet, but were not included in dietary recalls because this consumption was not part of a 'meal'. This project used a biocultural approach to better understand these often hidden aspects of child nutrition. Further, this study used the contexts of both the individual and the household to fully understand the pathways of food to the child's overall diet. The focus on individual responses is recommended for dietary analysis (Quandt 1986) whereas the household provides the context of food procurement and use and mediates laborforce participation and food consumption patterns (Lieberman 1986). The design of this project allowed for both perspectives to be developed and inter-related.

### **Research Context and Setting**

This research was conducted in Xalapa (also spelled Jalapa), Veracruz, Mexico (see Figure 1.1 for map) from October 2003 to November 2004. I selected this location because of the presence of a large population living in poverty conditions and the social acceptance of child labor outside the home. Pilot research in the summers of 2001 and 2002 confirmed the suitability and feasibility of conducting this research there. In addition, the University of Georgia has a partnership with the University of Veracruz, which facilitated gaining a research visa. I collected a sample of 96 families living in poverty conditions. In order to understand the results of this dissertation, it is important to contextualize the children's lives within the broader framework of Mexico.



Figure 1.1 Map of location of Mexico and Xalapa

Specifically, I give a very brief history of Mexico and government services (education and health care) that are important to the urban population. I describe urban poverty in Mexico and how urban poverty and government services play a role in the lives of the families I studied.

#### <u>Mexico</u>

Mexico is a complex and interesting country, playing host to some 107,449,525 people (as of July 2006, according to CIA Factbook). On its northern border is the United States of America, Belize and Guatemala on the southern border, and it has coastlines on the Caribbean Sea, Gulf of Mexico and Pacific Ocean. Spanish is the official language, although there are over 62 living indigenous languages. In 2000, there were over six million persons classified as indigenous and 92 indigenous groups. Mexico has a long history of civilization, starting with the Olmec culture (sometimes called the Mother culture of Mexico), which lasted from 1500 BC to 300 AD. The Mayan culture dominated from 300 to 900 AD, followed by the Aztecs. The Spanish conquest in 1521 marked the end of the Aztec rule, and the beginning of three centuries of Spanish control of the country. The Spaniards left a lasting legacy of the Spanish language and the Roman Catholic Church; currently, at least 89 percent of Mexicans are Roman Catholic. Mexico won independence from Spain after an 11 year war (1810-1821).

Mexico (United Mexican States) has 31 states and a Federal District. The government is a representative and democratic republic. In 2000 there was a dramatic change in political power when for the first time in seventy years, the Institutional Revolutionary Party (PRI) lost in a fair election. Vicente Fox of the National Action Party (PAN) took office on December 1<sup>st</sup> 2000.

In 1994, a devaluation of the peso threw the country into an economic recession. It is still recovering. Trade with the US and Canada has tripled since the implementation of NAFTA in 1994. Mexico has a free market economy of about a trillion dollars (CIA Factbook 2006). The greatest economic and social concerns include: low real wages,

underemployment, inequitable income distribution, and few advancement opportunities for the indigenous populations.

Mexico's population grows at an estimated rate of 1.4 percent. Over a third of the population is under the age of fifteen. The majority of the population resides in urban areas. An estimated 1.5 million Mexicans migrated to the United States in the last five years. The leading cause of death is heart disease, followed by various cancers, diabetes and accidents. Overall, mortality from infectious disease has declined, but the incidence of HIV/ AIDS and tuberculosis is on the rise (PAHO 1998).

### Health Care:

The Mexican health care system can be broken down into three levels (see figure 1.2). The first level provides services to over 40 percent of the population and is only for persons employed in the formal sector (that is, tax paying). The Mexican Social Security Institute (IMSS) provides services to workers and their families in the formal sector and retirees. Employers and employees pay a small fee to the federal government, and this allows them access to IMSS. This is by far the best medical care for the money available in Mexico. Jobs that offer access to Social Security hospitals are prized. The remaining sixty percent of the population can be divided into two groups: the wealthy that use private doctors and hospitals (private sector or *sector privado*) and the poor or self-employed (in the informal economy) that have access to SSA or the health secretariat.



Pemex: Mexican Oil Company

ISSSTE: Institute for Safety and Social Services for State Workers

IMSS: Mexican Social Security Institute

SSA: Health Secretariat

OCS: Health Maintenance Organizations

Figure 1.2 Mexican Health System's Three Components: Social Security, Health Secretariat and Private Sector (Gómez-Dantés et al. 2004)

The SSA consists of small hospitals and clinics paid for by general taxes. In terms of quality, the private sector is the best, but most expensive. The IMSS hospitals are well-staffed and respected. For the poor, specifically the urban poor, the closest SSA clinic is their only real option. Hypothetically, anyone can buy IMSS "insurance" for \$100 to \$250 USD a year. In practical terms, this cost to prohibitive to all but the wealthy. Thanks to government subsidies, SSA services are relatively affordable, but still too expensive to use for any but the most serious of illnesses. Health brigades make periodic tours of extremely poor urban and rural areas to provide vaccinations, nutritional evaluations, and food supplements to those diagnosed with malnutrition. This service, however, is spotty at best.

Ethnographically, people in poor urban areas use the local, poorly-stocked pharmacy as their primary health care facility, relying on the pharmacist to diagnose and prescribe medicines for minor illnesses. In the last ten years, the government has implemented programs (PROGRESA which was later renamed OPORTUNIDADES) to provide a wide range of services and care to the poorest populations in Mexico. This will be further discussed below.

## Education:

Approximately fifty-four percent of all students in Mexico attend a six-year primary-school program that, together with preschool, special education, and secondary school, constitutes the basic education system (Library of Congress 1998). If a student successfully completes their primary education, they may enter a three-year secondaryschool program, or vocational-education program. In 1996, only nineteen percent of students attended a secondary school. Ten percent of students continue on to mid-level education: a three-year college preparatory program (the *bachillerato*), or advanced technical training. Approximately five percent of all students were in postsecondary institutions: four-year college and university education (the *licenciatura*), or postgraduate training. Parker and Pederzini (2000) argue that given the level of GDP, the Mexican population has on average two and a half years less education than what it "should" have with respect to other Latin American countries.

The Mexican government aims to provide universal primary education, but it is still an on-going process. Based on student test scores, quality of primary school education is low (Palafox et al. 1994). The primary school day lasts for four hours, including a half-hour recess. Schools have two shifts, morning and afternoon, to allow for greater student enrollment. It also allows for children to work either in the mornings

or the afternoons. Indeed, more children who attend the afternoon session usually work informally, either for wages or in the family business (Palafox et al. 1994). Secondary education is not as accessible as primary education. There are fewer schools, and those are usually centrally located, which means inaccessible to poor urban and rural students. A study in 2004 (Coady and Parker 2004) demonstrated through GPS that less than a third of children in Mexico had a secondary school in their community. This is being addressed by building more secondary schools and having a nominal staff using distance learning through cable television (*telescondarias*). According to the Library of Congress (1998), many primary- and secondary-school-age students in Mexico fail to complete their education programs. Nationally, there was only a 55 percent graduation rate from primary school, falling to ten percent in many rural areas.

A 1998 evaluation determined that the system overly centralized and subject to bureaucratic encumbrance. The Department of Education and the Federal government accordingly decided to implement some changes. Powerful teachers unions made changes in the educational system difficult. The National Union of Education Workers (*Sindicato Nacional de Trabajadores de la Educación--SNTE*) strongly opposed efforts to decentralize curriculum and program management and retrain teachers for fear of losing political influence. At the same time, however, the government consistently allocates few resources to evaluate school system performance (Library of Congress 1998). Ethnographically, during the time period when this research was conducted, the teachers unions conducted a series of strikes that kept students out of school for weeks at a time. The reason for the strikes at that time was for salary raises.

Urban Poverty in Mexico:

Depending on how poverty is measured, the percentage of Mexicans living in poverty in 2004 was 39.4% whereas in 1999 it reached 45.1%. (Berg et al. 2007). A relative standard of poverty reflects the observationby Adam Smith: poverty is the lack of those necessities that "the custom of the country renders it indecent for creditable people, even of the lowest order, to be without" (1776:691). Thus poverty in Mexico is different from poverty in the United States, and poverty in 2006 is different from 1966. A UNICEF definition of a household living in poverty is one that requires the labor of children to meet basic household needs (Gordon et al. 2003).

Poverty in Mexico, as in other Latin American countries, is fundamentally urban (de la Rocha and Gantt 1995). Grinding poverty does exist in rural areas, but the face of poverty is changing from failing agricultural areas to urban slums. This is partially due to rural-urban migration and increasing dependency on the cash economy. Satterthwaite (2003) argues that poverty in urban areas can be more severe due to the paucity of "free" resources (such as building material, foraged foods, and water). He contends that this pattern is why urban squatter slums are on the rise because they are at least rent-free. The economic crisis of 1994 had the practical effect of shrinking the already small middle-class, and the lower-class became poorer. De la Rocha (2001) documented the struggle for urban households to earn sufficient incomes. She noted that Mexican urban poor engaged in a wide variety of self-provisioning activities with a large percent of household members, but that this flexibility is being strained to the point that it is no longer enough to meet the needs of the household.

Government responses to poverty: PROGRESA and OPORTUNIDADES

In August 1997, the Mexican government introduced the *Programa Nacional de Educacion, Salud, y Alimentacion* (PROGRESA) (national education, health and nutrition program) with dual objectives, namely (1) to alleviate current poverty through targeted cash transfers, and (2) to generate a sustained decrease in poverty by investing in human capital (i.e., education and health status) (Coady 2001). PROGRESA, renamed *Oportunidades* in 2002, is the principal anti-poverty program of the Mexican government. By providing cash transfers to households (linked to regular school attendance and health clinic visits), the program also fulfills the aim of alleviating current poverty (World Bank Report). Once households are deemed eligible for the program, they receive benefits according to a set structure. There are two types of benefits: a small education stipend and a cash subsidy for regular health check-ups. Mothers receive the money every two months. Families are reevaluated every six months to a year.

The goal of *Oportunidades* is to increase a family's investment in the future of their children by alleviating some of the costs of education, health care, and nutrition to break the cycle of intergenerational poverty. The underlying goal is to provide enough for the children that the family does not need their income. Thus, the idea of *Oportunidades* is to provide sufficient supplemental income so that parents will send their children to school instead (Skoufias 2001). *Oportunidades* has helped over 4 million families, 2.5 million families in rural areas and over 1.5 million in urban areas. *Oportunidades* also has significant commitment from the government, currently

representing 46.5 percent of Mexico's federal annual anti-poverty budget (about 0.2 percent of the GDP).

Critics of the program note that the access to health care is still irregular and of poor quality and educational quality is still low. Todd and Wolpin (2003) note that the existence of an active child labor market and low number of hours required by school attendance will not change child participation in the economy – at least in the informal sector. Working children, as will be later demonstrated, earn a large percent of the household food budget. While any additional income is welcome, government subsidies are still a small amount of money. They argue that poor urban families need government aid and income from child labor. The benefit of *Oportunidades* is that children will be encouraged to stay in school at least through primary school and continue on to secondary school.

Ethnographically, sociologist friends who worked to implement *Oportunidades* found the program cumbersome and *muy poco*, meaning too little. The effort required for a family to gain 120 pesos was not worth it considering the amount of money to be made from children working just a few hours a day. In addition, the extensive interviews, paperwork, doctors' visits, and classes for mothers, were perceived as intrusive. The government's hope is that the accumulation of benefits, including access to health care and supplemental income is enough to encourage families to participate and keep their children in school versus encouraging them to work.

Xalapa, Veracruz:

Xalapa is the capital city of the state of Veracruz. Xalapa is home to approximately 500,000 people according to the last census in 2000, which is almost double the 1990 count of 279,451. This doubling of the population is fueled at least partly by *campesinos* moving in from surrounding areas for employment. Xalapa is located at 4,200 feet above sea level in the valleys of five hills in the Sierra Madre Oriental Mountains. It is a rich environment, full of fruiting trees and lush growth, and very high rainfall. It is famous for the coffee that grows in the surrounding hills. In 1997, world coffee prices took a dramatic plunge, affecting the farmer in two ways: miniscule profit for coffee and fewer farm hands to harvest and maintain the coffee plants (Porter 2000). During this period, migration to nearby cities and across the border to the United States increased exponentially (USAID 2004). Families who used to rely on seasonal agricultural work had to look elsewhere to supplement their income. Anecdotally, I know of at least five coffee plantations left wild because the owners could not pay coffee pickers. Coffee plantations nearby Xalapa pay one peso for one kilo of picked coffee. Several families in this study were seasonal coffee pickers. The adults were able to pick more than fifty kilos each day, and the children could pick fifteen to twenty kilos. Seasonally, this provided a fairly good return for the family's time. One girl relied on her "coffee money" to pay for school supplies and field trips.

Xalapa, like many old colonial towns, has a well-established center where the cathedral and government buildings are located. This is an expensive part of town in which to live, and none of the participating families lived there. However, many families worked in this central area, some making an hour bus trip each way everyday. Instead,

the research occurred in about thirty different neighborhoods located on the outskirts of the city center, or even further out where it was possible to live without paying rent, by virtue of setting up a shack and living without formal running water or electricity. Some neighborhoods were more urban than others. Approximately half of the sample came from peri-urban neighborhoods, where it was common for there to be seasonal fruiting trees, home gardens and livestock. In the more developed urban neighborhoods, it was rare for a family to have fruit trees or gardens, but still common to have some chickens.

The peri-urban neighborhoods are the result of a burgeoning population, without the benefit of urban planning. Most of the families in these areas have moved there in the last ten years and claimed the land as their own as it was not in use. One subdivision, called "La Reserva", was actually government land set aside as a land reservation, without the intent of urban development. This land borders abandoned fruit and coffee plantations that house what little wild life is in the area. As Xalapa became more crowded and expensive, squatters moving to the area for work developed the shanty neighborhoods. In fact, some families moved to *La Reserva* to get away from the crime of other urban neighborhoods. The advantage of living in peri-urban neighborhoods is there was rarely any rent, and water and electricity was stolen from public water and power lines. However, this was subject to periodic raids and shortages. Neighborhood associations raised funds to create roads or to pave existing roads. It was very common for there to be no roads into these areas. Peri-urban dwellers also had the advantage of the run of abandoned fruit and coffee plantations and the ability to clear a little land to plant a garden or raise livestock.

Urban neighborhoods had the advantage of usually having paved roads (but not always) and usually having running water and electricity (but again, not always). These neighborhoods were located closer to the center of town and therefore, closer to jobs. However, more families paid rent to live in these neighborhoods, though it was still possible to live as squatters on empty plots of land. Of the participating families, only eight paid rent of any sort.

All the children participating in this study had access to primary education and all but three went to school whenever it was in session. Of these three, one did not go because he lacked "papers" (birth certificate and immunization records), another was bored, and the last was taken out of school because her parents felt she had achieved her academic potential. Four children chose to go to an alternative school sponsored by an NGO *Matraca* that catered to working and street children. Primary schools in these poor neighborhoods and shanty towns were also resource poor and erratically staffed by student teachers from the excellent local teacher's college (*Escuela Normal*). Parents joined together to clear land for a football field or dig a latrine as was needed.

Health care needs were met through a variety of measures. Most families used neighborhood pharmacies, trusting the pharmacist to diagnose their illness and prescribe the appropriate medications. About half of the families (46) had children enrolled in *Oportunidades* (and another 20 were waiting to be enrolled) which provided for regular health check-ups and nutritional supplements. Health brigades provided vaccinations during health drives at certain times of years. For a serious illness or emergency, families used free clinics and the SSA hospital. Due to the central location of the clinics, it was inconvenient and costly to make use of the facilities. One knew

something was seriously wrong if a family made the effort to go to the hospital. Rarely discussed, but present, were non-traditional medicinal practices, such as a *curandero* for persistent cases of *mal ojo* (evil eye). Women in several of the neighborhoods were herb women, conversant with the proper herbs to kill intestinal worms or heal aching eyes. A very popular university extension program offered free classes on herbal healing. There were also other healers that specialized in giving injections or massage.

The urban shanty town areas and the poor urban neighborhoods of Xalapa reflect poverty in the rest of Mexico. The economic pressures on Mexico generated by NAFTA and a recession also affected the lives of these families. The families in this study struggled to make ends meet working in the informal sector, with access only to the lowest rung of health care and primary education. Many of the families received government aid. For many families, children provided necessary labor, both inside and outside the home.

#### **Overview of Sample and Methodology**

#### Data Collection and Description of Sample

I collected data on 96 children from 96 different households during the thirteen month period between October 2003 and November 2004. I selected households for participation based on the presence of at least one child between the ages of 8 and 12. Circumstances (more fully explained below) did not allow for a random sampling of neighborhoods. I had almost a 95 percent retention rate, after a family accepted and data collected had begun. I lost only six families: in two the children decided they no longer wanted to participate, one family unexpectedly moved, and three families simply

were never home at the time of the scheduled visits. This high rate of completion for the study indicates that the research tools were not too onerous for the child or family.

I relied on snowball sampling and recommendations from outside figures such as community leaders, priests, and charitable organizations such as *Matraca* and Caritas. I also hired sociologists as field assistants who had worked in some of the neighborhoods for school projects, or lived nearby and knew people in the communities. I discovered that if a priest certified the research, catechism teachers would produce a list of children in the right age range willing to participate. These wonderful women would then take me and my field assistants around the neighborhoods and introduce us. I found that if one family in a neighborhood would agree to be involved in the study, others would follow. Once a household was identified as suitable, the mother was invited to participate, and if she was willing, the child was also asked to participate. In the case of more than one child in the age range (as was frequently the case) the child with the most recent birthday was asked to participate in the study. Sometimes this child did not want to participate but a sibling did. In this case, I accepted the willing participant.

In order to select families from similar socio-economic backgrounds, I identified key neighborhoods within the city of Xalapa that were considered by residents to be "very poor" or a "shanty town". Some of the very poor neighborhoods were located more centrally to the downtown area of Xalapa, whereas the shanty towns were all on the outskirts of town. I used the location of the household in these neighborhoods as a socio-economic indicator, in addition to the appearance of the house and presence or absence of high status items (like a car or truck). There is a large range of incomes, but a surprising uniformity in the way people lived. For example, in the shanty towns, only a

few families had permanent concrete walls, but all had televisions and a radio or stereo (along with stolen electricity). The accuracy of the income data as reported by the women is questionable for several reasons. First, the women distrusted the interviewers. Second, many families were on government assistance for being below a certain income bracket and they did not want to admit if they had an income higher than that amount. Third, and most significant, wives did not know exactly how much money their husbands made, but only knew how much money was given to them for household expenses. For this reason, the variable of "monthly household income" and "monthly food cost" were used together. Money spent on food each month is an accurate indication of household socio-economic status.

#### Household characteristics

The average home had laminated cardboard or zinc for walls, laminated cardboard or zinc for the roof, and usually a dirt floor. In areas where trees were available, wooden walls were more common. (See table 1.1 for a breakdown of material used in homes) Most houses (52) had a hard packed dirt floor, that was swept daily, or a cement floor (44). Nine homes had a tile floor. Fifty-one houses used cinderblock and poured cement for at least some of the walls. This was by far the preferred material for walls as it kept the rain out, but it was the most expensive. Sometimes walls would be slowly converted to cement blocks as finances allowed. Cardboard and laminated cardboard was more readily available and inexpensive (used in 31 homes). Unfortunately, with the steady rain, this material was not weather proof and deteriorated rapidly. Hand hewn wood slats or found plywood made up the walls in 28 homes. The walls were chinked with rags, plastic bags, or mud to minimize cold drafts. Laminated

cardboard and tin were the most common material for roofs (67 homes), with the fortunate possessing a cement or tile roof (32 homes).

All homes demonstrated an inventive spirit and a willingness to use whatever could be pressed into service to make a home. Very few homes used all of only one material for walls and roof. One family flattened out kerosene tins for the roof, and another used cement bags sewn together to make the interior walls. Politicians bought votes by promising zinc roofs for loyal party members. Many homes were in a constant state of being "under construction" as improvements were made whenever there was extra money.

	Home Construction			
Materials	Floor	Walls	Roof	
Dirt	52	1	0	
Cement	44	31	24	
Tile	9	0	7	
Cement block	0	20	1	
Wood	0	28	5	
Cardboard	0	8	5	
Tin	0	6	32	
Laminated Cardboard	0	23	35	
Plastic	0	3	5	
ND	2	3	3	

Table 1.1 Materials Used in Home Construction.

N=96 \*Most homes used more than one construction material for floors, walls, and roof.

Of the ninety-six households, 68 had either running water in the house or a hose with a connection to running water. The remaining twenty-seven used neighbor's water or collected water in buckets from a communal tap. (See table 1.2 for a description of household amenities.) Every household had electricity; however, this was usually due to stealing electricity from city power lines. Sometimes these connections went for blocks
and were potentially dangerous when it rained (which was frequently). Seventy-two households had some form of toilet. Some homes had actual flush toilets with a drain that joined a sewer line. In the peri-urban neighborhoods, a toilet meant a hole with a tube that took the waste away from the house, usually to a nearby stream. In fact, one common aspect of most of the neighborhoods was an open ditch or natural stream that acted as the sewage system. Unfortunately, this was where children loved to play. Twenty-eight households did not have a toilet, but used that of neighbors or went to the bathroom somewhere outside.

	Household Amenities									
	Water in House	Electricity	Toilet in House	Cooking F	uel					
Yes	68	95	72	Wood only	51					
No	27	0	20	Gas only	10					
				Both	34					
No Data	1	1	4		1					
Total	96	96	96		96					

Table 1.2 Description of Household (water, electricity, toilets and cooking fuel).

Families used both gas and wood for cooking fuel. Only ten families could afford to use only gas to cook all their food. Thirty-four of the participating families used both. Those living close to green spaces collected fire wood, but firewood was also for sale in the markets, and vendor sold firewood in the street. Some enterprising children gathered and sold firewood door-to-door. Gas was extremely expensive (and often listed as the greatest household expense). Families bought canisters of gas, and sometimes the gas ran out before payday. Those that could also use wood, preferred to light a wood stove to cook things that required a long time, like beans and corn, (and bath water) conserving gas as much as possible. All the homes had at least one table, one chair, one bed and one television. Variation in household furnishings was more visible in the number of beds to members of the household. The very poor slept two to three to a bed, whereas the relatively welloff households had fewer to a bed. One household of eleven people had one king-sized bed in which the parents and the two youngest children slept. The others slept on pallets on the floor. For the total population of all the households participating in this study (506) there were 247 beds to go around, with an average of 2.05 persons per bed.

Occasional household food shortages follow a lack of cash income. When this happened mothers indicated during interviews that they narrow the diet to the cheapest possible foods (beans and tortillas) have fewer meals. A money saving strategy was to buy corn kernels in order to soak and then grind to make the *masa* (corn dough) for home made tortillas. To a large household, the 8 pesos for a kilo of machine made tortillas was prohibitive. This way, the cost was 2 to 3 pesos. Milk (at 10 to 12 pesos a liter) was considered a luxury item and used sparingly in children's morning coffee. A large household could easily go through a liter of milk during one meal. Meat was used frequently, but sparingly, for added flavor. Most families had at least one "meat" meal a week, where chicken or a cut of meat was the principal component. Mothers listed food as the greatest household expense, followed by utilities and school supplies. The three families that paid rent said that was the greatest household expense. Some participants listed more than one item.

Table 1.3 Greatest House	ehold Expense
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Number of Households by Greatest Household Expense										
		Doctor/		Clothes/		Transport/	Furniture/Building			
Food	School	Medicine	Utilities	Shoes	Rent	Gas	Materials/Water			
46	25	4	21	3	3	13	5			

## Demography

The size of the participating household ranged from 3 to 14. The average household size was 5.9, with the most common household size being 5. Table 1.4 provides a breakdown of household size by number of household members. It was common for members of the extended family to live together. For example, one of the households consisted of a woman and man, their four youngest children, and three grandchildren. Another household consisted of three sisters and their children living together (the fathers were not involved with their children).

Table 1.4 Household Size

		Household Size									
	3	4	5	6	7	8	9	10	11	14	ND
Number of											
Households	4	18	28	17	12	6	3	2	3	1	2
N-96 Average household size 5.9											

N=96, Average household size 5.9

The average number of children living in the household was 3.6. This is not the total number of children of the mother of the house, but the number of the mother's children still living in the house. This caused some confusion. When I asked the question, "How many children do you have?" I assumed that this would elicit the total number of children the woman had given birth to or the number of surviving children. However, the question was often interpreted to mean the number of children living in the household. Indeed, for the purposes of this study, the number of children living in the household is the most relevant variable. The most common number of children was

three, with 28 participating households having three children. Five families that participated in the study had only one child at the time of the study. The largest number of children living in the house was ten. However, one household held 14 people. Table 1.5 provides a breakdown of the number of children per household.

Table 1.5 Number of Children per Household

	Number of Children in Household									
1 2 3 4 5 6 7 8 9 10										
3	19	28	20	10	10	0	2	0	1	
	1	<b>1 2</b> 3 19	Numb   1 2 3   3 19 28	Number of C   1 2 3 4   3 19 28 20	Number of Children   1 2 3 4 5   3 19 28 20 10	Number of Children in Hou   1 2 3 4 5 6   3 19 28 20 10 10	Number of Children in Househ   1 2 3 4 5 6 7   3 19 28 20 10 10 0	Number of Children in Household   1 2 3 4 5 6 7 8   3 19 28 20 10 10 0 2	Number of Children in Household   1 2 3 4 5 6 7 8 9   3 19 28 20 10 10 0 2 0	

N=96, average number of children per household 3.6

I worked almost exclusively with the mother or female caretaker of the child who participated in the study. In three households, the mother was not present in the household. These participating child ren were taken care of by a grandmother in two cases and an aunt in a third case. Of the participating families, 63 mothers worked in some way to earn money. Of these, 31 mothers worked by cleaning: house cleaning, office cleaning, laundry or as a housekeeper. Eighteen mothers sold food either parttime in their own entrepreneurial business or worked for a shopkeeper. A few mothers worked full-time as factory workers. One mother was a social worker. One mother was (very discretely) a prostitute. The majority of working mothers worked part time or in informal jobs where they could dictate the hours. Many of the women worked over the objection of their husbands, and many requested that I not tell their husbands that they worked.

Due to working schedules, it was normal to never meet the father of the child. I asked about the husband's occupation and income, but I was never sure if the man in question was the biological father of the participating child, step-father or boyfriend of

the mother. Also, for good Catholics, getting married in the church is a serious commitment. One couple who lived together for fourteen years decided it was time to get married, and their two children were part of the ceremony! So, many partnerships are not formalized by either church or state. In Mexico, as in many other countries, it is common for a man to have a "second family". Some of the families in this study were the "second family", and the father of the children was only occasionally present in the home. Of the ninety-six participating families, 70 had a father figure that was present in the house. Twenty-six households did not have a father figure present: of those, three were in the United States and one was dead. During the time of the study, two fathers came and went from the United States and many more had entered into the U.S. at some previous time.

#### Income

The minimum wage in Mexico is \$48 pesos a day, or about \$1,000 pesos a month. The Mexican Secretariat of Labor (1999) computes on a quarterly basis the daily and monthly cost of a minimum 4.6-person family consumption basket (*canasta de consumo familiar mínimo*). For the first quarter of 1999, the cost of the minimum family consumption basket was \$168 pesos (US\$17.09) per day, or \$36.53 pesos (US\$3.71) per person per day. The consumption basket includes food, clothing, household furnishings, goods and services, personal services, transportation, education and entertainment. Therefore, the absolute minimum monthly requirement for a household of 4.6 persons is \$5,110 pesos (US\$480). Eleven households have a total household income higher than that number. However, due to the number of persons in the household, only two have a total income significantly higher than the poverty line. (See

Appendix C for a complete breakdown of household income by household.) The household (ID101) that made \$11,630 pesos a month had a home based butcher shop. The majority of their income was reinvested into the business. The other household (ID5901) managed to make \$10,340 a month through the efforts of mother and four children selling newspapers on the street everyday. The father of the children did not contribute to the household income. A large percentage of their income was reinvested into buying daily newspapers. These families were unable (or unwilling) to estimate their net profit. The lowest household income, \$850 (approx US\$77), comes from a family in which very elderly grandparents were raising their two grandchildren.

			So	urces of	Househ	old Inco	me	•			
	\$0	\$1 - 1000	\$1001 - 2000	\$2001 - 3000	\$3001 - 4000	\$4001 - 5,000	\$5,001 - 10,000	\$10,001 - 15,000	ND	Average	n
Father's Income Father's	18	8	16	19	10	3	3	0	19	\$2567	59
Contribution to HH	19	17	39	7	6	0	0	0	8	\$1648	69
Mother's Income Children's	37	27	22	5	1	2	1	0	1	\$1453	58
Combined Income	54	20	12	6	2	0	2	0	0	\$1430	42
Government Aid	47	42	3	1	0	0	0	0	1	\$442	48
I otal Monthly Income	0	4	20	29	18	10	11	2	3	\$3251	93
Budget	0	33	44	18	0	0	0	0	4	\$1356	92

Table 1.6 Sources of Household Income by Income Groups

Monthly income data was difficult to accurately collect. This was partly due to the natural reluctance of people to share their private financial matters with a stranger, but also partly due to the fact that many wives did not know (and were not informed) of the exact amount of their husband's income. This was a common phenomenon in middle class families as well. Husbands gave an amount to the household, and wives paid bills

and bought groceries with that amount. Also, many family members worked part time jobs as the opportunity arose, or participated in other entrepreneurial activities that did not yield a steady income. For example, one family raised rabbits for food and sold them a couple times a year. One boy worked as a roofer when one of the regular roofers was sick. One girl sold yogurt door-to-door. Another girl sold seasonal sweets. Children especially did not make a fixed amount of money, and usually underreported their earnings so they could keep more of it for themselves.

Almost half of the sample (47 families) was enrolled in *Oportunidades* which provided monetary assistance. The average monthly amount was \$442 pesos (approx.US\$43), but as the stipend was per qualifying child, the range was quite large: \$155 to \$2500 pesos (see table 1.6). The household that received the most money was a woman raising three grandchildren while her youngest four children attended secondary school. Due to government requirement that children receiving *Oportunidades* not work, some parent's concealed whether their children worked. All of these factors made it difficult to capture a monthly (or even weekly) income amount. Therefore, to calculate the monthly income, I added the husband's contribution to the household to the wife's contribution and the children's contribution when applicable, and any government assistance. However, for the purpose of analysis, I used monthly food budget as an accurate indication of income. (Table 1.6 provides a breakdown of all the sources of household income.) Women were very certain about the amount of money spent on groceries.

#### Methods

I collected four data sets from the participating families: household survey, nutritional status (anthropometric measures), dietary recalls, and time allocation. A

combination of data sets was used to answer the hypotheses. In the first meeting with the family, I explained the purpose of the study and the informed consent forms. If the family agreed to participate, I asked the primary caregiver to sign (or give us permission to sign or give oral consent recorded on the tape player) and then asked the consent from the target child, I also asked for consent from all the children in the household under the age of eighteen. It was rare that household members over the age of eighteen would consent to be measured, and after awhile I only pursued the younger children. I then conducted the household survey with the primary caregiver, weighed and measured all the children, and conducted the first dietary and illness recall. This made for a long first interview, but also gave the family an idea of what to expect. At the end, I made an appointment to come back for the first five-hour observation session. Finally, as a token of gratitude I would give everyone a small treat. The most popular gift was tamarind lollypops covered in chili powder. I usually went to each house five or six times. I was frequently invited to participate in family events like birthday and confirmation parties. The final formal visit concluded with a larger thank you present, la despensa, which consisted of a kilo each of rice, beans, sugar, school supplies for each child, a special gift for the participating child, and other household essentials. I took pictures and gave doubles to the family. This was important because (due to the fear of child kidnapping) I was discouraged from taking pictures.

