INTERNATIONAL
FOOD
POLICY
RESEARCH
INSTITUTE

THE IMPACT OF PROGRESA ON CONSUMPTION: A FINAL REPORT

John Hoddinott
Emmanuel Skoufias
Ryan Washburn

International Food Policy Research Institute
Food Consumption and Nutrition Division
2033 K Street Nw
Washington, D.C. 20006, USA
Tel. (202) 862-5600
Fax (202) 467-4439

September 2000

CONTENTS

ACKNOWLEDGEMENTS

This Research Report is part of the PROGRESA Evaluation project of IFPRI. John Hoddinott and Emmanuel Skoufias are Senior Research Fellows at IFPRI and Ryan Washburn is a Senior Research Associate at IFPRI.

We wish to thank Angus Deaton who help us with the STATA programming code, Sudhanshu Handa for helpful comments and suggestions. Participants at the PROGRESA Workshop where the initial results of this report were first presented provided a number of useful comments and suggestions that have improved the quality of this report.

Dr. Jose Gomez de Leon, Daniel Hernandez, Patricia Muniz, Dr. Susan Parker, and other PROGRESA staff were supportive and helpful throughout the preparation of this report.

We, the authors of this report, and not IFPRI or PROGRESA, are responsible for all the contents of this report. Correspondence regarding this report should be sent to Emmanuel Skoufias, IFPRI, 2033 K Street NW, Washington DC 20006, USA; telephone 202-862-5637, fax 202-467-4439, e-mail: e.skoufias@cgiar.org.

EXECUTIVE SUMMARY

This report presents an examination of the impact of PROGRESA on household expenditures. In particular, we focus on how participation in PROGRESA affects the acquisition of food by poor households. This analysis has been based largely on the ENCEL 98O, ENCEL99J and ENCEL99N surveys, although we also draw on the Seguimento surveys, administrative data and ENCEL 98M. Two themes underlie this work. One is the importance of understanding how PROGRESA actually operated on the ground in the period March 1998 to November 1999. The second is the need to understand behavioral parameters, in particular households' marginal propensity to purchase calories out of additional income. Mindful of these themes, our findings are:

- Mean levels of household consumption are, when averaged over ENCEL98O, ENCEL99J and ENCEL99N, 151 pesos (in November 1998 pesos) higher amongst households receiving PROGRESA benefits than amongst comparable households not receiving cash transfers from PROGRESA. This corresponds to a percentage increase of 14.53% in mean consumption. When compared to PROGRESA's schedule of cash transfers, we find that beneficiary households in this sample received, on average, 197 pesos per month (a divergence of 46 persos).

- The value of food consumption for the median beneficiary household (per person per month) was 141.8 pesos in November 1998 as compared to 139.0 pesos in the median control household, a difference of 2.0% (see Table 4.1b) In November 1999, the value of consumption for the median beneficiary household was 129.4 pesos as compared to 117.0 pesos for the median control household, a difference of 10.6%. Further, the percentage improvements are greater for the poorest households within these groups. In November 1999, at the 25^{th} percentile, food consumption is 13.5% higher amongst beneficiary households, as opposed to being only 5.1% higher amongst beneficiary households at the 75^{th} percentile.

- The increase in the value of consumption (per person per month) is concentrated amongst two food groups: fruits and vegetables and animal products. In November 1998, Table 4.1b shows that the value of consumption of fruits and vegetables by median beneficiary households was 3.2% higher than comparable control households, a figure rising to 16.7% in November 1999. The value of consumption of animal products by median beneficiary households, as compared to control households, almost doubled from being 15.4% higher in November 1998 to 30.0% higher in November 1999.

- In November 1999, median caloric acquisition per person per day has risen by 7.8%. Dietary quality has clearly improved, as measured by the number of different foods consumed, by the likelihood that a household consumes fruit, vegetables or animal products, or the increase in calories from these sources.

- After using regression methods that control for differences in household and municipality characteristics, as well as differences in prices among municipalities we find that there is no evidence of a statistically significant impact on caloric availability as of November 1998. Given that PROGRESA had begun only limited operations at the time of this survey, such a result is not surprising.

- The regression methods, however, show that there is evidence of a significant impact in June and November 1999. For example, Table 5.2 indicates that in June 1999 households receiving PROGRESA benefits in treatment localities (specification A) obtained 4.3% more calories than did comparable households in control localities. In November 1999 under the same specification this effect is even higher. Households receiving PROGRESA benefits in treatment localities obtained 7.1% more calories than did comparable households in control localities. Thus after controlling for differences in household and municipality characteristics, as well as differences in prices among municipalities the estimated impact of PROGRESA on caloric acquisition is only slightly smaller than that obtained by simply comparing means among beneficiary and control households. Also the impact is greatest on the acquisition of calories from vegetable and animal products — a finding consistent with the view of respondents that PROGRESA was enabling them to "eat better."

- There is no evidence that the *papilla* nutritional supplement 'crowds out' the acquisition of calories.

- Although participation in PROGRESA raises the amount of calories acquired from grains and "other foods," this would appear to be due to PROGRESA's income effect. The estimates in Table 5.4 suggest that participation in PROGRESA does have an impact on the acquisition of calories from fruits, vegetables and animal products even after controlling for its income effect. Consistent with our description of the operations of PROGRESA, this is only observed in the two 1999 survey rounds. It is also consistent with the fact that during a regular series of lectures, called "*platicas,*" beneficiaries are encouraged to eat a more diverse diet, including more fruits, vegetables, milk and other animal products.

- There is some evidence that information conveyed during these *platicas* spills over and positively affects the behavior of non-beneficiaries in treatment localities.

- This *platica* effect does not appear to vary systematically by education level. It is observed in households with pre-school children. This latter finding is particularly significant given that in Mexico, poor quality diets inhibit the physical growth of children under 30 months.

- Concern has been expressed that PROGRESA beneficiaries would 'waste' their money on the consumption of processed foods such as sodas and cookies.

Although PROGRESA beneficiaries do consume more calories derived from such sources, the quantities involved — less than 100 kcal per day — are so trivially small that there does not seem to be any reason why these should be of concern.

- There is no evidence that PROGRESA communities paid higher food prices than similar control communities.

- PROGRESA beneficiaries appear to have lower household expenditures per capita on non-food items. The decrease in overall non-food expenditures is the result of lower expenditures on school-related expenses (transportation or contributions) and medicines (at least in November 1998). Surprisingly, perhaps, PROGRESA beneficiaries do not appear to have lower expenditures on medicines during the June 1999 and November 1999 rounds when the program is well under way. Finally, even though PROGRESA beneficiary households have lower total non-food expenditures they seem to have allocated more of their non-food expenditures to children's clothing and children's shoes.

THE IMPACT OF PROGRESA ON CONSUMPTION: A FINAL REPORT

John Hoddinott
Emmanuel Skoufias
Ryan Washburn

1. INTRODUCTION

In this report we conduct an investigation on whether PROGRESA, the Education, Health, and Nutrition Program, has any significant impact on the consumption and nutrition of households participating in the program. PROGRESA is a national anti-poverty program adopted by the federal government of Mexico in 1997. The program has a multiplicity of objectives, primarily aimed at improving the educational, health and nutritional status of poor families, and particularly of children and their mothers.

The means used to achieve these objectives include cash transfers linked to children's enrollment and regular school attendance and to clinic attendance. The program also includes in-kind health benefits and nutritional supplements for children up to age five, and pregnant and lactating women. In contrast to earlier programs in Mexico, a unique feature of PROGRESA is the targeting of transfers to the mother of the family.

As of the end of 1999, PROGRESA covered approximately 2.6 million families, about 40% of all rural families and about one-ninth of all families in Mexico. The program operated in almost 50,000 localities, more than 2,000 municipalities in 31 states, with a budget of approximately $777 million for 1999, equivalent to 0.2% of GDP.[1] The size of the amount transferred by the program, corresponding to around a 19% of the mean value of consumption of poor families, combined with the fact that these cash benefits are concentrated in the hands of mothers, who are the primary care providers in rural families in Mexico, suggest that the program may have a substantial impact on the food consumption and in effect on the nutritional status of poor families and their members.

Our analysis is based on the evaluation sample of approximately 24,000 households from 506 communities selected by PROGRESA. The 506 communities are located in seven states, including Guerrero, Hidalgo, Michoacan, Puebla, Queretaro, San Luis Potosi, and Veracruz. These seven states were among the first states to receive PROGRESA benefits. A distinguishing characteristic of the evaluation sample is that localities were randomly assigned into treatment and control groups. Specifically, of the 506 localities, 320 localities were randomly assigned to the treatment group and the remaining 186 were

[1] For more details see Gomez de Leon *et al.* (1999).

assigned to the control group. In these control localities the incorporation of beneficiary households into PROGRESA was postponed until the year 2000.

A detailed investigation of whether the assignment of localities into treatment and controls based on equality of key characteristics such as age, education and income, could not reject the null hypothesis that the means of these variables at the locality levels were equal (Behrman and Todd 1999). This suggests that randomization of localities into control and treatment groups was successfully implemented. However, the Behrman and Todd report also detected some significant differences when the comparison of the means was conducted at the household rather than at the locality level. For this reason we also make use of additional control variables as exogenous variables that might influence household consumption. Such control variables accounting for "observable" household heterogeneity may thus reduce the statistical bias associated with heterogeneity between households in treatment and control localities.

2. UNDERSTANDING THE LINKS BETWEEN INCOME, EXPENDITURES AND FOOD

We begin by reviewing the existing evidence on the links between household resources and the acquisition of food. Such a review serves two purposes. It informs our choice of method for such an analysis, indicating likely pitfalls and biases that poor methods may introduce. It also informs us of the 'plausible range' of the magnitude of the relationship between household resources and the acquisition of food.

2.1 Conceptual Framework

We begin with a fairly simple conceptual framework that draws heavily on Behrman and Deolalikar (1988) and Behrman (1988). We assume that household resources such as income and the acquisition of food and other goods are the outcome of a process by which households maximize well-being subject to a set of constraints. Specifically, households have a pre-determined set of preferences defined over the health (H_i), consumption of goods (C_i) and leisure (L_i) of each individual (i, i=1, … , I) member of the household. The household's utility function takes the following form:

$$U = u(H_i , C_i , L_i , \ldots) \qquad i=1, \ldots , I \tag{2.1}$$

This utility function is maximized subject to several constraints: a health production function, the determinants of nutrient intake, an income production function and a budget constraint. Health is produced by combining nutrient intake (N_i), consumption of goods (C_i), time use (T_i) individuals' innate genetic endowments (Ω_i) together with other household (Z_{hh}) or village/locality characteristics (Z_V) that might affect health. These factors could include quality of housing, access to health care facilities, the presence of certain diseases and so on:

$$H_i = h(N_i , C_i , T_i , \Omega_i , \dots , Z_{hh} , Z_V) \quad i=1, \dots , I \qquad (2.2)$$

Nutrient intakes are determined largely by the goods purchased by the household, but will also be affected by knowledge of what constitutes an appropriate diet (E). We write the determinants of nutrient intake as:

$$\Omega_i = e(C_i , \dots, E) \quad i=1, \dots, I \qquad (2.3)$$

Household income, from wage employment, farming activities, handicrafts and the like, are assumed to be an increasing function of individuals' health (healthier individuals are more likely to be more productive), nutrient intake (especially with respect to physical labor, there may be a relationship between intake of calories and work productivity; see Bliss and Stern, 1978, Dasgupta 1993, and Pitt, Rosenzweig and Hassan, 1990), household (Q_{hh}) and locality (Q_V) characteristics – such as holdings of capital stock, agro-ecological characteristics and prices – that affect output:

$$Y = y(H_i , N_i , \dots , Q_{hh}, Q_V) \qquad i=1, \dots , I \qquad (2.4)$$

The budget constraint indicates that any difference between income (earned plus net transfers to the household, NT) and expenditures (the sum of all goods consumed multiplied by their price, P_C) is reflected in changes in asset holdings (ÄA) – savings or dissavings.

$$Y + NT = \acute{O} P_c C + \ddot{A}A \qquad (2.5)$$

Maximization of (2.1) subject to (2.2), (2.3), (2.4) and (2.5) yields reduced form demand functions for goods and individual nutrient intake.

$$N_i = n(P_c, \Omega_i , E, Z_{hh}, Z_V , Q_{hh}, Q_V) \; c = 1, \dots, C; \; i=1, \dots, I \qquad (2.6)$$

Equation (2.6) expresses the relationship between nutrient intakes at the individual level on the one hand, and prices, endowments, and exogenous household and locality/village characteristics that affect the production of health and income. Note that the left hand side requires information on food/nutrient access at the individual – a very demanding requirement that is not met by the ENCEL surveys. Note too that the right hand side expresses resources in terms of assets. This is not quite what we have in mind when we think about assessing the impact of PROGRESA's monetary transfers on the consumption of food and other goods. Instead, we would like to model the relationship between some measure of income and these outcomes. The first concern can be readily addressed by replacing N_i with $\acute{O} N_i$. The second concern can be addressed in one of two ways. First, we could amend equation (2.4) to read:

$$Y = y(H_i , \dots , Q_{hh}, Q_V) \quad i=1, \dots , I \qquad (2.4')$$

In other words, we assume that while changes in household resources will affect nutrient demand, but incomes are not affected by nutritional intake. This is the position adopted

by Subramanian and Deaton (1996) who argue that in western India, the costs of acquiring calories necessary for very poor households is so low as a fraction of daily wages that this reverse causation (from intakes to incomes) is unlikely to be of importance.

Second, equation (2.6) posits a somewhat indirect relationship between incomes and food acquisition, as measured by nutrient intake. In a way, this is somewhat unfortunate because what we would really like to know is, given the design of PROGRESA, what is the impact on caloric acquisition of an additional peso. Two options are open to us. First, we could assume the decisions regarding the generation of income are made independent of those relating to consumption.[2] By doing so, some measure of income can be entered directly into equation (2.6). Alternatively, one could predict the determinants of income and place these predicted values (Y') into (2.6). These possibilities, together with a decision to estimate this relationship at either the individual or household level, gives us four possible relationships to estimate:

$$N_i = n(P_c, \Omega_i, E, Z_{hh}, Z_V, Y) \; c = 1, \ldots, C; \; i=1, \ldots, I \qquad (2.7')$$

$$N_i = n(P_c, \Omega_i, E, Z_{hh}, Z_V, Y') \; c = 1, \ldots, C; \; i=1, \ldots, I \qquad (2.7'')$$

$$\acute{O} \; N_i = n(P_c, \Omega_i, E, Z_{hh}, Z_V, Y) \; c = 1, \ldots, C; \; i=1, \ldots, I \qquad (2.8')$$

$$\acute{O} \; N_i = n(P_c, \Omega_i, E, Z_{hh}, Z_V, Y') \; c = 1, \ldots, C; \; i=1, \ldots, I \qquad (2.8'')$$

2.2 Estimates of the Magnitude of these Linkages

The next step in our discussion is to review the existence literature on estimates of equations (2.7'), (2.7"), (2.8') and (2.8"). These are found in Table 2.1. This list, which is a slightly updated version of that which appears in Strauss and Thomas (1995), contains the results of 15 studies from 8 countries. These are differentiated along three lines: whether they measure household resources in terms of income or expenditures, how they measure acquisition of food and the choice of estimation method. Some studies use income whereas others use expenditures – we take up the relative advantages of these measures at the beginning of Section 3. Access to food is measured in several ways. One approach is to obtain information on availability. This is calculated by asking households about the quantities of different items purchased, received as gifts or wages, or made available form own production in a given reference period, say one week. These quantities are converted to calories. A second method is to obtain information on intake by asking about food eaten over a much shorter period of time, say 24 hours. Typically, the list of foods used to measure intake is considerably longer than that used for measures of availability – the former really being nothing more than an extension to an expenditure survey – and often is done so on a meal by meal basis. Although intake data are, in principle, superior as they come closer to measuring individuals' actual acquisition of food, the use of a 24 hour recall period is problematic. If the previous period pertains to a day that is in some sense atypical – perhaps a day of fasting or feasting or a day on which

[2] Technically, this is referred to as an assumption of separability. See Singh, Squire, and Strauss (1986) and Benjamin (1992) for further discussions.

dietary restrictions are imposed — then the intake information will be a noisy indicator of true consumption. This can be overcome by obtaining such data over a longer period, say 7 visits to the household over a 7 or 14 day period, but doing so significantly increases survey costs.

These differences in method, together with the range of countries surveyed provide a fairly wide band of elasticities. They range from 0.59 (Bouis and Haddad's fixed effects estimates regressing expenditures on availability) to 0.01 (Wolfe and Behrman's OLS estimates of using least squares regressions of income on 24 hour recall. There is some evidence to suggest that estimates based on availability tend to be higher than those based on intakes.

Half of the estimates (15 out of 30) reported in Table 2.1 are based on ordinary least squares, typically using a log-log specification. Such an approach has one attraction, and a number of drawbacks. The attraction is that the coefficients of the log-log specification are, in fact, the calorie-resource elasticities. There are, however, three drawbacks. First, if one believes, unlike Subramanian and Deaton (1996), that causation running from calories to income generation is important, than OLS estimates will be biased. Second, even if one does not believe the reverse causation argument, bias in these coefficients may still result from measurement error. Suppose our measure of household resources is total expenditure in an environment where households purchase most of the food they consume, and where food consumption is the largest component of the household budget. Any mis-measurement of food expenditures will affect both dependent and right-hand side variables in a regression. "Total expenditure is therefore measured with error, and the error of the measurement is positively correlated with the composite error term in the regression, itself partly determined by the measurement error in calories. Note that the correlation between the measurement errors in the dependent and independent variables means that this is *not* a standard errors-in-variables problem" (Subramanian and Deaton, 1996). This provides a stronger justification for placing greater weight on the two stage least squares (2SLS) results because, provided that the instruments are satisfactory, this will produce unbiased estimates of this relationship.