#### Sample Size

I conducted a power analysis to determine sample sizes necessary for multiple regression using time allocation, anthropometrics and dietary recalls. Hypotheses were

tested with more than one predictor (example: age and gender). Table 1.7 provides the list of these tests with results of power analyses to determine sample size required to support the hypotheses. All power analyses were conducted using *Power and Precision, 2.00* software (2000).

- 1. That a child's time allocation to overall provisioning activity will be a function of their gender, age, and family and household size (addressed in Chapter 3).
- That the benefits children obtain from self-provisioning will be positively proportional to time allocated to the activity and the diversity of resources available in their immediate surrounding environment (controlling for household food availability, gender, and age) (addressed in Chapter 4)
- That boys will show greater overall benefit from self-provisioning compared to girls (including when controlling for time allocated to provisioning activities). (addressed in Chapter 4)

Based on pilot research, I knew the difficulties of collecting a large sample size.

Therefore, I accepted a lower power of 0.8 for all tests with alpha set at 0.05, minimum sample sizes required for the study is 106. My goal was to collect a sample size of 110 to allow some leeway for drop outs. A power of 0.8 is not statistically ideal, but still generally acceptable in Anthropology by convention. In fact, Bernard (1995) suggests that anthropologists should accept an alpha at the .10 level because of the difficulties of doing field work and the usually small sample size. With a sample size of 96, I was able to address all but one section of the second hypothesis at the 0.05 alpha. As previously noted, it was difficult to find willing participants. The diminished sample size illustrates the seriousness of this on my research. Only by dent of staying an extra

month and employing field assistants that lived in appropriate neighborhoods was I able

to collect 96 families.

Hypothesis	Outcome variable	N variable sets	Predictors	Covariates	Alpha	Sample size for Power=0.80	Sample Size for Power=0.90
H1-MR	time allocation	1	gender, age, hh size	-	0.05	73	97
		1		-	0.01	109	138
H2 - MR	anthropometric standards (weight for age, height for age)	2	time allocation	4	0.05	85	109
					0.01	120	149
	health status (illness frequency, malnutrition indices)	3		4	0.05	96	134
					0.01	134	164
	dietary adequacy (protein, calorie, nutrient)	3		4	0.05	96	134
					0.01	134	164
H2 - MR	clinical malnutrition (y/n)	1	time allocation	-	0.05	106	141
					0.01	157	200
H3	time allocation	1	gender	2	0.05	67	89
		2			0.05	83	107
		1			0.01	99	125
		2			0.01	118	147

Table 1.7 Power Analysis for Sample Size

## Household Survey

In conjunction with my field assistants, I collected data on demographic characteristics of the primary caregiver and all the children living in the household in the form of a brief survey. The survey included questions on the amount and source of household income and food. I also took note of the general characteristics of the house, such as water supply. The household survey consisted of basic demographic information regarding the children of the household, the income of the household (including income from the father, mother, provisioning siblings, and any government aid) and monthly food budget, and the normal household diet. I also took note of household characteristics such as construction material, proximity to open sewers, access to fruit trees or gardens, and presence of livestock or pets. I asked about the general health of all children, inquiring specifically about the incidences of malnutrition and major illnesses, if any, of the target child. Generally speaking, household economies were similar, in that most had insufficient access to cash to meet all bills and faced food shortages at least on occasion. Household monthly food budgets ranged from \$120 to \$3000 pesos (\$12 to \$300 USD), with a mean of \$1371 pesos (SD=\$686). To take into account variations in household size (membership ranged from three to fourteen), I estimated the mean monthly spending in each child's own household based on total household spending on food (overall mean for the total sample of children was \$259 pesos (\$25 USD) (SD=\$153).

#### Anthropometric and clinical nutritional assessment

Following a seminal study by Gomez et al. (1956) the standard nutritional status evaluation tool is standardized height-for-age, weight-for-age, and body mass index (weight/height<sup>2</sup>) z-scores by comparison with World Health Organization age- and gender-specific standard references using nutritional software released by the CDC (EpiInfo Version 1.1.2). I used the NCHS/WHO population reference (NCHS, 1977) as the most relevant for this study: the newest CDC growth charts have been established

to better describe obesity (Kuczmarski et al. 2000), but that is not an issue with this population.

Height-for-age provides a gross measure of long-run under-nutrition, particularly caloric insufficiency; based on the understanding that chronic undernutrition forestalls growth in stature (Dibley et al. 1987). Weight for age provides a shorter-run but still gross measure of nutritional sufficiency, in that lower weights are taken to represent lower caloric intakes (WHO 1995).

The advantage of using z-scores is the ability to compare the study population with a world wide sample to see where each child "should" be in comparison to other children (Dibley et al. 1987, Kuczmarski et al. 2000). A criticism of using standard references is that they may not be specific to the study population (Ward et al. 2001, Ulijaszek 2001). The Mexican health system uses the CDC/ WHO standardized growth curves in their nutritional evaluations (Monárrez-Espino et al. 2004, Ryan et al. 1999). Anthropometric indicators have advantages over other malnutrition indicators (such as biochemical or clinical) in that they are non-invasive, relatively easy to obtain, and accurate at diagnosing different forms of malnutrition. However, the main disadvantage is that body measures are sensitive to infection, altitude, stress and genetic background (de Onis 2000). It is important to take into account the physical body proportions of the study population which might be different than the WHO/ CDC standards. For example, Post and Victora (2001) found that the large abdominal circumference of their sample of poor Brazilian children caused underreporting of weight-for-height. Anthropometric measures also cannot determine specific nutritional deficiencies such as zinc that a blood sample would indicate.

Messer's research (1986) on the "Small but Healthy Hypothesis document's the Mexican governments attempts in the 1980's to politicize malnutrition scores, as all evaluations at that time indicated that over half of Mexico's young population was malnourished. Uneven food distribution was blamed on the "capitalist" and "imperialist" forces (the United States). In Mexico's case, the inflation of the incidence of malnutrition (counting even very mild malnutrition) became a political cause. Messer uses this case study to demonstrate the importance of taking into consideration the political context of government-generated statistics on nutritional adequacy.

I collected anthropometric data for all children in the study, following the anthropometric conventions given by Frisancho (1990). I weighed each child using a Detecto digital scale, height was taken with a Cooper Tools Six foot measure and bodymass-index using Lange Skinfold Caliper. Each measure was taken three times and the average was used in analysis. Each child was measured twice: an initial measuring and a follow six to eight weeks later (at the end of their participation in the study) to ensure accuracy. Each child was also given a physical examination to identify edema and characteristic hair discoloration (clinically significant for protein-energy malnutrition), as well as iron-deficiency anemia via examination of the inner surface of the lower eye-lid (Jelliffe 1966).

## <u>Time allocation (or focal follows)</u>

From the perspective of understanding the forms of child foraging, the critical data set concerns children's time allocation, especially the relative allocation of time to food-seeking and food-getting activities versus other activities, specific observed events

of child foraging, and observations of the ultimate disposal of food or potential food (i.e., money) resources (specifically whether they are consumed by the child or shared with others). Time allocation is a well-established method in foraging research (Bock 2002a, b, Borgerhoff Mulder and Caro1985, Hawkes et al. 1997).

I applied standard ethological theory (Lehner 1996) to develop an ethogram of children's time allocation, and used this to code children's activities during continuous focal follows. Bakerman and Gottman (1997) give an excellent guide to developing the proper "lens" to clearly define the targeted behavior. Possible child activities in the ethogram (see Appendix B) include working for money, household chores, sibling care, and free play as well as specific subsistence-related activities such as fishing or collecting fruit. Observation notes included noting everything the child ate, if he/she shared or received a food item and their relationship to that person. (For example: Juan at 2:00 p.m. working outside the home for money, received an apple from co-worker, ate half and shared the remainder with his brother.) Also noted was the frequency that a child received money, how much and from whom (employer, parent, non-related adult, sibling, or stranger) and what the child did with that money during the observation period. Most commonly, the child bought food which was either immediately eaten and/or shared, or taken home.

Other time allocation studies (see specifically Betzig and Turke 1985, Munroe and Munroe 1984, Shell-Duncan 1995, Shell-Duncan and Obungu Obiero 2000) employed instantaneous scans to determine the activities of their study population. Instantaneous scans are very useful in small societies (foraging) or village settings. The researcher walks around and determines what people are doing at the time of

observation. It is thought that this may reduce the observer effect. As this study was conducted in a large urban environment it was not practical to use this method. However, whenever possible I made note of what I saw participating children doing when they were not being observed by a researcher. In this way I determined that some children worked outside the home, even though they did not allow for this to be observed.

Each child was observed on three separate occasions outside of school hours for five hours for a total of fifteen hours, with times of day and days of the week varying in each round of observation. Due to the schedules of three children, they were observed on four occasions for a total of fifteen hours. I specifically considered what children were doing with their time when they were not in school, which meant most observations were conducted during weekends, vacations, or during the morning or afternoon hours when school was out. Xalapa has two rounds of school (four hours in the morning and the afternoon). Children either go to school from 8 to12 or 2 to 6.

The selection of 15 hours as the duration of observation of each child was based on a relatively infrequent rate of occurrence of the events being studied, estimated from pilot observational data collection. For example, when children are foraging in the classic sense, foraging events could occur quite frequently in a five hour period. However, I found that provisioning events in an urban setting tend to occur less frequently, as there were many other activities for children to engage in (such as watching the child-targeted soap opera everyday at four o'clock). By observing children for relatively large blocks of time, I was able to record an accurate range of behaviors. This amount of observation (15 hours/child) is also consistent with recently published

studies by anthropologists using similar methods of focal observation to study child time allocation (Bliege Bird and Bird 2002 [14 hours], Hawkes et. al 1995 [12 hours], and Yamanaka and Ashworth 2002 [12 hours]).

In the interest of safety, no focal follows were performed after sunset, so all observations relate to daylight hours only. I worked in neighborhoods that most Xalapans did not acknowledge existed. Crime rates were high, and there was little for men to do at night but get together and drink.

## Twenty-four hour dietary recalls

On three separate occasions, each target child was asked to recall all the items eaten the previous day (for a total of 288 recalls), following the recommendations of Thompson and Byers (1994). Multiple recalls are required to estimate the normal dietary intake. This is the most used dietary collection technique. Its flaw is that it relies on the memory of the participant which can be unreliable if the participant is a child. I conducted the dietary recalls in the presence of the mother, or the primary caregiver, who prompted children to help them remember more accurately what was eaten. Pilot research indicated that this was not enough, and I developed a series of prompts to capture the complete diet. The recall consisted of questions such as "What did you eat for breakfast? Did you eat anything at school? Before lunch?". To get as complete a recall as possible, children were always prompted to remember food items that might easily be forgotten like snack foods, a drink of soda, foraged fruit, or food received from a friend. (See Appendix B for the form used to record dietary recalls.) In addition, I used a set of plastic dishes (similar to those used by the families) to prompt children to remember quantities of food. Every effort was made to conduct the interviews on

different days, always including a weekend day when the diet might be different from weekdays.

There are many different methods of doing dietary recalls. The most accurate is to ask the study participant to write a record of their dietary intake (Serdula 2001). My study population of young children would not have been able to do this, and the majority of their mothers were illiterate (to all intents and purposes). Quandt (1986) notes that dietary recalls have a lower response burden and require less skill from the informant than records of dietary intake. The food frequency method lists the frequency with which the participants each certain items. This has been useful for determining micro-nutrient sufficiency, but can be cumbersome and time consuming (Serdula 2001). However, in addition to the dietary recalls, time allocation observation also recorded what children ate and this was used in conjunction with dietary recalls to asses the diet of the participating children.

#### Conclusion

The concluding chapter of this dissertation summarizes the findings of each chapter. I address what I would do differently had I the research to do over again. I address the concerns with this study, namely the sample size and the observer effect. While many of my findings were not statistically significant, this research still makes a contribution to anthropology. This dissertation provides interesting avenues for future research and contributes to a growing body of knowledge on children in marginal urban areas.

# **CHAPTER 2**

# **URBAN CHILD FORAGING IN MEXICO<sup>1</sup>**

<sup>&</sup>lt;sup>1</sup> Lee, Sarah Elisabeth. To be submitted to *Current Anthropology* 

#### INTRODUCTION AND LITERATURE REVIEW

In this paper, I consider children's foraging in the context of urban poverty. In this context household food shortages can be commonplace, child hunger profound, and under-nutrition common. It must be recognized that something akin to child foraging is practiced by millions of young children living in extreme poverty conditions globally who regularly search for food, work, trade, or beg for money and food for themselves or others (Scheper-Hughes 1992). While such behavior by children may often be perceived as inappropriate in the United States, and child work is considered a breach of human rights in many quarters (Toor 2001, Scheper-Hughes and Sargent 1998), in other settings, it is tolerated or even valued by adult caregivers (Munroe et al. 1984).

Food obtained by foraging children has been identified as having the potential to be a significant source of dietary supplementation in hunter-gatherer settings (Bird and Bliege Bird 2000, Blurton Jones et al. 1994 a, b). However, studies in traditional huntergatherer societies indicate that children do not need or rely on the calories they gather, even if they are able to gather a considerable amount (Blurton Jones et al. a,b, Bliege Bird and Bird 2002, Tucker and Young 2005). The question of whether child foraging has adaptive benefits for children's nutrition is less often addressed. This is perhaps because in hunter-gatherer settings proficient adults usually collect enough food to provide for children, and children's own actions thus might be expected to have little impact on dietary quality. Variously, children's foraging in these settings is not considered particularly productive or important in and of itself from a nutritional perspective other than providing dietary diversity from items that adults do not normally exploit (e.g., Bird and Bliege Bird 2000). In addition, children in hunter-gatherer

environments have been observed to use foraging as play and to waste food through play activities (Tucker and Young 2005). This influences how child foraging is understood in ecological and evolutionary terms. Because the irrelevance of the nutrition, it is interpreted to mean that child foraging is not a survival strategy for childhood, but rather reflects learning and practicing of a survival strategy that will become important later (Bird and Bliege Bird 2002, Blurton Jones and Marlow 2002).

I propose that the adaptive contexts of child foraging might be very different in cities from traditional hunter-gatherer settings because children living under conditions of extreme urban poverty often have very limited access to food, and are at high risk of stunting and wasting due to lack of calories available to them (Crooks 1998, Dettwyler 1992 and DeWalt 1983). There is some initial evidence, based mostly on studies with street children in urban Nepal, that children with the freedom to seek additional resources outside the household may sometimes fare better nutritionally than their peers who do not (Baker et al. 1997; Baker 1998; Baker and Panter-Brick 2000; Baker Hinton 2001). For example, homeless street children who provide entirely for themselves display less growth stunting and have better overall health than their rural counterparts living at home, although they do experience more illness and accidents (Baker et al. 1997, Panter-Brick et al. 1996a, b). While the behaviors underlying this apparent adaptive difference were not a focus of the Nepalese studies, it does suggest the compelling possibility that children's 'foraging' might allow for tangible improvements to their diets in the most ecologically marginal settings, thus be important in improving child physical status and wellbeing. MacDonald (1997) notes that malnutrition and

environmental stressors slow physical maturation; therefore, children who provision may be counteracting the effects of a poor diet in order to achieve maturation.

The focused study of child foraging in non-traditional contexts is a potentially productive avenue for thinking in new and more nuanced ways about children's nutrition under poverty conditions. This study is influenced by the theory that each child has a unique developmental micro-niche, and can be highly active in the construction of their nutritional niche (Super and Harkness 1986, 1994, Worthman 1994). A developmental micro-niche is dependant upon a child's gender, birth order, age, and possibly provisioning activities. In this way, children living in the same household might experience very different conditions. For example, a boy that is allowed more freedom outside the home might have increased access to foraged foods. As will be demonstrated, urban child foraging is largely child-directed. There is no (or very little) adult supervision or direction for foraging events. Foraging children create a developmental micro-niche by exploiting resources in their environment

Nutritional research on children's diet also informs this research. A reasonable criticism of nutritional anthropological (or in fact many nutritional studies) with children is that children's activities outside of the household might form a substantive and even crucial portion of their diet and nutrition, but this is rarely recognized in traditional nutritional methods (Quandt 1986). By using child focused-methods, particularly focal ethological observation of children's behavior, there is increased opportunity to document and explain the relevance of children's own activities for their nutrition, whether they are foraging for fruit or earning money they then use to purchase candy. Focal follows capture some of the social contexts of foraging and other forms of food

sharing with peers that are not as evident in household-focused studies. The use of more child-centered methods and paying attention to what children did when they were out of the house acknowledges not only that children are competent to act independently as well as determine their own future (Panter-Brick 2000, 2002). However, active engagement in navigating their social and physical environments outside of adult supervision has the potential for significant effects on their nutrition, health, and thus adaptive wellbeing.

In this paper, I address very basic questions about children's foraging in a resource-poor urban environment using the case of children living in the shantytowns on the perimeter of Xalapa, Mexico. The study is concerned with better understanding the forms and patterns of urban child foraging, the characteristics, and the predictors of child foraging. This study documents how children forage in urban environments, specifically what form children's urban foraging takes, such as who forages, and what and how they collect food, caloric returns for effort and more generally identifying some aspects of the adaptive contexts of urban child foraging.

## METHODS

## Study site

Xalapa lies about five hours by bus from Mexico City, up and over the Sierra Madre Oriental Mountains, in a temperate, lush coffee growing zone that reaches down toward the Gulf of Mexico. As a regional center, *campesinos* (many unemployed coffee farmers) from the surrounding countryside have moved to the city over the last two decades in search of new opportunities. Many have settled in the full periphery of the

city in informal *colonias*, building neighborhood after neighborhood of shacks from laminated cardboard and zinc and plastic sheeting. The neighborhoods are rent-free, but also receive no city services. Inventiveness provides the only means to tap into city electric services and sewage runs into local streams and open ditches. (See Figure 2.1 for a map of Xalapa and the location of the ninety-six households that participated in this study.) The neighborhoods farther out from the city center are located in the areas of abandoned fruit and coffee plantations (see figures 2.2 and 2.3 for examples of houses in both areas). Wandering livestock are common in these areas.

In neighborhoods closer in, affluent neighborhoods are a one hour bus ride away. Adults travel to work in these areas selling on the street or in market stalls, cleaning, intermittent construction, driving taxis, and working in factories. Almost all male household head's work in some capacity at least seasonally (taxi drivers a nd construction workers), and over half of their wives, although very few in the formal economy. Many family members worked part time jobs as the opportunity arose, or participated in other entrepreneurial activities. For example, in one family the father worked as a mechanic, the mother sold snacks in the afternoon by the side of the highway, the oldest son sold tamales door-to-door, and the daughter worked as a bag girl at a pharmacy.

Mothers indicated during interviews about household diet that household food shortages follow lack of cash income and are characterized by narrowing the diet to the cheapest possible foods, beans and tortillas, and by having fewer meals. A common money saving strategy was to buy corn kernels to soak and grind to make the *masa* 

(corn dough) used in home made tortillas. Milk and meat (very costly) were used sparingly when budgets were tight.

Families with children between the ages of seven and eighteen are eligible for federal *Oportunidades* support. To qualify, their children must have a birth certificate, attend school and make good grades. About half of the families in this study received various levels of support, and many more were waitlisted. Schools are provided in or near the communities. Lasting only four hours a day; most children attend.

Health facilities were extremely limited, and most problems were handled by visits to the poorly stocked pharmacies in the *colonia* rather than dealing with the hassle and cost of travel to the free SSA clinics or one of the two hospital emergency rooms. The residents of these *colonias* did not have access to the state-run hospitals, as they were not employed in the formal sector.

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Figure 2.1 Map of Xalapa, Veracruz, Mexico showing participating neighborhoods (circles) and number of households (squares) from each neighborhood or area. (N=96)



Figure 2.2. Households in *colonia* further from (left) and closer to (right) the city center.



Figure 2.3. Study neighborhood houses of zinc, laminated cardboard, and found objects.

## DATA COLLECTION AND METHODS

## Data collection

Fieldwork was conducted during thirteen months, October 2003 to November 2004. Eligible neighborhoods were identified initially as those social agency informants consistently identified on city maps as *de bajos recouros* (low in resources). The study focused on girl and boy children ages eight to twelve years from these neighborhoods and their households. Recruitment began slowly through contacts in community-based social agencies, such as charities, and sped up as local priests came on board to help with introductions to families. Parents were justifiably concerned about child kidnapping. At least three girls went missing in these neighborhoods during the field season. The families included in the study were predominantly dual-parent, although fathers were quite often absent (some working in the United States). Some of the families were a

"second family", following the Mexican practice of men supporting both a de jure and a de facto household.

The sample on which I base the following analyses consisted of 96 children, 51 boys and 45 girls, aged eight to twelve years and their households (another six children dropped out during the course of the study). Once a household was identified as suitable based on the presence of a child in this age range, the mother was invited to participate. If the mother (or primary caregiver) gave her consent, the child was also asked to participate. In the case of more than one child in the age range (as was frequently the case), the child with the most recent birthday was asked to participate in the study. As it happened, sometimes this child did not want to participate but another sibling in the same age range did, so they became the target child.

## <u>Methods</u>

I conducted focal follows for fifteen hours with each child in the study (1440 hours of observation). I applied standard ethological theory (Lehner 1996) to develop an ethogram of children's time allocation, and used this to code children's activities during continuous focal follows. Bakerman and Gottman (1997) give an excellent guide to developing the proper "lens" to clearly define the targeted behavior. Possible child activities in the ethogram (see Appendix B) include working for money, household chores, sibling care, and free play as well as specific subsistence-related activities such as foraging. Observation notes included noting everything the child ate, if he/she shared or received a food item and their relationship to that person. (For example: Juan at 2:00 p.m. working outside the home for money, received an apple from co-worker, ate half

and shared the remainder with his brother.) Also noted was the frequency that a child received money, how much and from whom (employer, parent, non-related adult, sibling, or stranger) and what the child did with that money during the observation period. Most commonly, the child bought food which was either immediately eaten and shared, or taken home.

Other time allocation studies (see specifically Munroe and Munroe 1984, Shell-Duncan 1995, Shell-Duncan and Obungu Obiero 2000) employed instantaneous scans to determine their study population's activities. Instantaneous scans are very useful in small societies (foraging) or village settings, but was not practical in the large urban environment of the present study. However, whenever possible I made note of what I saw participating children doing when they were not being observed by a researcher. In this way I determined that some children worked outside the home, even though they did not allow for this to be observed.

Each child was observed on three separate occasions outside of school hours for approximately five hours for a total of fifteen hours. Times of day and days of the week were different in each round of observation. While five hours was the ideal focal follow duration, an observation sometimes lasted longer if the child was far from home, working or foraging. The next observation would then last somewhat less than five hours. Due to the schedules of three children, they were observed on four occasions for a total of fifteen hours. I specifically considered what children were doing with their time when they were not in school. This meant that most observations were conducted during weekends, vacations, or during the morning or afternoon hours when school was

out. (Xalapa has two rounds of school four hours in the morning and the afternoon and children either go to school from eight to twelve or two to six.)

The selection of 15 hours as the duration of observation of each child was based on a relatively infrequent rate of occurrence of the events being studied, estimated from pilot observational data collection. For example, when children are foraging in the classic sense, foraging events could occur quite frequently in a five hour period. However, I found that provisioning events in an urban setting tend to occur less frequently, as there were many other activities for children to engage in (such as watching the child-targeted soap opera everyday at four o'clock). By observing children for relatively large blocks of time, I was able to record an accurate range of behaviors. This amount of observation (15 hours/child) is also consistent with recently published studies by anthropologists using similar methods of focal observation to study child time allocation (Bliege Bird and Bird 2002 [14 hours], Hawkes et. al 1995 [12 hours], and Yamanaka and Ashworth 2002 [12 hours]).

In the interest of safety, no focal follows were performed after sunset, so all observations relate to daylight hours only. I worked in neighborhoods that most Xalapans did not acknowledge existed. Crime rates were high, and there was little for men to do at night but get together and drink.

#### RESULTS

## Forms and patterns of urban child foraging

Foraging is defined in this study as any activity during which a child collected food outside of the home, without transfer of money or particular concern of social

rebuke (versus stealing food or begging, for example). This included what might be thought of as traditional foraging of fruits and vegetables (such as wild tomatoes) as well as what is sometimes termed scavenging, such as rooting through garbage. Twenty-one percent (or twenty children) were ever observed to forage. (Three other boys were known to forage in the nearby forest but were not observed to do so.) Boys foraged three times as frequently as girls (15 boys vs. 5 girls). Boys allocated to an average of 102 minutes of total observed time to foraging (range of 3 to 402 minutes). Girls allocated an average of 35 minutes of total observed time (range 2 to 69 minutes). The girl that spent the most time foraging was also foraging for firewood with some girl friends. The observed gender difference in foraging is at least partly due to parental concern for girls' safely. Girls were not allowed to be outside with the same freedom as boys; even then, they were required to be with a group of other children. In addition, girls had more responsibilities in the home with sibling care and domestic chores. Figure 2.4 demonstrates the gender differences in time allocation to foraging, working (formal and informal), childcare and begging. Further, it demonstrates that foraging makes up a very small percentage of child activities.



Figure 2.4: Children's time allocation to specific activities, including foraging. Note: in some cases activities can occur simultaneously, such as caring for siblings while engaged in a foraging expedition.

There was a significant difference by gender in time allocated to foraging, with boys greatly exceeding girls, with an average 3.5 versus 0.45 percent of their time (p=0.001 according to the t-test). Considering only children who were ever observed to forage, the total percentage of time they spent in that state was twelve percent (SD = 11.7). There was thus great variation in the amount of time individual children spent foraging, ranging from 0 to 43 percent of total time observed. The child that foraged 43 percent of time observed was a font of ethnobotanical knowledge. (Figure 2.5 depicts children foraging fruit from a tree in their neighborhood.) Other children looked to him to find the best seasonal fruit, and he kept his family (one of the poorest in the study) supplied with fruit they would not have been able to purchase.



Figure .2.5 Boys in a foraging party collecting fruit.

# **Geography**

There was a definite geographical component to foraging behavior. Even though all of Xalapa is surrounded by secondary growth forest, and most neighborhoods included scattered fruit trees, foraging was concentrated in one area. Seventeen of the twenty children ever observed to forage lived in the collection of neighborhoods locally known as *La Reserva* (designated as green space some time ago, but never enforced) which bordered on old plantations of coffee and bananas. Coffee requires shade provided by banana, orange, and other fruiting trees. The area is lush with secondary growth of fruit trees and wild species of chilies and tomatoes. Medicinal plants were harvested from the area as well.

Two of the other foraging children also lived in areas that bordered green spaces with seasonal fruit trees. The last lived in the most urban area, and he engaged in scavenging through neighborhood garbage for food. One boy from *La Reserva* chose to beg at the bus terminal and did very well in terms of money and discarded food. The map in figure 2.6 shows the outlying location of the neighborhoods with the largest group of foraging children and the location of the other three children.

It is easy to see that proximity to seasonal fruit trees or green spaces allowed children to forage. It does not explain, however, why more children did not scavenge or beg for food items more frequently. At the outset of this study, I thought more children would engage in "scavenging" of discarded food stuffs or begging for food from neighbors and shopkeepers. However, only two children were observed to provision from anything other than plants. It also does not explain why more children were not observed to forage for fruits in other green spaces in the city. Twenty-seven children lived in other neighborhoods that bordered green spaces, and most neighborhoods were dotted with fruit trees. It may that this area was a represented a particularly rich patch, with higher return for effort rates than other activities. However, it is also possible that foraging as a social activity developed among the children of *La Reserva* to a greater degree that it did elsewhere. This is supported by the fact that three of the boys that devoted the most time to foraging activities often played a leadership role in group foraging events (see table 2.2).



Figure 2.6 Map of foraging children by *colonias* (circles) and number of foraging children (squares) (N=20).

# Items foraged by urban children

The most commonly foraged fruit were oranges and bananas (seven observed events), but also included wild tomatoes, limes, guavas, wild coffee, *coyoles* (the seeds from a palm tree called *Coyolillo*), roseapples, and *jinicuiles* (red legume from a tree). Twice the herb known locally as *acuyo* (*hierba santa* or sacred herb) was foraged to take home to season tamales. Table 2.1 lists the Linnaean and common names of the foraged plants. Some items do not have an English equivalent. Table 2.1 demonstrates

that there was a wide range of fruiting trees and plants available for the children that chose to forage.

Two foraging events consisted of begging or scavenging and included bread and pizza, half-drunk soft-drinks, and other table scraps. Table 2.2 below represents a comprehensive compilation of all the items that children foraged. The table is by child, not foraging event.

Linnaean Name	Common Name
Capsicum annum	Chilies
Citrus aurantifolia	Lime [Key, Mexican, W. Indian]
Citrus sinensis	Orange
Coffea arabica	Coffee
Dioon spinulosum	Coyolillo (coyoles)
Inga densiflora	Jinicuiles
Lycopersicon esculentum	Tomatoes
Musa paradisiaca	Banana
Piper auritum	Hierba Santa (Sacred Herb)
Prunus persica	Peach
Psidium guajava	Guava
Syzygium jambos	Roseapple

Table 2.1 Latin and Common names of Foraged Plants

Percent time foraging	What food foraged?	Where?	Ate immediately	Shared with friends	Shared with family	Foraged in group	Largest group size
3.1	ORANGES	Forest	yes	no	no	yes	3+
2.3	LIMES, ORANGES	Forest	no	no	yes	yes	3+
7.1	BANANAS	Forest	no	no	yes	yes	2
25.0	BANANAS, LIMES, WILD COFFEE, CHILE, GUAVA, ROSEAPPLE	Forest	yes	yes	yes	no	4
0.3	BANANAS	Forest	yes	no	yes	yes	4+
26.6	WILD COFFEE, COYOLES, TOMATOES, ACUYO	Forest	yes	yes	no	yes	15+
6.7	COYOLES, ROSEAPPLE	Forest	yes	yes	yes	yes	12+
43.2	BREAD, SOFT DRINKS, PIZZA, COOKIES	Bus Station	yes	no	yes	no	1
7.8	BANANAS	Forest	no	no	yes	yes	2
0.2	TOMATOES, ORANGES,	Forest	yes	yes	no	yes	15+
4.9	ORANGES	Forest	yes	no	no	no	1
4.0	ORANGES	Neighborhood	yes	no	no	yes	2
2.2	PEACHES	Neighborhood	yes	no	no	no	1
3.0	JINICUILES,	Forest	yes	yes	yes	yes	2
3.3	ORANGES, TOMATOES	Neighborhood	yes	no	no	no	1
1.5	ORANGES	Neighborhood	yes	yes	yes	yes	3
8.8	BANANAS, LIMES, GUAVAS	Forest	yes	yes	yes	yes	3
2.3	ACUYO	Forest	no	no	yes	yes	2
25.3	BANANAS, GUAVAS	Forest	yes	yes	no	yes	4
19.2	FOOD SCRAPS	Neighborhood	no	no	yes	yes	2

# Table 2.2 Characteristics of urban child foraging.

## Group foraging for urban children

The most common form of foraging observed was groups of children spontaneously deciding to head off to collect ripe fruit, usually no more than 1.5 miles round trip. Of all observed foraging events, eighty percent occurred in group (see Table 2.2.). The largest foraging group size observed was fifteen (observed twice), and the most common foraging group size was three or four children (35 percent of foraging
events). Foraging in pairs (30 percent) was a close second. Four children opportunistically foraged fruit from trees while they were on their way to somewhere else, and they happened to be alone (for example see table 2.3). These foraging events lasted for only a few minutes, and the child usually immediately ate the fruit. Only one child was ever observed to forage alone for a significant amount of time; and he was unusual in that he was the child who spent by far the largest percent of his time begging. His favorite spot was the bus terminus where he earned \$50+ pesos each time observed, and received many partially eaten Dominos personal pan pizzas from departing travelers. During interviews, he stated that he preferred to spend time begging alone as it was much more profitable (he was also a highly socially rejected child - and a bully – based on how other children in the neighborhood interacted with him). He spent 6.7 hours of the fifteen observed in foraging for food. He begged and foraged for food at the bus station on two separate occasions, the first lasted 175 minutes, and the second for 227 minutes. He stated that this was a normal pattern for him.

I initially began coding observations for whether foraging events were initiated by adults, but during the research season only one case was observed (a parent requesting a child to forage some bananas); thus characteristically foraging events are child initiated, and child managed activities. Table 2.3 shows some examples of foraging events within the context of children's everyday lives. It demonstrates the very casual nature of the foraging activities as part of children's leisure time, how it relates to other forms of provisioning (such as earning money and converting it to food), and how child care and foraging activities often overlap. It also gives some notion of how foraging is often a collective activity and child-initiated.

Table 2.3 Examples of sequence and structure of observed child foraging events.

"Carlos," boy age 11.
12:00 Father gives Carlos 1 peso
12:15 Leaves to play kites with friends, on way to the bakery where he works informally.
12:34 Given a bakery basket to carry to the next neighborhood to sell door-to-door
1:09 Forages an orange from a neighborhood tree, eats while carrying the bread door-to-door
1:20 Returns basket to baker, and is paid 4.5 pesos
1:29 Returns home, watches television
2:04 Gives his father 50 centavos
2:05 Goes to corner store alone, and uses his 5 pesos to purchase corn chips and tic-tac candy.
2:09 Shares chips and candy with his nephew (age ~5 years) and friend (~11 years), until all is eaten.
2:30 Returns home to watch television
"Miguel," boy age 9.
9:33 Playing spinning tops with six neighborhood boys near his house
9:42 Eats two pieces of gum he had in his pocket
10:00 Starts taking care of younger brother (age 7 years) [until 11:50]
10:09 Attempts to organize a group outing to a local lake. Physical fight with one of the six boys because the other boy did not want to go.
10:35 Begs a papaya from adult neighbor who has a pile of the fruit in his truck parked nearby.
10:45 Forages <i>coyoles</i> [small, coconut-like fruit] en route to the lake at the edge of the neighborhood with the other boys and puts them in his pockets
10:56 Arrive at the lake, play, and eat the <i>coyoles</i>
11:50 Return home
12:12 Leaves house to forage thee wild tomatoes and one coffee bean from abandoned plantation approximately .5 km away; ate the tomatoes and sucked on the bean. Foraged handful of <i>acuyo</i> leaves [later used for grandmother's <i>tamales</i> ]. Then foraged <i>coyoles</i> and wild oranges in the same area
12:59 Returned home with the leaves, coyoles, and oranges.
1:15 Prepares <i>agua de naranja</i> (sugared orange water) with the wild oranges. Drinks all of it with six neighborhood boys he went to the lake with.
1:22 Boys begin a new game of tops

"Amparo." girl aged 12. 9:45 Begins caring for two younger siblings and a niece [until 10:20] 10:28 Ate a lollipop from her family's store; prepared to go to lake with friends 10:35 Customer arrives in store, A. tends to the sale. 10:39 Took 2 liters of Coke, 2 packets of cookies, water, and packet of Kool-Aid from the store. 10:44 Begins caring for three younger siblings and a niece [until 3:33] 10:45 Departs for local lake with four other neighborhood kids and the siblings. 11:03 Forages coyoles, eats five; saves four for later. Given a guarter bag of peanuts by one of her friends, and shares them with one sister. 11:16 Arrive at lake, swim. 11:35 Prepares ~ 1.0 liter of Kool-Aid and shares it with all children present, and group together drinks half of the Coke. Return to swimming. 2:11 Group drinks remainder of the Coke, and the packets of cookies. 2:31 A friend gives A. one different cookie from a packet they had bought to the lake. 2:45 Leave for home, en route forage for poma rosas [roseapples]; eats 15 and took ~25 home. 3:33 Arrives home; drinks more soft drink from family's store.

## Children's use of foraged foods

Obviously, children ate what they foraged. However, overwhelmingly children also shared what they foraged (see table 2.2). Eighty percent of foraging events occurred in a group that usually included a sibling and friends, and during a foraging event, children worked together to extract the most fruit off of a tree, climbing, catching and gathering together. This communal behavior makes it difficult to measure how much fruit was shared during a foraging event. However, in seven cases, children took foraged fruit to share with friends not present at the foraging event. The observed children were noted to receive foraged fruit 16 times, and to give foraged fruit 13 times during the course of this study (29 separate events, with siblings and peers). In addition, over half the children took foraged food home to share with the family. Often, green bananas were taken home to ripen. In the cases where children did not share with family, it was usually because the items were consumed before the child arrived home. Most children (70 percent) ate immediately what they foraged. A majority of children took some home to share (57 percent). Whether or not children shared with their family might have depended on the food items. For example, parents did not enjoy eating unripe peaches, but bananas were always welcome. The children that did not share with friends were the ones that had gone foraging in a group comprised of siblings.

#### Foraging Gains

Despite the small sample size, and infrequency of foraging behavior, foraging (and urban scavenging) can be productive in terms of approximate caloric value of items foraged per time spent foraging. The average calories gained from all the foraging events is 1028 Kcal, and the average calories per minute spent foraging is 14.5 Kcal. The most profitable resource in terms of caloric density is bananas. Children kept an observant eye on which trees were about to fruit. Bananas were also the only item that a parent requested her child to forage for. The boy (ID 2801) who begged and scavenged for food at the bus terminal had a high success rate in terms of calories, but it was far from home and costly (bus fare). He also spent more time scavenging to get the number of calories (calories/time: 6.4) than other children foraging for fruit. In addition, other children rejected him socially for eating discarded food. The other case of urban scavenging, (ID 9601) was the only child participating from his neighborhood,

so it is unknown how other children reacted to him. However, he asked for leftovers or unwanted food from neighbors and adult friends of the family, not strangers.

Six children were able to gain close to their recommended daily allowance (RDA) or more, from a few hours of activity. Table 2.5 below demonstrates the caloric requirements for active children by age. (Active is defined as sixty or more minutes a day of moderate physical activity, according to the USDA, 2005).

The fact that foraging in an urban environment is so potentially profitable further causes further confusion as to why more children did not do so. The reasons could be that the resources available from working for money or food were more attractive, and perhaps more socially acceptable, as is discussed further in chapter 4. However, as foraging was not an adult directed activity, it is also possible that most children did not know how to forage in terms of what fruit was safe to eat, or simply were not interested in eating fruit.

#### What Predicts Foraging?

Multiple regression analysis was used to predict children's time spent foraging, based on the following variables: children's allocation of time to informal and formal work, children's physical status (weight for age and height for age z-scores), age in months, monthly household food budget (in pesos), birth order in the household, whether they provision other siblings, or whether the target child has an older sibling provisioning them, child's gender, and whether the child was working informally or formally outside the home (the last four entered into the model as two level variables).

	Foraging			
ID	Time		Calories	Calories
Number	(minutes)	Items	Gained	per Minute
701	22	3 oranges	150	6.8
901	20	2 oranges, 1 lime	120	6.0
1201	70	bananas (approx 30)	2400	34.3
2101	155	3 coffee beans, bananas (approx 32), chilies,	2610	16.8
2301	3	2 bananas	160	53.3
		1 papaya, 3 small tomatoes, 1 coffee bean, acuyo, 12		
2401	242	coyoles, 23 oranges	2195	9.1
2701	65	9 coyoles, 15 roseapples	990	15.2
		4 jellos, 1500mL Pepsi, 3 slices bread, 4 slices Dominos		
2801	402	pizza, 1/2 club sandwich, papaya juice, 2 half-eaten rolls	2571	6.4
3001	69	bunch of bananas, approx 30	2400	34.8
3101	2	4 small tomatoes	60	30.0
3301	45	4 oranges	200	4.4
4001	35	2 oranges, 1 lime	100	2.9
4301	20	1 peach	30	1.5
5201	35	jinicuiles (30)	300	8.6
5301	30	5 small tomatoes	125	4.2
5401	15	1 orange	50	3.3
5601	80	bananas, approx 30	2631	32.9
5701	20	Асиуо	0	0.0
9201	215	15 bananas	1977	9.2
9601	160	various food scraps (primarily tortillas and bread)	1500	9.4
Average	85.3		1028.5	14.5

## Table 2.4 Foraging Returns by Time Expended

Table 2.5 Average	Caloric	Needs for	Active	Children b	by Age*.
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, , ,							
Average Caloric Needs for Active Children							
Age Boys Girls							
8	2000	1800					
9	2000	1800					
10	2200	2000					
11	2200	2000					
12	2400	2200					

\*Calorie levels are based on the Estimated Energy Requirements (EER) and activity levels from the Institute of Medicine Dietary Reference Intakes Macronutrients Report, 2002.

The inclusion of the sibling variables considers the possibility that the benefits of children's provisioning activities might be structured very differently based on their presence and actions. I base this possibility in part on the findings of studies such as

Kramer (2002), who found in Mayan families that older children produce more than they consume for many years before leaving (girls are net producers by the age of twelve, boys by the age of seventeen). Home and parent's production is not sufficient for the traditional large Mayan family without assistance (usually provided by their older children). While in this case, the allocation in question was for care of younger siblings, I wondered if the same basic considerations might apply to provisioning behavior. A reasonable proposition is that children in the sample share food more often with siblings than peers.

The variables of interest were entered as a single step. A non-linear relationship was seen between the dependent time allocation and the dependent variables; the former were skewed to the left and thus transformed into new variables using: log (old variable+1) to fit the assumptions of linearity. The best models were selected based on those with the best  $R^2$  and fewest variables and that met the assumptions of linearity based on residual analysis. Variables were removed if they failed to lift *p* above 0.1. Regression models were run using SPSS version 13.0.

The best model had a significant regression equation (F (6, 24) = 4.807, p=0.002), with an R<sup>2</sup> of 0.546, indicating the model explained more than half of the variation in the dependent variable. Children's predicted allocation of time to foraging is equal to: -32.386 – 5.865 (gender) +0.255 (age in months) – 4.867 (height for age z-score) + 7.653 weight for age z-score + 2.149 (log of percentage of time in child care) – 3.611 (child works outside the home). When gender is coded as 0 is male and 1 is female, and child working outside the home is coded as 1 but not working is 0. That is, percentage of time allocated to foraging was increased by 5.9 percent if the child was a

boy, reduced by 4.8 percent with an increase of 1.0 in the z-scores of height for age (i.e., was more likely if the child was stunted), increased 7.6 percent with each 1.0 increase in weight for age z-scores (i.e., was more likely if the child weighed more), increased 2 percent with each point increase in the percentage of time allocated to child care variable, and increased 3.6 percent if the child worked outside of the home. Height for age z-scores, gender, weight for age z-scores, age in months, and the allocation of time to child care variable (all p<0.05). Once these variables were taken into account, neither household food budget nor sibling variables explained any significant additional variation in the dependent variable.

Thus, children are most likely to spend time foraging if they are male, and have greater physical evidence of chronic under-nutrition (i.e., lower height for age), but not short-run malnutrition (i.e., lower weight for age). Older boys who worked outside the home are also more likely to forage. This was not notably affected by household food budget nor the presence of older or younger siblings.

#### **DISCUSSION AND CONCLUSIONS**

Urban child foraging is characterized by older boys (ages ten to twelve), and by children living nearest seasonal fruit tress and other wild plants. Children forage in groups, sometimes very large groups of more than fifteen. Children share their foraged food widely with friends, siblings and parents. Urban foraging does not constitute a large percentage of most children's time. Some children "specialized" in it, devoting over twenty percent of observed time (three hours) to foraging for food scraps or fruit.

Boys are more likely to forage than girls partly due to their greater freedom of movement. The neighborhood *La Reserva*, bordered a rich source of fruit trees and other wild plants. However, it was not seen as safe for girls to go there as squatters had taken up residence within the forest. There was the constant fear of child abduction as girls were taken much more frequently than boys. In safer provisioning environments, such as informal work for a grocery or pharmacy, girls worked as much as boys (see figure 2.4). Girls had heavier child care duties that involved infants. Both boys and girls kept an eye on siblings, but girls were more actively involved in the care of infants. Finally, boys were more willing (possibly more able) to climb the high trees. When girls foraged it was for more easily attainable fruit (like peaches or fallen seed pods). Boys seemed to enjoy climbing the trees or throwing rocks to knock down fruit. Boys foraged more as they got older. The ones that devoted the most time to foraging were 12 years old. It seems likely that strength and ability factored in to which children foraged.

The idea of gender differences in the local adaptive contexts of behavior fits with the view that even though boys and girls live in the same households and can be in the same peer groups, they inhabit local socio-ecologies or "developmental niches" that are unique from each other. These are in part created by the gender norms imposed by other social actors (Worthman 1994, Super and Harkness 1986, 1994).

Geographic proximity to an abundant forest had to be a large factor to why children foraged. However, other children in other parts of the city also lived near forested areas. Why did they not also exploit the fruit trees? Behavioral ecology's theory of optimal foraging offers a clue. It is possible that children exploit the resources that offer the best return for effort (Blurton Jones et al. 1994b, Tucker and Young 2005). A

quick walk to pluck some fruit is a good return for effort, but some foraging events required a longer walk, knowledge of the location of ripe fruit, and strength to pick the fruit. La *Reserva* is somewhat isolated and transportation to the nearest supermarket (where many children were employed to bag groceries) was a five peso ride away. It is possible that for these children, foraging offered the best return for their efforts, but for less isolated parts of the city, informal work for money (with which to buy food) was a better use of time. Indeed, the children that foraged the most lived the closest to the forest. In a nearby neighborhood, none of the participating children forage but many worked to sell bread door-to-door or assist in the few shops. It must be noted that even so, children in urban areas consistently take advantage of foraging fruit and plants much more frequently than begging or scavenging.

Urban foraging was observed to be a child directed event, with no adult supervision or direction. Yet households benefited from child foraging because children brought fruit home to share. One boy kept his (extremely poor) family supplied with bananas and other seasonal fruit. As children exploit seasonal fruit trees in groups of siblings and peers, they share a great deal with them as well. Also, the children observed to forage were having fun.

The caloric returns for time expended in foraging indicate that urban foraging can be a rich caloric source for those willing to forage. Most foraging children did not devote a large amount of time to foraging, nor did they extract a large amount of resources. The time spent, and the fact that resources gained were shared might indicate that the calories gained were not essential to the child's wellbeing. However, the potential quantity of calories could be a rich resource of calories and nutrients for children

nutritionally stressed. Resources from foraging forms a small part of the diet for the urban foraging children, but not a really essential part, as their base diet is provided by their family. This is similar to traditional foraging societies (Bird and Bliege Bird 2000, Tucker and Young 2005). In this case, urban foragers more closely resembled traditional child foraging than homeless child scavenging (Baker et al. 1997, Baker and Hinton 2001). It is possible that the study population was not stressed enough, not marginal enough, for there to be a true necessity for child foraging. It is entirely possible that if this study had been conducted with homeless street children, the results would have been very different.

Children self-provision in urban areas all over the world, and as the world's progressively live in urban areas, this may become a more common and important feature of childhood poverty. Foraging and provisioning in an urban context has not been extensively studied, and the few studies dealt with homeless street children. Foraging in many ways is an autonomous behavior of children, and the homelessness studies indicate provisioning behavior may be a critical aspect underlying children's relatively successful negotiation of challenging urban environments. The value of this study could be in demonstrating the availability of calories to urban poor through scavenging or foraging, especially in ecologically diverse areas, and understanding why these resources are not always exploited.

#### Limitations of the study and thoughts for future directions

An obviously important element of this line of inquiry is determining how foraging might supplement children's diets in ways that count, such as increasing dietary

diversity; this is described in chapter 4 of this dissertation. For future research it would be interesting to do an ethnobotanical knowledge study on urban children. A few of the boys knew a great deal about plants. It would be interesting to document how children gain botanical knowledge in an urban environment with seemingly no adult interaction. Studies have shown that knowledge of edible plants is gained very early on in life (Phillips and Gentry 1993), and that children tend to be extremely knowledgeable about the resources in their environment (Chipeniuk 1995). Also, I think that even in urban areas, foraged plant food could be part of a "famine diet" (Landerman 1991) allowing families to fall back on foraged foods when times got even tougher. Government agencies dealing with issues of food security might invest research into teaching children (and parents) how to accurately recognize safe food resources.

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# **CHAPTER 3**

# HEALTH CONSEQUENCES OF URBAN CHILDREN'S TIME ALLOCATION TO SELF-PROVISIONING, HOUSEHOLD WORK, AND CHILD CARE IN XALAPA, MEXICO<sup>1</sup>

<sup>&</sup>lt;sup>1</sup> Lee, Sarah Elisabeth. To be submitted to *Human Nature* 

#### INTRODUCTION

Children all over the world participate in their households by engaging in child care, housework and work (for money or food). Their time allocation to these activities aids their parents in raising children, running the household and even in buying sufficient food. Some studies show that without these efforts, parents would have reduced reproductive success (Turke 1988, Kramer 2005). Indeed, Niewenhuys (1996) argues that children's productivity in the household is a leading cause of large household size in agricultural and poor urban areas. Behera and Trawick (2001) hypothesize that in metropolitan cultures most children are without "childhood", advancing almost directly from infancy into adulthood due to their involvement in the running of the household. However great the benefit to the household, are there differences in how children allocate their time based on age and gender? Are there nutritional consequences to children's time allocation in a marginal urban environment?

Miles' (1990) study with urban families in Cuenca, Ecuador, demonstrates the gender differences of children's household work. In her study, children are allocated household work beginning around the age of six, depending on birth order. The oldest child was held responsible for all tasks, while the youngest was indulged. Boys engaged in the outside work (running errands) much more than girls. Girls' tasks, which were time-consuming, were inside the household: caring for younger siblings, helping with laundry or washing dishes. Young girls were at an obvious danger in the poor urban environment and not encouraged to go outside.

There are few detailed studies of children's time allocation. An unresolved issue is whether the adaptive contexts of time allocation in children might operate similarly or

very differently from that of adults. Bock (2002) documented working versus school time allocation of children in Botswana. He notes a potentially crucial aspect of gender on time allocation, and its adaptive consequences. In his study, girls allocate much more time to household chores than boys. Educational consequences include the finding that first born girls are less likely to attend or complete school whereas first born boys are more likely to attend school than later born siblings. In another study rural Nepali girls spent twice as much time engaged in heavy work than boys (Yamanaka and Ashworth 2002). Surprisingly, this differential time allocated to heavy work did <u>not</u> influence health status as much as location; children living in the mountainous region were more stunted than those living in the plains.

Frequently, children are the primary caregivers for younger siblings. This, according to Weisner and Gallimore (1977), does not have negative health consequences for the child caregiver. Stansbury et al. (2000) conducted a study to test the idea that child sibling care had a negative effect on child growth. Their study was based in the Ecuadorian highlands, in a region where levels of chronic undernutrition were very high (measured by stunting exceeding the 75<sup>th</sup> percentile); however, analysis indicated no statistical association between growth indices and the practice of older children caring for younger children. Children did not seem to suffer health costs resulting directly from peer care. It is possible that costs may accrue in the form of lost opportunities for some peer minders and emerge most acutely when child caretaking is found in the poorest households where mothers or nearby relatives may be absent (Stansbury et al. 2000). However, in urban areas this behavior may have negative health consequences, as suggested by Engle (1991, 1995) who demonstrated

nutritional and growth costs associated with child and sibling caretaking in peri-urban Guatemala.

Time allocated directly or indirectly to sibling care may have complex and crucial adaptive consequences for the family and household, as was seen in the findings of Kramer's (2002) study among the Maya. She found that older children produce more than they consume for many years before leaving home and parent's production is not sufficient for the traditional large Mayan family without assistance (usually provided by their older children). Mayan child ren's age of net production is twelve for girls and seventeen for boys. The children in this dissertation contributed to households substantively: allocating time to childcare, household chores, family enterprise and provisioning activities. In addition, a majority of children who worked contributed some or all of their income to the household, paying for their food budget per person many times over. Further research may reveal a similar pattern to Kramer's Mayan agricultural studies in terms of age of net production. It seems very possible that poor urban children achieve age of net production at a relatively early age, as well.

How do children living in a marginal urban environment allocate their time, and do differences in time allocation have implications for children's health in a marginal urban environment? In other words, can time allocation to childcare, self-provisioning (working, foraging, begging) or household work (house work, participation in household based business) have costs to a child's nutritional health status? Based on the above mentioned research on time allocation and pilot research, the following hypotheses were generated:

The hypotheses for children's time allocation are:

- Girls will engage in less provisioning activity than boys, and engage in more child care activity.
- Boys will have more leisure time and engage in more self-provisioning activities.

The hypotheses for the nutritional consequences of child time allocation are:

 Boys will have better nutritional status than girls due to more leisure and opportunities in provisioning time.

OR

 Girls will have better nutritional status than boys due to increased access to household resources.

### METHODS

#### Study site

Xalapa lies about five hours by bus from Mexico City, up and over the Sierra Madre Oriental Mountains, in a temperate, lush coffee growing zone that reaches down toward the Gulf of Mexico. As a regional center, *campesinos* (many unemployed coffee farmers) from the surrounding countryside have moved to the city over the last two decades in search of new opportunities. Many have settled in the full periphery of the city in informal *colonias*, building neighborhood after neighborhood of shacks from laminated cardboard and zinc and plastic sheeting. The neighborhoods are rent-free, but also receive no city services. Inventiveness provides the only means to tap into city electric services, and sewage runs into local streams and open ditches. The neighborhoods farther out from the city center are located in the areas of abandoned fruit and coffee plantations. Wandering livestock are common in these areas. In neighborhoods closer in, affluent neighborhoods are a one hour bus ride away. Adults travel to work in these areas selling on the street or in market stalls, cleaning, intermittent construction, driving taxis, and working in factories. Almost all male household head's work in some capacity at least seasonally (taxi drivers and construction workers), and over half of their wives, although very few in the formal economy. Many family members worked part time jobs as the opportunity arose, or participated in other entrepreneurial activities that did not yield a steady income. Families combined different economic pursuits in order to better their chances of always having household income. For example, in one family the father worked as a mechanic, the mother sold snacks in the afternoon by the side of the highway, the oldest son sold tamales door-to-door, and the daughter worked as a bag girl at a pharmacy.

Mothers indicated during interviews about household diet that household food shortages follow lack of cash income and are characterized by narrowing the diet to the cheapest possible foods, beans and tortillas, and by having fewer meals. A common money saving strategy was to buy corn kernels to soak and grind to make the *masa* (corn dough) used in home made tortillas. Milk and meat (very costly) were used sparingly when budgets were tight.

Families with children between the ages of seven and eighteen are eligible for federal *Oportunidades* support, if they qualify and their children are registered (which requires a birth certificate), attending school, and making good grades. About half of the families in this study received various levels of support, and many more were waitlisted.

Children receiving *Oportunidades* were not supposed to work outside the home, but many did. Children regularly participate in paid employment, especially after around age ten or so. Formal employment of children is illegal before the age of fourteen (Mexican Secretariat of Labor and Social Welfare 1992), but the law is so weakly enforced that business owners consider any fines part of the cost of doing business

(Department of Labor, Bureau of International Affairs 2007). The children who were employed in a more formal sense outside the home or family business did so in two areas: large supermarkets or pharmacies or small neighborhood businesses (like bakeries, grocery stores and car washes). Supermarkets had a highly structured environment for grocery baggers with security guards. Neighborhood businesses employed children to clean, stock shelves and sell door-to-door (bread or fruit). Children also worked informally by running errands for neighbors or on a construction site. Children rarely made a fixed amount of money, and usually under-reported their earnings so that they could keep more of it for themselves. More systematic arrangements, such as working as grocery baggers, meant a steadier source of cash, but higher expectations to share their earnings with the household. Children spent most of their discretionary cash on food.

Schools are provided in or near the communities. Lasting only four hours a day; most children attend. Schools are provided in or near the communities. This study spanned the Christmas, Easter, and summer holidays, not to mention the numerous government holidays in recognition of independence, Flag Day, etc. During the study, teachers were on strike several times. Therefore, children did not spend a great deal of time in school, and homework (for this age group) was very light. Even children motivated to do well in school did not allocate a large percentage of their non-school hours to school work.

Health facilities were extremely limited, and most problems were handled by visits to the poorly stocked pharmacies in the *colonia* rather than dealing with the hassle and cost of travel to the free SSA clinics or one of the two hospital emergency rooms.

The residents of these *colonias* did not have access to the state-run hospitals, as they were not employed in the formal sector.

The families in these communities thus face considerable challenges to maintain their houses, get services, and feed themselves. In many cases, children are expected to contribute. As in poor urban areas all over Mexico and Latin America, families engaged in a wide variety of income generating activities with a large percent of household members (de la Rocha 2001). For example, one family raised rabbits for food, and the children cut the grass to feed the rabbits; another boy worked as a roofer assistant while his father was in jail (for raping his sister); and a girl sold yogurt door-todoor for a neighbor's small business.

#### Data Collection

Fieldwork was conducted during thirteen months, October 2003 to November 2004. Eligible neighborhoods were identified initially as those social agency informants consistently identified on city maps as *de bajos recouros* (low in resources). The study focused on girl and boy children ages eight to twelve years from these neighborhoods and their households. Recruitment began slowly through contacts in community-based social agencies, such as charities, and sped up as local priests came on board to help with introductions to families. Parents were justifiably concerned about child kidnapping. At least three girls went missing in these neighborhoods during the field season. The families included in the study were predominantly dual-parent, although fathers were quite often absent (some working in the United States). Some of the families were a "second family", following the Mexican practice of men supporting both a de jure and a de facto household.

The sample on which I base the following analyses consisted of 96 children, 51 boys and 45 girls, aged eight to twelve years and their households (another six children dropped out during the course of the study). Once a household was identified as suitable based on the presence of a child in this age range, the mother was invited to participate, and if she was willing, the child was also asked to participate. In the case of more than one child in the age range (as was frequently the case), the child with the most recent birthday was asked to participate in the study. As it happened, sometimes this child did not want to participate but another sibling in the same age range did, so they became the target child. Then consent was requested of all other children in the house under eighteen, from whom additional data on nutritional and health status could be collected.

#### Methods

The results of this study are based on three different types of data for each target child and their household: household survey, anthropometrics and target children's time allocation as observed through focal follows.

In conjunction with my field assistants, I collected data on demographic characteristics of the primary caregiver and all the children living in the household in the form of a brief survey. The survey included questions on the amount and source of household income and food. I also took note of the general characteristics of the house, such as water supply. The household survey consisted of basic demographic information regarding the children of the household, the income of the household (including income from the father, mother, provisioning siblings, and any government aid) and monthly food budget, and the normal household diet. I also took note of

household characteristics such as construction material, proximity to open sewers, access to fruit trees or gardens, and presence of livestock or pets. I asked about the general health of all children, inquiring specifically about the incidences of malnutrition and major illnesses, if any, of the target child. Generally speaking, household economies were similar, in that most had insufficient access to cash to meet all bills and faced food shortages at least on occasion. Household monthly food budgets ranged from \$120 to \$3000 pesos (\$12 to \$300 USD), with a mean of \$1356pesos (SD=\$686). To take into account variations in household size (membership ranged from three to fourteen), I estimated the mean monthly spending in each child's own household based on total household spending on food (overall mean for the total sample of children was \$259 pesos (\$25 USD) (SD=\$153).

Anthropometric and clinical nutritional assessment followed the convention for nutritional studies set by Gomez et al. (1956). The standard nutritional status evaluation tool is standardized height-for-age, weight-for-age, and body mass index (weight/height<sup>2</sup>) z-scores by comparison with World Health Organization age- and gender-specific standard references using nutritional software released by the CDC (EpiInfo Version 1.1.2). I used the NCHS/WHO population reference (NCHS, 1977) as the most relevant for this study: the newest CDC growth charts have been established to better describe obesity (Kuczmarski et al. 2000), but that is not an issue with this population.

Height-for-age provides a gross measure of long-run under-nutrition, particularly caloric insufficiency based on the understanding that chronic undernutrition forestalls growth in stature (Dible y et al. 1987). Weight for age provides a shorter-run but still

gross measure of nutritional sufficiency, in that lower weights are taken to represent lower caloric intakes (WHO 1995).

I collected anthropometric data for all children in the study, following the anthropometric conventions given by Frisancho (1990). I weighed each child using a Detecto digital scale, height was taken with a Cooper Tools Six foot measure and bodymass-index using Lange Skinfold Caliper. Each measure was taken three times and the average was used in analysis. Each child was measured twice: an initial measuring and a follow up six to eight weeks later (at the end of their participation in the study) to ensure accuracy. Each child was also given a physical examination to identify edema and characteristic hair discoloration (clinically significant for protein-energy malnutrition), as well as iron-deficiency anemia via examination of the inner surface of the lower eyelid (Jelliffe 1966).

I conducted time allocation or focal follows for fifteen hours with each child in the study (1440 hours of observation). I applied standard ethological theory (Lehner 1996) to develop an ethogram of children's time allocation, and used this to code children's activities during continuous focal follows. Possible child activities in the ethogram (see Appendix B) included working for money, household chores, sibling care, and free play as well as specific subsistence-related activities such as collecting fruit. Observation notes included noting everything the child ate, if he/she shared or received a food item and their relationship to that person. (For example: Juan at 2:00 p.m. working outside the home for money, received an apple from co-worker, ate half and shared the remainder with his brother.) Also noted was the frequency that a child received money, how much and from whom (employer, parent, non-related adult, sibling, or stranger) and

what the child did with that money during the observation period. Most commonly, the child bought food which was either immediately eaten and shared, or taken home.

Each child was observed on three separate occasions outside of school hours for approximately five hours for a total of fifteen hours. Times of day and days of the week were different in each round of observation. While five hours was the ideal focal follow duration, an observation sometimes lasted longer if the child was far from home, working or foraging. The next observation would then last somewhat less than five hours. Due to the schedules of three children, they were observed on four occasions for a total of fifteen hours. I specifically considered what children were doing with their time when they were not in school. This meant that most observations were conducted during weekends, vacations, or during the morning or afternoon hours when school was out. (Xalapa has two rounds of school four hours in the morning and the afternoon and children either go to school from eight to twelve or two to six.)

In the interest of safety, no focal follows were performed after sunset, so all observations relate to daylight hours only.

#### RESULTS

#### Time allocation

In general, of the ninety-six participating children, sixty were observed at some time to be involved in child care (62.5 percent), and 82 children (85 percent) contributed labor to the household, including chores. Thirty-nine children actively worked outside the home for money or food (41 percent). Twenty children (21 percent) were ever observed to forage. Only four children were ever observed to beg.

#### Child Time Allocation to Provisioning Activities



Figure 3.1 Percentage of observed time allocated to provisioning-relevant activities, child care, or neither activity set, by children's gender.

As demonstrated by Figure 3.1, children of both genders spend a considerable percent of their non-school daytime hours in provisioning-related activities (foraging, formal or informal work) or in childcare. Foraging behavior includes foraging for fruit or vegetables (in the classic sense) and scavenging for food. Children who had an employer were classified as working formally. Many children earned money or food informally by running errands and doing odd jobs. All of these behaviors taken together are called provisioning activities because the child gains resources in terms of food or money. There was no gender difference in the percent of time children were in a provisioning inactive state (p>0.05 according to an independent samples t-test), with

both inactive an average of 63 percent of all time they were observed. The hypothesis predicating boys would have more leisure time was not supported.