The third weakness stems from the fact that almost all these studies impose a specific functional form on the data. Indeed, almost all assume a linear relationship. This is problematic for two reasons. First, at some point the relationship between incomes (or expenditures) and calories must become nonlinear. The reason for this is physiological. Food needs, expressed in terms of calories are a function of three individual characteristics: basal metabolic rates (BMRs), activity levels and body mass (Durnin, 1996). Basal metabolic rates are "the minimal rate of energy expenditure compatible with life" (Shetty *et al.*, 1996, p. S11). BMRs are not uniform across populations, varying by age, sex and body mass. For example, consider a 45 year-old man weighing 60 kilograms. The basal metabolic rate of that individual expressed in kilocalories per day is approximately 11.5(60) + 873 = 1563 (MAFF, 1995). By contrast, the BMR for a 16 year-old woman weighed 45 kilograms is 13.4(45) + 692 is 1295. BMR's are multiplied by a 'physical activity level' or PAL (Shetty *et al.*, 1996) to obtain caloric requirements. For example, our 45 year-old man undertaking 'moderate activity' has a PAL of 1.78

(FAO/WHO/UNU, 1985), yielding requirements of 2782 kcal/day. However, this notion of requirements needs to be treated cautiously. First, there is a certain degree of inter-individual variability in BMR (Shetty *et al.*, 1996). Second, in the short term, activity levels can be adjusted so as, in a narrow sense, to reduce requirements. Third, in the longer term, individuals may gain or lose weight as a consequence of changes in energy balances and this will alter their energy needs. Mindful of these caveats, consider a younger, heavier man (say a 25 year old weighing 75kg) engaging in strenuous agricultural labor. This produces a caloric requirement of about 3800kcal. In fact, it is difficult to imagine that many individuals in a rural Mexican setting would have caloric requirements in excess of 4000kcal per day. Yet an implication of the linear relationship between income and calories is that intakes continue to rise and rise as incomes increase, something we have seen to be impossible.

A few studies attempt to address this problem by specifying the relationship between income (or expenditures) and caloric intake as a quadratic. But such estimates are often strongly influenced by the presence of a few outliers in the data. An alternative, and more promising approach, is to start with a non-parametric relationship; we discuss this technique in greater detail in the next section. The essence of this approach is that it is one where the data determine the form of the functional relationship, rather than being imposed by the analyst. There are only two studies that do this: Strauss and Thomas (1995) and Subramanian and Deaton (1996). The Strauss and Thomas results indicate strong non-linearities in the income-calorie relationship, with elasticities of 0.24-0.33 for households with per capita expenditures below the median. Richer households exhibit much lower estimates that fall towards zero. Subramanian and Deaton's work indicate slightly higher elasticities, on average between 0.3 and 0.5, but exhibiting less flattening out at higher values of per capita expenditures.

What can one conclude from the results of other studies? It would appear that most studies report some relationship between income and caloric acquisition. However, there is no suggestion of anything like a one-to-one correspondence between increases in incomes and increases in intakes. A ballpark estimate of 0.3 would seem to be a reasonable prior to adopt. But such findings beg the question, if not on calories what does happen to food consumption as incomes rise?

2.3 The Spice of Life: The Demand for Increased Food Variety

One possibility is that at the margin, people select foods for reasons beyond their caloric value. Behrman and Deolalikar (1989) suggest that food variety itself may be valued so that as incomes increase, individuals purchase a wider variety of foods even though this may not affect their caloric intakes very much. This desire for variety is derived from the many characteristics, apart from calories, that different foods possess. These include attributes such as food texture, status value, appearance, taste, aroma and preparation.

Mindful of this, consider Figure 2.1, taken from Behrman (1988). The vertical axis refers to calories obtained from a single staple, say maize tortillas. The horizontal axis refers to calories derived from all other foods. Household preferences for the consumption of the

staple and all other foods are given by the curved lines, convex to the origin, denoted by U1, U2 etc. Consistent with basic microeconomic theory, welfare increases are associated with moving out from the origin. There exists a subsistence constraint — denoted by SS'— which denotes the minimal amount of calories needed to survive. Below the subsistence constraint, there is no trade-off between these foods and so preferences collapse onto the line SS' (in the absence of this constraint, we would have these curves as denoted by the dashed line below the subsistence constraint).

Suppose a household is initially at a point like A. Given these preferences, additional income is spent on purchasing increased dietary diversity, not additional calories. Consequently, we slide down the subsistence constraint to a point such as B. A further increase in income causes the household to move off this constraint to a point such as C, where both calories and dietary diversity increase. For the reasons described above, there is a limit to the increase in caloric consumption that one might expect and so, at some stage, the elasticity of caloric consumption with respect to income begins to fall. This income-calorie expansion path is denoted by the thick black line in Figure 2.1. This process is consistent with relatively low income-calorie elasticities. In fact, it suggests that the relationship might be non-linear, with elasticities first rising then falling as incomes increase.

One might be tempted to be dismissive of the desire of households to consume a more diverse diet. If one perceives poor diet to be of concern, then there may be a temptation to focus heavily on caloric acquisition and view dietary diversity as a frivolous luxury. In our view, this would be a mistake. Evidence from Mexico (Allen *et al.*, 1991; Allen *et al*., 1992) suggests that poor physical growth in young children — those aged less than 30 months — can be attributed in part to poor quality diets. Further, increased consumption of animal products results in increased intake of a variety of nutrients and a decrease in intake of phylates and fiber that reduces bioavailability (Allen *et al.* 1992). Complementary findings have been reported in countries as diverse as Kenya (Onyango, Koski, and Tucker, 1998) and China (Taren and Chen, 1993).

2.4 Conclusions

In this section, we have reviewed the existing economic literature on the relationship between incomes and patterns of expenditure. Given the objectives of PROGRESA, particular attention has been paid to the acquisition of food. There are three core conclusions. The first is that "method matters." The manner in which calorie data are collected and analyzed would appear to have a strong affect on the results obtained. Second, there are a wide variety of estimates of the impact of income on caloric acquisition. A reasonable estimate would be an elasticity of about 0.3. However, the literature contains a variety of estimates, although many of those higher than this figure would seem to be implausible. If these results hold true for Mexico — something we explore further in Section 5 — this suggests that PROGRESA may have only a modest impact on caloric availability at the household level. Third, one explanation for these low elasticities is that households demand for foods reflects concerns going beyond the

consumption of calories. Increased incomes may also lead to increased demand for a varied diet.

3. THE IMPACT OF PROGRESA ON CONSUMPTION: A FIRST LOOK

In this Section, we provide a descriptive analysis of the impact of PROGRESA on consumption. After a very brief presentation of some useful background discussion of the survey design and the selection of households eligible for PROGRESA benefits we explain precisely what we mean by "consumption" and by being a "PROGRESA beneficiary." Behrman and Todd (1999), Coady and Djebbari (1999) and Skoufias, Davis and Behrman (1999) describe these matters in more detail.

The fundamental problem in the evaluation of any social program is the fact that households participating in the program cannot be simultaneously observed in the alternative state of no treatment. For a proper evaluation of the impact of a program it is necessary to observe a group of households that are similar to beneficiary households in every respect possible but do not benefit from the program. In the case of PROGRESA, where evaluation was conceived from the beginning as part of the design of the program, the solution to this evaluation problem is achieved by random assignment of localities into treatment and control groups. From a set of rural communities in the same geographic region, localities were randomly selected for participation in PROGRESA (treatment localities) while the rest were introduced into the program at later phases (control localities). As the randomization was adequately done (Behrman and Todd 1999a), it ensures that there is only a small known probability that the differences between treatment and control groups are due to unobserved factors. As a consequence researchers can infer whether the changes observed in individual outcomes such as school enrollment, or health and nutritional status are due to the program or other factors.

Specifically the sample used in the evaluation of PROGRESA consists of repeated observations (panel data) collected for 24,000 households from 506 localities. The communities were located in the seven states that were among the first states to receive PROGRESA, including Guerrero, Hidalgo, Michoacán, Puebla, Querétero, San Luis Potosi, and Veracruz. Of the 506 communities, 320 were designated as treatment and 186 as control communities which implies that at the locality level, there was a 63% probability of a locality being assigned to treatment and a 37% chance of being assigned to the control group.

In November 1997 PROGRESA conducted a survey of the socio-economic conditions of rural Mexican households (*Encuesta de Caracteristicas Socioeconomicas de los Hogares or ENCASEH*) in the 506 evaluation communities to determine which households would be eligible for benefits. Using PROGRESA's beneficiary selection methods (see Skoufias, Davis and Behrman, 1999). In localities assigned to treatment, all eligible households are offered the opportunity to be formally incorporated into PROGRESA. On

average in the evaluation sample, 78% of the households were classified as eligible for program benefits.

The initial household census, was followed by a number of socio-economic household surveys (*Encuesta de Evaluación de los Hogares or ENCEL)* designed to collect information for the evaluation of PROGRESA The first evaluation survey took place in March 1998 before the initiation of benefits in May 1998. The rest of the evaluation surveys were conducted after beneficiary households started receiving benefits from PROGRESA. One round of surveys took place in October 1998, which was well after most households received some benefits as part of their participation in the program. The next two waves took place in June 1999 and November 1999. A number of core questions about the demographic composition of households and their socio-economic status were applied in each round of the survey. These core questions were accompanied by specific questionnaires, focused on collecting information critical to a thorough evaluation of the impact of the program. The topics of these modules included collecting information about family background, assets brought to marriage, schooling indicators, health status and utilization, parental attitudes and aspirations towards children's schooling, consumption of food and non-food items, the allocation of time of household members in various activities, and self-employment activities. The preceding surveys were supplemented by school and clinic surveys, community questionnaires, data on student achievement test scores, and other school and clinic administrative data.

Data used in this report are drawn from the November 1998, (ENCEL98O), June 1999, (ENCEL99J), and November 1999, (ENCEL99N) surveys where comparable consumption information was collected.

3.1 Distinguishing Between Consumption and Expenditures

There is a widespread view in the economics literature that expenditure-based or consumption-based standard-of-living measures are preferable to income-based measures. This is true for both theoretical and practical reasons (Deaton and Zaidi, 1999). The main theoretical reason is that according to the permanent income theory of consumption, estimates of current consumption are likely to provide a more reliable estimate of the household's permanent income (sustainable standard of living) than are estimates of current income. Current income may be much more volatile and subject to shocks from period to period, especially if the household engages in predominantly agricultural or self-employment activities. By contrast, for consumption there is some evidence that it can be smoothed, at least partially, in the face of these shocks by saving and borrowing. Consequently, even if current income is well measured, it is not a particularly good measure of the household's general or longer-term standard-of-living. Consumption measures what people actually consume. Accordingly, it is of considerable interest to assess the impact of PROGRESA on consumption.

Measuring consumption, however, is not straightforward. Few, if any households know how much they have spent over a given reference period, and experiments in survey design indicate that asking questions about broad categories of expenditures — for

example, “cereals,” “meats and animal products,” “clothing,” etc. — tend to lead to significant underestimates of consumption or expenditures (Deaton, 1997). In the face of this evidence, the sensible way to proceed is to ask households about a wide number of expenditures and aggregate these. This approach informed the design of the surveys, ENCEL98O, ENCEL99J and ENCEL99N, which we use here.

All ENCEL surveys fielded from November 1998 onwards contain a set of questions on expenditures on food and non-food goods. With respect to the former, the “most knowledgeable individual” within the household is asked, “In the last seven days, how much did you spend on the following foods?” This is asked with reference to 35 different foods plus alcohol. The food expenditures were grouped into four categories: fruits and vegetables, cereals and grains, meats, and other food products. Adding up these expenditures gives total food expenditure. Alcohol consumption data proved very unreliable with less than 2% of households reporting any consumption of alcohol. For this reason alcohol consumption was eliminated from the expenditure and calorie analyses.

An attraction of this approach is that it makes it possible, with due allowance for differences in questionnaire design, to compare these expenditures with those reported in earlier Mexican household surveys, such as ENIGH. However, it is not without dangers. Specifically, it is important to note that these expenditures are not the same as consumption. Households may have consumed foods either purchased before this recall period or obtained from own production or other non-market sources. In such cases, the value of consumption would exceed the value of expenditures. Conversely, households may purchase foods but not consume them immediately, in which case the value of expenditures would exceed the value of consumption. Before continuing, it is worthwhile considering whether such concerns will dramatically affect the results reported here.

In the ENCEL98O survey, the fifteen most commonly consumed foods by poor households are tomatoes, onions, potatoes, oranges, plantains, maize tortillas, maize grain, noodles, rice, beans, chicken, eggs, coffee, sugar and vegetable oil. Only maize tortillas (47.5%), maize grain (14.5%), oranges (14.0%) and eggs (10.5%) are consumed out of own production by more than 10% of surveyed households. In turn, this suggests that it is likely that the only significant divergence between a valuation based on consumption and a valuation based on expenditures will be a consequence of differences in maize tortillas consumed and purchased. This is indeed the case. About 50% of households report consuming, but not purchasing tortillas in the previous seven days.

Table 3.1 reports, for all three ENCEL surveys, mean levels of consumption and purchases of maize tortillas by four categories of household: whether the household is eligible for PROGRESA benefits, or not, and whether the household resides in a locality where PROGRESA is operating. It indicates that regardless of household type, consumption of maize tortillas is considerably higher than reported purchases. In turn, this suggests that levels of well-being measured in terms of expenditures will be considerably lower than those based on a valuation of consumption. There are two additional findings of note. First, Table 3.1 indicates that the differences between

PROGRESA and control households, those found in the first two sections of Table 3.1, are roughly the same when using either consumption or purchases as our measure. Second, purchases exhibit considerably greater volatility across rounds than does consumption. For example, mean purchases double between June and November 1999. By contrast, mean consumption remains relatively unchanged. Because reported expenditures *understate* the 'true' level of consumption, and *overstate* the degree of change across survey rounds, it would seem more appropriate to base our analysis on the value of consumption over a specified period.

This is accomplished in the following fashion. First, liters and unit quantities for the 35 different foods were converted to kilograms using a United States Department of Agriculture table. Then, household-level food specific prices were calculated by dividing the number of pesos spent on a particular food by the quantity purchased. In order to value food consumed by a household that was not purchased in the past week, locality-level food prices were generated. By taking the median household-level price in the village locality-level food specific prices were created, with the requirement that there be at least 20 prices. If 20 households in the locality did not purchase the food, then we, in turn, looked to the municipality and state levels. At each level, the median price was used only if there were at least 20 valid prices. These prices were then deflated to November 1998 levels and multiplied by kilograms consumed per month to yield a peso value of food consumed.

By contrast, nonfood expenditures are reported on the basis of weekly expenditures (transportation to school, other transportation and tobacco products), monthly expenditures (personal hygiene items, household cleaning supplies, medicine, doctor/clinic visits, school tuition, home combustibles and electricity) and expenditures made over the previous six months (kitchen utensils, linens, clothes, shoes, toys, school supplies, school contributions and special event/festival expenses). These are all converted into monthly expenditures. All expenditures were then converted into November 1998 prices by deflating using national CPI data.

3.2 Households Receiving Monetary Benefits (Beneficiaries) versus Households Eligible to Receive such Benefits (Eligible Households)

To measure the impact of PROGRESA on households participating in the program we first tried to confirm whether the list of eligible households provided with the data files of the evaluation surveys corresponded closely with the list of households that were reported to receive benefits.

For this purpose we managed to get access to the record of payments sent out by the PROGRESA headquarters in Mexico City. Our first task was to identify whether all eligible households were indeed incorporated as it was prescribed by the PROGRESA operational guidelines.[3] Since that information was not part of any record kept by the

[3] For a detailed discussion and evaluation of the operational aspects of PROGRESA, the reader is referred to Adato, Coady, and Ruel, 2000). Unfortunately, the

PROGRESA administration, we opted to confirm whether all eligible households were incorporated by examining the record of payments made out to eligible households since the start of the distribution of program benefits in May 1998.

Of the 12, 291 households in treatment localities eligible to receive PROGRESA benefits, 3,350 or 27% of the total eligible population had not received any benefits by March 2000. After checking this finding with the PROGRESA administration we confirmed that the most likely explanation for this discrepancy is that 2,872 households (or 85.7% of the eligible households not receiving any benefits) were never incorporated into the program. All of these "forgotten" households were households with a revised eligibility status from non-beneficiary to eligible beneficiary as a result of the revision of the selection process (densification). The remaining 478 households not receiving any benefits (or 14.3% of the forgotten eligible households and 3.9% of the total eligible population in treatment areas) were households that were incorporated during the early months of 1998, and probably chose not to participate. As stated above, we cannot ascertain whether this is indeed the case since there is no official record as to whether these households formally declined the opportunity to participate in the program.

The preceding findings associated with the "true" list of beneficiary households in treatment localities leaves us with two options in identifying the impact of PROGRESA on consumption. The first one is to examine the impact of PROGRESA on the group of potential beneficiaries in treatment areas relative to the potential beneficiaries in control areas. This would provide an estimate of the impact of PROGRESA inclusive of errors in the operational aspects of the program. By construction, however, the estimated impact would be biased downward since the conditional mean of consumption or expenditures or caloric availability among eligible households in treatment areas would be calculated by including the households that were never incorporated for reasons outside their control and thus did not necessarily expect to receive any benefits.

The other option is to examine whether PROGRESA has an impact on consumption *conditional* on households receiving PROGRESA monetary benefits. At least two critical questions can be raised about this option. First, the receipt of benefits may be the result of household behavior or choices that may result in misleading inferences about the impact of program. Given that the majority of the "forgotten" households were left out of the program for reasons beyond their control, we believe that this issue is not a major source of concern. Second, the eligible households in the control group may not be the appropriate comparison group. Specifically, upon close examination, the set of "true" beneficiaries seems to disproportionately exclude smaller, older households. For example, noting the household demographic characteristics in the bottom of Table 3.2, we see that the beneficiary households tend to be slightly (5.5%) larger, but considerably younger than control households. With the number of adults between eighteen and fifty-five years old nearly equal, the main demographic difference between the groups is that

---

data files of the timing and amounts of monetary benefits distributed to eligible households became available after the completion of the operations report. As a result this crucial operational issue could not be evaluated in great detail in this report.

beneficiary households have roughly 12% *more* children (aged zero to eighteen) and 13% *less* older adults older than fifty-five. These differences imply that simple comparisons of means between treatment and control groups may be misleading. For example, comparing to the average total household consumption (not per capita) between beneficiary households in PROGRESA localities and eligible households in control localities may lead to an overestimate of the PROGRESA effects. Since beneficiary households are on average larger than eligible households their total expenditures may be higher than the total expenditures of eligible households because of the differences in households size and not because of the PROGRESA program. Along similar lines, comparisons of the value of consumption per capita (consumption divided by family size) may lead to underestimates of the effects of PROGRESA when comparing simple averages. These differences in the samples of beneficiary and control groups, suggest that a more reliable and credible evaluation of the impact of PROGRESA on consumption has to rely on regression methods that control for the household size and age and gender composition of beneficiary and control households (see section 5), instead of simple comparisons of (unconditional) means.