Boys spent 23 percent of time in provisioning activities versus 16.5 percent for girls: this also was not significant according to a t-test (p=0.54). The hypothesis predicting boys would spend more time provisioning was not supported. Based on ethnographic research, the lack of a probability for gender difference in provisioning activities may be due to the availability of relatively safe work for girls to work as grocery baggers in supermarkets and pharmacies. These jobs are lucrative (due to the custom of giving a small tip to the bagger) and safe, as there is usually a security guard present. Children will often travel in groups and arrange their schedules so that they can come and go together.

Table 3.1 catalogues the types of work that children engage in for money. Boys are most likely to sell food door-to-door in their neighborhoods and also to sell on the street (matches and newspaper are most common). Boys also worked more in small businesses to do some of the dirty work, such as cleaning bakery pans, stocking grocery shelves and washing cars. Twice as many girls worked as grocery baggers. I observed only one child (a girl) do any kind of paid agricultural work. I was told that in years past, when the coffee market was better, many children from these neighborhoods worked in the coffee plantations.

Table 3.1 Type of Child Provisioning Activity by Gender

	Number of Boys	Number of Girls				
Provisioning Activity						
Sells Food Door-to-Door (tamales or bread)	5	3				
Sells on Street or in Market (matches, newspaper, handicrafts, foraged fruit and wood)	6	2				
Work in small business (bakery, grocery, car wash)	7	0				
Grocery Bagger	3	6				
Sells Wood or Cut Grass	1	1				
Runs errands for neighbors	1	1				
Washes Dishes	0	1				
Seasonal Agriculture (coffee picker)	0	1				
	n=23	n=15				
Total number= 38, some children engaged in more than one provisioning activity						





Overall, twenty percent of the total sample of children was ever observed to forage, and the prevalence was higher among boys (30 percent) than girls (10 percent). There was a significant difference by gender in time allocated to foraging, as can be seen in Figure 3.2 with boys greatly exceeding girls, with an average of 3.5 versus 0.45 percent of their time (p=0.00 according to the t-test). While all children in total spent an average of 2.1 percent of total observed time foraging, considering just children who were ever observed to forage the total percentage of time they spent in that state was twelve percent (SD = 11.7).

Observed begging behavior was rare, with only four recorded incidences (three boys and one girl). It is possible that more children would have begged if not for being observed. Only one child allocated a large amount of time to begging, and he was very successful. As to provisioning behavior more generally, as demonstrated by Figure 3.2, boys are more diversified in how they spend their provisioning time than girls. Girls' provisioning behavior focused on formal work. I think this meant that girls were working in a safer environment for a relatively steady income. Boys had a little more freedom to be flexible, and engaged in opportunistic (such as taking out garbage, running neighbor's errands, or selling door-to-door). It must be remembered that the neighborhoods were not safe (girls disappeared from these neighborhoods), and girls' freedom to engage in informal work was limited due to parents' safety concerns.

#### Child Time Allocation to Child Care:

There was a gender difference in the percentage of the observed time spent in child care; boys (13 percent total) versus girls (20 percent); however, this was not significant according to the t-test (p=0.51). The hypothesis stating that girls would engage in more child care is not supported. It is interesting to note that boys spent more time as the sole caretaker of siblings, and girls took care of siblings almost twice as much when a parent (mother) was present. Ethnographically, it seemed that boys were entrusted with sibling care for more "formal" or set time periods. One boy was frequently locked in the house with his five younger siblings when his mother had to go to work. Boys did not "stick around" to take care of siblings once someone else was available to do so. It is also likely that girls engaged in continuous child care of siblings during the presence or absence of the parent.

There is no statistical difference in time allocation to child care by age groups. The difference in average percent could indicate older children allocating time to other provisioning activities or household work. The variation in child care could not statistically be explained by household food budget or the child's time allocation to provisioning activities. Table 3.2 provides a breakdown of average time children allocated to sibling care.

Table 3.2 Percent of Time Allocated to Sibling Care by Gender, Age, Household Food Budget, Father's Contribution to Household Income and Provisioning Status of the Target Child.

	Time Allocation to sibling care						
	Total Alone		Total with Parent		Overall		
	Average	SD	Average	SD	Average	SD	
Gender							
Boys (N=52)	12.9	18.9	12.3	10.8	25.2	29.7	
Girls (N=44)	9.0	13.5	23.3	23.9	32.3	37.4	
Age							
10.9 yrs and younger (N=44)	13.1	19.0	17.6	18.1	19.1	23.8	
11.0 yrs and older (N=51)	9.6	14.3	20.7	22.5	15.2	20.7	
Household Food Budget							
1000 and less (N=34)	14.3	20.0	22.0	19.6	21.4	26.1	
1001 to 1799 (N=27)	8.2	12.7	8.9	11.0	10.7	14.2	
1800 and above (N=33)	10.5	15.8	24.1	25.5	17.6	22.9	
Father Contribution							
1000 and less (N=28)	7.2	11.6	17.8	27.9	12.3	20.3	
1001 to 1999 (N=26)	10.1	15.6	19.0	10.9	14.3	17.4	
2000 and above (N=42)	15.0	19.9	19.9	20.2	22.4	25.6	
Provisioning							
Working (N=46)	12.5	10.5	10.2	13.9	27.4	17.6	
Inactive (N=49)	14.9	20.3	23.2	24.1	23.4	26.7	

## Child Time Allocation to Household Chores:

Children's time allocation to household chores outside the house included running household errands and working in the household business. Household chores inside the house included housework such as cooking, cleaning and doing laundry. One girl did all the housework for her home and ran the small family business in the front room. Eighteen households had small family businesses that were casually run by whoever was present, including the children. These businesses included snack stalls on the street, fruit and vegetable stalls in the market, and small convenience stores in the front room of the house. Sometimes parents worked other jobs and relied on children to manage the home based shop. Older children were able to look after younger siblings and keep an eye on the shop. It must be noted that business was usually not brisk as many other families also had small shops in their front room. There was no statistical difference between girls and boys outside work for the household. If one looks only at the average percent in Table 3.3, girls seem to spend more time doing outside household work than boys. However, statistically, girls did more inside household work.

	Time Allocation to Household Related Chores					
	Outside the house		Inside the house		Free time	
	Average	SD	Average	SD	Average	SD
Gender						
Boys (N=52)	11.7	19.2	7.5	7.4	38.1	22.1
Girls (N=44)	16.8	26.0	19.2	15.0	31.1	21.3
Age						
10.9 yrs and younger (N=44)	14.6	21.9	12.7	13.7	40.3	24.3
11.0 yrs and older (N=51)	13.6	23.0	12.6	12.0	29.2	17.4
Provisioning						
Working (N=46)	12.3	20.2	11.9	11.0	27.4	17.7
Inactive (N=49)	15.2	24.1	14.8	16.6	39.7	23.1

Table 3.3 Percent of Time Allocated to Household Related Chores and Free Time by Gender, Age and Provisioning Status of the Target Child.

To summarize: based on the focal follows, children spend about forty percent of their non-school waking time in provisioning activities or child care. Both girls and boys work formally for money, especially as they get older, but boys work informally for money more often and had a wider range of informal provisioning activities. Thus, boys had slightly more time spent in provisioning overall compared to girls. Girls engaged in marginally significantly more child care than boys. Both had about equal amounts of "inactive" time.

#### Nutritional Status of the Participating Children

Considering the nutritional status of children based on height and weight data, stunting is widespread and underweight is common in the sample of children with no statistically significant gender differences. In the sample of target children, 33 percent are classified as underweight based on weight-for-age scores of <1, of those, 6.3 percent are moderately or severely underweight. The majority of children (67percent) are in what is considered a normal or healthy weight-for-age range. However, 52.1% of the children are stunted according to Height-for-age z-score of less than 1. Overweight is rare, with only 6.3 percent of children thus classified. Mean body mass index for boys was statistically the same as that of girls according to a t-test (p>0.05), being 18.5 (SD = 3.4) for boys and 18.6 (SD = 3.2) for girls.

Based on height for age z-scores, which can be used to indicate the prevalence of stunting (growth deficit) associated with under-nutrition, I classified mild stunting based on whether the child's height for age z-score was <-1, and moderate or severe stunting if it was <-2. The majority of children (55.8 percent) were stunted; boys were more likely to be moderately or severely stunted than girls (30 versus 22.2 percent), but there was not a significant gender difference in height-for-age z-scores, according to a ttest, or in the likelihood of being classified in a stunting category, according to a Chisquared test (p>0.05 for both). There was no marked gender difference related to risk of

wasting (low weight for age) or stunting (low height for age), a point that can be important for understanding any observed gender differences in time allocation.

#### Nutritional Status and Time Allocation

Figures 3.3, 3.4, and 3.5 plot weight for age, height for age and body mass index z-scores by age in months, differentiating children based on classifications of whether they spend more time in provisioning, more time in child care or do not invest significant time in either set of activities. Children were assigned to each category based on observations of time allocation. A child that spent at least twenty-percent of his or her time engaged in working or foraging was assigned to that category (N=36). The same for children engaged in child care (N=36). Children classified as inactive allocated their time to leisure activities or school work, spending less than twenty percent of their time in provisioning activities or childcare (N=34). Weight for age and height for age z-scores do not go up nor down particularly with increasing age.


Figure 3.3 Children's weight-for-age z-score by age in months, compared to WHO reference growth curves, differentiated by whether they tend to spend more time in child care, more time in provisioning activities (working, foraging) or are predominantly inactive with regard to both. The heaviest weight-for-age child (labeled A) has a mother in the U.S. who sends money for food.



Figure 3.4. Children's height-for-age z-score by age in months, compared to WHO reference growth curves, differentiated by whether they tend to spend more time in child care, more time in provisioning activities (working, foraging) or are predominately inactive with regards to both.



Figure 3.5. Children's Body Mass Index z-score by age in months, compared to WHO reference growth curves, differentiated by whether they tend to spend more time in child care, more time in provisioning activities (working, foraging) or are predominantly inactive with regard to both. The extreme outlier (A) is a boy who spends considerable time every day selling bakery goods door-to-door, carrying a very heavy basket and walking long distances.

Boys forage more frequently and work more often at informal jobs. Girls and boys devote time to child care. Despite gender differences in time allocation, there was not a significant gender difference in height-for-age z-scores according to a t-test or in likelihood being classified to a stunting category according to a Chi-squared test (p>0.05 for both). That is, I did not observe any marked gender difference related to risk of wasting (low weight for age) or stunting (low height for age). There was no significant nutritional difference between genders, even though they allocate their time to different

activities. These children are decidedly stunted relative to WHO standards; on the other two metrics their spread is within <u>+</u>2 standard deviations with a fairly even distribution around the 0 line although a slight tendency to be lighter-by-age than expected, and have higher body mass by age than expected. The population is stunted at twice the rate for the overall Mexican population (according to Rivera et al. 2004), but there is a broad distribution across z-scores. There is no statistically significant difference between time allocated to different activities and gender. Neither hypothesis concerning nutritional consequences was supported. Boys and girls had about the same nutritional status.

#### **DISCUSSION AND CONCLUSIONS**

There was no gender difference in provisioning status. There was no significant gender difference in time allocation to child care. However, there were no real stature differences between boys and girls, even though boys devote more time to provisioning activities. The lack of gender differences in time allocation differs from other child time allocation studies conducted with agriculturists (Bock 2002, Draper and Cashdan 1988, Yamanaka and Ashworth 2002). The gender equality in time allocation could reflect a unique quality of urban life, allowing more provisioning opportunities for girls, and perhaps requiring boys to engage in more child care (due to lack of close community or extended family living nearby). It is possible, but untested, that girls staying at home do have more access to the household resources, and boys that have more provisioning activities do benefit nutritionally, and they cancel each other out in terms of significant differences in health. This notion of possible gender differences in the local adaptive

contexts of behavior fits with the view that even though boys and girls live in the same households and can be in the same peer groups, they inhabit local socio-ecologies or "developmental niches" that are unique from each other. These are in part created by the gender norms imposed by other social actors (Worthman 1994, Super and Harkness 1986, 1994). However, it is worth considering the possibility that boys and girls operated within their own micro-niche to maximize their access to resources.

The hypothesis predicting boys would spend more time provisioning was not supported. Child time allocation to different activities cannot be determined to influence their nutritional status one way or another. However, their time allocation influences their household in terms of income, food and labor. Children spend about forty percent of their available non-school daylight hours engaged in working, foraging, caring for siblings, and helping in the family business. This is a considerable amount of time and must be valuable to parents. Consider what else a mother can do while her children look after each other, or how much the income of the household is increased if children bring in money and help in the family business. The non-significance of time allocation on nutritional status does not mean that time allocation is in and of itself, insignificant.

The importance of time allocation and gender roles is thoug htfully discussed by Miles (1990) based on research in an urban area in Ecuador. She writes that child participation in the household activities solidifies family relationships by emphasizing cooperation and reciprocity. "A child who performs any household chore eases the burden of his/her parents and thus reinforces family unity. As such, simple generalizations about inside/outside, female and male contributions become irrelevant, as the needs of the household take precedence" (Miles 1990:13). It is beyond the scope

of this study to determine the benefits of time allocation beyond that of nutritional status: for example, expanding it to the importance of education or household unity. However, these intangibles could be essential to understanding children's time allocation.

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# **CHAPTER 4**

# CHILD SELF-PROVISIONING AND CHILDREN'S DIETS IN A MARGINAL URBAN ENVIRONMENT<sup>1</sup>

<sup>&</sup>lt;sup>1</sup> Lee, Sarah Elisabeth. To be submitted to American Journal of Human Biology

#### INTRODUCTION

The world's poor do not have the luxury of an extended childhood, where child participation in the household work or economy is unnecessary and considered culturally taboo. Children of the poor begin at a young age to assume responsibilities both inside and outside the home, and their participation is both needed and valued (Baker et al. 1997). Nepali families consider children to be capable of adult work around the age of twelve. A four culture study (Kenya, Belize, American Samoa, and Nepal) found that by the age of nine, the average time devoted to chores or work outside the home was twenty-three percent (Munroe et al. 1984). This is not limited to agricultural or industrial societies. Children in traditional foraging societies contribute independently to family diet as well as their own, even at early ages (see Draper and Cashdan 1988, Hawkes et al. 1995, Blurton Jones et al. 1994a,b). Given that children are capable of adult responsibility, they must be credited with the ability to make decisions about their resources. This study seeks to document the dietary and monetary choices that children make in a marginal urban environment, Xalapa, Mexico.

In foraging societies, children's food-collecting behavior has the potential to increase the amount and diversity of food available, and thus improve their nutrition. Field-based studies suggest children are able to provide a substantial portion of their own diets by foraging (Bird and Bliege Bird 2000, Bliege Bird and Bird 2002, Blurton Jones et al. 1989, Blurton Jones et al. 1994 a, b). For example, Bliege Bird and Bird's (2002) study of reef fishing and collecting in the Torres Straits suggests children may forage less selectively than adults, resulting in more and different items than are collected by adults (Bird and Bliege Bird 2000). Hawkes et al. (1995) demonstrate that

African Hadza children provide a significant amount of their daily caloric needs through foraging, even as young as age five.

Providing a perspective from a very different ecological context, research in Nepal has indicated that children living under conditions of extreme urban poverty who obtain their own food may do better than their peers who do not (Baker 1998; Baker and Panter-Brick 2000; Baker and Hinton 2001; Baker et al. 1997). Specifically, homeless street children who provide entirely for themselves display less growth stunting (implying better overall nutrition) and have better overall health than their rural counterparts living at home, although they also experience more illness and accidents (Baker et al. 1997, Panter-Brick et al. 1996b). Possible, but untested, explanations for these findings include that the urban children had higher socioeconomic status prior to becoming homeless, a better energy return for effort (calories, time) invested among the urban children who self-provision, that the urban environment is richer and provides more and a greater variety of food or the urban street children keep proportionately more of the food they obtain because they do not have to share it with members of a household (Panter-Brick et al. 1996b).

The focus here is on addressing the latter suggestion, testing how children's investments in food and other resource-seeking behaviors external to the household influence their dietary quality. I test the idea that children's food- and other resource-seeking behaviors might make a difference to their nutritional wellbeing under the extremely marginal conditions associated with urban poverty in many developing world regions.

Millions of children worldwide living under conditions of poverty regularly search for or work for food (forage) or work, trade or beg for money that can be converted to food. In Xalapa, children have a range of ways to convert their free-time to food-getting, such as scouring trees for fruit, running errands, working for money, working for food or begging. Operationally, I defined children's provisioning as activities that had the potential to increase access to food or resources. I considered the dietary consequences of children's own p rovisioning strategies (working and foraging) to their diets in the context of resource limited urban environments, comparing children engaged in self-provisioning with those who are not.

The hypotheses are:

• Provisioning status (active or not in provisioning activities) will not greatly affect anthropometric markers of generalized caloric and protein sufficiency.

However, controlling for such factors as household food budgets and child's gender:

- Foraging children will have a greater amount and diversity of fruit and vegetables in their diet than other children.
- Otherwise-provisioning children (those working most formally or informally for money) will have a greater variety of food items, but lower overall dietary quality than other children, and eat more nutritionally empty foods such as candy).

This article also seeks to document children's allocation of their earned resources. Does children's income make up a large part of the household income? What do children do with their cash? During pilot research I noted that children use their money almost exclusively to purchase food, which is then widely shared with siblings and peers. I also

noted that foraged fruit was widely distributed among household members and friends. How does child sharing affect the dietary quality measures of their diet?

 Children who share the most will have higher dietary quality measures (Dietary Diversity Score and Food Variety Score) of sugar, fried food and sugared beverages than children who do not share.

These hypotheses are based in part on pilot research conducted in Xalapa during the summers of 2001 and 2002. I observed, through focal follows, dietary recalls and anthropometry that children who provisioned did not seem to be significantly better off than their inactive counterparts in terms of stature or weight. I also noted that some children foraged for fruits outside of the household, and that purchased fruit was expensive and not always included in the household diet. I also wondered if provisioning children were able to eat more high calorie/high fat food due to their earned income, or if they made other dietary choices. Recent studies on diet change in Latin America (Rivera et al. 2004) indicate that the traditional high starch diet is changing, and more nutritionally empty foods (such as packaged snacks and soft drinks) are taking their place. This is primarily a concern in urban areas where the shift is happening rapidly. However, anecdotally, other anthropologists working in Mexico have observed that even the most isolated areas have small *tiendas* selling coca-cola (often brought in on the back of a burro).

#### Study site

Xalapa lies about five hours by bus from Mexico City, up and over the Sierra Madre Oriental Mountains, in a temperate, lush coffee growing zone that reaches down toward the Gulf of Mexico. As a regional center, *campesinos* (many unemployed coffee

farmers) from the surrounding countryside have moved to the city over the last two decades in search of new opportunities. Many have settled in the full periphery of the city in informal *colonias*, building neighborhood after neighborhood of shacks from laminated cardboard and zinc and plastic sheeting. The neighborhoods are rent-free, but also receive no city services, so inventiveness provides the only means to tap into city electric services, and sewage runs into local streams and open ditches. (See Figure 4.1 for a map of Xalapa and the location of the ninety-six households that participated in this study.) The neighborhoods farther out from the city center are located in the areas of abandoned fruit and coffee plantations. Wandering livestock are common in these areas. In neighborhoods closer in, affluent neighborhoods are a one hour bus ride away. Adults travel to work in these areas selling on the street or in market stalls, cleaning, intermittent construction, driving taxis, and working in factories. Almost all male household head's work in some capacity at least seasonally (taxi drivers and construction workers), and over half of their wives, although very few in the formal economy. Many family members worked part time jobs as the opportunity arose, or participated in other entrepreneurial activities that did not yield a steady income. Families combined different economic pursuits in order to better their chances of always having household income. For example, in one family the father worked as a mechanic, the mother sold snacks in the afternoon by the side of the highway, the oldest son sold tamales door-to-door, and the daughter worked as a bag girl at a pharmacy.

Mothers indicated during interviews about household diet that household food shortages follow lack of cash income and are characterized by narrowing the diet to the cheapest possible foods, beans and tortillas, and by having fewer meals. A common

money saving strategy was to buy corn kernels to soak and grind to make the *masa* (corn dough) used in home made tortillas. Milk and meat (very costly) were used sparingly when budgets were tight.

Families with children between the ages of seven and eighteen are eligible for federal *Oportunidades* support. To qualify, their children must have a birth certificate, attend school and make good grades. About half of the families in this study received various levels of support, and many more were waitlisted. Schools are provided in or near the communities. Lasting only four hours a day; most children attend.

Oportunidades, a national federally funded child welfare system with a purpose to improve the education, health and nutrition of children living below the poverty level (Secretaria de Desarrollo Social 2002), provides some limited assistance to families in these neighborhoods. The program has a complicated relationship to income in very marginal households because a child receiving aid is not supposed to be employed, yet many households use - even depend on - the money their children earn. Ways in which children make money include bagging groceries, washing cars, selling items on the street such as chewing gum or matches or newspapers, making seasonal handicrafts (such as for *dia de los muertos*), running errands for neighbors and begging. Girls, specifically, make a little money by washing other people's dishes or laundry or baby sitting. Children are also engaged in more formal employment such as working for construction companies and working as shop assistants. Children make an invaluable contribution to family businesses, helping run small snack stalls and other entrepreneurial enterprises, but this is usually unpaid work. Children, particularly girls, also do considerable unpaid work within the household, such as in child care and

housework (sweeping, laundry, washing dishes); both boys and girls do neighborhood errands.

Schools are provided in or near the communities. Lasting only four hours a day; most children attend. Health facilities were extremely limited, and most problems were handled by visits to the poorly stocked pharmacies in the *colonia* rather than dealing with the hassle and cost of travel to the free SSA clinics or one of the two hospital emergency rooms. The residents of these *colonias* did not have access to the state-run hospitals, as they were not employed in the formal sector.

The families in these communities thus face considerable challenges to maintain their houses, get services, and feed themselves. In many cases, children are expected to contribute. As in poor urban areas all over Mexico and Latin America, families engaged in a wide variety of income generating activities with a large percent of household members (de la Rocha 2001). For example, one family raised rabbits for food, and the children cut the grass to feed the rabbits; Another boy worked as a roofer assistant while his father was in jail (for raping his sister), and a girl sold yogurt door-todoor for a neighbor's small business.



Figure 4.1 Map of Xalapa Colonias Indicating Participating Households.

## METHODS

## Data Collection and Variables

The completed study sample consisted of 96 target children (6 more dropped out of the study) aged between eight and twelve years, and their households, spread through twenty-nine local neighborhoods (*colonias*) in the shantytowns around Xalapa (see Figure 4.1). Initially, the target neighborhoods were selected by those emicly identified by child local agency informants (such as working with street child organizations and charitable aid) to be "very poor" or a "shanty town". Children and their families were initially recruited through referrals from community agency workers, a process slowed considerably at least initially by local concerns about children being kidnapped from neighborhoods where there is almost no police presence. (This was not an abstract fear; during the study period three girls disappeared. Local journalists informally suggested they were probably taken for the growing child prostitution industry in the nearby port town of Veracruz, but the persistent rumor in the neighborhoods was that children are stolen and taken to the United States for organ harvesting.) Recruitment gained momentum once local priests certified the research, allowing catechism teachers to provide a list of children in the right age range that might be willing to participate and personally taking the researchers to visit the identified households. Some neighborhoods were simply more willing to participate than others, as demonstrated by the cluster of forty-six participants in neighborhoods on the lower right hand corner of Figure 4.1. The mother was invited to participate, and if she was willing, the child was also asked to participate. If there was more than one child between 8 to 12 years in the household the child with the most recent birthday was first asked to participate in the study. If they refused, any eligible sibling was then offered the chance to participate. The focus on children aged 8 to 12 years was because children have clear ongoing primary connections to households but also less direct supervision by parents in their day-to-day activities.

#### Household Survey

The household survey consisted of basic demographic information regarding the children of the household, the economics of the household (including income from the father, mother, provisioning siblings, any government aid and monthly food costs) and

normal household diet. I also took note of household characteristics such as construction material, proximity to open sewers, access to fruit trees or gardens and presence of livestock or pets. I asked about the general health of all children, inquiring specifically about incidence of malnutrition and major illnesses of the target child. Generally speaking, household economies were similar, in that most had insufficient access to cash to meet all bills and faced food shortages at least on occasion. Household monthly food budgets ranged from \$120 to \$3000 pesos (\$12 to \$300 USD), with a mean of \$1356 pesos (SD=\$686). To take into account variations in household size (membership ranged from three to fourteen), I estimated the mean monthly spending in each child's own household based on total household spending on food (overall mean for the total sample of children was \$259 pesos (\$25 USD) (SD=\$153)). Dietary Quality Measures

Previous studies have not well identified children's foraging and food-gathering activities in urban environments, for several reasons. First, the problem is somewhat beyond the scope of standard nutritional methods that might be applied in urban settings (Quandt 1986). Researchers may have missed the importance of child self-provisioning because items children collect and eat are often not classified culturally as "food" (Fleuret 1979, Huss-Ashmore and Johnston 1997) or only as "children's food" (Bliege Bird and Bird 2002). Fleuret (1979) noted that opportunistic snacking of wild fruits and greens accounted for a significant portion of Shamba children's diet, but were not included in dietary recalls because this consumption was not part of a "meal". Dewalt (1981, 1983) documented the nutritional strategies undertaken by Mexican agricultural families that included farmed, foraged and purchased food items. She

argues that it is not enough to list foods eaten in a household, but also to document the pathway of how the items become part of the diet. Parents or caregivers may be completely unaware of the inclusion of foraged food, child purchased food and child shared food into their children's diet. To ensure that all possible child food items were included in the nutritional analysis and adequately observed in the focal follows, four key child informants lead researchers through neighborhoods pointing out all the possible locations and related items children could possibly find to eat.

Children's diets were calculated using twenty-four hour dietary recalls and observation data. Data were then coded using Dietary Diversity Score (DDS) and Food Variety Score (FVS). I calculated the caloric value of the dietary recall food using nutritional software (Diet analysis +, Version 6.0), and a publication by the Mexican Government on nutritional values of Mexican food (*Sistema Mexicano de Alimentos Equivalentes*). Unfortunately, I do not place much confidence in the accuracy of the dietary recalls in terms of quantity of each food. Even with the aid of a parent, children were very uncertain of exact amounts eaten. For example, a "plate full" could mean very different quantity to different children. I and my field assistants endeavored to clarify by demonstrating quantities on dishes we brought with us to the interview; but there is only so much a child can remember. For this reason, DDS and FVS were seen as not only reasonable alternatives, but desirable. Children and their parents were able to remember what they ate, but not always how much. The caloric values are internally consistent, in that I calculated the calories in exactly the same way for each recall.

#### Twenty-four hour dietary recalls:

On three separate occasions each target child was asked to recall all the items eaten the previous day (for a total of 288 recalls), following the recommendations of Serdula et al. (2001). This usually occurred in the presence of the mother, or the primary caregiver, who prompted younger children to help them remember. In addition, my self and my field assistants each carried an identical set of plastic dishes to help children determine quantities of food. The set included three different plates, three different cups, two mugs, two bowls and a serving spoon. These utensils were similar to those used in the homes of participating families. Every effort was made to conduct the interviews on different days, always including a weekend day when the diet might be different from weekdays. The recall consisted of questions such as "what did you eat for breakfast? Did you eat anything at school? Before lunch?" To get as complete a recall as possible, children were always prompted to remember food items that might easily be forgotten like snack foods, a drink of soda, foraged fruits or food received from a friend.

#### Time allocations:

Time allocation is a well-established method in foraging research (Bock 2002, Bock and Sellen 2002, Borgerhoff Mulder and Caro 1985, Hawkes et al. 1997). I applied standard ethological theory (Lehner 1996) to develop an ethogram of children's time allocation, and I used this to code children's activities during continuous focal follows. Observation codes for states (events of longer duration) included time spent in the house, outside the house with a parent, foraging, working in a formal environment for money, working informally for food or money, begging for food or money, household

errands, time spent in transit between places, free time, time spent in someone else's house and time spent engaged in household chores. (See appendix B for a complete ethogram listing.) In addition, child care by the target child was coded to see how much direct or supervised care he or she gave to a sibling, and how many children he or she was responsible for at a time.

Each child was observed on three separate occasions outside of school hours for five hours, to a total of fifteen hours, with times of day and days of the week varying in each round of observation. I specifically considered what children were doing with their time when they were not in school, which meant most observations were conducted during weekends, vacations or during the morning or afternoon hours when school was out. Also, for children that worked outside the home, efforts were make to observe them during their work. Children either go to school from eight to twelve or two to six. For safety's sake, no focal follows were done after sunset, so all observations relate to daylight hours only.

Observation notes included noting everything the child ate, if he/she shared or received a food item and their relationship to that person. (For example: Juan at 2:00 p.m. working outside the home for money, received an apple from co-worker, ate half and shared with brother.) Also noted was the frequency that a child received money, how much and from whom (employer, parent, non-related adult, sibling, or stranger) and what the child did with that money during the observation period. Most commonly, the child bought food which was either immediately eaten and shared, or taken home.

Dietary quality scores:

For the purposes of the analysis, measures of dietary quality were derived in three ways.

(1) Food Variety Score (FVS) determined from the number of food items consumed

(2) A Dietary Diversity Score (DDS) developed from number of food groups consumed

(3) Caloric intake developed from 24 hour dietary recalls

In a report prepared for the Food Consumption and Nutrition division of the International Food Policy Research Institute, Hoddinott and Yohannes (2002) present the argument that: "Looking across all samples, the magnitude of the association between dietary diversity and caloric availability at the household level increases with the mean level of caloric availability. Accordingly, dietary diversity would appear to show promise as a means of measuring food security and monitoring changes and impact, particularly when resources available for such measurement are scarce." The authors further state 24 hour dietary recalls are time consuming, expensive, and require skilled data collection and analysis (Hoddinott and Yohannes 2002).

Food Variety Score (FVS) is a simple count of food items or the number of food items consumed during the observed or recorded period (Hatloy et al. 1998). A study in Vietnam (Ogle et al. 2001) demonstrated that FVS could also capture aspects of the diet that might otherwise be lost, such as the dietary role of wild vegetables. Mali children (Hatloy et al. 2000) from urban households with a low FVS or DDS had a doubled risk for being stunted and underweight, which was not the case for rural participants. FVS and DDS seem to be associated with nutritional status of urban children. This study indicated a positive correlation between number of food items eaten

and nutritional adequacy. However, the authors found that FVS was not as good a predictor as DDS. This is similar to findings of other studies (see Guthrie and Scheer 1981, Ries and Daehler 1986; Schuette et al. 1996).

Dietary Diversity Score (DDS) is a simple count of the number of food groups that the participant eats (Arimond and Ruel 2004, Ruel 2002). In a report to the International Food Policy Research Institute, Rule (2002) writes that 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". Interestingly, poor populations are increasingly adding high intakes of refined sugar and fats in the form of packaged food, to their previously starchy staple diet. As will be demonstrated in this article, children include a large amount of these items in their diet. High dietary diversity scores have been associated with improved nutritional status (Hotloy et al. 2000, Arimond and Ruel 2004) even controlling for household income.

These simple counts have been used in multiple studies to give an assessment of the nutritional adequacy of the diet (Hatloy et al. 1998, Ruel 2002, Torheim et al. 2003, Torheim et al. 2004, Arimond and Ruel 2004). The scores are most accurate if used in combination, because they identify different aspects of dietary quality (Arimond and Ruel 2004). FVS can capture the different kinds of food (fine grained) whereas DDS can indicate nutrient adequacy. Indicators can be the most reliable diet measure in settings where it is difficult to make the more detailed dietary assessment, usually involving dietary diaries, and weighing and measuring of food amounts, as was the case

in interviewing children and observing consumption during focal follows. All the observation data and dietary recall data were compiled to calculate these scores.

Dietary diversity score (DDS) has been used in many different cultures: Mali (Torheim et al. 2004), China (Stookey et al. 2000), Vietnam (Ogle et al. 2001) and is flexible enough that food groups can be defined by the context. For example, a study of Vietnamese women's diets included a category for pickled vegetables or fish (Ogle et al. 2001). However, all the above mentioned studies use the major food groups as identified by the USDA. As this study dealt with children's diet, oils/fats, beverages and sugar are in separate categories, because this was a major part of each child's diet and also what most children used their money to purchase.

Food Variety Score (FVS) was calculated by simply counting the number of distinct food items a child ate. For example, a child eating beans, tortillas, and an egg, washed down with a fruit juice, would receive a score of 4 for the meal. However, these items would only be counted once for the child. If beans, tortillas and eggs made up the entire diet, the FVS would be a score of 3.

	Ten Food Groups for Dietary Diversity Score
STARCHES	CORN MEAL, RICE, BREAD, PASTA, CERAL, POTATOES
LEGUMES	BEANS, LENTILS, PEANUTS
DAIRYT	MILK, CHEESE, YOGURT
EGGS	
MEAT/SEAFOOD	CHICKEN, BEEF, PORTK, SAUSAGE, SEAFOOD, MUTTON
VEGETABLES	BEETS, BROAD BEANS, CABBAGE, CARROTS, CHAYOTE, CHILE CILANTRO,
	COLIFLOWER, CORN, CUCUMBER, GREEN BEANS, LETTUCE,
	MUSHROOMS, NOPALES, ONIONS, RADISH, SPINACH, SQUASH, SQUASH
	FLOWER, TOMATOES
FRUIT	APPLES, AVOCADOES, BANANAS, GRAPES, GUANABANA, LIMES,
	MANDARIN ORANGES, MANGOS, PASSION FRUIT, MELON, ORANGES,
	PAPAYA, PEACHES, PINAPPLE, PLANTAIN, STRAWBERRIES, CACTUS PEAR,
	WATERMELON
OILS/FAT	CHIPS, FRIED PIG SKIN, OTHER FRIED SNACKS, LARD
BEVERAGES	SUGARED FRUIT DRINKS, SOFT DRINKS, ATOLE, HORCHATA
SUGAR/SWEETS	CANDY, COOKIES, GELATIN, MILKY SWEETS, CANDIED FRUIT, CAKE, PIE

Γable 4.1 Ten Food Groι	ips Used in Calculation of	f Dietary Diversity Score
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For the purposes of analysis, a diversity score of one was given for each food group if they each ate something within the group three times during the observation and recalls. This method followed Arimond and Ruel (2004), who used this method to capture foods eaten regularly. For example, every child ate at least three servings of starches during the data collection (receiving a DDS of one), but sixty percent did not eat 3 servings of dairy (and received a DDS of zero).

Based on three 24 hour dietary recalls, I developed caloric intakes for each of the participating children.

#### Anthropometric and clinical nutritional assessment

Anthropometric and clinical nutritional assessment followed the convention for nutritional studies set by Gomez et al. (1956). The standard nutritional status evaluation tool is standardized height-for-age, weight-for-age, and body mass index (weight/height<sup>2</sup>) z-scores by comparison with World Health Organization age- and gender-specific standard references using nutritional software released by the CDC (EpiInfo Version 1.1.2). I used the NCHS/WHO population reference (NCHS, 1977) as the most relevant for this study: the newest CDC growth charts have been established to better describe obesity (Kuczmarski 2000), but that is not an issue with this population.

Height-for-age provides a gross measure of long-run under-nutrition, particularly caloric insufficiency; based on the understanding that chronic undernutrition forestalls growth in stature (Dibley et al. 1987). Weight for age provides a shorter-run but still

gross measure of nutritional sufficiency, in that lower weights are taken to represent lower caloric intakes (WHO 1995).

I collected anthropometric data for all children in the study, following the anthropometric conventions given by Frisancho (1990). I weighed each child using a Detecto digital scale, height was taken with a Cooper Tools Six foot measure and bodymass-index using Lange Skinfold Caliper. Each measure was taken three times and the average was used in analysis. Each child was measured twice: an initial measuring and a follow up six to eight weeks later (at the end of their participation in the study) to ensure accuracy. Each child was also given a physical examination to identify edema and characteristic hair discoloration (clinically significant for protein-energy malnutrition), as well as iron-deficiency anemia via examination of the inner surface of the lower eyelid (Jelliffe 1966).

#### Child-Centered (Household Extraneous) Provisioning Strategies

The observational data were also used to distinguish children's independent provisioning behaviors (i.e., those that occur outside the household and without specific parental direction). Children were classified as "foragers" if they were ever observed to forage during any focal follows. Foraging was defined as getting food without monetary transaction (included traditional foraging or scavenging). Children were defined as working if they were ever observed to earn money in the cash economy, either formally or informally; street begging was included as a form of informal work. I interviewed children and collected self-reports of their work for cash. However, children's work is often so opportunistic, casual and fluid that I determined for the purposes of analysis

relying on observation of cash work behaviors was more reliable as the way to differentiate children, particularly since the 24 hour food recalls were being taken within





Figure 4.2.Pictures Demonstrate the Wide Range of Children's Activities (a boy eating a foraged banana, a boy selling homemade sweets on the street, a boy working in the family business while taking care of his younger sister and a girl making hand made tortillas)

close time frames to the observation. Thus, I would have a better chance of capturing

the effects of children's earnings on their diet. Children can be classified as both

foraging and earning money if they were observed ever to allocate time to both activities.(See Figure 4.2 for examples of the range of children's provisioning activities.)

Some children worked informally within *colonias*, doing errands for neighbors or local shopkeepers. One child entrepreneurially took out garbage to the collection area on garbage days, for a small fee. However, almost all the children that worked formally in a shop for a steady wage did so in larger shops in commercial districts, noted in blue shapes on the map. Children competed to work as bag girls or boys in large grocery and pharmacy stores because it is customary to give a small tip to the person who bags your purchases. Stores use this fact to choose only children with good grades, a certificate of good health, and over the age of eleven. There is also the custom of children tipping their immediate supervisor as thanks for letting them continue to work.

All analyses were conducted using SPSS, version 13.0. Methods and informed consent procedures used in the study were reviewed and approved by the University of Georgia Institutional Review Board.

#### RESULTS

#### Nutritional Status of Provisioning Children

One-third (32.6 percent) of the children were underweight based on the standard criteria of a weight-for-age z-scores at least one standard deviation (SD) below World Health Organization reference curves, 6.3 percent were severely underweight (<2SD), and 42.1 percent were stunted (height-for-age z-score <2 SD below the mean). This is more than double the average stunting incidence for Mexican children, based on Word Nutrition Report, which was 17 percent in 2000 (Rivera et al. 2004). Overweight is rare,

with only 6.3 percent of children having a weight for age z-score of over 2.0. Mean body mass index for boys was statistically the same as that of girls according to a t-test (p>0.05), being 18.5 (SD = 3.4) for boys and 18.6 (SD = 3.2) for girls. None of the study sample children had clear clinical signs of pronounced protein-energy malnutrition, based on the physical examinations. However, 43.4 percent had clinical signs of anemia (51.5 percent of boys and 46.9 percent of girls). The measures of weight- and height-for-age were not different by gender (both p>0.05).

Provisioning status was not associated with variation in either longer-run (heightfor-age) or shorter run (weight-for-age) nutritional status. A comparison of foraging and non-foraging children showed that they had similar mean weight for age z-scores (-.363 and -.346, p>0.05) and mean height for age z-scores (-1.053 and -1.133, p>0.05). When I ran a standard regression considering a possible interaction between working or foraging and household income in predicting the anthropometric variables, I found that the model was not significant for either height for age z-scores or weight for age zscores in either case (all p>0.05).

I developed a binary logistic regression model predicting risk of being anemic (1) versus not anemic (0) based on children's provisioning strategies, with covariates including gender, household food budget and age in months. Household food budget was entered as a two level variable, based on households with a higher (1) and lower (0) monthly food budgets. Both foraging and other provisioning failed to predict the presence of anemia in children, based on this criteria, the findings were not significant if the odds ratio included 1.0. For working for cash, the odds ratio was  $1.034 \pm .033$ , for foraging the odds ratio was  $1.628 \pm .536$ . The variation in the presence of anemia for the

participating children could not be explained by children's provisioning status. Child directed purchasing by children who provision and child sharing events do not include items that contain a great deal of nutrients. Perhaps it is not surprising that if sufficient iron is not provided in the home diet, that provisioning behavior does not make up for it.

The hypothesis that provisioning status will not greatly affect anthropometric markers of generalized caloric and protein sufficiency was supported.

#### Children's Provisioning Strategies and Dietary Quality

I ran a standard regression predicting children's (1) dietary diversity scores and (2) food variety scores based on (a) whether they were foragers or not and (b) whether they were otherwise-provisioning or not, taking into account mean household monthly spending on food per household member and the children's gender. The household budget and gender variables were entered at the first step and the provisioning status at the second. The total household food budget per member and child's gender did predict higher food variety scores ( $R^2$ =.129); household food budget was significant (p<0.05). When the foraging and working status of the child were added to the models, however, they did not explain significant additional variation in children's dietary diversity scores (p>.05). In the regression predicting dietary diversity scores, there was also no additional explanation of variation in dietary diversity once children's other provisioning status was entered in the model (p>0.05); at the first step of the model children's gender was significant (p<0.05) but household food budget per member was not (p<0.05). When children's foraging was entered at the second step, it also failed to explain any additional variation in children's dietary diversity scores.

I tested if foraging children had a higher number of raw fruit servings than other children and found that they did (one girl who worked in a fruit stall was removed from the analysis). Children who foraged (N=20) had 3.7 reported and observed servings of fruit, whereas other children had a mean of 2.3. This difference was significant, but not very strong, according to independent samples t-test (F=2.863, *df*=91, p=0.005). When I considered the influence of household budgets in this relationship, as can be seen below in Figure 4.3, I found that the budget variable did not predict fruit consumption except as it interacted with foraging, meaning that fruit consumption was predicted to be higher in foraging children as household budgets rose, but the same relationship did not hold for children overall.  $R^2$  change by entering foraging status in the regression model was .108 (p=.008).

Considering vegetable consumption, foraging versus other children had similar levels (p>0.05). The two groups also did not differ in the number of sweet food items, fried food items and sugar beverages they consumed (all p>0.05 according to a t-test).

In regard to children who earn money versus others, regression analysis showed that work status did not contribute to variation in children's consumption of fruit, vegetable, sugar and fried food items, nor sweet drink consumption (all P>0.05), including once household food budgets were taken into account.

The hypothesis that foraging children will have a greater amount and diversity of fruit in their diet is supported (weakly) but foraging children do not have a greater diversity or amount of vegetables in their diet than other children.



Figure 4.3 Relationship Between Frequency of Fresh Fruit Consumption and Household Average Food Budget per Member, Differentiating Foraging Versus Non-Foraging Urban Children.

#### Dietary Quality of Provisioning Children

The hypothesis is that otherwise-provisioning children (those working most formally or informally for money) will have a greater variety of food items, but lower overall dietary quality than other children, and eat more nutritional empty foods such as candy). Table 4.2 demonstrates the overall dietary quality of the children broken down into groups that were used in analysis. The differences between groups are not statistically significant, even controlling for gender, age, household food budget, provisioning status and household size. However, it is interesting to see the consistency and the slight variations between groups. Caloric intake was used as an additional control to see if any difference existed between groups. However, there are no statistically significant differences between the caloric intakes of groups (all p>0.05 based on independent samples t-tests).

All children met the DDS requirements for starches, legumes, oils/fats, eggs, candy and sugared beverages. Variation between children was in the expensive food items of dairy, meat/seafood, vegetables and seasonal fruit. The usual diet of tortillas and beans was enhanced by the addition of homemade salsas (the price of tomatoes was a constant concern). Only two children got the highest DDS score of ten. Ethnographically, they were active children, engaged in foraging activities, but did not work outside the home. The average DDS for all the children was 6.5.

Based on pilot research, I expected to see a significant difference between the variety of food eaten by provisioning and non-provisioning children. However, once again, there is no statistical difference. Dietary Diversity Score shows almost no difference between gender, age and household size. Surprisingly, the middle-range food budget had the lowest DDS. Working children had the lowest average diversity in their diet, but all the groups of children had a low score compared to a total possible of ten.

The child with the highest Food Variety Score both foraged and worked in her parent's home based grocery (and she had the freedom to snack on the inventory). She ate 36 distinct food items during the research period. Compare this to the lowest FVS of 13 by a child who sold newspapers with his mother and ate exactly (truly) the same thing every day. The average FVS for all groups was 23.8. Girls in general ate slightly more variety of food items, as did the children in the lower age group. The lowest food

Table 4.2 Overall Characterization of Dietary Quality (FVS and DDS) of Children by Gender, Age, Household Food Budget, Provisioning Status and Household Size.

	DDS Foods		FVS Foods	
	Average	SD	Average	SD
Gender				
Boys	6.3	1.4	22.8	4.6
Girls	6.7	1.5	24.8	4.7
Age				
10.9 years and younger	6.6	1.4	24.3	4.4
11.0 years and older	6.4	1.6	23.3	5.0
Household				
Food Budget				
1000 and less	6.4	1.8	21.7	4.8
1001 to 1799	3.5	1.3	24.1	4.6
1800 and above	6.7	1.4	25.7	4.2
Provisioning				
Working	6.0	1.5	22.1	4.7
Inactive	6.9	1.4	25.3	4.2
Foraging	6.7	1.3	23.8	5.5
Non-Foraging	6.5	1.5	23.8	4.5
Household Size				
3 to 5	6.5	1.4	24.0	4.5
6 to 8	6.5	1.4	23.3	4.5
9 and above	6.6	2.4	25.9	6.4

budget income household ate the least variety of foods, but this is not a statistically significant difference. Inactive children have the highest average of variety in their diet (FVS of 25).

Why do inactive children have higher scores on all the dietary measures? Tremendous effort was made to observe working children while they were working, and most children did not eat anything during this time. It is possible that their diet was not truly captured during observed hours, and dietary recalls did not make up the difference. For three 24 hour dietary recalls, the average caloric intake over three days was 1600 Kcal. As previously noted, I do not place great confidence in the accuracy of this measure. However, in making the calculation I tried to err on the side of generosity. Given this, the average necessary caloric intake for active children of this age group is 2200 Kcal for boys and 2000 Kcal for girls. There was of course great variation, ranging from 495 Kcal to 3515 Kcal for a single day caloric intake. (See Appendix C for a complete listing of caloric intakes by child.) Most children did not exceed their RDA of calories on a consistent basis. As documented below, children purchased almost exclusively high calorie junk food with their disposable income. It is possible that children were in need of the calories provided by fried snack food, candy and soft drinks.

#### Children's Provisioning within the Context of Sharing and Household Food Budgets

The resources children gain through provisioning have implications for their household, and sibling and peer groups. Their provisioning status may not have made a difference to diet quality, but what do children do with the food and money they gain? Thirty-six of the children in the study were actively engaged in the cash economy, earning money either formally or informally, based on the observations. Based on logistic regression predicting children's working in the cash economy (1) or (0), the odds of children working were strongly influenced by being in a higher age category (10-12 years versus 8-9 years; p=0.002, but were not predicted by child's gender or by total household monthly income category (both p>0.05)). That is, child provisioning occurs across higher and lower levels of household monthly budgets in these communities.
For children earning money through both formal and informal employment, reported monthly incomes ranged from 50 to 1960 pesos, with a mean of 533 pesos (SD=425), or around \$47 US dollars, and a median of 375 pesos. This compares to mean estimated total income for the study households of 3250 pesos (SD = 1880) and medium of 2820, or around \$300 US dollars. The earning children's income thus represents a mean of 16.2 percent of household income. Children's earnings are more significant when compared to household food budgets (especially given, as we discuss below, that most of children's discretionary income is converted to food). Average estimated monthly household food budgets were a mean of 1356 pesos, or 259 pesos per member once variations in household size were taken into account. For earning children, cash income was thus estimated at an average of 269 percent of per-person monthly food budgets (SD=298) or, perhaps more meaningfully, were 167 percent of the median. In 90.1 percent of cases, working children's usual monthly earnings exceeded the per-person spending on food reported for that child's own household. Clearly, when children engage with the cash economy it produces sufficient resources to change household food availability, children's purchasing of food outside of the household or both.

The money children earn had two primary destinations. It was either contributed to the household, almost always given to the senior household women, or it was spent discretionally as child-directed food purchases. In terms of how children's independent earning relates to household economics, I used a combination of interviews with both the child and the mother (who control the household food purchasing) to detect how cash generated by children outside the house relate to and become incorporated in

household food budgets. According to children's reports, 42 percent of children provided "none" of the money they make outside the house to the household budget, 39 provide "some", and 19 percent provide "most or all". In all, eighty-one percent of working children kept either some or all of their income for their own use. Conversely, 58 percent gave some or all of their income to the household (as demonstrated in table 4.3 below). Once money given to households was taken into account, the average per month cash income earning children retained for their own use was 234 pesos (*SD*=199, median of 200 pesos or around \$18 US dollars).

		Keep	Purchase	Purchase	Give All					
	Keep All	Some	Food	School	Income to					
	Income	Income	(Snacks)	Supplies	Parent					
Children	15	14	26	5	7					
Percent	42%	39%	72%	14%	19%					
N=36										

Table 4.3. Child Allocation of Earned Income

The fact that most children do not give all their money to the household indicates that in general children in this study are not being exploited for their labor. Rather, children seem to work to defray their own expenses in relation to the household and to have discretionary spending money. Some of the children that kept all their money indicated in interviews that they save their money to purchase school supplies and allow for "extras" like field trips which their parents could not otherwise afford. This spending was not observed.

I also examined how children's discretionary cash was used to acquire food in child-directed contexts. During time allocation observations, I followed 126 separate events of child-directed purchases (i.e., the child used money they acquired to make discretionary purchases, without oversight or control by a household adult). Observation showed that almost all child-directed purchases were for food items (the only exception was one girl buying a ponytail holder on the way to soccer, and four events of boys spending money on video games). Children who worked long hours purchased "meal" items like *tamales*, *burritos*, *gorditas* and ham sandwiches. All other food observed purchases can be divided into sugared beverages, fried snacks and sweets. In no case was food purchased discretionarily passed to caregivers for further use or allocation. Only sixty-four of the ninety-six participating children purchased something during observation. Children with discretionary cash convert this to food in almost all cases. It is in the form of food that children's provisioning is shared with peers or siblings in all but a handful of cases. As can be seen in Table 4.4, children's purchasing decisions favor food items that are high in calories but low in nutrients. Those most often purchased were candy, sugared drinks, and fried snacks. A comparison of children who regularly earn and retain cash to all other children, indicate no difference in their mean anthropometric or dietary quality measures (all p>0.05 based on independent samples ttests).

In sharp contrast to foraging events, most purchasing events were solitary or took place without peers (64 percent alone, 19 percent with a sibling, only 7 percent occurred with a peer). Many of the solitary purchasing events were followed by sharing events with siblings or peers. Therefore, the purchase of a food item may have been asocial, but the consumption of the items usually was not. Observations indicate that children retained purchased food solely for their own consumption around half of the time (75 of 136 observed purchasing events), but otherwise shared the food with other children. Table 4.4 shows the observed events of food purchasing and sharing by the

ltem Purchased	Number of Purchasing Events by a Target Child	Number of Purchasing Events with Item Not Shared	Number of Giving Events with Older Siblings	Number of Giving Events with Younger Siblings	Number of Giving Events with Peers	Number of Getting Events with Older Siblings	Number of Getting Events with Younger Siblings	Number of Getting Events with Peers
Cookies	7	3	1	9	5	1	2	4
Fried Snacks	33	18	0	11	8	1	2	11
Corn Items (popcorn, tortilla)	0	0	1	3	0	2	1	1
Sugared drinks	22	15	1	7	10	2	1	8
Candy	39	19	3	14	9	0	2	15
Peanuts	2	1	1	1	0	1	2	1
Fruit	0	0	2	6	6	2	1	16
Bread	6	2	1	1	2	0	0	1
Meal items (noodles, sandwich)	14	11	2	2	2	2	0	3
Popsicle, ice cream	12	5	0	3	5	0	0	6
water	1	1	0	0			0	0
Non-food items	5	5						
Total	136	75	12	60	47	11	11	66
Direct sharing of money				3	0			0

Table 4.4 Structure of Children's Purchasing Events.

target child after they purchased food ("food giving") and also observed events where purchased food was given to the target child by other children ("food getting"). The purchasing events that occurred with peers *always* resulted in sharing, but the purchasing events with siblings did not. Sharing events by the target child favored giving of food to younger siblings (60 events) and to same-age peers (47 events). Older siblings were much less likely to be given food by the target child (12 events). Food sharing was more even between target children and their peers (66 getting *vs.* 47 giving events) than with younger siblings, the latter food sharing relationship appearing asymmetric (60 events of giving to younger siblings versus 11 getting events). Based on both observations and interviews with the children, it seemed that children wanted to retain some privacy regarding how much money they had and wanted choice over how much they shared. While there did not seem to be a clear pattern in what amount was shared with whom and when, purchased items were certainly shared more sparingly that foraged food, the latter almost always liberally given to others. In terms of its nutritional impact, children who shared shop purchased items more did have higher frequencies of fried food snacks (R=.303, R<sup>2</sup>=.092, F=9.480, *df* = 1,94, *p*=0.03) and sugar items (e.g., candy and cookies) (R=.292, R<sup>2</sup> = .085, F=8.78-, *df* = 1,94, *p*=0.004) in their diet compared to other children, although they did not have differences in their mean anthropometric measures (all *p*>0.05).

Ethnographic observation indicates that children share most often the cheaper items, which are also the items that children are most likely to purchase. For example, Table 4.4 shows the most shared item is candy with fourteen observed events, this is closely followed by fried snacks and foraged fruit with twelve events. Candy is cheap and easily divided, as is a bag of chips or fried pigskin. Foraged fruit is free (and very widely distributed among friends and siblings). Sugared beverages are relatively more expensive. This may mean that children purchase them less often, or do not share as readily. The hypothesis concerning child sharing was partially supported: children who shared the most did have higher dietary quality measures of sugar based items, and fried food, but not sugared beverages.

## DISCUSSION AND CONCLUSIONS

The proposition that children's food- and other resource-seeking behaviors might make a difference to their nutritional wellbeing under the extremely marginal conditions associated with urban poverty has yet to be supported. Children's behaviors associated with self-provisioning (such as "urban foraging" and food-sharing) cannot be related directly to variation in their health and developmental status, based on the results of this study. Provisioning status was not associated with variation in either longer-run (heightfor-age) or shorter run (weight-for-age) nutritional status. A comparison of foraging and non-foraging children showed that they had similar mean weight for age z-scores and mean height for age z-scores. Both foraging and other provisioning failed to predict the presence of anemia in children. The tantalizing results of Baker and Panter-Brick's studies in Nepal (Baker et al. 1997, Panter-Brick et al. 1996; Baker 1998; Baker and Panter-Brick 2000; Baker and Hinton 2001; Baker et al. 1997) that indicated improved nutritional status for homeless children, is not supported for homed children in marginal urban environments. The hypothesis that provisioning status will not greatly affect anthropometric markers of generalized caloric and protein sufficiency was supported. However, the fact remains that this sample of ninety-six children was drawn from a very poor section of society. How could their provisioning activities not have some beneficial effect on some aspect of their lives, be it health or diet? As previously noted, children share with their household and with each other. The Nepali homeless children did not share with their household and the study was not clear on the amount of sharing that went on between children. The key difference between these two studies is that homeless children could reap all the benefits of their own efforts. It is also possible that

this sample was not marginal enough that resources gained through provisioning made a real difference to their well-being.

The hypothesis that foraging children will have a greater amount and diversity of fruit and vegetables in their diet than other children was only partially supported in that foraging children had a significantly higher number of fruit servings in their diet, but neither provisioning status nor foraging explained variation in vegetables.

The hypothesis that provisioning children would have a greater variety of food items, but lower overall dietary quality than other children, and eat more nutritionally empty foods such as candy, was not supported. The total household food budget per member and child's gender predicted higher food variety scores. However, provisioning status did not explain significant additional variation in children's dietary diversity scores or number of sweet food items, fried food items and sugared beverages. Children's diets did vary based on degree of their sharing, more sharing meant more fried snacks and sugar items, but not increased amount of sugared beverages.

Clearly, when children engage with the cash economy they are able to produce sufficient resources to change household food availability, children's purchasing of food outside of the household or both. Not only do children share with the household, but they share with each other and siblings. Children share their purchased items and share them frequently. This is a rich area for behavioral ecology models to predict sharing behavior using Optimal Foraging Theory and tolerated theft. It is entirely possible that children share knowing that other children will share in return. This is supported by the analysis that indicated children who shared had more fried foods and sweets in their diet.

Given that provisioning status did not affect nutritional status or dietary quality, why would children devote their one resource, time, to provisioning activities? Munroe et al. (1984) found in their study on children's work that children work when their labor is necessary, "when their domestic unit is relatively low in the proportion of workers present, and when their domestic unit possess an infant requiring care" (374). For future research, it will be important to determine the "labor force" of a household and determine if that can predict variation in provisioning activities. Some children in Mexico were exploited for their labor, and that is certainly true world wide (Toor 2001, Baker and Hinton 2001). I felt that only two working children were exploited (in that they worked more than they wanted to and did not receive any income). One did not even collect his wages as it went directly to his mother. But in both cases the father were non-revenue producing members of the household (drunks) and the children's income was vital.

Therefore, this study contributes to the understanding of child provisioning in a marginal urban environment. Even if the hypotheses relating to provisioning status and health were not supported, provisioning children did change the household income by adding many times their food budget, paying for their own way and maybe that of their siblings.

## Additional Conclusions

While this study did not provide a tidy answer to questions of the benefits of child provisioning behavior, it provided some surprising leads into other areas of research. Namely, how provisioning children fit into the nutrition transition currently underway in

Mexico, the idea of provisioning behavior and social networks, and tools of dietary recall data analysis.

#### Nutrition Transition in Mexico

I did not intend to examine the nutrition transition of marginalized children in Mexico; however, I found the dietary analysis of provisioning children strikingly in agreement with other research. Child directed purchasing reflects the change in diet in Mexico that includes less and less fruits and vegetables, milk and meat and increasing amounts of refined carbohydrates and soft drinks (Rivera et al. 2004). On no occasion did children purchase fruit, vegetables, or meat to take home. All purchased items fe II into the category of high calorie/ low nutrition food, even the "meal" items of instant noodle soup and sandwiches. Foraged fruit added much needed fruit and variety to their diet, but was exploited by a small percentage of the participating children. Children with their own income are able to buy relatively large quantities of junk food and soft drinks.

Based on food purchases in households, Mexican families are eating thirty percent less fruits and vegetables, twenty-seven percent less milk and almost twenty percent less meat in 1998 than they did in 1984 (Rivera et al. 2004). In fourteen years, the consumption of refined carbohydrates increased six percent, but the purchase of soft drinks increased almost forty percent! That is the most current data, but based on observation and dietary recalls, the trend continues in the same direction. The traditional beverage of fresh diluted fruit juice is being replaced by soft drinks. For some families, it was the only fruit consumed during observation.

The low DDS and FVS demonstrated by this study indicates a move away from the traditional diet in Mexico, characterized by corn, beans, vegetable sauces, and fresh fruit (Monarrez-Espino et al. 2004). Indeed, as the tool allowed for three "junk food" categories (fried food, sweets and sugared beverages), a large part of the DDS came from consumption of foods in these categories.

Caloric intake for a three day recall was not at all excessive of what one would expect for 8-12 year old active children (and if there were calculation errors, it was on the side of generosity). However, the small consumption of fruit, vegetables and the large (and ever increasing) consumption of fried packaged snacks, soft drinks, and candy indicate that this population may well be on the track to follow the nutrition transition of undernourished directly to overnourished (Popkin 2004). As of right now, however, large percentages of these children are physically stunted and underweight (One-third (32.6 percent) underweight, 6.3 percent severely and 42.1 percent stunted). A small percentage is o verweight (6.3 percent). Almost half of the participating children showed signs of anemia (based on a field eye test), which indicates the paucity of nutrients in this diet. The low nutritional quality of child directed purchased food will not make up for deficiencies in the household diet.

It is entirely possible that purchasing choices are made in order to maximize the caloric "bang for the buck" so to speak. And children did not purchase items that they could reasonably be expected to share at home, items which would require preparation or cooking. This further indicates a desire to retain the calories, or at least have control in the distribution of them. This does not seem to be the behavior of children with no need of the additional calories.

Is child directing purchasing the savvy cost/benefit analysis of caloric value per energy expended to best benefit the child, or is it mere reaction to relatively cheap packaged foods? Traditional Mexican snack food includes roasted corn, cucumber, mango and jicama seasoned with chili powder and lime juice. These items were inexpensive and seasonally available for sale in all of the participating neighborhoods. The fact that they were not eaten more frequently could indicate a decision to purchase high calorie food. The moment captured by this study could be the brief in-between moment predicted by nutritional transition researchers, indicating a time in Mexico where undernutrion is rapidly succeeded by overnutrition (Brewis 2003, Popkin 2004, Popkin and Gordon-Larsen 2004, Rivera et al. 2004).

## Food Sharing and Networks

Children share their purchased items and share them frequently. Obviously, the shared and purchased items are basically the same items, but what motivates a child to share something that they purchased with earned money or household money? This is a rich area for behavioral ecology models to predict sharing behavior using Optimal Foraging Theory and tolerated theft. It is entirely possible that children share knowing that other children will share in return. This is supported by the analysis that indicated that children who shared had more fried foods and sweets in their diet.

Children's practice of food-sharing appears to favor social rather than nutritional functions (although younger siblings may benefit more, given the asymmetric flow-down from their brothers and sisters in middle childhood). It is possible these suggestive findings might be more striking if the study was set in a more dramatically food-insecure

setting. While children in Xalapa are sometimes hungry and can have very limited dietary choices provided at home, it may be that life in these communities was not sufficiently resource-strained for children's self-acquired food to make a critical positive difference to their nutritional status. I originally planned to locate the study in the poorest neighborhoods of Veracruz, where there are more homeless children and the economic realities of life are even more pressing, but determined early on it was impossible to conduct the study safely.

Ethnographically, there was no reason to suspect that sharing offered a defense against excessive scrounging, although children were somewhat cagey about letting others know exactly how much money they had. It may have helped enhance children's social standing, in that failure to share in group settings might incur social risk, such as rejection. In summary, children's sharing behavior - whether it was in the context of traditional forms of foraging for plant foods, or based on child purchased items - was common: uneven forms of sharing were seen among kin and fairly even sharing among non-kin peers, but with little apparent nutritive effect. This provides at least circumstantial evidence that the activities have a social element, creating or tracking links among children. Although I did not collect similar data for adults, it is quite possible the extensive sharing with non-kin is not practiced by their parents, thus the food sharing itself with non-kin is a child developed and directed set of behaviors.

## DDS and FVS as tools in from dietary analysis

The difficulties of collecting accurate dietary recall data inspired me to look for other dietary quality measures. Dietary Diversity Score and Food Variety Score have

become accepted as reasonable alternatives to caloric data, especially under conditions where accurate data collection is difficult (Hatloy et al. 1998, Hatloy et al. 2000, Ruel 2002). The sample collected for this study falls into that category. The fact that caloric data did not show a difference between groups, exactly like the DDS and FVS, indicates a similar reliability of measures, as is discussed at length previously. Caloric intake provides information that can be easily translated to RDA and caloric necessity for child growth, if it is accurate. DDS and FVS provide a closer examination of the diet in terms of food security and nutrient adequacy. FVS captures the different kinds of food (fine grained) whereas DDS indicates nutrient adequacy. I do not suggest that one should supplant the other. Ideally, all dietary quality measures would be taken and made full use of, but under some circumstances, such as relying on a child population or illiteracy, DDS and FVS can take the place of caloric intake measures. Urban poverty studies dealing with challenging populations similar to ones described in this study, might well find it easier and more useful to employ these measures.