In our evaluation of the impact of PROGRESA on household consumption we have chosen to focus our analysis and most of our discussion by examining on the impact of the program conditional on households receiving monetary benefits. However, since the evaluation of the impact of PROGRESA has informative content based on whether we compare impact on eligible versus beneficiary households in PROGRESA localities we also present some key estimates regarding the impact of PROGRESA using both definitions. In this manner we can check the robustness of the results regarding the impact of PROGRESA and thus have more confidence about the conclusions we can draw.

3.3 The Impact of PROGRESA on Consumption: Comparing Mean Values Across Beneficiaries and Non-Beneficiaries

With these caveats in mind, Table 3.2 reports consumption and expenditure levels for PROGRESA beneficiaries and eligible households located in control communities. Beneficiary households have mean monthly consumption of 1331 pesos per month in November 1998, 1152 pesos per month in June 1999 and 1049 pesos per month in November 1999. By contrast, comparable households in control localities have mean monthly value of consumption of 1130 pesos per month in November 1998, 1016 pesos per month in June 1999 and 926 pesos per month in November 1999. Consequently, consumption in beneficiary households is (depending on the survey round) between 123 and 201 pesos per month higher than in comparable control households. This is equivalent to a percentage increase in consumption of, depending on the survey round, 13.4 to 17.8%. Note: a) it would appear that consumption is falling in real terms over this period; and that b) this difference is accounted for almost entirely by differences in the value of food consumption. In the discussion below, we address both these points.

3.4 How Plausible are the Differences in Consumption between PROGRESA Beneficiaries and Poor Households in Control Localities?

Before continuing, it is helpful to consider whether the observed differences in consumption between PROGRESA beneficiaries and poor households in control localities are plausible. PROGRESA's monetary transfers take three forms: a scholarship tied to continued attendance of children at school (the *beca*); money for school supplies; and a cash transfer for food (the *alimento*). These transfers are given out in a lump sum every two months. PROGRESA (1997) and Coady and Djebbari (1999) outline the logistics of these transfers in more detail. As Tables 3.3a and 3.3b show, the monthly amount of the scholarships varies by age and sex of the child, ranging (in June 1998) from 65 pesos for a boy attending third grade to 240 pesos for a girl attending the third grade of secondary school. However, these payments were capped, with the maximum scholarship transfer set at 490 pesos per household per month from January to June 1998, rising to 625 pesos per month from July to December 1999. The cash transfers were pegged at 95 pesos per month at the start of 1998, but had been subsequently increased to 125 pesos per month in July 1999. Actual transfers to each household should depend on the age and sex of children in the household, as well as their compliance with the requirements of PROGRESA. Coady and Djebbari (1999) estimate that for a family in extreme poverty, these monetary transfers should average around 260 pesos per household. It is important that this figure, 250-260 pesos per beneficiary family per month is the figure that is commonly used when describing the level of these monetary transfers. Given that the difference in mean expenditures between PROGRESA and control households is around 150 pesos per household, this suggests that only a fraction of the PROGRESA transfer can be accounted for in terms of increases in consumption. Since all the analysis presented in this report rests on the credibility of these data, it is important to address this issue at length.

The first point to note is that we always express the value of expenditures or consumption in November 1998 pesos. The figures reported in Table 3.3a are nominal amounts. As Table 3.3b shows, the real value of these transfers is broadly constant over this period.

Next, note that Hoddinott and Skoufias (2000) determined that by November 1998 (corresponding to the ENCEL98O survey round), beneficiaries selected under the third phase of incorporation were beginning to receive the *alimento* but had, in most cases, received only a single *beca* payment. Further, households who were selected into PROGRESA as a result of the "densification" process had not yet received any payments by the time ENCEL98O was fielded. An important implication of this is that we would expect to observe a much smaller impact of PROGRESA when we look at the ENCEL98O data than when we examine the ENCEL99J or ENCEL99N simply because fewer households would have received these transfers and these transfers were likely to be lower in value. Also recall that the largest component of these cash transfers is the *beca*. These payments are conditional on school attendance. Verification of attendance relies on a process by which households are sent relevant forms, these forms are completed, ultimately returned to PROGRESA before the initiation of payment, see Coady and Djebbari (1999) and Schultz (1999) for details. This process takes some time;

further households do not receive school payments for the school holiday period (July-August). Consequently, one would expect there to be some 'lumpiness' in the pattern of actual payments made to beneficiaries; a pattern compounded by any delays that might creep into the payment process.

Figure 3.1 draws on PROGRESA's administrative database of receipts of payments by beneficiaries in the ENCEL surveys. There is considerable variation in the average payment received per month. For example, a typical beneficiary received more than 500 pesos in December 1998, but nothing in January or February 1999. This variability in payments has two implications for the analysis of impact on expenditures. First, it is plausible that purchases of semi-durable and durable items such as clothing are associated with receipt of very large payments in months such as December 1998, July 1999 and December 1999. Recall that the ENCEL surveys take place in November 1998, June 1999 and November 1999 and thus, a considerable period of time elapses between these large payments and the ENCEL surveys. It is widely documented that people generally forget purchases of consumer goods as the recall period is increased (a phenomenon known as 'recall bias'; see Deaton and Grosh, 2000, for a further discussion and references) and so it is possible that the ENCEL surveys are underestimating purchases of non-food items. Second, it is likely that beneficiaries are aware that payments will tend to be lumpy and irregular. Given this knowledge, economic theory suggests that they will smooth out purchases made out of these cash transfers rather than spending them as they are received. Consequently, payments received just prior to the ENCEL surveys are likely to be a noisy indicator of longer-run average payments.

Actual average payments, in total and by component, received over the 12 month period between November 1998 and October 1999, along with data on household consumption averaged across all three rounds are reported in Table 3.4. The first monetary benefits associated with participation in PROGRESA start in May 1998, covering, in principle, the first two months of participation in the program (i.e. March and April 1998). However, since the first payments that were sent out to some households in May 1998 exceeded the maximum bi-monthly amount suggests that some households were incorporated before March 1998 (e.g. in January 1998). Given that there is no record of the date of incorporation of households into the program, and the initial lags in payments that took place because of delays in the processing of the forms necessary for payment authorization we opted to base our calculation of the average monthly monetary benefits received by PROGRESA beneficiaries on the 12-month interval between November 1998 and October 1999.

There are several important findings. Average monthly transfers are around 197 pesos (in November 1998 pesos) per beneficiary household per month. On average, households receive 99 pesos per month for the *alimento*, and 91 pesos for the *beca*. In households with school age children, the average *beca* received rises slightly to 93 pesos. The *alimento* accounts for 67.4% of the transfers received by households headed by individuals 60 years or older, a finding not surprising given that such households will tend to have fewer children of school age. One way of expressing these transfers as a percentage of income is to calculate the percentage of their average value to average

expenditures made by poor households in control localities. This figure is 19.54%, with some variation by household demographic composition.

Averaging across all survey rounds, total consumption in poor households receiving PROGRESA benefits is 151 pesos per month higher than in comparable households in control localities. As discussed earlier, part of this difference can be attributed to differences in household size, since this characteristic is higher among beneficiary households in treatment localities than eligible households in control localities. Overall, the ratio between differences in consumption between poor households in control and treatment localities, and PROGRESA transfers is 77%. This ratio is 97.5% for households with pre-schoolers, 65.3% for households with school-age children but only 41% for households headed by individuals aged 60 or older. If older respondents (who also tend to be less literate) have greater difficulty in remembering past expenditures, then this recall problem might account for some of the divergence between transfers received and the difference in expenditures between these two groups of households. Also, some of the divergence may be a result of households saving a fraction of the transfer, reducing labor supply or the crowding out of private transfers by funds from PROGRESA. (However, Teruel and Davis, 2000, and Skoufias and Parker, 2000, find little evidence of changes in labor supply or crowding out). Finally, note that the difference in food expenditures (947-806 = 141 pesos) is considerably higher than the difference in non-food expenditures (242 – 233 = 9 pesos) a finding consistent with the recall bias hypothesis described above.

3.5 Conclusions

In this section, we report that mean levels of household consumption are, when averaged over ENCEL98O, ENCEL99J and ENCEL99N, 151 pesos higher amongst households receiving PROGRESA benefits than amongst comparable households not receiving cash transfers from PROGRESA. This corresponds to a percentage increase of 14.53% in mean consumption. When compared to PROGRESA's schedule of cash transfers, we find that beneficiary households in this sample received, on average, 197 pesos per month (a divergence of 46 persos. Some of the divergence between transfers and differences in consumption between treatment and control households may be a consequence of poor recall of consumer durable purchases.

4. ASSESSING THE IMPACT OF PROGRESA ON FOOD CONSUMPTION: A DESCRIPTIVE ANALYSIS

Question. Thinking about your household, what has changed since you began receiving assistance from PROGRESA?

Answers.
We eat better: 48% of beneficiary households give this response in November 1998

We eat more: 19% of beneficiary households give this response in November 1998

(Source Seguimento 3 survey: November 1998)

In this section, we present a detailed descriptive analysis of the impact of PROGRESA on food consumption. Recall that a key objective of PROGRESA is to improve the health and nutritional status of individuals residing in poor households. Access to food plays an important role in meeting these needs. However, it is important to adopt a fairly broad view of the notion of "access to food." As the review presented in Section 2 indicates, households do not solely value food quantity. Dietary quality, as exemplified by a varied diet is also important. Such concerns are clearly in the minds of the PROGRESA beneficiaries in our sample, as the responses to the question about the impact of PROGRESA illustrate.

4.1 The Impact of PROGRESA on Food Consumption: A First Look

Tables 4.1a and 4.1b provide basic descriptive statistics on monthly expenditures and consumption of all foods, as well as four broad food categories: cereals (maize tortillas, maize grains, white bread, sweet breads, loaf of bread (Wonderbread), wheat flour, pasta noodles, rice, crackers, beans, breakfast cereal); fruits and vegetables (tomatoes, onions, potatoes, carrots, leafy vegetables, oranges, plantains, apples, lemons, prickly pears); meat and animal products (chicken, beef, pork, goat, sheep, fish, sardines, tuna, eggs, milk, cheese, lard) and other food products (cupcakes, sodas, coffee, sugar, vegetable oil). We report expenditures and consumption by beneficiary and control households at the 25^{th}, 50^{th} (median) and 75^{th} percentiles as well as mean values.

Tables 4.1a and 4.1b contain a considerable amount of detail. Close examination reveals the following salient points.

First, a comparison of the two tables reinforces the remarks made in Section 3.1 on the importance of distinguishing between the value of consumption and expenditures. The former is always smaller than the latter, irrespective of survey round, food group or level of expenditure. We underestimate living standards when we focus on expenditures.

Second, looking at either the value of consumption or expenditures, it would appear that these are falling over time. Indeed, a naïve reader might use the results for the beneficiary households to argue that acquisition of food by beneficiaries is actually falling between November 1998 and November 1999 - for example, Table 4.1b shows the median value of food consumption falling from 141.8 pesos per person per month in November 1998 to 129.4 pesos per person per month in November 1999. But such a judgment is premature. Recall that the value of consumption is obtained by taking physical units of consumption, multiplying them by locality level prices, then deflating this figure to November 1998 pesos using the CPI. Suppose that physical consumption was unchanged over time, and that food prices rose more slowly than the CPI. If this were the case, then in real terms, the value of food consumption would fall over time. Consequently, instead of focusing

only on the value of food consumption by beneficiary households, we want to explore these data in three further ways: by comparing trends in expenditure levels between beneficiary and control households (such a comparison removes the impact of deflating by the CPI since this is common to both); by looking at physical quantities (which removes difficulties associated with valuation); and by looking at trends in prices in control and treatment localities (if food prices fall faster, in real terms, in treatment localities, then a simple comparison of beneficiary and control households will understate the impact of PROGRESA).

Third, the impact of PROGRESA is more clearly seen when we compare control and beneficiary households at different points in time. For example, Table 4.1b shows that the value of food consumption for the median beneficiary household (per person per month) was 141.8 pesos in November 1998 as compared to 139.0 pesos in the median control household, a difference of 2.0%. In November 1999, the value of consumption for the median beneficiary household was 129.4 pesos as compared to 117.0 pesos for the median control household, a difference of 10.6%. Further, the percentage improvements are greater for the poorest households within these groups. In November 1999, at the 25^{th} percentile, food consumption is 13.5% higher amongst beneficiary households, as opposed to being only 5.1% higher amongst beneficiary households at the 75^{th} percentile.

Fourth, the increase in the value of consumption is concentrated amongst two food groups: fruits and vegetables and animal products. In November 1998, Table 4.1b shows that the value of consumption of fruits and vegetables by median beneficiary households was 3.2% higher than comparable control households, a figure rising to 16.7% in November 1999. The value of consumption of animal products by median beneficiary households, as compared to control households, almost doubled from being 15.4% higher in November 1998 to 30.0% higher in November 1999.

4.2 The Impact of PROGRESA on Dietary Diversity: A Descriptive Analysis

Section 4.1 has indicated that, in value terms, increased consumption of food was particularly marked amongst fruits, vegetables and animal products. However, it is unclear whether this change has come about because of changes in prices (with physical consumption unchanged), increases in consumption of foods already being eaten by these households, by the consumption of new foods not previously consumed, or by some combination of these possibilities. In this section, we focus on the third explanation, examining whether PROGRESA has resulted in beneficiary households consuming a more varied diet.

Tables 4.2, 4.3, and 4.4 provide answers to this question. Table 4.2 shows the percentages of PROGRESA and control households who report that in the last seven days whether they consumed each food listed in the ENCEL questionnaires, as well as the magnitude (in actual and percentage terms) of the differences between these groups.

Table 4.2 indicates that PROGRESA households are more likely to be consuming a wide variety of fruits, vegetables and meat products. Particularly noteworthy are the increased

likelihood of consuming chicken, beef and pork, eggs, potatoes, oranges, plantains. If we limit the sample to only households that were surveyed in both November 1998 and November 1999, we observe a striking increase in chicken consumption: 36% more beneficiary households reported eating chicken in 1999 than 1998, compared with a 19% increase for control households. Note that, not surprisingly, there is less change amongst foods — such as tomatoes, onions, tortillas, beans, sugar and vegetable oil — commonly consumed in rural Mexico.

Tables 4.3 and 4.4 summarize the information found in Table 4.2 in two different ways. Table 4.3 shows the number of unique foods consumed by beneficiary and control households by survey round. It indicates that, in aggregate, PROGRESA beneficiaries are consuming a more varied diet. Table 4.4 looks at dietary diversity in terms of the inability of households to eat certain foods. This table indicates that PROGRESA beneficiaries are more likely to eat vegetables (especially apart from tomatoes and onions), meat or fish and dairy products than comparable households in control localities. However, they are also more likely to be eating processed foods such as bread, noodles, crackers, breakfast cereals, cupcakes and sodas.

4.3 The Impact of PROGRESA on Caloric Availability: A Descriptive Analysis

We now turn to the question of whether PROGRESA has led to an increase in the physical consumption of food. A natural way of doing so is to examine its impact on caloric availability. To do so, we need to construct a measure of caloric availability at the household level. ENCEL98O, ENCEL99J, and ENCEL99N all contain a set of questions of the following form, "In the last seven days, how much have you consumed of the following foods." This asked with reference to 35 different foods. Converting these data into calories involved the following steps.

After converting all the missing units to zeros, the first step was to convert different units of measurement into a common measure for each food item. This involved converting reported units into kilograms. Volumes were converted to weights using a table from the United States Department of Agriculture and Chavez's (1999) *Tablas de Valor Nutritivo* that includes conversions from pieces to kilograms.[4] With each food item expressed in kilograms, it was then multiplied by the percentage weight of the food deemed edible. Next, the edible kilograms of food were converted to kilocalories. Both calculations were based on the 1999 *Tablas de Valor Nutritivo*.

These 35 food variables and their aggregate, expressing calories per family per week, were then converted to daily amounts and divided by household size to get calories per person per day. This measure of household size excludes members not regularly eating in the home and includes non-household members that eat there. (We experimented with various measures of "adult equivalent units" but such adjustments are rather ad hoc and, in any case, do not substantively affect the results presented here).

[4] We thank Marcos Fuentes Muniz for providing us with this table.

There are a number of reasons why one should be careful in interpreting these data. First, these are rough estimates of calories 'available' to be consumed, rather than actual consumption data. Second, there can be considerable heterogeneity with broad food categories such as 'chicken' or 'rice' and such heterogeneity may be correlated with household characteristics. For example, a 100 gram serving of boneless chicken purchased by a wealthy household will have more calories than a 100 gram serving of boned chicken wing consumed by a poorer household. Third, households may consume food outside the household and such consumption is not reflected in these data. Fourth, there is some evidence in the data to suggest that reported caloric availability falls dramatically in large (more than 10 person) households, suggesting that for these (few) households, measurement error may be a matter of considerable concern.

Mindful of all these caveats, Table 4.5 reports mean values of caloric availability in poor households in treatment and control localities as well as at the 25^{th}, 50^{th} (median), and 75^{th} percentiles. These calories are also disaggregated by food group: grains, fruit and vegetables, animal products and other foods.