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## CONCLUSIONS

In this conclusion I discuss the primary findings of each article, the factors influencing data collection and the results of analysis, directions for future research, and some practical applications that this research might have for child labor laws.

# Primary Findings

This dissertation described children's provisioning activities in a marginal urban environment. The results developed a picture how of children use the resources available to them: their environment and their time. These children exploited the available resources such as fruit trees and work opportunities to gain food and money (which was contributed to the household and used to buy food). Children allocated their time to helping their families in various ways: child care, household chores, working for money or working to help the family business. The dietary quality of children was reflected in their dietary quality scores and caloric intake. Children did not suffer any nutritional consequences for their time allocation to work or childcare, or receive any great benefits to their health.

## Chapter 2: Urban Child Foraging in Mexico

At the outset of this research, I thought that poor urban children would beg and "scavenge" for food much more frequently than they were observed to do. Instead, children opportunistically foraged for fruit when it was geographically convenient, but only infrequently foraged for food scraps or begged for food or money. It is possible that the sample of homed children or children that lived in a stable home (not street families)

meant that begging was not an attractive option. The children that foraged for fruits and wild plants (like chilies and tomatoes) were usually older boys, and they were very successful foragers and knowledgeable about their environment. Foraged fruit was shared widely. Foraging children had higher dietary quality measures of fruit in their diet than any other provisioning group (working or inactive children).

The caloric returns for time expended in foraging indicate that urban foraging can be a rich caloric source for those willing to forage. Most foraging children did not devote a large amount of time to foraging, nor did they extract a large amount of resources. The time spent, and the fact that resources gained were shared might indicate that the calories gained were not essential to the child's wellbeing. However, the potential quantity of calories could be a rich resource of calories and nutrients for children nutritionally stressed. Foraging does not appear to be strictly about calories, given that calories are widely available through scavenging. Also, the communal nature of foraging events indicates child foraging in this urban context might function as a social activity of childhood rather than a nutritive one.

# Chapter 3: Health Consequences of Urban Children's Time Allocation to Self-Provisioning, Household Work, and Child Care in Xalapa, Mexico.

The second article addressed time allocation of children living in a marginal urban environment, and whether time allocated to provisioning activities had implications for children's health. In other words, can time allocated to childcare, selfprovisioning (working, foraging, begging), or household work (house work, participation in household based business) have costs to a child's nutritional health status. There was no significant difference in health status between these groups or between genders. There was no significant gender difference in time allocation to child care. It is possible, but untested, that girls that stay home do have more access to the household resources, and boys that have more provisioning activities do benefit, and they cancel each other out in terms of significant differences in health.

This notion of possible gender differences in the local adaptive contexts of behavior fits with the view that even though boys and girls live in the same households and can be in the same peer groups, they inhabit local socio-ecologies or "developmental niches" that are unique from each other. These are in part created by the gender norms imposed by other social actors (Worthman 1994, Super and Harkness 1986). However, it is worth considering the possibility that boys and girls operated within their own micro-niche to maximize their access to resources. The lack of gender differences in time allocation differs from other child time allocation studies conducted with agriculturists (Bock 2002, Draper and Cashdan 1988, Yamanaka and Ashworth 2002). The gender equality in time allocation could reflect a unique quality of urban life, allowing more provisioning opportunities for girls, and perhaps requiring boys to engage in more child care (due to lack of close community or extended family living nearby).

# Chapter 4: Child Self-Provisioning and Children's Diets in a Marginal Urban Environment

The third and final article addressed the diet of self-provisioning children. Provisioning status was not associated with variation in either longer-run (height-forage) or shorter run (weight-for-age) nutritional status. The tantalizing results of Baker and Panter-Bricks studies in Nepal (Baker et al. 1997, Panter-Brick et al. 1996; Baker

1998; Baker and Panter-Brick 2000; Baker and Hinton 2001; Baker et al. 1997) that indicated improved nutritional status for homeless children, is not supported for homed children in marginal urban environments. The hypothesis that provisioning status will not greatly affect anthropometric markers of generalized caloric and protein sufficiency was supported.

How was it possible for their provisioning activities not to have some beneficial effect on some aspect of their lives, be it health or diet? An interesting outcome of this study is the demonstration of how much a child can earn, and what this means in terms of the household economy. Children were able to earn the cost of feeding themselves and frequently, their siblings as well. Child sharing is so strong and so pervasive that it actually changed the diets (increased sugar and fried foods) of the children that shared (and were shared with) the most frequently. This may not be a nutritious addition to their diet, but these are additional calories. Even if the hypotheses relating to provisioning status and health were not supported, provisioning children did change the household income by adding many times their food budget, paying for their own way and maybe that of their siblings.

# Factors influencing data collection and analysis (or things I would have done differently).

Incidence of child kidnapping:

At the conclusion of any research project, it is always possible to see where one's missteps were, and what could have been done to improve the project. There were many factors that contributed to the smallness of my sample size (which may in

turn have resulted in the significance levels of the analysis), but the most serious one was the difficulty in getting families to participate.

During pilot research I found that families were suspicious of strangers due to the high incidence of children disappearing from the very poor neighborhoods (where there was almost no police presence). This was not an abstract fear. While I was there, three girls disappeared. None of these girls were from families I had been working with or had photographed. Sadly, I never heard of these girls being returned to their families.

Child prostitution is a growing industry in the nearby port town of Veracruz. I was told by a journalist that the missing children had most likely been taken to work as child prostitutes. However, the urban legend is that children are stolen and taken to the United States for organ harvesting. This pervasive urban legend has hindered international development agencies in providing aid. Scheper-Hughes (2000) writes that there is a market for organs (specifically Brazil) of poor people selling their organs to the rich desperate for new organs. This is not always a voluntary activity; force and coercion are often used to find "donors". Therefore, the family's reluctance to talk to a stranger was sometimes compounded by my nationality.

## Observer effect:

In the process of gaining permission to work with a child, I explained to each child that they were to behave normally and that I would watch and take notes and not interfere. Parent, child and I all agreed that this would occur. Naturally, the reality of having someone in the house changed behavior. Sometimes this seemed to be only for a few hours, or the first session. For a few families, it completely changed the activities

of the child. For example, four employed children did not go to work on the days that they were observed, and a further five did not work on the first day of observation (when they would have otherwise) because their parent told them not to. This ties back into the fear that the family might get disqualified for *Oportunidades* benefits if it became known that the child worked outside the home.

The other aspect of observer effect was that I was sometimes seen as a babysitter. Mothers that normally did not allow their child out of the house would have no problem letting them run around when I was present. Often, mothers would schedule the five hour observation period to coincide with something they could do outside of the house (like visit with friends) while I watched their children. On six occasions, children admitted that the activities I observed were not normal and only allowed because of my presence (for example: going to the forest). The reverse was also true. Children did not do their normal activities for fear that their mothers would find out. On at least four separate occasions, children chose to curtail their routine that might have been frowned upon by their mother (one child begged for money, but got spanked whenever his mother heard about it). Whether observation prevented the children from engaging in their normal activities or encouraged them to do something beyond the routine, it did sometimes change behavior. I recorded nineteen incidences of observer effect where I was certain that the child behavior was different than it normally would be. I and my field assistants did everything possible to not interfere with the children. Usually observation occurred on the third or fourth visit, when the novelty factor had worn off a bit. We were careful to not play with them or interact in ways that would change their activities. However, the mere fact of observation must at some level influenced their behavior.

My efforts in data collection went to collecting the best possible data in the best possible way. I tried to ensure as little observer effect as possible, but obviously behavior does change when observed. However, most of these busy, active children could not stop their time allocation to family and work obligations (such as sibling care, household chores). A few children that would have worked normally did not work. But most of the provisioning children went on with their activities. The babysitter effect was most pronounced for the children who were inactive outside the household. Having someone else there made mothers with inactive children change their behavior. Mothers used me as an excuse to leave the house, or allowed children the freedom to go to the park (since they were accompanied by an adult), or stay away at play longer than they normally would have been allowed.

Various research methods have been recommended to deal with the observer effect, including instantaneous scan sampling, and a more intensive participant observation. Again, this study was designed to examine self-provisioning in an urban environment thinking that it would mimic foraging in traditional foraging environments. However, the challenges of data collection are very different. Other time allocation studies (see specifically Munroe et al. 1984, Shell-Duncan 1995, Shell-Duncan and Obungu Obiero 2000) employed instantaneous scans to determine the activities of their study population. Instantaneous scans are very useful in small societies (foraging) or village settings. The researcher walks around and determines what people are doing at the time of observation. It is thought that this may reduce the observer effect. As this study was conducted in a large urban environment covering 29 neighborhoods scattered throughout the city, it was not practical to use this method.

In retrospect, I could have concentrated all my efforts in one neighborhood or collection of neighborhoods. I was able to collect the most opportunistic data about children lives from *La Reserva*, which was a collection of about 20 small neighborhoods. As a large part of my sample came from this area, I frequently saw the participants during non-observation times. I could have lived in this area and eventually become part of the landscape. With the benefit of hindsight, this could have worked very well as I could have combined focal follows and instantaneous scans. However, it was not until six months into data collection that I realized how many of the children came from this area, as they agreed to participate slowly, one by one.

Overall, I think that the quality of data garnered by lengthy focal follows outweighs the cost of the observer effect. Yes, some children did change their behavior, but most had duties and responsibilities that could not be changed. If I had this to do over again, I would try to narrow the area I worked in and take note of what I saw children doing during non-observation hours, and use this to determine the accuracy of the focal follows.

## Unit of analysis:

I began this study with the idea of individuals operating within the context of a poor urban environment. I was informed by various aspects of behavioral ecology, which looks for evolutionary explanations of behavior on the individual level. For example, cost benefit analysis of foraging and foraging returns are usually calculated for the individual, not the group. During analysis of my data, I began to understand that the individual children participating in this study were not in a vacuum, but well-integrated

into their homes and social networks. However, this study was designed to examine what individual benefits, in terms of nutritional status and diet, children accrued to themselves through their activities. But the reality of their behavior was that they benefited others, as well. Most children allocated large blocks of time to sibling care, household chores, working in the family business, and working outside the home. Very little of children's behavior could be said to have benefits or cost to themselves alone (except for the few solitary foraging events). Foraged food was shared with siblings and peers, earned income was mostly shared with the household, and purchased food was frequently shared with siblings and peers.

Lieberman (1986) wrote that the household "mediates a variety of behaviors, including labor-force participation, consumption patterns, and migration" (21). The household level of these children's lives were that depending on the household income, number of siblings, whether there was a family enterprise, geographic location of the home, etc. all influenced children's provisioning activities and time allocation. I do not think I could have designed this study differently to examine the individual effects of provisioning activities, but the study as a whole is somewhat limited in not better addressing children within their household context. Divorcing children from the household context meant that while I achieved the goal of studying children on their own terms (something rarely done in anthropology), I did lose the richer context. However, the importance of understanding that children do make decisions and behave in ways independent of their household was documented. The challenge is now to replace them into that context to better understand motivations for provisioning behavior.

This tension between individual and household level analysis can be seen in the social welfare service Oportunidades. In their attempt to alleviate poverty, the Mexican government funded the program PROGRESA (which later became Oportunidades) to implement scholarships and services to families in need. Their research to determine a poverty line, led them to develop the idea of a family consumption basket which determined the basic necessities of a family of 4.6 persons. A family needed minimum of \$5,110 pesos (US\$480) for adequate food, shelter and clothing (Mexican Secretariat of Labor 1999). Most of the families participating in the study earning this level of household income, achieved this through the combined efforts of both parents, children, and government aid. And yet, to receive the government aid offered, there were restrictions on children working outside the home. The government research might have developed a reasonable tool to determine a poverty line, at the household level, but failed to take into account the individual contributions to the household income. Until I ran the analysis, I also did not understand how much children could earn outside the home, and what that might mean to the household members.

# Sample Population:

If this study had been conducted with homeless street children, the results of benefits associated with provisioning activities might have been very different. As previously noted, children in this study shared with their household and with each other. The Nepali homeless children did not share with their household and the study was not clear on the amount of sharing that went on between children (Baker et al. 1997, Panter-Brick et al. 1996; Baker 1998; Baker and Panter-Brick 2000; Baker and Hinton

2001; Baker et al. 1997). The key difference between these two studies is that homeless children could reap all the benefits of their own efforts. In fact, they were healthier than homed children living in shanty-town. In this case, the individual children removed from the household context made the benefits of provisioning activities evident. The benefits in this study are not so easily defined.

It is also possible that this sample was not marginal enough so that resources gained through provisioning made a real difference to children's developmental status. There are many levels of poverty. Everyone in this study had access to water, electricity, and shelter. No one reported going to bed hungry every night, although there must have been times were children were hungry. All the children wore clothes, and usually shoes, but the purchase of a school uniform was such a burden that sometimes children were kept at home until money could be saved to purchase it. Of course, there are people living under worse poverty conditions. This sample represents an under recognized economic strata: those who are making it by the skin of their teeth, through constant effort and cooperation on a household level. There is a fine line between abject poverty and living a few pay checks away from it. Had I worked with families living in even worse poverty conditions, it is possible that the benefits of children's provisioning behavior would have been more evident. However, I would have still been looking at homed children, who would most likely share the results of any provisioning activities. Given my current understanding of children in the household context, I do not think that a poorer population would have made a significant difference to the results of this study. A completely different population (homeless street children) would have.

Dietary quality measures:

When I researched appropriate methods to document the diet of these children, I determined upon using 24 hour dietary recalls. This is possibly the most used method in nutritional studies and is reasonably accurate (see Dufour et al. 1997, Fluert 1979, Messer 1991, Quandt 1986, Torheim et al. 2003 to name just a few). What I did not realize is that most of these studies were conducted with adults. I found that all my best efforts to help children (with a parent present to jog their memory) could not induce them to remember with certainty amounts of food consumed.

The difficulties of collecting accurate dietary recall data inspired me to look for other dietary quality measures, such as Dietary Diversity Score and Food Variety Score. Had I been aware of these measures from the outset, I could have concentrated on getting dietary data to address questions of dietary sufficiency and food variety. However, I was able to collect these scores from dietary recall data with out any problem. My desire to have caloric data also stems from my behavioral ecology background where return-for-effort is always measured in calories.

I would have done one of two things differently: used these measures from the outset of research, or used more rigorous methods to gain caloric data, such as observing family meals (which brings its own set of complications). The emphasis on caloric data blinds researchers to the possibilities that under some circumstances, such as relying on a child population or illiteracy, DDS and FVS can be useful measures. Urban poverty studies dealing with challenging populations similar to ones described in this study, might well find it easier and more useful to use these measures.

# **Directions for Future Research and Application to Policy**

"Helpers at the Nest"

Given that provisioning status did not affect nutritional status or dietary quality, why would children devote their one resource, time, to provisioning activities? Munroe et al. (1984) found in their study on children's work that children work when their labor is necessary, "when their domestic unit are relatively low in the proportion of workers present, and when their domestic unit possess an infant requiring care" (374). As was noted in the introduction, a family's response to urban poverty is often to diversify sources of income to have as many sources of income possible (de la Rocha 2001). This is beyond the scope of this dissertation, but consider the possibility that children who provision did so out of need and consider what would these children look like (in terms of height for age, weight for age, etc.) if they did not engage in provisioning activities. There were two cases where the child provided the primary household income, if they had not their mother and siblings would have suffered. It is possible, but untested, that provisioning and foraging behavior allows these children to have the same nutritional status as the children who do not engage in provisioning activities.

Provisioning children changed the household income by adding many times their food budget, paying for their own way and maybe that of their siblings. It is possible that children's goal in provisioning behavior was not for themselves, but for the overall benefit of the household. Urban population studies have yet to be done on the "Helpers at the Nest" hypothesis proposed and tested by Turke (1988) Kramer (2002), and Crognier et al. (2001). Whether children received a health benefit from foraging or working, they on average earned the equivalent of their own food budget. Future

research could determine the benefits of having provisioning children on siblings in the same household and reproductive success of the parents in urban settings.

Sharing and social networks:

Clearly, when children engage with the cash economy it produces sufficient resources to change household food availability, children's purchasing of food outside of the household or both. Not only do children share with the household, but they share peers and siblings. Children share their purchased items and share them frequently. This is a rich area for behavioral ecology models to predict sharing behavior using Optimal Foraging Theory and tolerated theft. It is entirely possible that children share knowing that other children will share in return. This is supported by the analysis that indicated children who shared had more fried foods and sweets in their diet.

Provisioning children do gain something more than food and money from their activities (that is beyond the scope of this dissertation), social networks. Children with more extensive social networks deal more competently with stress and provide support for learning skills important to their environment (such as child care, making tortillas, etc.) (Tietjen 1994). Foraging is a group behavior, but if children are not foraging specifically to promote improved health and stature, could it be for social networking? Tucker and Young (2005) also found that foraging children did not seem to maximize their foraging time for food, sometimes wasting food in play. They concluded that sometimes children are bored and foraging is a fun activity. It would be interesting to do a longitudinal study to see how provisioning children who provision do in the long term,

if they are happier or better-adjusted than children who were inactive in terms of provisioning.

## Food security:

This research demonstrated that foraging plays a minor role in the arsenal of food acquiring strategies employed by children. Children worked and bought their own food, and shared and received food from other children. I believe that all of these food sources are often hidden from researchers concerned with dietary quality or food security. The household based diet for the participating families was fairly basic, meeting immediate caloric needs but maybe not nutrient or protein needs (as demonstrated by the high level of stunting and anemia in the population). Caloric intake values seemed to indicate a fairly low caloric intake compared to requirements for active children. Indeed, purchased food was almost always high in calories. However, policy makers determining food security should not be solely concerned with caloric levels. For example, the Dietary Diversity Scores indicate that most children did not eat many of the food groups (such as fruits, vegetables and meat). An awareness of all the sources of children's diet and purchasing patterns could then be used to encourage children to purchase fruit, veggies, and meat to share with the household, instead of high calorie food alone.

For future research it would be interesting to do an ethnobotanical knowledge study on urban children, similar to studies done in rural contexts (see Zarger and Stepp 2004). A few of the boys knew a great deal about plants. It would be interesting to document how children gain botanical knowledge in an urban environment with

seemingly no adult interaction. Studies have shown that knowledge of edible plants is gained very early on in life (Phillips and Gentry 1993), and that children tend to be extremely knowledgeable about the resources in their environment (Chipeniuk 1995). Also, I think that even in urban areas, foraged plant food could be part of a "famine diet" (Landerman 1991) allowing families to fall back on foraged foods when times got even tougher.

## Time allocation:

The importance of time allocation and gender roles is thoughtfully discussed by Miles (1990) based on research in an urban area in Ecuador. She writes that child participation in the household activities solidifies family relationships by emphasizing cooperation and reciprocity. "A child who performs any household chore eases the burden of his/her parents and thus reinforces family unity. As such, simple generalizations about inside/outside, female and male contributions become irrelevant, as the needs of the household take precedence" (Miles 1990:13). The lack of significance in time allocation by gender roles is one of the surprising findings of this study, in terms of time allocation studies in agricultural settings (Bock 2002, Kramer 2002). However, the findings are similar to the above mentioned urban study. The gender equality in time allocation could reflect a unique quality of urban life, allowing more provisioning opportunities for girls, and perhaps requiring boys to engage in more child care (due to lack of close community or extended family living nearby). A direction for future time allocation research would be to see if this could be replicated in other urban settings.

## Implication for Child Labor Policy

This dissertation did not deal specifically with child labor policy or investigate the consequences of children working in sweat shops. The child labor documented in this dissertation was mostly voluntary, casual and fluid. I cannot say that there was no pressure for children to bring in outside resources to the home because I was not privy to household interactions where this might have taken place. Two of the participating children might have gualified for the UNICEF definition of child labor, which is full-time work at too early an age, too many hours spent working, work that exerts undue physical, social, or psychological stress, or and life on the streets in bad conditions, inadequate pay, too much responsibility and work that hampers access to education (Gay 1998). However, without the labor of these two children, their siblings would have suffered considerably from hunger. If one includes housework and child care into the definition, many children's time was exploited to ensure the running of a household and the care of siblings. These households did not have the option of hiring outside help to cook, clean or baby-sit. Children's participation in household economy was necessary and valued. Children of the poor begin at a young age to assume responsibilities both inside and outside the home, and their participation is both needed and valued (Baker and Hinton 2001). Nepali families consider children to be capable of adult work around the age of twelve. A four culture study (Kenya, Belize, American Samoa, and Nepal) found that by the age of nine, the average time devoted to chores or work outside the home was twenty-three percent (Munroe et al. 1984).

It is important to emphasize that children of all provisioning states, provisioning or non-provisioning are about the same; that is, fairly normal, though stunted and somewhat anemic, which is not too surprising given that they live in a shanty town in Mexico. Children are not being harmed by their provisioning behavior. Baker and Hinton (2001) present a strong argument for the benefits of improved work conditions rather than banning child labor. Child labor is a benefit to families that have provisioning children, as they can make more than their personal food budget and supplement the food of others. It is short-sighted for powerful government and charitable agencies to determine that all child labor is harmful, without considering what children receive from participating in the household economy, and what parents would do if they were not allowed to accept help from their children.

Child labor laws stigmatize children's provisioning activities due to a desire to protect children from exploitation and harm. However, these are based on ethnocentric ideas about childhood and should also take into consideration cultural expectations of childhood and the importance of child work to the household (Baker and Hinton 2001, Toor 2001). The Mexican government social programs *Oportunidades* was implemented partially to decrease child labor by offering families small scholarships and access to health care in exchange for children not working (Secretaria de Desarrollo Social 2002). This study showed that provisioning activities did not have a detrimental effect on the health of provisioning children. The children that worked, either formally or informally, or begged had the same incidence of stunting, statistically similar height-for-age and weight-for-age scores as did children who did not engage in provisioning activities. Furthermore, they had the same diets as measured by three different dietary scores.

While the idea that provisioning could benefit a child's health was not necessarily supported, neither was the idea that working children suffer for their efforts.
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## APPENDICES

## Appendix A. Consent forms

### **Parental Consent**

I agree to take part in a study called "The Health Consequences of Children's Subsistence Behavior" with Sarah Lee from Georgia, USA, the University of Georgia at Athens, department of Anthropology, phone number in Xalapa: \_\_\_\_\_\_. I agree to allow my child \_\_\_\_\_\_\_ to take part in the study as well. My child can stop participating at any time without giving the researcher a reason and without penalty. If I want, I can get back all the information my child or I told her. I understand that I do not have to take part in the study and I do not have to allow my child to take part.

The reason for this study is to understand if working, begging, or looking for food outside the home has any benefit to a child's health. This information will benefit children in terms of better understanding of health. My child will receive a small gift for participating.

If I agree to take part, I understand that I will be asked to:

- Talk to Sarah about what my family eats, health, and household income. This will take about one and a half hours.
- Help my child to remember everything he/she ate and did on three different days. Each time will take about 30 minutes.
- Remember and discuss any illness occurring in my household on three separate occasions.

I understand that one child with the most recent birthday will be asked to:

- Allow weight, height, skin fold, and malnutrition measures to be taken on two separate occasions. This will take approximately 30 minutes each time.
- Tell Sarah on three separate days what everything that was eaten and done the previous day.
- Allow Sarah to follow him/her on three different days for about five hours and take notes on what he/she does and eats. This will not interrupt the normal routine of my child.

In addition, I understand that all children in my home will be asked to allow weight, height, and skin fold measures to be taken once. This will take approximately 10 minutes.

No discomfort or risk is expected from any of these activities.

All information about my household or my child will be confidential, which means that the only people who will know that we are participating are Sarah and her trained

assistant. If Sarah writes anything about us, it will be written in such a way that we cannot be identified.

Sarah will answer any and all questions that I may have concerning the study or the results of the study. She can be reached at (phone in Xalapa) or selee@uga.edu.

My signature below or agreement on the tape recorder shows that I understand what will happen during the study. Sarah has answered all of my questions and I agree to volunteer and allow my child to participate as well. I have been given a copy of this form.

Signature of Researcher Date

Signature of Participant Date

For questions or problems about your rights please call or write: Human Subjects Office University of Georgia 606A Boyd Graduate Studies Research Center Athens, GA 30602-7411 USA 001-706-542-6514, email address irb@uga.edu

### Consent of all other adults in household

I agree to take part in a study called "The Health Consequences of Children's Subsistence Behavior" with Sarah Lee from Georgia, USA, the University of Georgia at Athens, department of Anthropology, phone number in Xalapa: \_\_\_\_\_\_. If I want, I can get back all the information taken about me. I understand that I do not have to take part in the study.

The reason for this study is to understand if working, begging, or looking for food outside the home has any benefit to a child's health. This information will benefit children in terms of better understanding of health.

If I agree to take part, I understand that I will be asked to allow height, weight, and skin fold measures to be taken by Sarah or a field assistant. This will take approximately ten minutes.

No discomfort or risk is expected from any of these activities.

All information will be confidential, which means that the only people who will know that I am participating are Sarah and her trained assistant. If Sarah writes anything about me, it will be written in such a way that I cannot be identified.

Sarah will answer any and all questions that I may have concerning the study or the results of the study. She can be reached at (phone in Xalapa) or selee@uga.edu.

My signature below or agreement on the tape recorder shows that I understand what will happen during the study. Sarah has answered all of my questions and I agree to volunteer. I have been given a copy of this form.

Signature of Researcher Date

Signature of Participant Date

For questions or problems about your rights please call or write : Human Subjects Office University of Georgia 606A Boyd Graduate Studies Research Center Athens, GA 30602-7411 USA 001-706-542-6514, email address irb@uga.edu

## Assent of Target Child

Hi. My name is Sarah Lee and I am doing a study on children's health. You are exactly the kind of child I want to talk to. Your (mom, dad, guardian) said it was all right for me to talk to you about what you eat and do during the day. On three different days, I would like to hear about everything you ate and did for an entire day. I want to know about how you feel or if you have been sick. Twice, I will see how much you weigh, how tall you are, and how healthy you are. This will not harm you in any way.

Also, I would like to hang out with you on three days for about five hours while you walk around and see what you do and what you eat. I want you to do what you normally do and not change anything just because I am there.

You do not have to do this. If it would make you uncomfortable or you just don't want to, just tell me or your (mom, dad, guardian). If you say yes now, but decide later that you don't want for me to ask you questions or follow you around that is OK, too. Just tell your (mom, dad, guardian) or me. If you agree, anything that you tell me or I see will be kept just between you and me. I may not be able to keep this promise if you tell me that you or another child is being hurt in some way. If that happened, I would tell someone to help keep you or the other child safe.

Do you have any questions? Are you willing to participate?

If this is OK with you, say your name and "yes" into the tape recorder (or sign if age appropriate).

Signature of Researcher Date

Signature of Child

### Assent of all other children in household

Hi. My name is Sarah Lee and I am doing a study on children's health. You are exactly the kind of child I want to talk to. Your (mom, dad, guardian) said it was all right for me to see how much you weigh and how tall you are. This will only take about ten minutes. This will not harm you in any way.

You do not have to do this. If it would make you uncomfortable or you just don't want to, tell me or your (mom, dad, guardian). If you say yes now, but then decide that you don't want me to measure you, that is OK. Just tell your (mom, dad, guardian) or me.

Do you have any questions? Are you willing to participate?

If this is OK with you, say your name and "yes" into the tape recorder (or sign if age appropriate).

Signature of Researcher Date

Signature of Child

### Consentimiento de los padres

Estoy de acuerdo en tomar parte en el estudio llamado "Las consecuencias de salud en la conducta de subsistencia de los niños" con Sarah Lee que viene del Departamento de Antropología de la Universidad de Georgia en la ciudad de Athens, Georgia, en los Estados Unidos, con el siguiente número telefónico en Xalapa : **812-05-93**. Estoy de acuerdo en dejar que mis hijos formen parte de este estudio. Mis hijos pueden dejar de participar en cualquier momento sin tener que dar al investigador una razón y sin que haya represalias. Si quiero, puedo pedir que quiten toda la información sobre mi y/o mis hijos del estudio o que la destruyan. Entiendo que no es mi obligación formar parte de el estudio ni es obligatorio dar mi autorización para que mis hijos lo hagan. Me han invitado a participar porque tengo hijos de entre 8 y 12 años de edad que viven conmigo. Un niño de mi hogar se escogerá para participar de lleno en el estudio, pero a todos mis hijos se les pedirá que participen tomando su estatura, peso y medidas corporales. El objetivo de este estudio es entender la dieta y nutrición de los niños de entre 8 y 12 años de edad en esta ciudad, incluyendo qué come mi hijo, cómo y dónde obtiene sus alimentos tanto en casa, mientras juega, trabaja o en la escuela también. El entender mejor la dieta y nutrición de los niños tanto en esta ciudad como en otras, ayuda a comprender sobre todo la salud de los niños de estas edades y a conocer que puede ser lo mejor para ayudarlos a estar saludables.

Si estoy de acuerdo en formar parte de este estudio, entiendo que tendré que hacer lo siguiente:

- En mi primera entrevista hablaré con Sarah sobre lo que mi familia come y nuestra salud en general y cómo nos organizamos en nuestro hogar. Esto durará alrededor de una hora y media, y se hará en mi casa a la hora en que yo tenga tiempo disponible.
- Debo dejar que Sarah pese a mis hijos, tome su estatura y sus medidas corporales el mismo día de la entrevista pero más tarde a una hora que acordemos. Cada vez que tome medidas tardará como 10 minutos. Esto no lastimará ni causará ningún daño a los niños.
- Durante los 3 meses siguientes, Sarah visitará mi casa 3 veces cada mes y me hará algunas preguntas sencillas sobre problemas de salud que alguno de los miembros de mi familia haya tenido durante las 2 semanas anteriores, esto le tomará alrededor de 15 minutos cada vez.
- Durante estas visitas me pedirá que ayude a mis hijos a que le digan a Sarah todo lo que han comido el día anterior y las actividades que realizaron, esto les tomará aproximadamente 20 minutos en cada ocasión.

Si estoy de acuerdo en formar parte de este estudio, entiendo que los niños de entre 8 y 12 años cumplidos tendrán que:

- Permitir que Sarah tome su peso, estatura y medidas corporales. Esto les llevará aproximadamente 10 minutos por cada niño.
- Con mi ayuda, harán memoria de todo lo que hicieron y comieron el día anterior. Esto tardará cerca de 20 minutos cada vez.
- Con mi autorización, Sarah observará las actividades de mi hij@ en 3 diferentes días por 5 horas cada vez, tomará notas de todo lo que coma y de los lugares que vaya. Esto no debe interrumpir la rutina normal del niño.

Asi que la participación total de nuestra familia consiste en lo siguiente: Sarah visitará mi casa 4 veces en los 3 meses siguientes: la entrevista inicial que durará alrededor de 1 hora y media, y 3 visitas más de una hora cada una. Además, Sarah se pondrá de acuerdo conmigo para observar a mi hijo en 3 ocasiones sin importar que coincidan con las fechas de las visitas a casa.

Se espera que estas actividades no causen incomodidad o riesgo de ninguna manera.

Toda la información sobre mi casa o mis hijos será estrictamente confidencial, osea que las únicas personas que saben que estamos participando en el estudio son Sarah y su asistente. Si Sarah escribe algo sobre nosotros, se escribirá de tal manera que no podamos ser identificados.

Sarah contestará todas mis preguntas o dudas con respecto al estudio o los resultados del estudio. Puedo contactarla por teléfono en Xalapa o por correo electrónico en selee@uga.edu.

Mi firma abajo o la grabación de mi voz aceptando participar muestran que entiendo lo que sucederá en este estudio. Sarah ha aclarado todas mis dudas y estoy de acuerdo a participar voluntariamente y dejar que mis hijos participen también. He recibido además, una copia de esta forma.

Firma del investigador Fecha

Firma del participante Fecha

Estoy de acuerdo en que mis hijos participen.

El nombre de mi hijo es:

Los nombres de mis otros hijos que viven conmigo a quienes autorizo a que les tomen medidas corporales, peso y estatura son:

Si tiene preguntas o problemas sobre sus derechos por favor llame o escriba a la siguiente dirección: Human Subjects Office University of Georgia 606A Boyd Graduate Studies Research Center Athens, GA 30602-7411 USA 001-706-542-6514, email address <u>irb@uga.edu</u>

## Consentimiento de todos los otros adultos en el hogar

Estoy de acuerdo en tomar parte en el estudio llamado "Las consecuencias de salud en la conducta de subsistencia de los niños" con Sarah Lee que viene del Departamento de Antropología de la Universidad de Georgia en la ciudad de Athens, Georgia en los Estados Unidos, con el siguiente número telefónico en Xalapa : **812-05-93**. Estoy de acuerdo en dejar que mis hijos formen parte de este estudio. Mis hijos pueden dejar de participar en cualquier momento sin tener que dar al investigador una razón y sin que haya represalias. Si quiero, puedo pedir que quiten toda la información sobre mi y/o mis hijos del estudio o que la destruyan. Entiendo que no es mi obligación formar parte de el estudio.

El objetivo de este estudio es entender la dieta y nutrición de los niños de entre 8 y 12 años de edad en esta ciudad, incluyendo qué come mi hijo, cómo y dónde obtiene sus alimentos en casa, mientras juega, trabaja o en la escuela también. El entender mejor la dieta y nutrición de los niños tanto en esta ciudad como en otras, ayuda a comprender sobre todo la salud de los niños de estas edades y a conocer que parecer ser lo mejor para ayudarlos a estar saludables. Si estoy de acuerdo en tomar parte de este estudio, entiendo que me pedirán que deje que Sarah o su asistente me pesen, midan mi estatura y tomen mis medidas corporales. Esto tomará como 10 minutos aproximadamente.

Se espera que estas actividades no causen incomodidad o riesgo de ninguna manera.

Toda la información será estrictamente confidencial, osea que las únicas personas que sabrán que estoy participando en el estudio son Sarah y su asistente. Si Sarah escribe algo sobre mi, se escribirá de tal manera que no pueda ser identificado/a.

Sarah contestará todas mis preguntas o dudas con respecto al estudio o los resultados del estudio. Puedo contactarla por teléfono en Xalapa o por correo electrónico en <u>selee@uga.edu</u>

Mi firma abajo o la grabación de mi voz aceptando participar muestran que entiendo lo que sucederá en este estudio. Sarah ha aclarado todas mis dudas y estoy de acuerdo a participar voluntariamente y dejar que mis hijos participen también. He recibido además, una copia de esta forma.

Firma del investigador Fecha

Firma del participante Fecha

Si tiene preguntas o problemas sobre sus derechos por favor llame o escriba a la siguiente dirección: Human Subjects Office University of Georgia 606A Boyd Graduate Studies Research Center Athens, GA 30602-7411 USA 001-706-542-6514, email address irb@uga.edu

#### Consentimiento del niño (participante en el estudio)

Hola. Mi nombre es Sarah Lee y estoy haciendo un estudio sobre la dieta y alimentación de los niños. Tu eres exactamente el tipo de niño con quien quiero hablar. Tu (mama, papá, tutor) me dio permiso para que hablara contigo sobre lo que comiste e hiciste durante el día. En los 3 próximos meses me gustaría venir a verte a tu casa. Durante 3 días distintos, me gustaría que me contaras lo que comiste e hiciste durante todo el día. Esto nos llevara cerca de 20 minutos. Quiero saber como te sientes y si has estado enfermo. Dos veces, veré cuanto pesas, cuanto mides y que tan saludable estas. Esto nos tomará 10 minutos cada vez. Esto no te causará daño alguno.

Además, me gustaría salir contigo durante 3 días por 5 horas cada vez, caminar contigo y ver durante 5 horas lo que comes y lo que haces. Quiero que hagas lo que haces normalmente y que no cambies tus actividades solo porque estoy ahí.

Tu no estas obligado a participar en esto. Si te hace sentir incómodo o simplemente no quieres, no tienes que hacerlo, solo dímelo o dile a tu (mama, papá, tutor). Si dices que sí ahora, pero después decides que no quieres que te haga las preguntas o que te acompañe para ver lo que comes y lo que haces, esta bien. Sólo dile a tu (mama, papá, tutor) o a mi. Si estas de acuerdo, cualquier cosa que me digas o que yo vea será un asunto entre tu y yo. No puedo cumplir esta promesa si me dices que tu u otro niño están siendo lastimados de alguna forma. Si eso sucediera, le diría a alguien que me ayudara a mantenerte a ti o a otro niño a salvo.

¿Tienes alguna pregunta? ¿Estas dispuesto a participar?

Si estas de acuerdo, dime tu nombre, y di que estas de acuerdo en la grabadora (o firma si puedes hacerlo).

Firma del investigador Fecha

Firma del niño

### Consentimiento de todos los otros niños en la casa

Hola. Mi nombre es Sarah Lee y estoy haciendo un estudio sobre la dieta y alimentación de los niños. Tu eres exactamente el tipo de niño con quien quiero hablar. Tu (mama, papá, tutor) me dió permiso para que te pese y mida tu estatura. Durante próximos 3 meses, me gustaría tomar tus medidas dos veces al mes. Esto nos llevará cerca de 10 minutos cada vez. Esto no te causará daño alguno.

Tu no estas obligado a participar en esto. Si te hace sentir incómodo o simplemente no quieres, no tienes que hacerlo, solo dímelo o dile a tu (mama, papá, tutor). Si dices que sí ahora, pero después decides que no quieres que te mida y te pese, no hay problema, sólo dile a tu (mama, papá, tutor) o a mi.

¿Tienes alguna pregunta? ¿Estas dispuesto a participar?

Si estas de acuerdo, dime tu nombre, y di que estas de acuerdo en la grabadora (o firma si puedes hacerlo

Firma del investigador Fecha

Firma del niño Firma del niño

# Appendix B. Research Tools

### **Behavioral Observation Ethogram Codes**

A O TI		EVE	NTS:
AC III	In school	BTA	Obtain food by barter/trade with adult (not
OHP	(all others outside below are no-parent present)	BTP BTS	parent) Obtain food by barter/trade with peer Obtain food by barter/trade with
IH	In household (or immediate grounds of household)	JOB	sibling) Obtain money through formal employment
AF	Actively foraging (stated mission of action or intent)	FOR	Obtain money through informal employment Obtain food by foraging Obtain food by gift from adult (non
\$W	Working for money - formal agreement of payment with	FRG	parent) Obtain food by gift from peer
\$B	adult non-parent Begging	SBG	Obtain food by gift from sibling (state age and sex)
IVV	payment, helping an adult not a parent directly or indirectly	\$BG FBG	Obtain money by begging Obtain food by begging
ннс	Chores outside household - helping a parent indirectly	\$ST FST	Obtain money by stealing Obtain food by stealing
ΙТ	In transition - en route to or from school or work and household	\$NP	Obtain money by gift from adult (non parent)
FT	In free time outside (not doing any of above)	SFR SB	Obtain money by gift from peer Obtain money by gift from sibling
OHH OTH	In a non-own household Other	хэг X\$F	food) at store Exchange money for food not at
<u>CHILI</u>	D CARE STATE:		store
PCC	Primary child care - has primary responsibility by self for one preschool age child, no adults present	GFT	Food/money given to a sibling/peer/parent – note who and what happens to food/money
PCP	Primary child care plural - has primary responsibility by self for 2 or more preschool age children, no	EAT	Actual food consumption
SCC	adults present Secondary child care - has responsibility for one pre school age child, shared with another child of equal or greater age than focal child, no adults present		
SCP	Secondary child care plural		

HHC Household Chores

# Behavioral Observation Ethogram Codes – Spanish (as used in the field)

### ESTADOS DE ACTIVIDAD

ESC	En la escuela
FCP	Fuera de casa con papas
EC	En casa
F	Forraie
Т\$	Trabajar por dinero
P\$	Pedir dinero
TI	Trabajo informal – pago no fijo o avuda de un adulto (no padres)
LFC	Labores fuera de casa – avudar a sus papas o familiares (indirectamente)
ET	En el travecto – en el camino
TL	En el tiempo libre (ninguna de las de arriba)
OC	Otra casa que no es la suva
0	Otros
FCSP	Fuera de casa sin papas
ESTADOS DE C	UIDADO A CARDO DEL NINO PRINCIPAL/LABORES EN CASA
CP1N	Cuidados del niño principal de un niño – tiene responsabilidad principal de un niño mas chico
CDAN	durante la ausencia de los papas.
CP2N	Cuidados del niño principal de varios niños – tiene responsabilidad principal de 2 o mas niños mas chicos durante la ausencia de los papas.
CR1N	Cuidados de un segundo niño mayor compartiendo la responsabilidad can el niño principal de un niño menor
CR2N	Cuidados de un segundo niño mayor compartiendo la responsabilidad can el niño principal de 2 o
	mas niños.
CPNP	Cuidados del niño principal de otro niño cuando hay un adulto
CNP	Cuidados de un segundo niño mayor del niño principal
LEC	Labores en casa
ACONTECIMIE	NTOS/ EVENTOS
OCT	Obtener comida por trueque/intercambio con un adulto (no padres)
CIC	Obtener comida por trueque/intercambio de contemporáneos
CIH	Obtener comida por trueque/intercambio de un hermano(a)
O\$TF	Obtener dinero por trabajo formal
O\$TI	Obtener dinero por trabajo informal
CF	Obtener comida por forraje
CRA	Obtener comida como regalo de un adulto (no papas)
CRC	Obtener comida como regalo de contemporáneos
CRH	Obtener comida como regalo un hermano(a)
O\$P	Obtener dinero pidiendo
СР	Obtener comido pidiendo
O\$R	Obtener dinero robando
CR	Obtener comida robando
O\$RA	Obtener dinero como regalo de un adulto (no papas)
O\$RC	Obtener dinero de contemporáneos
O\$RH	Obtener dinero un hermano(a)
\$XCT	Cambio de dinero por comida en las tiendas
\$XNT	Cambio de dinero por comida pero no en las tiendas
CNF	Comida dada – no de los padres sino de alguien mas de las casa
C/\$	Dinero o comida dada a un hermano/contemporáneos/ papas.
CAC	Consumo actual de comida
CP	Obtener comida de casa de papas o de alguien mas de la casa
O\$P	Obtener dinero de papas o de otro familiar (no hermanos)
D\$NP	Dar dinero a otra persona

# Ethogram Form

Fecha:	Investagador:	Clima:
Dia de la semana:		
Nombre del Nin@:		ID#:

Hora A	ctividades E	stados E	ventos I	Notas

# Anthropometric Measures

Date					
Interviewer					
ID# P001					
Age:	[]Male []Fe	emale			
Birthday:					
1. Weight :	_lbs	kgs			
2. Weight:	_lbs	kgs			
3. Weight:	_lbs	kgs	Ave	rage:	
1. Height:	_ins	m			
2. Height:	_ins	m			
3. Height:	_ins	m	Ave	rage:	
Length of handedness u	pper arm	cm			
Mid-upper arm circumfe	rence	cm			
Triceps skinfold 1	_mm 2	_mm 3	_mm Av	verage:	_mm
Biceps skinfold 1	_mm 2	_mm 3	_mm Av	verage:	_mm
Subscapular skinfold 1	mm 2	mm 3	mm	Average:	mm
Supra-iliac skinfold 1	mm 2	mm 3	mm	Average:	mm
Presence of: [] edema of ankle					

- [] discolored hair (on head)
- [] anemia of eye
- [] depigmentation of facial skin

# Recall of Illness Episodes

These questions are about the health of (child's name).

1. Has \_\_\_\_\_\_ had any illness in the last two weeks?

[]Yes

[]no

2. If yes, what was wrong? Specific illness or symptoms:

3. What did you do? (all that apply)

[] Treated at home

[] went to infirmary

[] went to doctor

[] hospital

[] pray, priest, etc.

4. During the last two weeks, did (child's name) suffer from:

- a. Stomach ache
- []Yes
- []no
- b. A cold
- []Yes
- [] no
- c. Diarrhea
- []Yes
- []no
- d. Respiratory problems
- []Yes

[] no

- e. Rashes of the skin
- []Yes

[] no

5. Has anyone else in the household been ill during the last two weeks?

- []Yes
- []no

6. If yes, what was wrong? Specific illness or symptoms:

7. What did you do? (all that apply)

[] Treated at home

- [] went to infirmary
- [] went to doctor
- [] hospital
- [] pray, priest, etc.

## Household Survey

Household ID# H001 Address:

### **Demographics:**

- 1. Name of mother or primary caregiver
- 2. How many children do you have? \_\_\_\_\_

\_\_\_\_\_

- 4. How many people total living in the household?\_\_\_\_\_
- 5. Names and ages and birthdays of all children in household:

1.	Name	Age	Birthday
2.			
3.			
4.			
5.			
6.			
7.			

### Household Food:

6. Do you have running water in the house?[] yes [] no

- 7. Where is your primary source of drinking water?
- [] from the tap in home
- [] from the tap near the home
- [] from a well
- [] store bought purified water

[] boil water at home

8. What kind of fuel do you use to cook with?

[]gas

[] paraffin stove

[]coal

[] wood

[] electricity

9. Besides buying food at the market, do you get food from: (can be more than one) garden []yes []no fruit trees []yes []no family farm plot []yes []no fishing []yes []no donations from friends, family, neighbors. []yes []no

other – please specify

10. How often do your children eat meat (red meat, pork, chicken)?

[] Daily

[] At least once a week

[] More than once a week

[] At least once a month

- [] More than once a month
- [] Rarely
- 11. How often do your children eat eggs?
- [] Daily
- [] At least once a week
- [] More than once a week
- [] At least once a month
- [] More than once a month
- [] Rarely
- 12. How often do your children drink milk?
- [] Daily

[] At least once a week

[] More than once a week

- [] At least once a month
- [] More than once a month
- [] Rarely

13. How often do your children eat vegetables? (prompt – carrots, zucchini, spinach, etc.)

[] Daily

[] At least once a week

[] More than once a week

[] At least once a month

[] More than once a month

- [] Rarely
- 14. How often do your children eat fruits?

[] Daily

[] At least once a week

[] More than once a week

- [] At least once a month
- [] More than once a month
- [] Rarely

15. How often do your children eat beans and/or rice and corn tortillas?

[] Daily

[] At least once a week

[] More than once a week

[] At least once a month

- [] More than once a month
- [] Rarely

16. Do you feel that you have enough food for your children?

- [] No
- [] almost never
- [] usually
- [] Yes

17. Have any of your children ever been diagnosed with malnutrition?

- []Yes
- []No

17a. If yes, who? \_\_\_\_\_

18. Have any of the children ever received food supplements from DIF?

- [] Yes
- [] No

18a. What types of supplements?\_\_\_\_\_

19. During <u>(child's name)</u> life, would you say that he/she has been a healthy child	?
] Yes (skip to Q54)	
[ ] no	

19a. If no, why not? Specifics:

20. In general, how often does (child's name) suffer from:

Stomach aches?			
almost never [	] sometimes	[] often	[] don't know
Colds?			
almost never [	] sometimes	[] often	[] don't know
Diarrhea?			
almost never [	] sometimes	[] often	[] don't know
Respiratory proble	ms?		
almost never [	] sometimes	[] often	[] don't know
Rashes of the skir	?		
almost never [	] sometimes	[] often	[] don't know
almost never [ Respiratory proble almost never [ Rashes of the skir almost never [	] sometimes ms? ] sometimes ? ] sometimes	[] often [] often [] often	<ul> <li>[ ] don't know</li> <li>[ ] don't know</li> <li>[ ] don't know</li> </ul>

### **Provisioning and Income**

21a. Does \_\_\_\_\_\_ go work outside of the home? [ ] Yes [ ] no

b. Doing what?

c. How much does \_\_\_\_\_make?

d. What does he/she do with the money?

22. Does \_\_\_\_\_\_ go outside to find food (forage)?

- [] Yes
- [ ] no

23. If yes – what kinds of food does \_\_\_\_\_\_find?

24. What does he/she do with the food?
[] Eat right then
[] Bring home and eat
[] Bring home and share
[] Sell
[] Don't know.

25. Do you work?

[]Yes

[] No

26. Approximately how much do you make each month? Pesos \_\_\_\_\_

27. Does your spouse work? [ ] Yes

[ ] No

28. Approximately how much does he/she make each month? Pesos \_\_\_\_\_

29. Do any of your other children work outside of the home?

- []Yes
- [ ] No

30 a. Approximately how much does he/she make each month? Pesos \_\_\_\_\_

b. Approximately how much does he/she make each month? Pesos \_\_\_\_\_

c. Approximately how much does he/she make each month? Pesos \_\_\_\_\_

31. Are there any other sources of income? (to probe: pension, government aid, etc) How much? \_\_\_\_\_

32. Approximately how much money is brought into the household each month from all these sources?

Confirmation – So, on average, the total monthly household income is \_\_\_\_\_\_ [ ] Yes [ ] No

33. How much do you spend each week on food? \_\_\_\_\_

34. How much do you spend each month on rent? \_\_\_\_\_

35. What is the single greatest household expense? \_\_\_\_\_ (food, rent, school supplies, etc.)

### Household characteristics

To be noted by interviewer:

Structure of house material used for:

floor:

walls:

roof:

Presence of:

]	Rur	nning	water
_			

[] electricity

[] bathroom

Presence of:

- [] radio
- [] TV [] bicycle other \_\_\_\_\_

Presence of:

[] garden plot - what is planted? \_\_\_\_\_

[] fruit trees \_\_\_\_\_

[] animals\_\_\_\_\_

Furnishing:

Number of beds/people\_\_\_\_\_

[] Table

[ ] Chairs #\_\_\_\_\_

### **Time Allocation Recall**

I am going to ask you to remember everything you did yesterday. If you went to work, or looked for food, I would like to know how much money or food you got and what you did with it.

About what time did you get up yesterday? (prompts - before or after your mom, was it dark)

What was the first thing you did yesterday morning?

What did you do after that?

So, around lunch time, what were you doing?

What did you do after lunch?

What did you do after that?

So, around dinner time, what were you doing?

What did you do after dinner?

What did you do until you went to bed?

What was the last thing you did last night?

So, yesterday you did (list activities). What else did you do?

### **Twenty-Four Hour Dietary Recall Form**

## 24 HOUR RECALL

Date of Record\_\_\_\_\_Subject Code No.\_\_\_\_ DAY OF WEEK TAKEN: M T W TH F S SUN (CIRCLE)

Food and Beverage Consumed

CODE NO.	5	WHAT DID YOU EAT?	AMOUNT	COOKING METHOD	TIME O DAY	F	ACTIVITY WHILE EATING
	Example	EGGS	2 med.	fried	7:30 a.m.	talking with far	nily
. '		_Oil	1tbs.				
Ε	REAKFAST		· .				
	T		•				
					· · · · · · · · · · · · · · · · · · ·	· ·	
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# Appendix C. Household survey data and caloric intake values

# Household and Primary Child Demographics

				Gender of	Age of	Birth Order of
	Household	Children in	Malnutrition in	Primary	Primary	Primary
ID	size	Household	Family?	Child	child	Child
101	6	4	0	F	12.9	2
201	6	4	0	F	12.2	3
301	8	6	1	Μ	9.7	5
401	4	2	0	F	9.7	1
501	8	2	1	Μ	9.2	5
601	4	2	0	М	9.4	1
701	8	6	1	Μ	10.3	4
801	5	3	0	F	11.2	2
901	4	2	0	Μ	9.8	1
1001	5	4	1	F	11.0	2
1101	7	6	9	М	9.2	1
1201	7	5	0	М	12.4	1
1301	5	3	1	М	12.4	1
1401	4	2	0	М	9.2	1
1501	4	2	0	М	10.5	1
1601	5	3	0	М	10.8	3
1701	5	3	1	F	11.2	2
1801	7	1	0	F	11.0	1
1901	7	4	1	М	12.9	3
2001	4	2	0	М	10.7	1
2101	11	10	0	М	13.1	4
2201	5	3	0	F	11.0	1
2301	7	5	0	М	7.8	2
2401	5	6	1	М	10.3	1
2501	4	2	0	М	9.0	1
2601	5	4	1	М	12.3	1
2701	14	4	1	F	12.4	1
2801	11	6	1	М	12.3	4
2901	4	2	0	F	12.9	1
2902	4	2	0	F	11.9	1
3001	7	4	0	F	13.0	3
3101	7	5	1	F	11.7	2
3201	7	4	0	F	8.9	1
3301	4	2	9	М	12.3	2
3401	3	1	0	М	8.0	1
3501	4	2	0	М	9.0	2
3601	3	1	0	М	7.1	1
3701	8	6	0	М	11.3	3
3801	5	3	0	М	8.2	1
3901	6	4	0	F	9.5	2
4001	7	5	0	Μ	11.6	4

4101	4	3	0	F	9.4	2
4201	5	3	0	F	10.3	3
4301	7	6	0	F	11.2	4
4401	10	4	1	F	11.7	3
4501	6	4	0	F	12.1	1
4601	6	4	0	F	10.2	3
4701	5	3	0	М	8.8	8
4801	6	3	0	F	13.1	1
4901	7	3	0	F	12.2	2
5001	6	4	0	М	12.4	1
5101	5	3	0	F	10.8	1
5201	5	6	0	М	10.7	2
5301	4	1	nd	M	10.1	1
5401	5	3	9	M	10.4	3
5501	6	4	1	F	10.0	4
5601	8	6	1	M	11.5	3
5701	7	5	1	F	9.5	3
5801	5	3	1	М	12.7	2
5901	5	4	1	M	12.7	2
6001	5	4	0	M	7 9	2
6101	6	5	0	F	13.7	2
6201	5	3	0	F	13.7	2
6201	3	5	1	F	10.4	2
6501	5	J 4	1	1	12.7	2 1
6601	3	4	1	N/	0.2	4
6701	4	3	0		9.2	ו כ
6901	5	2	0	г с	11.9	2
6001	0	4	1	г г	12.3	3
7001	4	0	0	F	0.3	0
7001	10	8	0	F	10.3	3
7101	4	2	0	F	12.4	2
7201	5	3	1		12.4	3
7301	6	3	0	F	9.0	1
7401	5	3	1	F	10.1	3
7501	3	2	0	F	8.4	1
7601	6	3	0	F	12.9	2
7701	4	2	0	F	11.5	2
7801	6	5	1	M	8.5	2
7901	5	3	1	M	10.1	1
8001	11	4	0	M	9.4	1
8101	9	5	0	F	13.2	2
8201	5	3	0	M	12.5	2
8301	5	2	0	F	13.3	2
8401	9	3	1	М	12.8	3
8501	9	3	0	М	10.7	3
8601	6	2	1	F	11.1	1
8701	6	1	1	F	10.9	1
8801	nd	3	0	М	12.0	2
8901	5	1	0	М	12.6	1
9001	nd	3	0	F	11.1	2
9101	4	5	1	М	12.0	2

9201	6	4	0	М	12.3	1
9301	4	2	0	М	13.2	1
9401	6	4	0	М	9.1	4
9501	8	8	1	F	10.5	4
9601	5	3	0	М	12.5	3
*primary cl	nild					
0=no, 1=ye	s, 9=don't k	now				
1 1						

nd= no data available

# Household Economy

ID	Mother's Monthly Income	Father's Monthly Income	Father's Contribution to Household	Income from Working Children	Gov. Aid	Total Monthly Income	Monthly Food Budget	Greatest Household Expense
101	3330	7000	nd	1300	0	11630	2400	school
201	1200	nd	1600	1200	0	2400	280	food
301	0	2800	2000	500	775	2775	1000	school
401	1200	0	0	0	0	1200	400	food
501	0	0	0	2000	100	2100	nd	doctor
601	1600	2000	2000	0	0	3600	2000	cloths, utilities
701	0	1200	1200	0	600	1800	800	school, food
801	750	0	0	900	0	1650	280	food
901	0	nd	1200	0	0	1200	1650	gas
1001	0	0	0	80	0	nd	1400	utilities, food
1101	0	3000	1200	80	310	3310	1500	furniture
1201	1960	2400	1000	9	350	4710	2100	utilities, food
1301	600	2000	1000	0	0	2600	980	gas
1401	3000	4000	nd	0	0	7000	3000	food, doctor
1501	500	1800	1500	0	0	2300	1200	school
1601	0	2400	2000	300	0	2700	1800	transportation
1701	1680	1960	1500	400	350	4400	1500	doctor
1801	1800	0	0	0	0	1800	1800	food, utilities
1901	0	4500	1000	600	290	5390	800	food school
2001	0	3200	3200	0	335	3535	3000	transportation
2101	1600	0	0	0	0	1600	200	water
2201	2550	3000	3000	0	350	5900	1200	building materials
2301	1000	6000	4000	0	0	7000	3000	food
2401	160	800	0	0	360	1320	120	food
2501	6000	6000	2100	0	214	6214	1800	food
2601	1800	nd	2000	0	160	3960	1800	food
2701	0	2000	2000	0	150	2150	500	water
2801	1500	4000	4000	3000	150	5650	1500	food
2901	1500	3200	3200	0	350	1850	1800	gas
2902	1500	3200	3200	0	350	1850	1800	gas
3001	0	2800	nd	2400	500	5700	1200	food
3101	0	2400	nd	80	350	2830	1800	food
3201	800	nd	400	0	150	1350	600	utilities