Beginning with the November 1998 survey round, there are several noteworthy features. The first is the monotony of the diets of these poor Mexican households, with calories from grains accounting for about 75% of caloric availability. Second, there is a statistically significant difference in the unconditional means across these poor households, but the magnitude of the difference is small. However, as we move from November 1998 to June 1999, and then onto November 1999, the magnitude of these differences increases. By November 1999, households receiving PROGRESA benefits have, at the mean, 7.8% more calories available per person per day than do comparable households in control localities. Particularly striking are the increases in calories consumed from vegetables and fruits and meat and animal products.

Note however that this analysis tells us little about the distribution of change amongst these poor households. In light of the review of the extant literature presented in Sections 2.2 and 2.3, it would be helpful to learn whether this change occurs uniformly, or whether it is concentrated amongst particular groups.

Table 4.5 and Figure 4.1 answer this question. Table 4.5 shows that the increase in caloric availability from different food sources as measured in the three ENCEL surveys. Looking across all food groups, we observe that the increase in caloric availability is slightly lower for beneficiary households at 25^{th} percentile than for households at the 75^{th} percentile in June 1999 and the median in both November 1998 and June 1999. However, the increase is nearly identical for all groups in November 1999. What are especially striking, however, are the changes by food groups. Proportionately, these are largest for fruits, vegetables, meat and animal products for the poorest beneficiary households, as measured by households at the 25^{th} percentile.

Figure 4.1 is a graph of the kernel density estimates of household caloric availability across the 3 rounds of the survey obtained using an Epanechnikov kernel and optimal bandwidth. Briefly, these figures show the distribution of the log per capita caloric

availability. They can be thought of as histograms in which the 'width' of the bars has been narrowed and the tops of the bars joined together. The horizontal axis gives the logarithm of the per capita caloric availability, while the vertical axis the percentage of households to whom that value applies. Deaton (1997) describes this technique in detail. The most noteworthy feature of Figure 4.1 is the shifting of the distribution to the right, a shift consistent with the findings presented in Table 4.5. Note that although some of the estimates of caloric availability at the lower end of the distribution might appear low, recall that these data do not adjust for age or sex of household members.

4.4 Conclusions

In this section, we present a detailed descriptive analysis of the impact of PROGRESA on food consumption. In 1999, median value of food consumption average 10.6% higher in PROGRESA households when compared with comparable control households. This increase is driven largely by higher expenditures on fruits, vegetables, meats and animal products. By November 1999, median caloric acquisition has risen by 7.8%. Dietary quality has clearly improved, as measured by the number of different foods consumed, by the likelihood that a household consumes fruit, vegetables or animal products, or the increase in calories from these sources. These quantitative findings reinforce the views of beneficiaries that access to PROGRESA has meant that they "eat better."

That said, it would be desirable to move beyond this descriptive analysis. In particular, it would be useful to know whether these differences are robust to the inclusion of controls for household, locality and municipality characteristics. If such differences are robust, it would also be useful to know what aspects of PROGRESA have led to these changes. Answering these questions requires that we move to direct estimates of the relationship between caloric availability, household incomes and PROGRESA.

5. THE IMPACT OF PROGRESA ON CALORIC ACQUISITION: AN ECONOMETRIC ANALYSIS

In this section, we examine the impact of PROGRESA on caloric availability at the household level using econometric techniques. Specifically, we address the following issues: did PROGRESA lead to increases in caloric availability; did PROGRESA lead to improvements in dietary quality; how were these benefits distributed across different household types eligible for PROGRESA; and by what pathways did participation in PROGRESA lead to these changes?

5.1 Parameterizing the Relationship Between Caloric Availability and Income

The discussion presented in Section 2 highlighted the dangers of assuming a specific functional relationship between caloric acquisition by households and incomes. Accordingly, as a first step in our analysis, we examine the relationship between the per

capita caloric availability at the household level and the per capita permanent income of the household (measured by per capita expenditures) using nonparametric techniques.

Recall that the key parameter is the income elasticity of caloric availability, a number that summarizes the sensitivity of a household's per capita caloric availability (PCCA) to changes in its income as proxied by total household expenditures (PCE). More formally, the income elasticity of per capita caloric availability, $E_{d,}$

$$E_d = \frac{d \ln PCCA}{d \ln PCE} = \frac{\%\Delta PCCA}{\%\Delta PCE}, \qquad (5.1)$$

is defined as the ratio of the percentage change (denoted by %Δ) in PCCA to the percentage change in PCE. We estimate this elasticity using non-parametric approaches with several objectives in mind. First, households participating in the PROGRESA program receive cash transfers that in the absence of any monetary and other time costs associated with participation in the program can be interpreted as increases in household income. An analysis using data from households in control localities enables us to derive an estimated range for how much per capita caloric availability could increase if household incomes were increased. This expected range of impact can be used as a measure against which the estimated impact of PROGRESA on caloric availability can be gauged. Secondly, we use nonparametric methods to examine visually whether there is noticeable impact or change in the relationship between caloric availability and household income between households in PROGRESA (treatment) villages and households in control villages. This could provide us with useful insights when conducting our econometric analysis that imposes a linear specification between the variables of interest.

The advantage of our nonparametric approach is that it allows us to examine whether the elasticity of per capita caloric availability varies with the level of household income. As mentioned in Section 2 of our report, most of the studies in the income-nutrition literature impose a linear functional form on the data that forces the elasticity of caloric availability to be constant irrespective of the level of household income. It is quite likely, however, that poorer households that have low income, exhibit a higher income elasticity in caloric availability than households with higher income.

To allow for such a possibility, we use nonparametric procedures to estimate the regression functions. The regression function, which is the expectation of calories conditional on household per capita expenditures, can be written as

$$m(x) = E(y|x) \qquad (5.2)$$

where y is the logarithm of per capita calorie availability (lnPCCA), and x is the logarithm of per capita total household expenditure (lnPCE).

Following the methods used by Subramanian and Deaton (1996), we estimate $m(x)$ using a smooth local regression technique. As Subramanian and Deaton explain, the procedure

works as follows. At any given point *x*, we run a weighted linear regression of the logarithm of calories per capita on the logarithm of per capita expenditure. The weights are chosen to be largest for sample points close to *x* and to diminish with distance from *x*; they are also set so that, as the sample size increases, the weight given to the immediate neighborhood of *x* is increased so that, at the limit, only *x* is represented. In our case, for the local regression at *x*, observation *i* gets the (quartic kernel) weight

$$w_i(x) = \frac{15}{16}\left[1-\left(\frac{x-x_i}{h}\right)^2\right]^2 \qquad (5.3)$$

if $-h \le x - x_i \le h$ and zero otherwise. The quantity *h* is a bandwidth that is set so as to trade off bias and variance, and that tends to zero with the sample size. We have set the bandwidth to the value of 0.5. Our main concern is to plot the regression function so that, instead of calculating local regressions for each point in the sample, we choose an evenly spaced grid of 50 points in the distribution of log per capita expenditure and calculate local regressions for each. The estimate of *m(x)* is the predicted value from the local regression at *x*, and the local estimated slope coefficient, $\hat{b}(x)$ say, is used as an estimate of the slope *m'(x)*. Standard errors for the regression function and its slope are obtained by bootstrapping following the directions in Efron and Tibshirani (1993, chap. 7.3).[5]

We illustrate this method drawing on the ENCEL98O survey round. We begin with an analysis of the regression function using the sample of all (poor and nonpoor) households in the control villages. The estimated regression function from the control villages provides an estimate of the relationship between calories and income before the introduction of the PROGRESA program and thus an estimate of the "counterfactual" regression function in the absence of the program.

Figure 5.1 exhibits the local regression estimate of the regression function (1) using the sample of households in the control villages where expansion of the PROGRESA program has been delayed. The line in the middle is the local regression estimate, while the confidence intervals around the line show two standard errors on either side for the unclustered bootstrap.

Inspection of Figure 5.1 reveals that the estimated "curve" is quite close to a straight line similar to that estimated by Subramanian and Deaton (1996). In contrast to the curve estimated by Strauss and Thomas for Brazil the households in the PROGRESA control sample are generally poorer than the sample of households used in the Brazil study and that is why even those households at the top of the income distribution exhibit a nonzero income elasticity of caloric availability.

[5] Our "bootstrapped standard errors are unclustered" meaning that our estimation of standard errors does not take into consideration the clustering of households within localities.

Figure 5.2 displays the slopes of the "curve" in Figure 5.1, along with bootstrapped confidence intervals. From this figure, we can see more clearly that the slope of the curve in Figure 5.1, or in other words how the income elasticity of per capita caloric availability varies with income. Clearly, the income elasticity is generally higher for poorer households with lower levels of PCE and lower for richer households (i.e., with higher levels of PCE). Moreover, it seems that the decline is not steady. At the lowest level of PCE the income elasticity of caloric availability is around 0.3. As PCE increases the elasticity seems to follow an inverted U shaped pattern, first increasing to reach the maximum value of 0.5 at the log value of PCE equal to 4.8. From that point on the elasticity seems to decline rather slowly and steadily with higher values of PCE.

5.2 The Relationship Between the Quality of Food (Measured by Price per Calorie) and Income

The analysis so far has focused on the quantity of food and nutrient availability at the household level but ignored the relationship between quality and income. Figures 5.3 and 5.4 correspond to Figures 5.1 and 5.2 but show the price per calorie and the income elasticity of price per calorie. The price per calorie, defined as the ratio of food expenditures and the total calories available in the household, may be considered as an indicator of the quality of food purchased by the household.

As was the case for the calorie relationship, the curve is close to being linear, and once again there is some evidence from Figure 5.4 that the elasticity follows a U shape meaning that it declines as income of poor households increases reaching a minimum at the value of lnPCE equal to 4.8 and then increasing slowly with increases in income.

Thus poorer households receiving extra income spend a larger proportion of that income increase for purchasing food of higher caloric content and slightly lower quality

The preceding analysis does not provide any direct evidence as to whether the diversity of food items consumed increases. To address this question in a bit more detail we use the nonparametric methods to examine the extent to which the elasticity of the calorie price results from within-group substitution as opposed to between-group substitution. The inverse of the price per calorie, calories per peso, is given by the identity

$$\frac{K}{X_f} = \sum_G w_G p_G = \sum_G w_G \sum_{ieG} \frac{k_i q_i}{X_G}, \qquad (5.4)$$

where, as before, w_G is the share of the food budget devoted to good G, X_f is expenditure on food, and $\eth_G$, which is defined by the second equality, is calories per peso devoted to good G. As we move from poor to rich, the ratio of K to X_f , and thus the price per calorie, is influenced both by changes in the budget shares w_G as households substitute between groups and by changes in the group-specific calorie price inverses $\eth_G$ as quality and nutrient substitution takes place within groups. We can neutralize the within-group effect by calculating the values of the ð's at the sample mean and using these numbers in

place of the actual ð's to recalculate (2) and, thus, to get an adjusted log calorie price, ln*P*, that excludes within-group substitution:

$$\ln P = -\ln\left(\sum_G w_G \bar{p}_G\right) \qquad (5.5)$$

The variation in ln *P* with per capita outlay reflects the changing allocation of the budget over groups of goods, but with the price per calorie within the groups held constant.

Our results using the four major groups of cereals, vegetables, meats and other foods are presented in Figure 5.5. The regression function of the income elasticity of price per calorie for households in control localities including intra-group substitution is indicated by the solid line and this is identical to the line in Figure 5.3. The regression function excluding intra-group substitution is shown by the line with the small circles "o". The same symbols are used for the graphs of the slopes of the corresponding regression functions (or elasticities) in Figure 5.6.

When the fixed values of group calorie prices are used, the poor pay more per calorie, so that calorie price to PCE line excluding intra-group substitution is rotated clockwise. This difference becomes much more apparent in Figure 5.6 where we graph the income elasticity of price per calorie including and excluding intra-group substitution. In this figure, the vertical difference between the two lines is a measure of the contribution of *intra*-group substitution to the elasticity of the calorie price. The larger difference or gap between these two lines for wealthier households compared to the difference for poorer households suggests that wealthier households exhibit higher within-group substitution that between group substitution.

To summarize, the non-parametric methods used so far reveal a number of tentative conclusions about how a cash transfer, such as that awarded to poor households participating in the PROGRESA program, can impact on household consumption. First, poorer households near or on a subsistence constraint are likely to increase the caloric availability at the household level. Secondly, the income elasticity of poor households in control localities appears to be in the range between 0.3 and 0.55, suggesting that a 1% increase in household income increases household caloric availability by 0.3 to 0.55%.

Unfortunately, the non-parametric methods are most useful at exploring bivariate relationships but become increasingly constrained if we were to take into consideration additional variables into the analysis with a fixed sample size. For example, caloric availability may differ across households because prices differ across villages. In principle, we could estimate the bivariate relationship between income and calories for each village using nonparametric methods, but we would soon run into sample size constraints. And these sample size constraints would be only compounded if we wanted to repeat the exercise for households of different size and demographic composition. Also, the type of work performed by individuals in households may differ depending on their occupation.

5.3 Measuring the Impact of PROGRESA

The discussion in the previous two sections has revealed two important pieces of information: that we can represent the relationship between caloric acquisition and income using a log-log specification, and that we should be alert to changes in dietary quality as incomes rise. With this information, we move on to a parametric analysis of the impact of PROGRESA on caloric acquisition. Recall that in their report on the randomness of locality access to PROGRESA benefits, Behrman and Todd (1999) find that at the locality level, there are no significant differences between treatment and control communities across a range of characteristics that include age, education, access to health care and income. However, when these tests are performed on household level data, they find many more rejections of the null hypothesis of no differences across control and treatment localities than would be expected by chance given standard significance levels. Although they note that many of these differences may be due to the large sample sizes, their finding suggests that it would be unwise to rely solely on differences in unconditional means when assessing the impact of PROGRESA on caloric acquisition.

In this section, we outline the methods we use to examine the impact of PROGRESA, conditioning on household, locality, municipality and state characteristics. Our approach is similar to Schultz's (2000) work on the impact of PROGRESA on education, Gertler's (1999) work on the impact of PROGRESA on health outcomes and Behrman and Hoddinott's (2000) study of the impact of PROGRESA on child nutritional status.

As a starting point for our econometric analysis we begin with a linear regression of the form[6]:

$$\ln PCCA(i,v) = a \cdot \tilde{X}(i) + b \cdot T(i) + g \cdot E(i) + d \cdot (E \cdot T) + h(i,v)$$

where PCCA denotes caloric availability in household i in village v, a, b, and g are fixed parameters, $\tilde{X}$ is a vector of household characteristics and h is an error term summarizing the influence random disturbances. In our empirical analysis regressions below we allow for alternative specifications regarding the structure and the correlation patterns of the individual error terms. The elements of the vector $\tilde{X}$ are specified to be as follows: household demographic characteristics (the logarithm of household size, proportions of children 0-2, 3-5; boys 6-7, 8-12, 13-18; girls 6-7, 8-12, 13-18; women 19-54; men 55 and older; women 55 and older); characteristics of the head (education, age, occupation, ethnicity, marital status, gender). We also include dummy variables for each

[6] The specification adopted above, in addition to estimating the impact of PROGRESA on eligible households allows us to draw inferences about the potential spillover effects of PROGRESA on non-eligible households as well. An alternative approach is to use the sample of eligible households only and estimate the regression $\ln PCCA(i,v) = a \cdot \tilde{X}(i) + q \cdot T(i) + h(i,v)$.

of the localities in the sample; see below. The variables contained in $\tilde{X}$ allow us to condition out the impact of these confounding factors on the impact of PROGRESA. We are then left with three variables and their associated parameter estimates. Specifically:

T =1 if household resides in a treatment community; =0 if resides in a control community;

E =1 if household is eligible for PROGRESA benefits = 0 if not eligible or otherwise.

TxE = 1 if household resides in a treatment community (*T=1*) and is eligible for PROGRESA benefits (i.e. *E=1*); = 0 otherwise.

With this specification, for a household eligible for PROGRESA and residing in a treatment locality, the expected value of ln*PCCA* is given by:

$$E(lnPCCA \mid E=1, T=1) = \alpha\tilde{X} + \beta T + \gamma E + \delta (ExT)$$

Similarly, for a household eligible for PROGRESA but located in a control locality, the expected value of ln*PCCA* is given by:

$$E(lnPCCA \mid E=1, T=0) = \alpha\tilde{X} + \gamma E$$

The expected value of *lnPCCA* for a household not eligible for PROGRESA and residing in a treatment locality is:

$$E(ln\ PCCA \mid E=0, T=1) = \alpha\tilde{X} + \beta T$$

Finally, the expected value of ln *PCCA* for a household not eligible for PROGRESA and residing in a control locality is:

$$E(ln\ PCCA \mid E=0, T=0) = \phi\tilde{X}$$

The impact of PROGRESA on eligible households can be written as:

$$E(lnPCCA \mid E=1, T=1) - E(lnPCCA \mid E=1, T=0),$$

that is, the difference in the conditional expectation of ln*PCCA* between PROGRESA-eligible households in treatment localities and PROGRESA-eligible households in control localities)

$$E(lnPCCA|E=1,T=1) - E(lnPCCA|E=1, T=0) = \alpha\tilde{X} + \beta T + \gamma E + \psi(ExT) - [\alpha\tilde{X} + \gamma E]$$

$$= \beta T + \psi(ExT)$$

Finally, we need to consider the nature of the disturbance term. In order to capture the role of regional differences in characteristics, the error term for each household is decomposed as

$$h(i,v) = m(v) + e(i,v).$$

Variation arising from regional differences that are common for all households in the same community is denoted by $m(v)$, while variation arising from other random shocks is denoted by $e(i,v)$. For our purposes, a region or community is specified at both the state and municipality level. In our sample there are seven states and 191 different municipalities. Assuming that $e(i,v)$ is independently and identically distributed across households and communities with mean 0, and variance s_e^2, the appropriate estimator for equation (1) is determined by the treatment of the state or municipality-specific component $m(v)$. There are two specifications of heterogeneity. The first treats the specific component $m(v)$ as the realization of a random variable that is uncorrelated with e and the included regressors and distributed with mean 0 and variance s_m^2. With this random effects (or variance components) specification the efficient estimator is the generalized least squares (GLS) estimator. Hausman and Taylor (1981) show that the GLS estimator of this model can be obtained by running ordinary least squares on suitably transformed data.

The alternative specification treats $m(v)$ as an individual specific omitted variable (fixed effect) that may be correlated with the included regressors. To the extent that these state or municipality-specific omitted variables are correlated with the included regressors, the parameter estimates obtained by either OLS or GLS methods may be biased and inconsistent. As a more rigorous test of the potential correlation of individual specific effects with the included regressors, a Hausman (1978) statistic is also constructed. Under the null hypothesis of exogeneity, the random effects estimator will be consistent and efficient. Under the alternative hypothesis that $m(v)$ is correlated with the regressors, the random effects estimator is not consistent while the fixed effects estimator is consistent. Hausman tests consistently reject the random effects estimator in favor of the state or municipality fixed effects estimator; hence, only the latter is reported here.

5.4 The Impact of PROGRESA on Caloric Availability

As discussed in more detail in section 3.2, administrative errors resulted in significant differences in the list of eligible households in treatment areas and the list of beneficiary households (i.e. eligible households that ended up receiving monetary benefits). In order to check the sensitivity of our econometric estimates regarding the impact of PROGRESA on consumption we used two different definitions of the binary variable E for households in treatment localities. In the first specification (specification A) in the treatment localities where PROGRESA operates, E=1 for the households that received non-zero monetary benefits between May 1998 and October 1999 and E=0 for the households that did not receive any monetary benefits (note that some of the non-

receiving households may have been eligible but never received any benefits). In the second specification (specification B) in the treatment localities E=1 for all eligible/poor households irrespective of whether they received any monetary benefits or not and E=0 for households classified as non-eligible (nonpoor). In the control localities, for both specifications, the binary variable E=1 for eligible (poor) households and E=0 non-eligible households.

Table 5.1 reports the parameter estimates for â, ã and ä for specification A using fixed effects specifications for five outcomes: the log of total calories available per capita and the logs of calories available from cereals, vegetables, animal products and other foods. We have also estimated these equations including the median locality-level prices of tomatoes, onions, potatoes, oranges, leafy vegetables, tortillas, corn, rice, beans, chicken, milk, eggs, but found that the parameter estimates and their standard errors were practically identical to those obtained excluding the locality level food prices. Therefore, we decided to focus on the estimates obtained using municipality fixed effects (that allow for food and non-food prices to differ across municipalities and excluding locality level food prices (that allow food prices to differ by locality within municipalities).

Note that the magnitude of these impacts is higher for the acquisition of fruits and vegetables, and to a lesser extent animal products, than for grains and miscellaneous food items. Finally, comparing *non-poor* households, we find that those non-poor households residing in localities where PROGRESA is providing benefits also appear to exhibit increased levels of caloric acquisition. This result should be treated cautiously – these regressions do not control for log per capita expenditure – but it is something we return to below.

We focus on the impact on poor households. As discussed above, this impact is obtained by calculating the value of [$\hat{a}T + \ddot{a}(ExT)$]. This figure, along with its t statistic, is reported in Table 5.2 for the two different specifications of the binary variable E. Recall that when the dependent variable is expressed in log terms, dummy variables with coefficients small in magnitude can be regarded as indicating percentage changes in the dependent variable. Mindful of this, the conditional impact of PROGRESA on poor households, reported in Table 5.2, are generally smaller than the unconditional impacts reported in Table 4.5. Further, there is little evidence of much of a statistically significant impact on caloric availability as of November 1998. As we discussed above, given that PROGRESA had begun only limited operations at the time of this survey, such a result is not surprising. But note that the estimates for June and November 1999 are increasing in magnitude and significant at the 95 per cent confidence level. For example, specification A in Table 5.2 indicates that in June 1999 households receiving PROGRESA benefits in treatment localities obtained 4.3% more calories than did comparable households in control localities. In November 1999 under the same specification this effect is even higher Households receiving PROGRESA benefits in treatment localities obtained 7.1% more calories than did comparable households in control localities. Also the impact is greatest on the acquisition of calories from vegetable and animal products – a finding consistent with the view of respondents that PROGRESA was enabling them to “eat better.”

A comparison of the estimates under specifications A and B reveals the anticipated results. In general under specification A that focuses on the impact of PROGRESA on beneficiary households (i.e., households that received some monetary benefits) the estimated effect of PROGRESA is larger than that using specification B. However, it is important to note that whenever there are significant effects under specification A there are also significant effects, albeit lower, under specification B.

5.5 The Impact of PROGRESA on Caloric Availability Controlling for Levels of Household Expenditures

In our specification so far we did not include the logarithm of household consumption (lnPCE) as an explanatory variable. There are a number of reasons for excluding lnPCE from the regression, the most important being the potential for introducing correlated measurement errors in nutrients and in total expenditures. As Bouis and Haddad (1992) note, if caloric availability is estimated based on food expenditures, as is done in this study and many other studies, then the measurement error will be correlated with error in total expenditures, which implies an upward bias in the estimated nutrient expenditure association.

Mindful of this, Table 5.3 reports the new regression coefficient estimates with lnPCE as an additional explanatory variable using specification A. One reason for doing so is that one of the stated objectives of PROGRESA is to promote community participation and support for the actions of PROGRESA, so that educational and health services benefit all families in the localities where the program operates. Thus, as part of the program, in the localities where PROGRESA operates there are a series of regular lectures "*platicas*" where information and training on health and nutrition is given by a doctor and/or nurse from the health clinic serving the community.

In order to obtain some insights about the non-monetary benefits derived from participation in the program we estimate the potential effect of participation in PROGRESA on caloric availability after controlling for the log of per capita expenditures (lnPCE). It is important to note that the interpretation of impact has to be revised appropriately when PCE is included as an additional explanatory variable in the regression. In this case [$\hat{a}T + \ddot{a}(ExT)$] is the change in the conditional mean of lnPCCA after accounting for the potential increases in lnPCCA brought about by the cash transfers received from participating in the PROGRESA program. Thus, if we were to assume that there are no potential biases from correlated measurement errors between PCE and PCCA, then [$\hat{a}T + \ddot{a}(ExT)$] provides an estimate of the impact of participation in the health and nutrition –related lectures (*platicas*) on PCCA.

Based on the coefficient estimates in table 5.3, table 5.4 contains estimates of the impact of PROGRESA. There are four important findings in Table 5.4. First, although participation in PROGRESA raises the amount of calories acquired from grains and "other foods" (as reported in Table 4.5), this would appear to be due to PROGRESA's income effect. Once we control for log per capita expenditures, there is no additional effect of PROGRESA on the acquisition of calories from these sources.

Second, participation in PROGRESA does have an impact on the acquisition of calories from fruits, vegetables and animal products after controlling for its income effect. Consistent with our description of the operations of PROGRESA, this is only observed in the two 1999 survey rounds. It is also consistent with the fact that during these *platicas*, beneficiaries are encouraged to eat a more diverse diet, including more fruits, vegetables and milk and other animal products. Note that this impact is observed after controlling for other confounding factors, including price changes, household characteristics and fixed, municipality level characteristics. However, the numerical estimate of the *platica* effect appears to be unreasonably high. For example, consider the case of calories from vegetables observed in the November 1999 survey (see tables 5.2 and 5.4). Excluding the log per capita consumption, the estimated effect of the program is found to be 20.4% (see table 5.2). Including the log of consumption per capita effect which presumably accounts for the income effect of PROGRESA, yields an estimated effect of 14.1%. This suggests that 69% of the increase in calories from vegetables is due to the *platica* effect while the remaining effect is due to the increased income. The estimated elasticity of vegetable calories with respect to income changes (0.789 in table 5.3) combined with the size of the benefits received by participating in PROGRESA which amount to a 19.5% increase in income, suggest that the estimated *platica* effect is unreasonably high. One possible explanation is the presence of simultaneity bias arising for the inclusion of log per capita consumption in the regression.

Third, inferences on whether PROGRESA is having a significant impact on household caloric availability per capita (total or by major food group) appear to be insensitive to the specification used for the binary variable E. As in table 5.2, the estimated impact of PROGRESA is higher when focusing on beneficiary households (specification A) in comparison to the estimated impact on eligible households (specification B).

Fourth, in table 5.3 the coefficient on being in a treatment locality, but being a non-beneficiary household, is positive and significant for the acquisition of calories from fruits and vegetables in the June and November, 1999 survey rounds, as well as for animal products in November, 1999. (Although the coefficient is negative in June 1999, it is poorly measured). Again recalling that these regressions control for confounding factors, such as price differences at the municipality level, household characteristics and fixed, municipality level characteristics, this suggests some evidence that the information provided at these *platicas* is spilling over to non-beneficiaries.

5.6 The Impact of PROGRESA on the Consumption of Specific Groups of Poor Households

Next, we examine impact for two particular groups: the elderly and households with pre-school children. PROGRESA's community consultations during the targeting phase of the program revealed that the former were often seen to be deserving of assistance, even though they were not revealed to be poor by PROGRESA's earlier targeting algorithm. The estimates of the impact of PROGRESA in table 5.5, obtained using specification A show that these households do experience gains in caloric acquisition when compared to poor households in treatment localities, but the impact is slightly smaller than for the sample as a whole. This finding should not be seen as especially surprising given that these households are receiving, on average, lower cash transfers from PROGRESA and tend to have lower calorie-expenditure elasticities. Moreover, the effect of PROGRESA remains significant even after including the logarithm of per capita consumption as a regressor.

Households with pre-schoolers are of interest for a different reason. A component of PROGRESA benefits is the *papilla* nutritional supplement which is distributed to households containing pregnant and lactating women, and children between the ages of four months and two years in addition to children between two and five years if any signs of malnutrition are detected. (These supplements also are given to non-PROGRESA households under similar circumstances; if this occurs in control communities in the evaluation sample, it biases downward the estimated impact of PROGRESA because both treatment and control children are receiving this part of the treatment). Mothers visit the clinic at least once a month (more if they are pregnant of have small children) to pick up six packets of supplements per child per month with each packet containing five doses, enough for one dose per day. The supplements constitute 20% of calorie requirements and 100% of all necessary micronutrients.

A possible concern is that the provision of the *papilla* may cause households to divert expenditures on food to other items, thus undercutting efforts to increase caloric availability in these households. If the *papilla* is truly 'crowding out' household acquisition of calories, we would expect to see lower measures of impact for households with pre-school children. Given that the ENCEL and INSP surveys show that children above the age of 2 are also being given these supplements, we look at caloric acquisition in households containing at least one child below the age of 5. However, the results presented in Table 5.6 (panel A) suggest that such concerns are unfounded; the impact of participation in PROGRESA on caloric acquisition is, if anything, slightly higher for these households..

Panel B in table 5.6 reports the *platica* effect on households with pre-schoolers. Again, there is evidence that these *platicas* are having an impact of caloric acquisition from vegetables, fruits and animal products even after controlling for PROGRESA's impact via higher household incomes. This finding is particularly significant given (as discussed

in Section 2), there is evidence that in Mexico, poor quality diets inhibit the physical growth of children under 30 months.

Finally, table 5.7 summarizes the results of running these regressions (i.e. specification A for E and controlling for log per capita expenditures) when the ENCEL samples are disaggregated by the level of education (none, primary and post-primary) of the senior woman within the household. To make it easier to compare across education levels, we only report the estimated coefficient of the PROGRESA effect (i.e., [$\hat{a}T + \ddot{a}(ExT)$]) for all calories, vegetables and animal products. As before, we see no evidence of a PROGRESA effect, over and above its impact via higher incomes, in the November 1998 survey round. In June 1999, it would appear that these *platica* effects are greater in households where the senior woman has less than post-primary education, but this pattern is reversed when we look at November 1999.

5.7 The Impact of PROGRESA on the Consumption of Processed Foods and Tortillas

In this section, we investigate whether beneficiaries use their PROGRESA monies to consume processed foods. These include white breads, sweet breads, loaves of bread (Wonder Bread), soup noodles, crackers, breakfast cereal, cookies, and sodas. Separately, we also consider the consumption of tortillas. One can regard the consumption of these foods in three ways. One could see such purchases as wasteful, an expensive way of obtaining calories more cheaply available from other sources. Alternatively, one could see such consumption as part of a process in which women are freed from the laborious process of food preparation and have time to devote to other tasks including child care. Thirdly, one could simply assume that the consumption of such goods yields utility to these households.

Table 5.12 indicates that effectively, there is no difference in acquisition of calories from tortillas between beneficiary and control households. PROGRESA beneficiaries do consume more calories derived from other processed foods, but the quantities involved — less than 100 kcal per day — are so trivially small that there does not seem to be any reason why these should be of concern.

6. DOES PROGRESA AFFECT LOCALITY LEVEL FOOD PRICES?

There is no evidence that PROGRESA communities paid higher food prices than similar control communities. Table 6.1 presents the price paid per kilogram of the 14 most consumed foods in November 1998, June 1999 and November 1999. Prices are deflated to November 1998 levels using national CPI data. In two notable cases, maize grain and chicken, residents of beneficiary localities paid more than those in the control group in each of the three survey rounds. In fact, the large increase in chicken consumption illustrated in Table 4.2b is even more remarkable after noting that beneficiaries, on average paid more per kilogram than non-beneficiaries.

Comparing prices between beneficiary and control groups does not tell the whole story, however. Examining the change in prices between November 1998 and November 1999, we see that the majority of food prices have fallen in real terms regardless of community. Since many of the foods' prices rise more slowly than the CPI, the earlier computed value of food consumption underestimates real food consumption. Beans represent perhaps the most important food in the Mexican diet, as the three surveys show they are the most consumed food and provide the 4th most calories of all 35 foods. The average price paid per kilogram of beans fell price fell 20.7% and 25.5% in beneficiary and control communities, respectively. Figures 6.1 and 6.2 also emphasize that food prices generally decline from 1998 to 1999 and remain relatively unchanged between control and treatment localities. Figure 6.1 points to the drop in prices for the 5 most consumed foods (tomatoes, onions, beans sugar and vegetable oil) with very little difference between control and treatment groups, while Figure 6.2 graphs the 5 foods that make up 84% of total household caloric availability: tortillas, maize grain, beans, sugar and vegetable oil.

7. THE IMPACT OF PROGRESA ON NON-FOOD CONSUMPTION

To conclude our investigation of the impacts of PROGRESA we examine whether PROGRESA has an impact of non-food expenditures overall and in some specific components. Table 7.1 shows that, on average, beneficiaries spent more money on children's and adult's apparel but less on medical expenses than control households. In table 7.2 we report the estimated impact of PROGRESA on beneficiaries (i.e. specification A for the dummy variable E) using regression methods and including the logarithm of per capita consumption. Table 7.2 yields the following. First, PROGRESA seems to decrease overall household expenditures on non-food items. Second, this decrease in overall non-food expenditures is the result of lower expenditures on school-related expenses (transportation or contributions) and medicines (at least in November 1998). Surprisingly, perhaps, PROGRESA beneficiaries do not appear to have lower expenditures on medicines during the June 1999 and November 1999 rounds when the program is well under way. Third, PROGRESA beneficiary households seem to allocate more of their non-food expenditures to children clothing and shoes.

8. SUMMARY OF RESULTS

In conclusion our investigation into the impact of PROGRESA on household consumption has yielded the following results:

- Mean levels of household consumption are, when averaged over ENCEL98O, ENCEL99J and ENCEL99N, 151 pesos (in November 1998 pesos) higher amongst households receiving PROGRESA benefits than amongst comparable

households not receiving cash transfers from PROGRESA. This corresponds to a percentage increase of 14.53% in mean consumption. When compared to PROGRESA's schedule of cash transfers, we find that beneficiary households in this sample received, on average, 197 pesos per month (a divergence of 46 pesos).

- The value of food consumption for the median beneficiary household (per person per month) was 141.8 pesos in November 1998 as compared to 139.0 pesos in the median control household, a difference of 2.0% (see Table 4.1b) In November 1999, the value of consumption for the median beneficiary household was 129.4 pesos as compared to 117.0 pesos for the median control household, a difference of 10.6%. Further, the percentage improvements are greater for the poorest households within these groups. In November 1999, at the 25th percentile, food consumption is 13.5% higher amongst beneficiary households, as opposed to being only 5.1% higher amongst beneficiary households at the 75th percentile.

- The increase in the value of consumption (per person per month) is concentrated amongst two food groups: fruits and vegetables and animal products. In November 1998, Table 4.1b shows that the value of consumption of fruits and vegetables by median beneficiary households was 3.2% higher than comparable control households, a figure rising to 16.7% in November 1999. The value of consumption of animal products by median beneficiary households, as compared to control households, almost doubled from being 15.4% higher in November 1998 to 30.0% higher in November 1999.

- In November 1999, median caloric acquisition per person per day has risen by 7.8%. Dietary quality has clearly improved, as measured by the number of different foods consumed, by the likelihood that a household consumes fruit, vegetables or animal products, or the increase in calories from these sources.

- After using regression methods that control for differences in household and municipality characteristics, as well as differences in prices among municipalities we find that there is no evidence of a statistically significant impact on caloric availability as of November 1998. Given that PROGRESA had begun only limited operations at the time of this survey, such a result is not surprising.

- The regression methods, however, show that there is evidence of a significant impact in June and November 1999. For example, Table 5.2 indicates that in June 1999 households receiving PROGRESA benefits in treatment localities (specification A) obtained 4.3% more calories than did comparable households in control localities. In November 1999 under the same specification this effect is even higher. Households receiving PROGRESA benefits in treatment localities obtained 7.1% more calories than did comparable households in control localities. Thus after controlling for differences in household and municipality characteristics, as well as differences in prices among municipalities the estimated impact of PROGRESA on caloric acquisition is only slightly smaller than that obtained by simply comparing means among beneficiary and control households.

Also the impact is greatest on the acquisition of calories from vegetable and animal products — a finding consistent with the view of respondents that PROGRESA was enabling them to "eat better."

- There is no evidence that the *papilla* nutritional supplement 'crowds out' the acquisition of calories.