3401         1500         900         600         0         2400         1800         food           3601         2000         2800         2000         0         4800         1200         gas, school, doctor           3701         0         9         1800         0         0         1800         1200         gas, school, doctor           3801         1500         0         0         0         3200         school         food, doctor           3801         1500         0         0         0         3200         school         food           4001         0         1800         1800         0         3200         food           4101         1500         1200         1200         0         3200         1800         gas           4201         640         2400         1600         0         3400         1500         lood           4401         0         nd         1400         2700         0         4100         160d         4601           4601         nd         nd         1000         0         0         2505         1000         food           4701         0         2000	3301	0	1400	nd	700	0	2100	1500	food, cloths	
3501         0         2800         1600         1200         0         4400         1500         food           3601         2000         2800         0         0         4800         1200         gas, school, doctor           3801         1500         0         0         0         0         1200         900         school           3801         0         3000         200         1200         0         3200         1800         food           4001         0         1800         1800         0         0         3400         food           4101         1500         1200         0         3400         1500         food           4301         0         2400         800         900         100         3400         food           4501         200         3000         nd         0         325         3525         1800         food           4501         200         3000         nd         0         3250         2500         1000         food           4501         200         0         0         0         2500         900         school           5001         4200	3401	1500	900	600	0	0	2400	1800	food	
3601         2000         2800         2000         0         4800         1200         gas, school, doctor           3701         0         9         1800         0         0         1800         1800         food, doctor           3801         1500         0         0         0         3200         1200         0         3200         food, doctor           3801         1500         1200         1200         0         3200         1800         food           4101         1500         1200         1200         0         250         2950         1800         gas           4201         640         2400         1600         0         3040         1500         food           4301         0         Add         1000         0         4400         1500         food           4401         0         nd         1400         0         3400         1500         food           4401         0         nd         1000         0         400         1400         900         school           4501         200         0         0         0         3750         1200         food           4701	3501	0	2800	1600	1200	0	4000	1500	food	
3701         0         9         1800         0         0         1800         1800         food, doctor           3801         0         3000         2000         1200         0         3200         1800         food           4001         0         1800         1800         1200         0         2320         1800         food           4101         1500         1200         0         250         2950         1800         food           4201         640         2400         1600         0         0         3400         1500         food           4301         0         2400         800         900         100         3400         1500         food           4501         200         3000         nd         0         325         3525         1800         food           4501         200         0         0         0         2500         3700         food         4601           4601         1200         0         0         2500         3700         600         school           5001         4200         1200         0         2400         900         school         school     <	3601	2000	2800	2000	0	0	4800	1200	gas, school, doctor	
3801         1500         0         0         1200         0         3200         1800         food           3901         0         3800         2000         1200         0         3200         1800         food           4101         1500         1200         1200         0         250         2950         1800         gas           4201         640         2400         1600         0         0         3040         1600         food           4301         0         2400         800         900         100         3400         1500         food           4501         200         3000         nd         0         2255         3525         1800         food           4601         nd         nd         1000         0         400         1400         900         school           4701         0         2000         0         0         2550         3700         600         school           4801         1200         0         0         4200         1200         food         500         school         school           5101         0         3600         1200         0         2	3701	0	9	1800	0	0	1800	1800	food, doctor	
3901         0         3000         2000         1200         0         3200         1800         food           4001         0         1800         1800         5300         0         7100         1200         food           4101         1500         1200         1200         0         250         2950         1800         gas           4201         640         2400         1600         0         0         3440         1600         food           4301         0         2400         800         900         100         3400         1500         utilities, school           4501         20         3000         nd         0         325         3525         1800         food           4701         0         2000         0         0         2000         3700         600         school           4801         1200         0         0         303         3750         1200         food           5201         0         0         0         1534         767         nd         school           5301         1000         800         600         140         300         1750         600	3801	1500	0	0	0	0	1200	900	school	
4001         0         1800         1800         5300         0         7100         1200         food           4101         1500         1200         1200         0         250         2950         1800         gas           4201         640         2400         1600         0         0         3040         1500         food           4301         0         2400         800         900         100         3400         1500         food           4401         0         nd         1400         2700         0         4100         900         school           4501         220         3000         nd         0         325         3525         1800         food           4801         2000         0         0         0         2950         3700         600         school           4801         2000         0         0         1534         767         nd         school           5011         0         800         600         1400         300         3750         1200         food           5101         0         800         600         1200         0         2500         390 </td <td>3901</td> <td>0</td> <td>3000</td> <td>2000</td> <td>1200</td> <td>0</td> <td>3200</td> <td>1800</td> <td>food</td>	3901	0	3000	2000	1200	0	3200	1800	food	
4101         1500         1200         1200         0         250         2950         1800         gas           4201         640         2400         1600         0         3040         1600         food           4201         0         2400         800         900         100         3440         1500         food           4401         0         nd         1400         2700         0         4100         1500         utilities, school           4501         200         3000         nd         0         325         3525         1800         food           4701         0         2000         2000         0         0         2950         1000         food           4801         2000         0         0         2500         3700         600         school           5011         4200         4200         1200         0         4200         900         school           5201         0         0         0         303         1750         600         utilities           5401         0         800         500         0         250         900         school           5501	4001	0	1800	1800	5300	0	7100	1200	food	
4201 $640$ $2400$ $1600$ $0$ $0$ $3040$ $1600$ food $4301$ 0 $2400$ $800$ $900$ $100$ $3400$ $1500$ utilities, school $4501$ $200$ $3000$ nd $0$ $325$ $3525$ $1800$ food $4601$ ndnd $1000$ $0$ $400$ $1400$ $900$ school $4701$ $0$ $2000$ $2000$ $0$ $0$ $2200$ $900$ food $4801$ $2000$ $0$ $0$ $0$ $2250$ $3700$ $600$ school $4901$ $1200$ $0$ $0$ $0$ $2250$ $3700$ $600$ school $5001$ $4200$ $1200$ $0$ $0$ $4200$ $900$ school $5101$ $0$ $3600$ $1200$ $0$ $300$ $3750$ $1200$ food $5301$ $100$ $800$ $600$ $140$ $300$ $1750$ $600$ utilities $5401$ $0$ $1800$ $500$ $0$ $250$ $250$ $900$ school $5501$ $800$ $3000$ $1200$ $0$ $2600$ $1220$ food $5701$ $0$ $2600$ $1800$ $0$ $600$ $3200$ $1650$ food, $5901$ $420$ $0$ $0$ $1400$ $0$ $2240$ $840$ utilities $6101$ $0$ $1800$ $1800$ $2600$ $0$ $2700$ $1600$ food $6201$ $0$ </td <td>4101</td> <td>1500</td> <td>1200</td> <td>1200</td> <td>0</td> <td>250</td> <td>2950</td> <td>1800</td> <td>gas</td>	4101	1500	1200	1200	0	250	2950	1800	gas	
4301         0         2400         800         900         100         3400         1500         food           4401         0         nd         1400         2700         0         4100         1500         utilities, school           4501         200         3000         nd         0         325         3525         1800         food           4601         nd         nd         1000         0         400         1400         900         school           4701         0         2000         2000         0         0         2000         900         food           4801         2000         0         0         0         2000         3700         600         school           501         4200         1200         0         0         0         school         1200         food         501           511         0         3600         1200         0         650         4450         900         school         5501           5401         0         1800         500         0         250         2050         900         school         5501           5501         800         3000	4201	640	2400	1600	0	0	3040	1600	food	
4401         0         nd         1400         2700         0         4100         1500         utilities, school           4501         200         3000         nd         0         325         3525         1800         food           4701         0         2000         2000         0         0         2000         900         school           4701         0         2000         2000         0         0         2000         900         food           4801         1200         0         0         950         2950         1000         food           5001         4200         4200         1200         0         0         4200         900         school           5101         0         3600         1200         0         3750         1200         food           5301         1000         800         600         140         300         1750         600         utilities           5401         0         1800         500         0         250         2050         900         school           5501         800         3000         1200         0         2600         1200         food	4301	0	2400	800	900	100	3400	1500	food	
4501         200         3000         nd         0         325         3525         1800         food           4601         nd         nd         1000         0         400         1400         900         school           4701         0         2000         2000         0         0         2000         900         food           4801         2000         0         0         950         2950         1000         food           5001         4200         4200         1200         0         300         3750         1200         food           5101         0         3600         1200         0         300         3750         1200         food           5201         0         0         0         1534         767         nd         school           5301         1000         800         600         140         300         1750         600         uillities           5401         0         1800         3000         1200         c600         3200         1650         food           5701         0         2600         1800         0         600         3200         160d	4401	0	nd	1400	2700	0	4100	1500	utilities, school	
No.         No. <td>4501</td> <td>200</td> <td>3000</td> <td>nd</td> <td>0</td> <td>325</td> <td>3525</td> <td>1800</td> <td>food</td>	4501	200	3000	nd	0	325	3525	1800	food	
No.         No. <td>4601</td> <td>nd</td> <td>nd</td> <td>1000</td> <td>0</td> <td>400</td> <td>1400</td> <td>900</td> <td>school</td>	4601	nd	nd	1000	0	400	1400	900	school	
Hot         Doo         Doo         Doo         Doo         Doo         Doo         Doo           4801         2000         0         0         0         2500         3700         600         school           5001         4200         4200         1200         0         0         4200         900         school           5001         4200         4200         1200         0         300         3750         1200         food           5201         0         0         0         1534         767         nd         school           5301         1000         800         600         140         300         1750         600         utilities           5401         0         1800         500         0         250         2050         900         school           5601         0         2000         1800         1200         2800         school         500         500	4701	0	2000	2000	0	0	2000	900	food	
Hot         Loo         G <thg< th="">         G         G         <thg< th=""></thg<></thg<>	4801	2000	0	0	0	950	2000	1000	food	
Fash         Fash <th< td=""><td>4001 /001</td><td>12000</td><td>0</td><td>0</td><td>0</td><td>2500</td><td>3700</td><td>600</td><td>school</td></th<>	4001 /001	12000	0	0	0	2500	3700	600	school	
5001         4200         4200         0         0         4200         300         3150         300         strong           5101         0         0         0         0         1534         767         nd         school           5301         1000         800         600         140         300         1750         600         utilities           5401         0         1800         500         0         250         2050         900         school           5501         800         3000         1200         0         650         4450         1500         school           5601         0         2000         1000         1200         0         2600         1200         food           5701         0         2600         1800         0         600         3200         1650         food, gas           5801         900         0         0         5400         10340         2400         utilities           6001         840         0         0         10340         2400         food           611         0         1800         2660         300         4770         2400         food	4901 5001	1200	4200	1200	0	2300	4200	000	school	
S101         0         3600         1200         0         300         3730         1200         1000           5201         0         0         0         1534         767         nd         school           5301         1000         800         600         140         330         1750         600         utilities           5401         0         1800         500         0         250         2050         900         school           5501         800         3000         1200         0         660         1200         food           5601         0         2600         1800         0         600         3200         1650         food, gas           5701         0         2600         1800         0         600         3200         1650         food, gas           5801         900         0         0         5400         1100         10340         2400         utilities           6001         840         0         0         2240         840         utilities           6101         0         0         0         0         2000         3000         1200         rent, transportation     <	5001	4200	4200	1200	0	200	4200	900	food	
5201         0         0         1334         767         10         stributi           5301         1000         800         600         140         300         1750         600         utilities           5401         0         1800         500         0         250         2050         900         school           5501         800         3000         1200         0         650         4450         1500         school           5601         0         2000         1000         1200         0         2820         800         school           5701         0         2600         1800         0         600         3200         1650         food, gas           5801         900         0         0         1920         0         2820         800         school           5901         4200         0         0         1400         0         2400         utilities           6101         0         1800         1800         2660         300         4770         2400         food           6501         2800         nd         4000         4000         0         0         600         1630 <td>5101</td> <td>0</td> <td>3600</td> <td>1200</td> <td>0</td> <td>300</td> <td>3750</td> <td>1200 nd</td> <td>IUUU</td>	5101	0	3600	1200	0	300	3750	1200 nd	IUUU	
5301         1000         600         140         300         1730         600         utilities           5401         0         1800         500         0         250         2050         900         school           5501         800         3000         1200         0         650         4450         1500         school           5601         0         2000         1000         1200         0         2600         1200         food           5701         0         2600         1800         0         600         3200         1650         food           5801         900         0         0         5400         1000         10340         2400         utilities           6001         840         0         0         1400         0         2240         840         utilities           6101         0         1800         2660         300         4770         2400         food           6201         0         0         0         1640         900         school           6501         2800         nd         4000         6000         1880         gas           6601         1000 <td>5201</td> <td>1000</td> <td>0</td> <td>0</td> <td>140</td> <td>200</td> <td>1750</td> <td>11U 600</td> <td>SCHOOL</td>	5201	1000	0	0	140	200	1750	11U 600	SCHOOL	
5401         0         1800         500         0         250         200         900         School           5501         800         3000         1200         0         650         4450         1500         school           5601         0         2000         1000         1200         0         2600         1200         food           5701         0         2600         1800         0         600         3200         1650         food, gas           5801         900         0         0         5400         1100         10340         2400         utilities           6001         840         0         0         1400         0         2240         840         utilities           6101         0         1800         2660         300         4770         2400         food           6301         840         nd         800         0         0         6000         1800         gas           6601         1000         nd         2000         0         2000         3000         1200         rent, transportation           6701         2240         0         0         0         2000 <td< td=""><td>5301</td><td>1000</td><td>800</td><td>600</td><td>140</td><td>300</td><td>1750</td><td>600</td><td>utilities</td></td<>	5301	1000	800	600	140	300	1750	600	utilities	
5501         800         3000         1200         0         650         4450         1500         School           5601         0         2000         1000         1200         0         2600         1200         food           5701         0         2600         1800         0         600         3200         1650         food           5801         900         0         0         1920         0         2820         800         school           5901         4200         0         0         1400         0         2440         utilities           6001         840         0         0         1400         0         2400         utilities           6101         0         1800         2660         300         4770         2400         food           6301         840         nd         800         0         0         1640         900         school           6501         2800         nd         4000         4000         0         6000         1680         gas           6601         1000         nd         2000         0         2240         2000         food <td< td=""><td>5401</td><td>0</td><td>1800</td><td>500</td><td>0</td><td>250</td><td>2050</td><td>900</td><td>school</td></td<>	5401	0	1800	500	0	250	2050	900	school	
5601         0         2000         1000         1200         0         2200         1200         160d           5701         0         2600         1800         0         600         3200         1650         food, gas           5801         900         0         0         1920         0         2820         800         school           5901         4200         0         0         5400         1100         10340         2400         utilities           6001         840         0         0         1400         0         2240         840         utilities           6101         0         1800         1800         2660         300         4770         2400         food           6201         0         0         0         2600         2770         1440         food           6301         840         nd         800         0         0         1640         900         school           6501         2800         nd         4000         4000         6000         1680         gas           6601         1800         2200         1800         1200         3800         2400         rent, fo	5501	800	3000	1200	0	650	4450	1500	school	
5701         0         2600         1800         0         600         3200         1650         food, gas           5801         900         0         0         1920         0         2820         800         school           5901         4200         0         0         5400         1100         10340         2400         utilities           6101         0         1800         1800         2660         300         4770         2400         food           6201         0         0         0         2660         300         4770         2400         food           6301         840         nd         800         0         0         1640         900         school           6501         2800         nd         4000         4000         0         6000         1680         gas           6601         1000         nd         2000         0         3800         1200         rent, transportation           6701         2240         0         0         0         2240         2000         food           6801         1800         2200         1800         2200         1600         food <t< td=""><td>5601</td><td>0</td><td>2000</td><td>1000</td><td>1200</td><td>0</td><td>2600</td><td>1200</td><td>food</td></t<>	5601	0	2000	1000	1200	0	2600	1200	food	
5801         900         0         0         1920         0         2820         800         school           5901         4200         0         0         5400         1100         10340         2400         utilities           6001         840         0         0         0         1400         0         2240         840         utilities           6101         0         1800         2660         300         4770         2400         food           6201         0         0         2600         0         2700         1400         food           6301         840         nd         800         0         0         1640         900         school           6501         2800         nd         4000         4000         0         6000         1680         gas           6601         1000         nd         2000         0         2240         2000         food           6701         2240         0         0         0         2240         2000         food           6801         1800         2200         1800         1200         0         1200         rent, food <t< td=""><td>5701</td><td>0</td><td>2600</td><td>1800</td><td>0</td><td>600</td><td>3200</td><td>1650</td><td>food, gas</td></t<>	5701	0	2600	1800	0	600	3200	1650	food, gas	
5901         4200         0         0         5400         1100         10340         2400         utilities           6001         840         0         0         1400         0         2240         840         utilities           6101         0         1800         1800         2660         300         4770         2400         food           6201         0         0         0         2600         0         2700         1400         food           6301         840         nd         800         0         0         1640         900         school           6501         2800         nd         4000         4000         0         6000         1880         gas           6601         1000         nd         2000         0         2000         3000         1200         rent, transportation           6701         2240         0         0         0         0         600         150         transportation           6901         450         900         varies         1400         600         150         transportation           7001         500         500         2000         0         2500	5801	900	0	0	1920	0	2820	800	school	
6001         840         0         0         1400         0         2240         840         utilities           6101         0         1800         1800         2660         300         4770         2400         food           6201         0         0         0         2600         0         2700         1400         food           6301         840         nd         800         0         0         1640         900         school           6501         2800         nd         4000         4000         0         6000         1680         gas           6601         1000         nd         2000         0         2000         3000         1200         rent, transportation           6701         2240         0         0         0         0         2240         2000         food           6801         1800         2200         1800         1200         0         3800         2400         rent, transportation           7001         500         500         2000         0         2500         600         utilities           7301         0         3200         2400         0         3200	5901	4200	0	0	5400	1100	10340	2400	utilities	
6101       0       1800       1800       2660       300       4770       2400       food         6201       0       0       0       2600       0       2700       1400       food         6301       840       nd       800       0       0       1640       900       school         6501       2800       nd       4000       4000       0       6000       1680       gas         6601       1000       nd       2000       0       2000       3000       1200       rent, transportation         6701       2240       0       0       0       0       2240       2000       food         6801       1800       2200       1800       1200       0       3800       2400       rent, transportation         7001       500       500       2000       0       2500       600       utilities, food         7101       600       3600       1500       0       0       4800       school       gas         7201       0       4800       1600       0       3200       2400       o       1500       school         7501       750       750	6001	840	0	0	1400	0	2240	840	utilities	
6201         0         0         0         2600         0         2700         1400         food           6301         840         nd         800         0         0         1640         900         school           6501         2800         nd         4000         4000         0         6000         1680         gas           6601         1000         nd         2000         0         2000         3000         1200         rent, transportation           6701         2240         0         0         0         0         2240         2000         food           6801         1800         2200         1800         1200         0         3800         2400         rent, transportation           7001         500         500         2000         0         2500         600         utilities, food           7101         600         3600         1500         0         0         4200         1800         school           7201         0         4800         1600         0         3200         1600         food, utilities           7301         0         3200         2400         0         1500 <t< td=""><td>6101</td><td>0</td><td>1800</td><td>1800</td><td>2660</td><td>300</td><td>4770</td><td>2400</td><td>food</td></t<>	6101	0	1800	1800	2660	300	4770	2400	food	
6301840nd800001640900school65012800nd40004000060001680gas66011000nd20000200030001200rent, transportation67012240000022402000food68011800220018001200038002400rent, food6901450900varies14000600150transportation7001500500500200002500600utilities, food7101600360015000048002100utilities72010480016000032001600food, utilities7301032002400001500schoolschool75017507507500015001500school7601360nd1600015521151000food77011000000160960400utilities79010nd1600044020402100food78010nd1600044020402100food78010nd1600044020402100food78010nd1600044020	6201	0	0	0	2600	0	2700	1400	food	
65012800nd40004000060001680gas66011000nd20000200030001200rent, transportation67012240000022402000food68011800220018001200038002400rent, food6901450900varies14000600150transportation7001500500500200002500600utilities, food7101600360015000048002100utilities72010480016000032001600food, utilities7301032002400001500schoolschool7501750750750001500schoolfood,7601360nd1600015521151000food7601360nd1600015521151000food7701100000044020402100utilities79010nd1600044020402100food8001028002000080036003000food80010000160960400utilities7910nd16000440<	6301	840	nd	800	0	0	1640	900	school	
66011000nd20000200030001200rent, transportation67012240000022402000food68011800220018001200038002400rent, food6901450900varies14000600150transportation7001500500500200002500600utilities, food7101600360015000042001800school72010480016000032002100utilities73010320024000032001500school7507507500015001500school75011800nd1200015521151000food7601360nd1600015521151000food78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800000200school82010nd120072002075600food82010nd120072002075600food<	6501	2800	nd	4000	4000	0	6000	1680	gas	
670122400000022402000food68011800220018001200038002400rent, food6901450900varies14000600150transportation7001500500500200002500600utilities, food7101600360015000042001800school72010480016000048002100utilities73010320024000032001600food, utilities74017507507500015001500school75011800nd1200017025001200school7601360nd1600015521151000food77011000000160960400utilities78010nd1600044020402100food78010nd1600044020402100food8001028002000080036003000food8101108000002075600food82010nd120072002075600food82010nd12007200207560	6601	1000	nd	2000	0	2000	3000	1200	rent, transportation	
68011800220018001200038002400rent, food6901450900varies14000600150transportation7001500500500200002500600utilities, food7101600360015000042001800school72010480016000048002100utilities73010320024000032001600food, utilities74017507507500015001500school75011800nd1200017025001200school7601360nd1600015521151000food78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food8101108000044020402100food82010nd120072002075600food830184020002000220024002100school	6701	2240	0	0	0	0	2240	2000	food	
6901450900varies14000600150transportation7001500500500200002500600utilities, food7101600360015000042001800school72010480016000048002100utilities73010320024000032001600food, utilities74017507507500015001500school75011800nd1200017025001200school7601360nd1600015521151000food770110000001600960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220020034002100school	6801	1800	2200	1800	1200	0	3800	2400	rent, food	
7001500500500200002500600utilities, food7101600360015000042001800school72010480016000048002100utilities73010320024000032001600food, utilities7401750750750001500school75011800nd1200017025001200school7601360nd1600015521151000food77011000000160960400utilities78010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220034002100school	6901	450	900	varies	1400	0	600	150	transportation	
7101600360015000042001800school72010480016000048002100utilities73010320024000032001600food, utilities74017507507500015001500school75011800nd1200017025001200school7601360nd1600015521151000food77011000000160960400utilities78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220020034002100school	7001	500	500	500	2000	0	2500	600	utilities, food	
72010480016000048002100utilities73010320024000032001600food, utilities74017507507500015001500school75011800nd1200017025001200school7601360nd1600015521151000food7701100000001000200school78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220020034002100school	7101	600	3600	1500	0	0	4200	1800	school	
73010320024000032001600food, utilities74017507507500015001500school75011800nd1200017025001200school7601360nd1600015521151000food7701100000001000200school78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220020034002100school	7201	0	4800	1600	0	0	4800	2100	utilities	
74017507507500015001500school75011800nd1200017025001200school7601360nd1600015521151000food7701100000001000200school78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220020034002100school	7301	0	3200	2400	0	0	3200	1600	food, utilities	
75011800nd1200017025001200school7601360nd1600015521151000food7701100000001000200school78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220020034002100school	7401	750	750	750	0	0	1500	1500	school	
7601360nd1600015521151000food7701100000001000200school78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220020034002100school	7501	1800	nd	1200	0	170	2500	1200	school	
7701       1000       0       0       0       1000       200       school         7801       0       nd       800       0       160       960       400       utilities         7901       0       nd       1600       0       440       2040       2100       food         8001       0       2800       2000       0       800       3600       3000       food         8101       1080       0       0       0       400       1480       900       school         8201       0       nd       1200       720       0       2075       600       food         8301       840       2000       2000       2200       200       3400       2100       school	7601	360	nd	1600	0	155	2115	1000	food	
78010nd8000160960400utilities79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220034002100school	7701	1000	0	0	0	0	1000	200	school	
79010nd1600044020402100food8001028002000080036003000food810110800004001480900school82010nd120072002075600food830184020002000220034002100school	7801	0	nd	800	0	160	960	400	utilities	
8001         0         2800         2000         0         800         3600         3000         food           8101         1080         0         0         0         400         1480         900         school           8201         0         nd         1200         720         0         2075         600         food           8301         840         2000         2000         2200         3400         2100         school	7901	0	nd	1600	0	440	2040	2100	food	
8101         1080         0         0         0         400         1480         900         school           8201         0         nd         1200         720         0         2075         600         food           8301         840         2000         2000         2200         200         3400         2100         school	8001	0	2800	2000	0	800	3600	3000	food	
8201 0 nd 1200 720 0 2075 600 food 8301 840 2000 2000 2200 200 3400 2100 school	8101	1080	0	0	0	400	1480	900	school	
8301 840 2000 2000 2200 200 3400 2100 school	8201	0	nd	1200	720	0	2075	600	food	
	8301	840	2000	2000	2200	200	3400	2100	school	

8401	1200	3200	2560	0	0	4400	2400	food	
8501	1000	nd	2400	27	435	3835	1400	food	
8601	0	nd	1200	280	0	1480	nd	nd	
8701	560	nd	1200	0	200	1900	600	school, utilities	
8801	800	nd	200	800	155	1555	750	food	
8901	720	800	600	800	0	2320	750	utilities	
9001	0	0	0	0	nd	nd	nd	nd	
9101	1000	1500	1500	1960	325	3285	1800	rent	
9201	1200	1200	800	0	0	2400	1200	food, transportation	
9301	800	4000	2400	280	0	5080	nd	school, shoes	
9401	0	2200	2200	640	0	2840	1500	school, food	
9501	0	2400	2000	3200	0	5600	2250	utilities	
9601	2400	nd	nd	400	0	2800	400	food	

# **Household Characteristics**

				Water in-		Bathroom	Cooking	Number beds to
ID	Floor	Walls	Roof	house	Electricity	in-house	Fuel*	persons
101	cement	cement block	cement	1	1	1	gas	3 to 6
201	cement	cement block	lam cardb	0	1	0	gas	2 to 4
301	cement	cement block	cement block	1	1	1	both	4 to 8
401	tile	cement	cement	1	1	1	gas	2 to 4
	dirt,		lam cardb,					
501	cement	cement	cement	1	1	1	gas	6 to 8
601	tile	cement	cement	1	1	1	gas	2 to 4
701	dirt	cement block	cement	1	1	1	gas	nd
801	dirt	wood	lam cardb, plastic	1	1	1	both	2 to 5
901	dirt	wood	lam cardb	1	1	1	both	2 to 4
1001	dirt	wood	lam cardb	1	1	0	wood	2 to 4
1101	dirt	cardb, tin	tin	1	1	0	wood	3 to 7
1201	dirt	cardb	cardb	0	1	0	wood	nd
1301	dirt	cardb	lam cardb	0	1	1	gas	3 to 5
1401	dirt	wood	tin, cardb	1	1	1	gas	2 to 4
1501	cement	cardb, tin	tin, lam cardb	1	1	1	gas	2 to 4
1601	cement	wood	lam cardb	1	1	0	wood	4 to 5
1701	cement	cement block	tin	1	1	1	gas	3 to 5
1801	cement	cement	tin	1	1	1	gas	4 to 7
1901	dirt	cardb	cardb	0	1	0	both	2 to 5
2001	cement	cement	tin	1	1	1	gas	2 to 4
2101	dirt	lam cardb, plastic	lam cardb, wood	0	1	0	both	3 to 7
2201	dirt	cement	plastic, cement	1	1	1	both	3 to 5
	Cement,		•					
2301	dirt	wood, cardb	lam cardb	1	1	0	gas	3 to 7
2401	dirt	lam cardb	wood, plastic	0	1	0	wood	2 to 5
	dirt,							
2501	cement	wood	lam cardb	0	1	1	gas	2 to 4
2601	dirt	cardb, lam cardb	tin, wood	1	1	1	gas	2 to 5
2701	dirt	cement block, lam	tin, cardb	1	1	1	both	5 to 14
		cardb						
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2801	dirt	cement, tin	cement, tin	1	1	1	gas	5 to 11
2901	dirt	lam cardb, wood	tin	0	1	1	both	2 to 4
2902	dirt	lam cardb, wood	tin	0	1	1	both	2 to 4
3001	dirt	wood, lam cardb	lam cardb	1	1	1	both	4 to 7
3101	dirt	cardb	lam cardb	0	1	1	gas	1 to 7
3201	dirt	lam cardb	tin	0	1	0	wood	2 to 7
3301	tile	tile	cement	1	1	1	gas	nd
3401	dirt	plastic, lam cardb	lam cardb	0	1	0	wood	2 to 3
3501	dirt	lam cardb, wood	lam cardb, wood	1	1	1	wood	2 to 4
3601	dirt	lam cardb	lam cardb	0	1	1	gas	2 to 3
3701	dirt	lam cardb, tin	tin	1	1	0	gas	2 to 8
3801	cement	cement	tin	1	1	1	gas	2 to 5
3901	dirt	lam cardb, tin	lam cardb	0	1	1	both	3 to 6
4001	dirt	wood	lam cardb	1	1	1	wood	3 to 4
4101	dirt	wood	lam cardb	1	1	1	both	3 to 4
4201	dirt	tin, cement block	tin	1	1	1	both	3 to 5
4301	dirt	lam cardb	lam cardb	0	1	0	both	3 to 7
4401	cement	cement	cement	1	1	1	wood	5 to 10
4501	dirt	lam cardb	tin	1	1	0	gas	2 to 3
4601	cement	wood	tin	1	1	1	both	3 to 6
	cement,							
4701	dirt	cement block	cement, tin	1	1	1	gas	3 to 5
4801	dirt	wood, lam cardb	tin	1	1	1	both	3 to 6
4901	cement	cement	cement, tin	1	1	1	gas	6 to 8
5001	cement	cement	cement	1	1	1	both	2 to 6
5101	dirt	wood, lam cardb	tin	0	1	1	gas	2 to 5
5201	cement	cement block	tile (gift)	0	1	1	gas	nd
5301	dirt	lam cardb	tin	0	1	0	both	nd
5401	dirt	lam cardb	lam cardb	1	1	0	gas	nd
5501	dirt	wood	lam cardb	1	1	1	both	2 to 6
5601	cement	cement block	tin	1	1	1	both	2 to 8
5701	dirt	nd	nd	0	1	nd	gas	2 to 7
5801	tile	cement	cement	1	1	1	gas	4 to 5
5901	tile	cement	cement	1	1	1	gas	4 to 5
6001	cement	cement	tin	1	1	1	gas	2 to 5
6101	cement	cement	plastic	1	1	1	gas	3 to 6
6201	cement	cement	cement	1	1	1	gas	2 to 5
6301	tile	cement	cement	1	1	1	gas	3 to 3
6501	cement	cement	tile	1	1	1	gas	4 to 4
6601	cement	cement	cement	1	1	1	gas	3 to 4
6701	cement	cement	cement slab	1	1	1	both	2 to 5
6801	tile	cement	cement slab	1	1	1	gas	3 to 6
6901	cement	cement	cement	0	1	0	both	2 to 4
7001	cement	wood, plastic	wood, plastic	1	1	1	gas	1 to 10
7101	tile	cement	tile	1	1	1	gas	3 to 4
7201	tile	cement	tile	1	1	1	gas	3 to 5
7301	nd	nd	nd	1	1	1	both	2 to 5
7401	cement dirt.	cement block cement block.	tile	1	1	1	gas	4 to 5
7501	cement	wood	lam cardb, tin	0	1	1	both	2 to 3

	dirt,	cement block,						
7601	cement	wood	lam cardb, tin	1	1	1	both	2 to 6
7701	cement	cement block, dirt	tile	1	1	1	gas	3 to 4
7801	dirt dirt,	lam cardb	lam cardb cement, lam	0	1	1	both	2 to 6
7901	cement	cement cement block,	cardb cement, lam	1	1	1	both	2 to 5
8001	cement dirt,	wood	cardb	1	1	nd	gas	6 to 11
8101	cement	lam cardb	lam cardb	1	1	1	gas	3 to 9
8201	dirt dirt,	lam cardb	lam cardb	1	1	1	both	2 to 5
8301	cement	cement block cement block,	lam cardb	0	1	1	gas	3 to 5
8401	dirt	wood	tin, cardb	0	1	nd	gas	4 to 9
8501	nd	nd	nd cement, lam	nd	nd	nd	gas	4 to 9
8601	cement	cement, wood	cardb	1	1	1	both	2 to 6
8701	dirt dirt,	wood cement block,	lam cardb	1	1	1	both	2 to 6
8801	cement dirt,	wood	lam cardb	1	1	1	both	nd
8901	cement	cement, wood cement block,	lam cardb	1	1	1	both	3 to 5
9001	cement	wood	tin	1	1	1	nd	2 to 4
9101	cement	cement	cement	1	1	0	gas	1 to 4
9201	dirt	wood, lam cardb	tin, lam cardb	0	1	1	gas	2 to 6
9301	cement	cement block	tin	0	1	0	both	3 to 4
9401	cement	cement	tin	1	1	1	gas	3 to 6
9501	cement	cement	tin	1	1	1	both	6 to 8
9601	cement	cement	tile	0	1	0	gas	2 to 5

0=no, 1=yes, nd=no data available "Lam" is laminated; "cardb" is cardboard \*"Both" indicates that the household used both gas and wood as cooking fuel.

## Caloric Intake Values from Three 24 hour Dietary Recalls for All Participating Children

	Caloric				
	totals for 3				
10	day dietary	<b>D</b> (	<b>D</b>	<b>B</b>	3 Day
ID	recall	Day 1	Day 2	Day 3	Average
101	3368	1771	867	730	1123
201	3815	1125	1650	1040	1272
301	3867	607	1225	2035	1289
401	6390	2670	2705	1015	2130
501	4802	2060	1665	1077	1601
601	4830	2305	1290	1235	1610
701	3162	1207	880	1075	1054
801	3615	2140	675	800	1205
901	N/D	XXXX	1180	2120	1650
1001	4615	1870	1520	1225	1538
1101	3850	1820	1150	880	1283
1201	3045	1180	495	1370	1015
1301	6005	2500	1280	2225	2002
1401	5920	2460	2025	1435	1973
1501	5070	2430	1150	1490	1690
1601	4745	1510	1075	2160	1582
1701	5885	1685	2120	2080	1962
1801	6220	2030	1950	2240	2073
1901	5040	1630	2245	1165	1680
2001	5855	1950	1770	2135	1952
2101	6261	1445	2180	2636	2087
2201	6050	2400	2470	1180	2017
2301	4100	1740	1200	1160	1367
2401	4195	1955	770	1470	1398
2501	4695	2085	1385	1255	1575
2601	3750	1790	870	1090	1250
2701	7255	2425	2975	1855	2418
2801	4985	1195	2975	815	1662
2901	2825	825	1420	580	942
2902	3535	1110	1500	925	1178
3001	3980	1460	1250	1270	1327
3101	3880	2025	1145	710	1293
3201	5285	2315	1890	1080	1762
3301	5875	1575	1810	2490	1958
3401	6565	2250	1610	2705	2188
3501	4635	2135	1505	995	1545
3601	4350	1950	1270	1130	1450
3701	8220	2630	2460	3130	2740
3801	5220	1910	1680	1930	1840
3901	4365	1970	1505	890	1455
4001	4495	1860	900	1735	1498
4101	3275	1350	535	1390	1092
4201	6500	3515	2425	560	2167

4301	5335	1810	1340	2185	1778
4401	4580	1565	1560	1455	1527
4501	5730	2765	1900	1065	1910
4601	4420	1040	2510	870	1473
4701	2720	1130	645	945	907
4801	4445	1765	1430	1250	1482
4901	4200	1025	1795	1380	1400
5001	5585	1940	2110	1535	1862
5101	5685	1950	1200	2535	1895
5201	2410	660	1020	730	803
5301	3490	1230	1380	880	1163
5401	4390	1145	1625	1620	1463
5501	4515	1060	1490	1965	1505
5601	2525	920	1605	1820	1448
5701	2925	975	1010	940	975
5801	3427	1352	975	1100	1142
5901	4650	1885	1160	1605	1550
6001	6315	2060	2965	1290	2105
6101	6950	1550	2060	3340	2317
6201	4680	1815	1345	1520	1560
6301	5580	1560	1900	2120	1860
6501	2645	880	1765	1555	1400
6601	5005	2140	1490	1375	1668
6701	6795	2915	1900	1980	2265
6801	3905	1290	1550	1065	1302
6901	4605	1610	1700	1295	1535
7001	6195	1550	2785	1860	2065
7101	5390	1670	2105	1615	1797
7201	5390	1280	2060	2050	1797
7301	5400	1990	1785	1625	1800
7401	4540	1330	1805	1405	1513
7501	4340	700	1760	1880	1447
7601	7800	2370	2230	3200	2600
7701	5565	1835	1500	2230	1855
7801	2180	900	360	920	727
7901	2640	870	600	1170	880
8001	5640	1330	1960	2350	1880
8101	2820	940	810	1070	940
8201	4745	1600	2090	1055	1582
8301	5205	2460	1570	1175	1735
8401	4710	2370	730	1610	1570
8501	4230	1480	1480	1270	1410
8601	4680	1590	1615	1475	1560
8701	3380	1215	1015	1150	1127
8801	2965	970	1040	955	988
8901	5335	1325	2500	1510	1778
9001	3445	1050	1015	1380	1148
9101	4590	1965	1290	1335	1530
9201	3925	1395	730	1800	1308
9301	6440	2060	1980	2400	2147

9401	5090	2000	1095	1995	1697
9501	7025	2385	2170	2470	2342
9601	6370	1880	2150	2340	2123
				Average	1599