- Although participation in PROGRESA raises the amount of calories acquired from grains and "other foods," this would appear to be due to PROGRESA's income effect. The estimates in Table 5.4 suggest that participation in PROGRESA does have an impact on the acquisition of calories from fruits, vegetables and animal products even after controlling for its income effect. Consistent with our description of the operations of PROGRESA, this is only observed in the two 1999 survey rounds. It is also consistent with the fact that during a regular series of lectures, called "*platicas,*" beneficiaries are encouraged to eat a more diverse diet, including more fruits, vegetables, milk and other animal products.

- There is some evidence that information conveyed during these *platicas* spills over and positively affects the behavior of non-beneficiaries in treatment localities.

- This *platica* effect does not appear to vary systematically by education level. It is observed in households with pre-school children. This latter finding is particularly significant given that in Mexico, poor quality diets inhibit the physical growth of children under 30 months.

- Concern has been expressed that PROGRESA beneficiaries would 'waste' their money on the consumption of processed foods such as sodas and cookies. Although PROGRESA beneficiaries do consume more calories derived from such sources, the quantities involved — less than 100 kcal per day — are so trivially small that there does not seem to be any reason why these should be of concern.

- There is no evidence that PROGRESA communities paid higher food prices than similar control communities.

- PROGRESA beneficiaries appear to have lower household expenditures per capita on non-food items. The decrease in overall non-food expenditures is the result of lower expenditures on school-related expenses (transportation or contributions) and medicines (at least in November 1998). Surprisingly, perhaps, PROGRESA beneficiaries do not appear to have lower expenditures on medicines during the June 1999 and November 1999 rounds when the program is well under way. Finally, even though PROGRESA beneficiary households have lower total non-food expenditures they seem to have allocated more of their non-food expenditures to children's clothing and children's shoes.

In conclusion, the PROGRESA program appears to have sizeable and significant effects on the consumption of beneficiary households. It is worth commenting that the large injections of cash that these communities receive as a result of having PROGRESA beneficiaries are likely to have an effect on the local economy and the development of new markets. Whereas this was not an aspect that was evaluated, it is an important topic that should be examined in future evaluations.

REFERENCES

Adato, M., D. Coady, L. Kuriyan. D. Mindek, and M. Ruel. 1999. A preliminary evaluation of PROGRESA in Mexico at the level of beneficiaries, communities, and institutions. Report submitted to PROGRESA. Washington D.C.: International Food Policy Research Institute. Mimeo. December.

Alderman, H. 1986. Effects of price and income increases on food consumption of low income consumers. Washington, D.C.: International Food Policy and Research Institute. Mimeo.

Allen, L., A. Black, J. Backstrand, *et al*. 1991. An analytical approach for exploring the importance of dietary quality vs quantity to the growth of Mexican children. *Food and Nutrition Bulletin* 13: 95-104.

Allen, L., J. Backstrand, E. Satnek, G. Pelto, A. Chavez, E. Molina, J. Castillo and A. Mata. 1992. Title of article?? *American Journal of Clinical Nutrition* 56: 353-364.

Behrman, J., and A. Deolalikar. 1987. Will developing country nutrition improve with income? A case study for rural South India. *Journal of Political Economy* 95: 492-507.

Behrman, J. 1988. Nutrition and incomes: Tightly wedded or loosely meshed? Pew/Cornell Lecture Series on Food and Nutrition Policy. Ithaca: Cornell University.

Behrman, J., and A. Deolalikar. 1988. Health and nutrition. In *Handbook of development economics, vol.* 1, eds. H. Chenery and T.N. Srinivasan. Amsterdam: North-Holland.

Behrman J.R., and P.T. Todd. 1999. Randomness in the experimental samples of PROGRESA (Education, Health and Nutrition Program). Report submitted to PROGRESA. Washington D.C.: International Food Policy Research Institute. Mimeo. June 1999.

Behrman, J. and B. Wolfe. 1984. More evidence on nutrition demand: Income seems overrated and women's schooling underemphasized. *Journal of Development Economics* 14: 105-128.

Benjamin, D. 1992. Household composition, labor markets and labor demand: Testing for separation in agricultural household models. *Econometrica* 60: 287-322.

Bliss, C., and N. Stern. 1978. Productivity, wages and nutrition: Two parts. *Journal of Development Economics* 5: 331-398.

Bouis, H., and L. Haddad. 1992. Are estimates of calorie-income elasticities too high? A recalibration of the plausible range. *Journal of Development Economics* 44: 199-226.

Chavas, M. 1999. *Tablas de valor nutrivo.* Mexico.

Chernichovsky, D., and O. Meesook. 1984. *Urban-rural food and nutrition consumption patterns in Indonesia*. World Bank Staff Working Paper No. 670. Washington D.C.: World Bank.

Cleveland, W. 1979. Robust locally weighted regression and smoothing scatterplots. *Journal of the American Statistical Association* 74 (December): 829-36.

Coady, D., and H. Djebbari. 1999. A preliminary process evaluation of the Education, Health and Nutrition Program (PROGRESA) of Mexico. Washington, D.C.: International Food Policy Research Institute. Mimeo.

Dasgupta, P. 1993. *An inquiry into well-being and destitution*. Oxford: Clarendon Press.

Deaton, A. 1997. *The analysis of household survey data*. Baltimore: Johns Hopkins University Press.

Deaton, A. and M. Grosh. 2000. Consumption. In *Designing household survey questionnaires for developing countries*, eds. M. Grosh and P. Glewwe. Washington: The World Bank.

Deaton, A., and S. Zaidi. 1999. Guidelines for constructing consumption aggregates for welfare analysis. Princeton University. Mimeo

Durnin, J. 1996. Energy requirements: General principles. *European Journal of Clinical Nutrition* 50 (supplement 1): S2-S10.

Edirisinghe, N. 1987. The food stamp scheme in Sri Lanka: Costs, benefits and options for modification. Washington, D.C.: International Food Policy Research Institute. Mimeo.

Efron, B., and Tibshirani, R.J. 1993. *An introduction to the bootstrap*. London: Chapman and Hall.

Fan, J. 1993. Local linear regression smoothers and their minimax efficiencies. *Annals of Statistics*, 21 (March): 998-1004.

FAO/WHO/UNU Expert Consultation. 1985. *Energy and protein requirements*. WHO Technical Report Series 724. Geneva: World Health Organization.

Garcia, M., and P. Pinstrup-Andersen. 1987. The pilot food price subsidy scheme in the Philippines: Impact on incomes, food consumption and nutritional status. Washington, D.C.: International Food Policy Research Institute. Mimeo.

Gomez de Leon, J, S. W. Parker, D. Hernandez, P. Muniz, and M. Orozco. 1999. The design and methodology of the impact evaluation of the education, health and nutrition program (PROGRESA) in Mexico. Mexico City: PROGRESA. Mimeo. June 1999.

Haddad, L., J. Hoddinott, and H. Alderman, eds. 1997. *Intrahousehold resource allocation in developing countries: Models, methods and policy*. Baltimore: Johns Hopkins University Press.

Hausman, J. 1978. Specification tests in econometrics. *Econometrica* 46: 1251-1270.

Hausman, J., and W.E. Taylor. 1981. Panel data and unobservable individual effects. *Econometrica* 47: 455-473.

MAFF (Ministry of Agriculture, Fisheries and Food). 1996. *Manual of nutrition*. HMSO: London.

Murray, D. 1998. *Design and analysis of group-randomized trials.* Monographs in Epidemiology and Biostatitics, vol. 27. New York: Oxford University Press.

Onyango, A., K. Koski, and K. Tucker. 1998. Food diversity versus breastfeeding choice in determining anthropometric status in rural Kenyan toddlers. *International Journal of Epidemiology* 27: 484-489.

Pitt, M., M. Rosenzweig, and MD Hassan. 1990. Productivity, health and inequality in the intrahousehold distribution of food in low-income countries. *American Economic Review* 80: 1139-1156.

PROGRESA. 1997. *PROGRESA: Programa de Educacion, Salud y Alimentacion*. Mexico City, Mexico.

Ravallion, M. 1990. Income effects on undernutrition. *Economic Development and Cultural Change* 38: 489-515.

Schultz, T.P. 1999. Preliminary evidence of the impact of PROGRESA on school enrollments from 1997 and 1998. Report submitted to PROGRESA. Washington, D.C.: International Food Policy Research Institute.

Shetty, P. et. al. 1996. Energy requirements of adults: An update on basal metabolic rates (BMRs) and physical activity levels (PALs). *European Journal of Clinical Nutrition* 50 (supplement 1): S11-S23.

Singh, I., L. Squire, and J. Strauss, eds. 1986. *Agricultural household models: Extensions, applications and policy*. Baltimore: Johns Hopkins University Press.

Skoufias, E., B. Davis, and J. Behrman. 1999. Final report: An evaluation of the selection of beneficiary households in the Education, Health and Nutrition Program (PROGRESA). Report submitted to PROGRESA. Washington, D.C.: International Food Policy Research Institute.

Strauss, J., and D. Thomas. 1990. The shape of the calorie expenditure curve. Discussion Paper No. 595. Yale University.

Strauss, J., and D. Thomas. 1995. Human resource: Empirical modeling of household and family decisions. In *Handbook of development economics* vol. 3, eds. J. Behrman and T.N. Srinivasan. Amsterdam: North-Holland.

Subramanian, S. and A. Deaton. 1996. The demand for food and calories. *Journal of Political Economy* 104: 133-162.

Taren, D., and J. Chen. 1993. A positive association between extended breastfeeding and nutritional status in rural Hubel Province, People's Republic of China. *American Journal of Clinical Nutrition* 58: 862-867.

Timmer, P., and H. Alderman. 1979. Estimating consumption parameters for food policy analysis. *American Journal of Agricultural Economics*. 61: 982-994.

Trairatvorakul,. 1984. (get ref from the published version of Strauss and Thomas)

von Braun, J., D. Puetz, and P. Webb. 1989. *Irrigation technology and commercialization of rice in the Gambia: Effects on income and nutrition*. Research Report No. 75. Washington D.C. International Food Policy Research Institute.

Ward, J., and J. Sanders. 1980. Nutritional determinants and migration in the Brazilian northeast: A case study of rural and urban Ceara. *Economic Development and Cultural Change* 29: 141-163.

Wolfe, B. and J. Behrman. 1983. Is income overrated in determining adequate nutrition? *Economic Development and Cultural Change* 31: 525-549.

Table 2.1— Estimates of the Relationship Between Household Resources and Food Acquisition

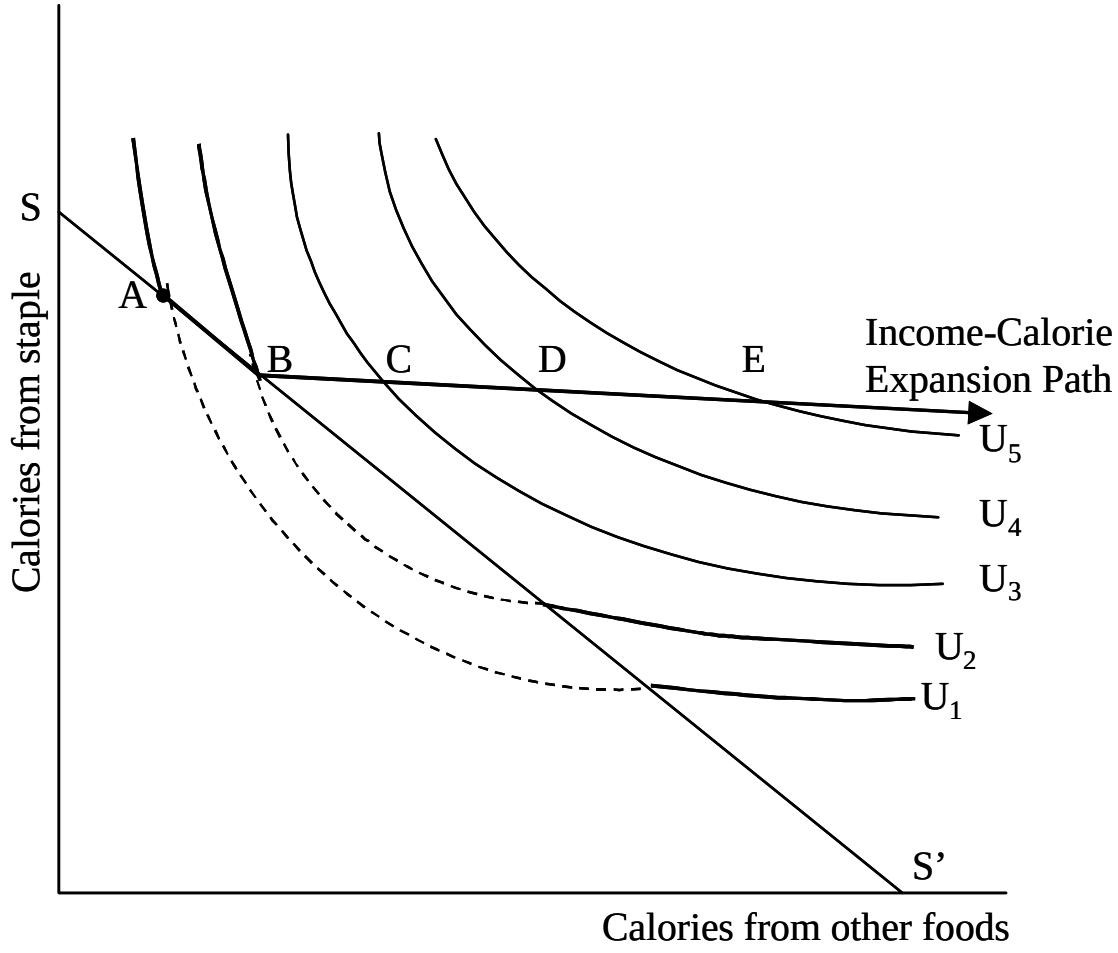
Country	Author(s)	Measure of Household Resources	Measure of Calories	Estimation Method	Elasticity (at mean)
Brazil	Strauss & Thomas (1990)	expenditures	intake-7 day recall weighed	OLS	0.20
"	"	"	"	2SLS	0.11
"	Strauss & Thomas (1995)	"	"	non-parametric	0.29 (below median); falls to 0 (above median)
"	Ward & Sanders (1980)	income	availability	OLS	0.24
"	"	"	"	2SLS	0.53
Gambia	von Braun, Puetz & Webb (1989)	income	"	OLS	0.37-0.48
India	Alderman (1987)	expenditures	availability	2SLS	0.41-0.44
"	Behrman & Deolalikar (1987)	expenditures	intake-24hr recall	2SLS	0.17 (not significant)
"	"	"	"	FE	0.37 (not significant)
"	Strauss & Thomas (1995)	"	"	non-parametric	0.30 (below median); falls to 0 (above median
"	Subramanian & Deaton (1996)	expenditures	availability	non-parametric	0.3-0.5
Indonesia	Chernichovsky & Meesook (1984)	expenditures	intake – 7 day recall	OLS	0.54
"	Ravallion (1990)	expenditures	intake – 7 day recall	OLS	0.15
"	Timmer & Alderman (1979)	expenditures	availability	OLS	0.51 (rural) 0.26 (urban)
Nicaragua	Behrman & Wolfe (1984)	income	intake – 24 hr recall	OLS	0.05
"	Wolfe & Behrman (1983)	income	intake – 24 hr recall	OLS	0.01

(continued)

Table 2.1 — Continued

Country	Author(s)	Measure of Household Resources	Measure of Calories	Estimation Method	Elasticity (at mean)
Philippines	Bouis & Haddad (1992)	expenditures	availability	OLS	0.43
"	"	"	"	2SLS	0.32
"	"	"	"	FE	0.59
"	"	"	intake – 24hr recall	OLS	0.12
"	"	"	"	2SLS	0.08
"	"	"	"	FE	0.14
"	"	income	availability	OLS	0.11
"	"	"	"	2SLS	0.28
"	"	"	intake – 24hr recall	OLS	0.03
"	"	"	"	2SLS	0.09
"	Strauss & Thomas (1995)	expenditures	"	non-parametric	0.33 (below median); falls to 0 (above median
"	Garcia & Pinstrup-Andersen (1987)	expenditures	availability	OLS	0.12-0.34
Sri Lanka	Edirisinghe (1987)	expenditures	availability	OLS	0.56
Thailand	Trairatvorakul (1984)	income	availability	OLS	0.27-0.33

Figure 2.1 — Demand for Food Variety as Income Increases



Source: Behrman (1988).

Table 3.1 — Consumption and Purchases of Maize Tortillas in Previous Seven Days by Locality and Eligibility for PROGRESA

	Mean Household Consumption of Tortillas (kgs) in Previous Seven Days	Mean Household Purchases of Tortillas (kgs) in Previous Seven Days	Difference (kgs)
PROGRESA community and is eligible			
Nov-98	14.08	4.68	9.40
Jun-99	12.89	3.38	9.51
Nov-99	13.76	7.72	6.04
Non PROGRESA community, but eligible			
Nov-98	12.94	4.59	8.35
Jun-99	11.90	3.62	8.28
Nov-99	13.34	7.73	5.61
PROGRESA community, not eligible			
Nov-98	11.73	4.77	6.96
Jun-99	10.56	3.20	7.36
Nov-99	11.52	6.34	5.18
Non PROGRESA community, not eligible			
Nov-98	11.92	4.98	6.95
Jun-99	10.25	3.38	6.86
Nov-99	13.40	8.64	4.76

Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys. Sample does not include 212 observations reporting that no food was consumed within the home.

Table 3.2 — Monthly Expenditures: Poor Beneficiary and Control Households

		Beneficiary Households	Control Households	Percent Differences
Mean monthly value of consumption per household	Nov-98	1,330.9	1,130.2	17.8%
	Jun-99	1,152.4	1,016.4	13.4%
	Nov-99	1,049.9	926.0	13.4%
Mean monthly value of consumption per per person	Nov-98	260.0	242.7	7.1%
	Jun-99	232.6	223.9	3.9%
	Nov-99	208.8	202.3	3.2%
Mean monthly value of food consumed per person	Nov-98	217.8	194.1	12.2%
	Jun-99	184.6	175.0	5.5%
	Nov-99	159.0	149.5	6.4%
Mean monthly food expenditures per person	Nov-98	129.2	133.4	-3.1%
	Jun-99	122.4	113.2	8.2%
	Nov-99	116.1	110.0	5.6%
Mean monthly nonfood expenditures per person	Nov-98	42.2	48.6	-13.2%
	Jun-99	48.0	49.0	-2.1%
	Nov-99	49.8	52.8	-5.7%
Median monthly value of consumption per per person	Nov-98	177.8	176.7	0.6%
	Jun-99	174.7	160.5	8.9%
	Nov-99	171.5	160.4	6.9%
Mean household size	Nov-98	5.76	5.46	5.5%
	Jun-99	5.66	5.37	5.4%
	Nov-99	5.75	5.44	5.7%
Mean number of household members aged 0-18 years	Nov-98	3.62	3.22	12.2%
	Jun-99	3.64	3.25	12.0%
	Nov-99	3.68	3.31	11.5%
Mean number of household members aged 19-54 years	Nov-98	2.06	2.04	1.3%
	Jun-99	2.14	2.12	0.8%
	Nov-99	2.18	2.16	1.1%
Mean number of household members 55 years old or older	Nov-98	0.47	0.54	-12.2%
	Jun-99	0.48	0.56	-13.8%
	Nov-99	0.49	0.57	-14.5%
Sample size	Nov-98	8,500	7,128	19.2%
	Jun-99	8,018	6,627	21.0%
	Nov-99	7,850	6,811	15.3%

Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys.

Sample does not include 212 observations reporting that no food was consumed within the home.

Table 3.3a — PROGRESA Transfer Schedule (Nominal Pesos)

	January-June 1998	July-December 1998	January-June 1999	July-December 1999
SCHOLARSHIPS				
Primary:				
3rd grade	65	70	75	80
4th grade	75	80	90	95
5th grade	95	105	115	125
6th grade	130	135	150	165
Secondary:				
1st – male	190	200	220	240
2nd – male	200	210	235	250
3rd – male	210	225	245	265
1st – female	200	210	235	250
2nd – female	220	235	260	280
3rd – female	240	255	285	305
Scholarship Maximum:	490	525	580	625
SCHOOL MATERIALS				
Primary - September	-	In-kind	-	110
Primary – January	40	-	45	-
Secondary - September	-	170	-	205
CONSUMPTION				
HH Consumption Transfer	95	105	115	125

Source: Hernandez Franco and Vazquez Cermeno, (1998), PROGRESA, (1998) and PROGRESA, (1998)

Table 3.3b — PROGRESA Transfer Schedule (November 1998 Pesos)

	January-June 1998	July-December 1998	January-June 1999	July-December 1999
6 Month CPI adjust factor	0.91	0.98	1.08	1.13
SCHOLARSHIPS				
Primary:				
3rd grade	71.4	71.4	69.4	70.8
4th grade	82.4	81.6	83.3	84.1
5th grade	104.4	107.1	106.5	110.6
6th grade	142.9	137.8	138.9	146.0
Secondary:				
1st – male	208.8	204.1	203.7	212.4
2nd – male	219.8	214.3	217.6	221.2
3rd – male	230.8	229.6	226.9	234.5
1st – female	219.8	214.3	217.6	221.2
2nd – female	241.8	239.8	240.7	247.8
3rd – female	263.7	260.2	263.9	269.9
Scholarship Maximum:	538.5	535.7	537.0	553.1
SCHOOL MATERIALS				
Primary - September	-	In-kind	-	97.3
Primary – January	44.0	-	41.7	-
Secondary - September	-	173.5	-	181.4
CONSUMPTION				
HH Consumption Transfer	104.4	107.1	106.5	110.6

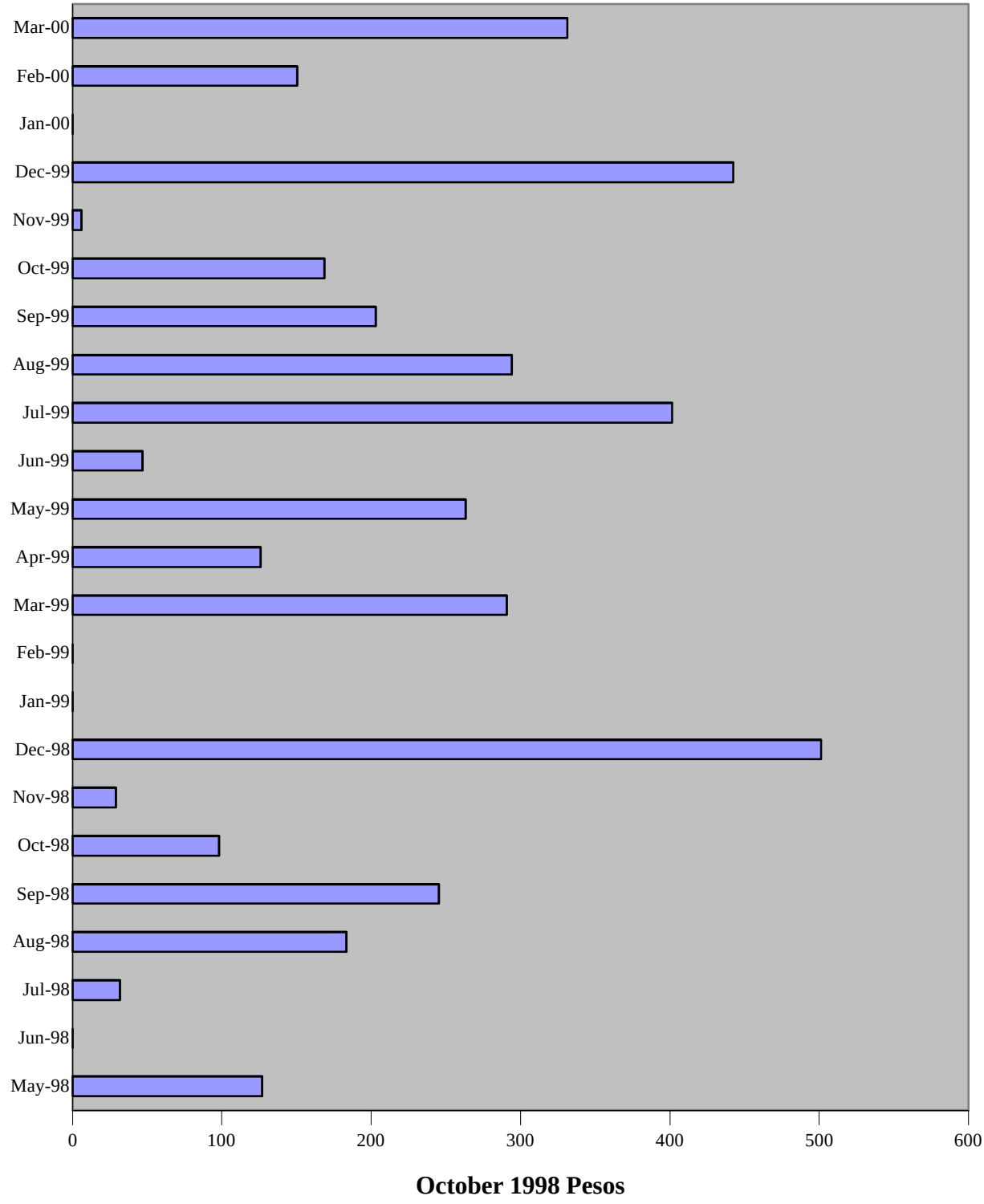
Source: Hernandez Franco and Vazquez Cermeno, (1998), PROGRESA, (1998) and PROGRESA, (1998) and Banco de Mexico, Indices de Precios.

Table 3.4 — PROGRESA Transfers to Beneficiary Households from November 1998 to October 1999

	Beneficiary Households						Poor Households Residing in Control Localities		
	Household size	Total value of consumption (Food) [Nonfood]	Average monthly transfers received	Average monthly *alimento* transfer	Average monthly *beca* transfer	Average monthly school utilities transfer	Household size	Total expenditures (Food) [Nonfood]	Transfers as a percentage of non-beneficiaries expenditures
All poor households	5.81	1190 (947) [242]	197	99	91	8	5.47	1039 (806) [233]	19.54%
Households with pre-schoolers	6.58	1289	202	101	93	8	6.41	1092	18.7%
Households with school aged children	6.59	1311	239	101	128	11	6.40	1155	20.9%
Households with heads aged 60 or older	4.35	936	138	93	41	3	4.23	880	16.5%

Source: Calculations based on transfer data provided by PROGRESA averaged across the 12 months period between November 1998 and October 1999 (deflated to November 1998 prices). Consumption and family size averaged across the 3 rounds of the ENCEL surveys in November 1998, June 1999, and November 1999.

Figure 3.1— Average Cash Transfers from PROGRESA



Source: Calculations based on transfer data provided by PROGRESA deflated to November 1998 prices.

Table 4.1a—Expenditures on Food by Poor Beneficiary and Control Households: Totals and Broad Categories

Monthly Expenditure Per Person	Beneficiary 25%	Control 25%	Percent Difference	Beneficiary Median	Control Median	Percent Difference	Beneficiary 75%	Control 75%	Percent Difference	Beneficiary Mean	Control Mean	Percent Difference
All food												
Nov-98	69.5	66.0	5.3%	105.2	104.3	0.8%	155.5	161.9	-4.0%	129.2	133.4	-3.1%
Jun-99	66.2	56.9	16.3%	97.6	88.4	10.4%	142.5	137.2	3.8%	122.4	113.2	8.2%
Nov-99	67.7	57.2	18.3%	96.6	89.4	8.1%	139.9	133.5	4.8%	116.1	110.0	5.6%
Cereals and grains												
Nov-98	22.3	21.7	2.5%	40.2	41.8	-3.8%	65.9	69.5	-5.2%	51.4	53.4	-3.8%
Jun-99	20.8	19.8	5.0%	37.9	36.1	5.2%	60.2	59.4	1.3%	48.1	45.9	4.8%
Nov-99	20.6	18.3	12.5%	36.6	34.3	6.7%	56.7	56.1	1.0%	43.9	42.7	2.8%
Fruits and vegetables												
Nov-98	9.6	8.7	10.0%	17.4	16.3	6.7%	28.6	28.6	0.0%	23.3	23.8	-1.9%
Jun-99	7.9	5.9	33.3%	13.2	10.7	22.8%	21.8	18.8	15.8%	19.1	16.5	15.9%
Nov-99	8.7	6.9	27.0%	14.0	11.9	17.3%	22.9	20.0	14.3%	19.1	17.7	8.0%
Meat and animal products												
Nov-98	6.2	5.2	19.0%	16.9	15.2	11.4%	35.2	34.8	1.3%	26.3	26.6	-1.1%
Jun-99	6.6	4.6	42.9%	17.8	13.2	35.0%	35.6	30.1	18.4%	27.4	23.0	19.0%
Nov-99	8.1	5.4	48.8%	20.0	15.3	31.2%	37.4	32.4	15.3%	27.8	24.3	14.5%
Other food												
Nov-98	13.5	13.0	3.3%	20.9	21.7	-4.0%	32.6	33.9	-3.8%	28.2	29.6	-4.7%
Jun-99	13.4	12.5	6.6%	20.5	19.8	3.3%	31.7	31.7	0.0%	27.8	27.8	0.1%
Nov-99	13.8	12.7	8.8%	20.2	19.7	2.3%	29.6	30.5	-3.1%	25.2	25.3	-0.1%

Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys. Sample does not include 212 observations reporting that no food was consumed within the home.

Table 4.1b—Value of Food Consumption by Poor Beneficiary and Control Households: Totals and Broad Categories

Monthly Value of Food Consumed/Person	Beneficiary 25%	Control 25%	Percent Difference	Beneficiary Median	Control Median	Percent Difference	Beneficiary 75%	Control 75%	Percent Difference	Beneficiary Mean	Control Mean	Percent Difference
All food												
Nov-98	100.9	97.5	3.4%	141.8	139.0	2.0%	203.9	207.4	-1.7%	217.8	194.1	12.2%
Jun-99	94.4	84.1	12.2%	134.6	120.7	11.5%	192.3	178.9	7.5%	184.6	175.0	5.5%
Nov-99	94.4	83.2	13.5%	129.4	117.0	10.6%	180.2	171.4	5.1%	159.0	149.5	6.4%
Cereals and grains												
Nov-98	47.8	46.9	1.8%	68.2	66.8	2.1%	97.8	97.0	0.8%	115.9	91.0	27.4%
Jun-99	42.9	40.7	5.5%	63.4	60.2	5.4%	92.7	88.1	5.3%	91.9	93.9	-2.1%
Nov-99	40.7	38.8	4.9%	56.8	54.0	5.2%	80.7	76.3	5.8%	70.7	68.0	4.0%
Fruits and vegetables												
Nov-98	11.9	11.3	6.0%	20.9	20.2	3.2%	34.0	34.8	-2.1%	29.1	30.7	-5.3%
Jun-99	9.6	7.4	30.8%	15.8	13.2	20.0%	26.4	23.0	14.9%	24.8	20.9	18.8%
Nov-99	11.2	9.1	24.0%	17.8	15.3	16.7%	28.0	24.8	12.8%	24.7	22.4	9.9%
Meat and animal products												
Nov-98	8.1	7.2	12.5%	21.7	18.8	15.4%	42.0	41.3	1.8%	35.9	33.4	7.6%
Jun-99	7.9	5.9	33.3%	21.1	16.6	27.0%	41.6	35.6	16.7%	35.5	29.4	20.7%
Nov-99	11.9	7.6	56.2%	24.8	19.1	30.0%	44.5	38.1	16.7%	35.1	31.6	11.0%
Other food										`		
Nov-98	13.7	13.8	-0.6%	21.7	21.7	0.0%	33.5	34.8	-3.6%	36.9	39.0	-5.4%
Jun-99	13.6	12.9	5.5%	20.8	19.8	5.0%	32.3	31.7	2.1%	32.4	30.8	5.4%
Nov-99	14.6	13.4	9.5%	21.0	20.3	3.1%	31.1	31.7	-2.0%	28.6	27.4	4.1%

Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys. Sample does not include 212 observations reporting that no food was consumed within the home.

Table 4.2 — Proportions of Poor Households Consuming Different Foods

Code	Food	Percentage of PROGRESA Beneficiaries Consuming this Food	Percentage of Control Households Consuming this Food	Difference in Percentages	Percentage Difference
Fruits and vegetables					
1	Tomatoes				
	Nov-98	87.6%	86.8%	0.8%	0.9%
	Jun-99	92.4%	91.3%	1.1%	1.2%
	Nov-99	96.4%	93.9%	2.5%	2.7%
2	Onions				
	Nov-98	91.1%	88.3%	2.8%	3.2%
	Jun-99	94.8%	92.6%	2.2%	2.4%
	Nov-99	96.5%	93.8%	2.7%	2.8%
3	Potatoes				
	Nov-98	50.8%	46.0%	4.8%	10.4%
	Jun-99	56.3%	46.2%	10.1%	22.0%
	Nov-99	60.2%	48.2%	12.1%	25.0%
4	Carrots				
	Nov-98	7.7%	6.8%	0.9%	13.6%
	Jun-99	8.5%	6.5%	2.0%	31.2%
	Nov-99	7.1%	5.7%	1.4%	25.4%
5	Leafy vegetables				
	Nov-98	7.7%	7.4%	0.3%	3.7%
	Jun-99	8.1%	5.6%	2.5%	44.5%
	Nov-99	5.7%	4.7%	1.1%	22.8%
6	Oranges				
	Nov-98	37.0%	32.2%	4.8%	14.8%
	Jun-99	21.5%	13.4%	8.1%	60.4%
	Nov-99	47.3%	40.0%	7.3%	18.2%
7	Plantains				
	Nov-98	43.5%	36.2%	7.3%	20.3%
	Jun-99	46.8%	35.1%	11.7%	33.4%
	Nov-99	49.4%	39.3%	10.1%	25.7%

Table 4.2 — Proportions of Poor Households Consuming Different Foods (continued)

Code	Food	Percentage of PROGRESA Beneficiaries Consuming this Food	Percentage of Control Households Consuming this Food	Difference in Percentages	Percentage Difference
8	Apples				
	Nov-98	15.1%	12.2%	2.9%	24.0%
	Jun-99	6.4%	3.7%	2.7%	72.3%
	Nov-99	14.9%	10.3%	4.6%	44.1%
9	Lemons				
	Nov-98	30.6%	28.8%	1.8%	6.3%
	Jun-99	30.4%	23.7%	6.7%	28.4%
	Nov-99	33.7%	32.6%	1.1%	3.5%
10	Prickly pears				
	Nov-98	16.1%	14.3%	1.8%	12.7%
	Jun-99	34.9%	27.4%	7.5%	27.5%
	Nov-99	11.4%	8.9%	2.5%	28.0%
Cereals and Grains					
11	Maize tortillas				
	Nov-98	90.1%	89.2%	0.9%	1.1%
	Jun-99	78.3%	76.4%	1.9%	2.5%
	Nov-99	85.5%	90.2%	-4.7%	-5.2%
12	Maize grain				
	Nov-98	45.2%	43.5%	1.7%	3.9%
	Jun-99	58.4%	57.0%	1.4%	2.5%
	Nov-99	34.2%	25.9%	8.2%	31.8%
13	White bread				
	Nov-98	18.3%	15.7%	2.6%	16.7%
	Jun-99	17.0%	11.8%	5.2%	44.0%
	Nov-99	14.2%	12.2%	2.0%	16.4%
14	Sweet bread				
	Nov-98	31.9%	28.1%	3.8%	13.6%
	Jun-99	34.1%	26.2%	7.9%	30.0%
	Nov-99	39.3%	29.9%	9.3%	31.2%

Table 4.2 — Proportions of Poor Households Consuming Different Foods (continued)

Code	Food	Percentage of PROGRESA Beneficiaries Consuming this Food	Percentage of Control Households Consuming this Food	Difference in Percentages	Percentage Difference
15	Loaf of bread (Wonderbread)				
	Nov-98	1.6%	1.3%	0.3%	20.8%
	Jun-99	1.1%	0.7%	0.4%	56.7%
	Nov-99	1.0%	0.8%	0.1%	15.7%
16	Wheat flour				
	Nov-98	7.2%	5.7%	1.6%	27.3%
	Jun-99	3.7%	2.7%	1.0%	39.5%
	Nov-99	5.6%	4.8%	0.7%	14.9%
17	Pasta noodles				
	Nov-98	67.7%	63.3%	4.4%	7.0%
	Jun-99	62.9%	57.2%	5.8%	10.1%
	Nov-99	73.9%	68.5%	5.4%	7.8%
18	Rice				
	Nov-98	63.7%	61.8%	1.9%	3.0%
	Jun-99	63.6%	58.0%	5.7%	9.8%
	Nov-99	66.0%	62.3%	3.8%	6.0%
19	Crackers				
	Nov-98	15.2%	12.9%	2.3%	18.3%
	Jun-99	13.7%	9.9%	3.8%	38.8%
	Nov-99	12.2%	10.2%	2.0%	19.8%
20	Beans				
	Nov-98	96.4%	96.0%	0.4%	0.4%
	Jun-99	95.4%	95.4%	0.0%	0.0%
	Nov-99	96.7%	96.8%	-0.1%	-0.1%
21	Breakfast cereal				
	Nov-98	0.9%	0.6%	0.2%	37.9%
	Jun-99	1.3%	1.0%	0.4%	35.2%
	Nov-99	1.4%	1.0%	0.4%	40.8%

Table 4.2 — Proportions of Poor Households Consuming Different Foods (continued)

Code	Food	Percentage of PROGRESA Beneficiaries Consuming this Food	Percentage of Control Households Consuming this Food	Difference in Percentages	Percentage Difference
Meat, poultry, and dairy					
22	Chicken				
	Nov-98	41.6%	37.3%	4.4%	11.7%
	Jun-99	47.3%	38.2%	9.2%	24.0%
	Nov-99	56.2%	44.1%	12.0%	27.3%
23	Beef and pork				
	Nov-98	19.1%	16.7%	2.4%	14.6%
	Jun-99	23.0%	17.7%	5.3%	30.0%
	Nov-99	27.2%	20.9%	6.4%	30.5%
24	Goat and sheep				
	Nov-98	0.6%	0.4%	0.2%	35.3%
	Jun-99	0.7%	0.4%	0.3%	71.7%
	Nov-99	0.2%	0.2%	0.0%	17.8%
25	Fish				
	Nov-98	1.6%	1.6%	0.0%	-2.3%
	Jun-99	2.1%	1.4%	0.7%	53.5%
	Nov-99	1.3%	1.1%	0.1%	12.3%
26	Sardines and tuna				
	Nov-98	7.4%	5.7%	1.7%	29.3%
	Jun-99	7.7%	5.5%	2.2%	39.7%
	Nov-99	11.6%	10.4%	1.3%	12.3%
27	Eggs				
	Nov-98	83.8%	79.1%	4.8%	6.0%
	Jun-99	85.3%	80.7%	4.7%	5.8%
	Nov-99	86.2%	80.3%	5.9%	7.4%
28	Milk				
	Nov-98	24.8%	23.1%	1.7%	7.3%
	Jun-99	18.9%	14.7%	4.2%	28.7%
	Nov-99	22.5%	19.5%	2.9%	15.0%

Table 4.2 — Proportions of Poor Households Consuming Different Foods (continued)

Code	Food	Percentage of PROGRESA Beneficiaries Consuming this Food	Percentage of Control Households Consuming this Food	Difference in Percentages	Percentage Difference
29	Cheese				
	Nov-98	11.2%	10.1%	1.2%	11.5%
	Jun-99	9.9%	6.7%	3.2%	47.2%
	Nov-99	9.7%	8.1%	1.5%	18.7%
30	Lard				
	Nov-98	17.1%	15.4%	1.7%	11.3%
	Jun-99	16.6%	14.5%	2.1%	14.2%
	Nov-99	13.7%	13.7%	0.1%	0.5%
Other foods					
31	Cupcakes				
	Nov-98	0.6%	0.5%	0.1%	19.4%
	Jun-99	0.3%	0.1%	0.2%	138.8%
	Nov-99	0.4%	0.3%	0.1%	36.3%
32	Soda				
	Nov-98	18.2%	15.4%	2.8%	18.2%
	Jun-99	21.4%	15.0%	6.3%	42.0%
	Nov-99	18.8%	16.0%	2.7%	17.0%
33	Coffee				
	Nov-98	67.1%	69.4%	-2.3%	-3.3%
	Jun-99	66.0%	66.5%	-0.5%	-0.8%
	Nov-99	73.0%	71.3%	1.7%	2.4%
34	Sugar				
	Nov-98	93.2%	90.4%	2.8%	3.1%
	Jun-99	93.7%	92.1%	1.6%	1.7%
	Nov-99	97.3%	95.9%	1.4%	1.4%
35	Vegetable Oil				
	Nov-98	84.8%	83.5%	1.3%	1.6%
	Jun-99	84.2%	84.7%	-0.5%	-0.6%
	Nov-99	89.7%	88.0%	1.7%	2.0%

Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys. Sample does not include 212 observations reporting that no food was consumed within the home.

Table 4.3 — Dietary Diversity as Measured by Number of Foods Consumed: Poor Households Only

		Beneficiary Households	Control Households	Difference
Total number of foods consumed	Nov-98	13.0	12.3	0.7
	Jun-99	13.1	11.8	1.3
	Nov-99	13.6	12.5	1.1
Total number of types of fruits & vegetables consumed	Nov-98	3.9	3.6	0.3
	Jun-99	4.0	3.5	0.5
	Nov-99	4.2	3.8	0.5
Total number of types of cereals & grains consumed	Nov-98	4.4	4.2	0.2
	Jun-99	4.3	4.0	0.3
	Nov-99	4.3	4.0	0.3
Total number of types of meats & animal products consumed	Nov-98	2.1	1.9	0.2
	Jun-99	2.1	1.8	0.3
	Nov-99	2.3	2.0	0.3
Total number of types of other foods consumed	Nov-98	2.7	2.6	0.0
	Jun-99	2.7	2.6	0.1
	Nov-99	2.8	2.7	0.1

Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys. Sample does not include 212 observations reporting that no food was consumed within the home.

Table 4.4 — Dietary Diversity as Measured by Percentage of Poor Households Not Eating any Foods in Food Grouping

		Beneficiary Households	Control Households	Difference
Percentage of households not eating any fruits or vegetables*	Nov-98	2.8%	4.4%	-1.6%
	Jun-99	1.6%	2.4%	-0.8%
	Nov-99	0.6%	2.1%	-1.6%
Percentage of households not eating any vegetables aside from tomatoes or onions**	Nov-98	18.2%	22.8%	-4.6%
	Jun-99	17.0%	26.1%	-9.1%
	Nov-99	12.2%	20.0%	-7.9%
Percentage of households not eating any tortillas	Nov-98	9.9%	10.8%	-0.9%
	Jun-99	21.7%	23.6%	-1.9%
	Nov-99	14.5%	9.8%	4.7%
Percentage of households not eating any meat or fish***	Nov-98	47.9%	53.2%	-5.3%
	Jun-99	41.9%	51.1%	-9.2%
	Nov-99	32.9%	43.8%	-10.9%
Percentage of households not eating any dairy products****	Nov-98	12.5%	17.0%	-4.6%
	Jun-99	12.3%	16.3%	-4.0%
	Nov-99	10.5%	16.3%	-5.8%
Percentage of households not eating any processed foods*****	Nov-98	18.6%	22.6%	-4.0%
	Jun-99	19.9%	26.5%	-6.6%
	Nov-99	15.0%	20.2%	-5.2%

*Includes: tomatoes, onions, potatoes, carrots, leafy vegetables, oranges, plantains, apples, lemons and prickly pears
**Includes: potatoes, carrots, leafy vegetables, oranges, plantains, apples, lemons and prickly pears
***Includes: chicken, beef, pork, fish, canned sardines and canned tuna
****Includes: eggs, milk and cheese
*****Includes: white bread, sweet bread, loaf of bread (Wonderbread), noodles, crackers, breakfast cereal, cupcakes and soda

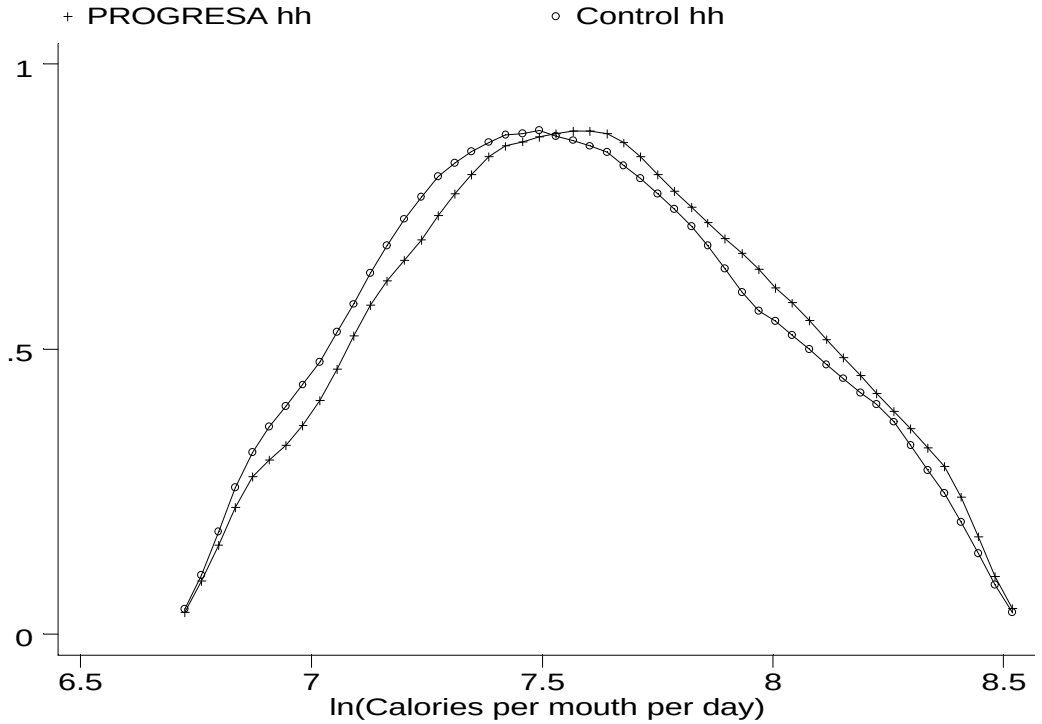
Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys. Sample does not include 212 observations reporting that no food was consumed within the home.

Table 4.5 — Household Caloric Availability per Month per Day: Poor Beneficiary and Control Households

	Beneficiary 25%	Control 25%	Percent Difference	Beneficiary Median	Control Median	Percent Difference	Beneficiary 75%	Control 75%	Percent Difference	Beneficiary Mean	Control Mean	Percent Difference
All food												
Nov-98	1,450.0	1,432.8	1.2%	1,957.6	1,930.3	1.4%	2,699.8	2,682.6	0.6%	2,160.6	2,144.2	0.8%
Jun-99	1,547.5	1,513.9	2.2%	2,136.4	2,054.2	4.0%	2,925.4	2,828.3	3.4%	2,302.9	2,245.9	2.5%
Nov-99	1,494.8	1,387.8	7.7%	1,940.0	1,799.4	7.8%	2,569.4	2,389.9	7.5%	2,109.5	1,978.6	6.6%
Cereals and grains												
Nov-98	1,006.9	994.3	1.3%	1,421.4	1,397.1	1.7%	2,076.7	2,038.2	1.9%	1,622.2	1,597.4	1.6%
Jun-99	1,067.2	1,064.0	0.3%	1,550.2	1,495.5	3.7%	2,291.1	2,214.8	3.4%	1,735.8	1,700.9	2.0%
Nov-99	1,005.9	943.3	6.6%	1,348.2	1,250.1	7.9%	1,836.5	1,690.1	8.7%	1,510.5	1,395.8	8.2%
Fruits and vegetables												
Nov-98	17.3	14.4	20.6%	36.1	33.0	9.6%	64.5	62.4	3.4%	46.9	45.2	3.7%
Jun-99	20.1	13.4	50.0%	38.1	29.8	27.9%	64.5	54.3	18.7%	48.0	39.6	21.2%
Nov-99	24.6	17.9	37.6%	44.5	36.3	22.7%	75.7	63.9	18.5%	55.5	46.7	18.7%
Meat and animal products												
Nov-98	33.1	30.9	7.0%	77.3	74.0	4.5%	162.1	161.6	0.4%	125.9	123.7	1.8%
Jun-99	39.6	31.0	27.5%	81.4	66.8	21.8%	169.6	147.9	14.7%	129.2	113.4	14.0%
Nov-99	49.7	36.9	34.7%	94.8	79.0	20.0%	176.5	166.3	6.1%	137.5	127.4	7.9%
Other food												
Nov-98	230.0	224.7	2.4%	326.3	336.5	-3.0%	446.5	471.9	-5.4%	365.5	377.8	-3.3%
Jun-99	243.0	238.9	1.7%	344.8	339.6	1.5%	469.7	497.5	-5.6%	389.9	392.1	-0.5%
Nov-99	269.7	254.3	6.1%	363.5	359.4	1.1%	487.7	534.4	-8.7%	406.0	408.7	-0.7%

Source: ENCEL98O, ENCEL99J and ENCEL99N household surveys. Sample does not include 212 observations reporting that no food was consumed within the home or 10% of consumption records with caloric availability per person per day less than or equal to 875 kcal or greater than or equal to 4700 kcal.

Figure 4.1 — Caloric Availability



Based on data including poor households only across the three survey rounds: November 1998, June 1999, and November 1999.

Table 5.1— Dependent Variable: Log of Total Calories Available per Person per Day Controlling for Household Characteristics and Municipality Fixed Effects

Log calories	Survey Round	Regressor	coeff.	t-value	p-value
Total	Nov-98	Treatment Locality (T)	-0.029	-2.6	0.01
		Eligible/Poor Household (E)	-0.025	-2.4	0.02
		Beneficiary Household (TxE)	0.043	3.5	0.00
	Jun-99	Treatment Locality (T)	0.016	1.4	0.17
		Eligible/Poor Household (E)	-0.016	-1.5	0.13
		Beneficiary Household (TxE)	0.027	2.1	0.04
	Nov-99	Treatment Locality (T)	0.025	2.6	0.01
		Eligible/Poor Household (E)	-0.029	-3.2	0.00
		Beneficiary Household (TxE)	0.046	4.3	0.00
From Grains	Nov-98	Treatment Locality (T)	-0.024	-1.7	0.09
		Eligible/Poor Household (E)	-0.001	-0.1	0.95
		Beneficiary Household (TxE)	0.035	2.3	0.02
	Jun-99	Treatment Locality (T)	0.027	1.7	0.08
		Eligible/Poor Household (E)	0.001	0.1	0.96
		Beneficiary Household (TxE)	0.010	0.6	0.56
	Nov-99	Treatment Locality (T)	0.036	2.8	0.01
		Eligible/Poor Household (E)	-0.014	-1.2	0.21
		Beneficiary Household (TxE)	0.036	2.6	0.01
From Vegatables	Nov-98	Treatment Locality (T)	-0.073	-2.8	0.01
		Eligible/Poor Household (E)	-0.172	-7.1	0.00
		Beneficiary Household (TxE)	0.161	5.6	0.00
	Jun-99	Treatment Locality (T)	0.004	0.2	0.88
		Eligible/Poor Household (E)	-0.132	-5.8	0.00
		Beneficiary Household (TxE)	0.217	8.0	0.00
	Nov-99	Treatment Locality (T)	0.034	1.5	0.14
		Eligible/Poor Household (E)	-0.129	-6.0	0.00
		Beneficiary Household (TxE)	0.170	6.7	0.00

Table 5.1— Dependent Variable: Log of Total Calories Available per Person per Day Controlling for Household Characteristics and Municipality Fixed Effects

Log calories	Survey Round	Regressor	coeff.	t-value	p-value
From Animal Products	Nov-98	Treatment Locality (T)	-0.110	-3.9	0.00
		Eligible/Poor Household (E)	-0.172	-6.7	0.00
		Beneficiary Household (TxE)	0.160	5.2	0.00
	Jun-99	Treatment Locality (T)	-0.071	-2.4	0.02
		Eligible/Poor Household (E)	-0.166	-6.0	0.00
		Beneficiary Household (TxE)	0.215	6.6	0.00
	Nov-99	Treatment Locality (T)	0.043	1.7	0.09
		Eligible/Poor Household (E)	-0.112	-4.8	0.00
		Beneficiary Household (TxE)	0.109	4.0	0.00
From Other Foods	Nov-98	Treatment Locality (T)	-0.031	-1.9	0.05
		Eligible/Poor Household (E)	-0.059	-4.0	0.00
		Beneficiary Household (TxE)	0.038	2.2	0.03
	Jun-99	Treatment Locality (T)	-0.021	-1.2	0.22
		Eligible/Poor Household (E)	-0.047	-3.1	0.00
		Beneficiary Household (TxE)	0.036	2.0	0.05
	Nov-99	Treatment Locality (T)	-0.021	-1.5	0.13
		Eligible/Poor Household (E)	-0.052	-4.2	0.00
		Beneficiary Household (TxE)	0.050	3.4	0.00

Notes: Estimates based on data from the November 1998, June 1999, and Novemebr 1999 ENCEL survyes. Sample excludes 221 households reporting that no food was consumed within the home, and 7,165 households with caloric availability per person per day less than 875 kcal or greater than 4,768 kcal.

Table 5.2 — Impact of PROGRESA on Log Caloric Acquisition Controlling for Household Characteristics and Municipality Fixed Effects

Excluding the Log of Per Capita Consumption as a Regressor

	Nov-98				Jun-99				Nov-99			
	(A)		(B)		(A)		(B)		(A)		(B)	
	Impact	t-value	Impact	t-value	Impact	t-value	Impact	t-value	Impact	t-value	Impact	t-value
Log total calories	0.014	1.7	0.009	1.2	0.043	5.2	0.035	4.3	0.071	10.2	0.063	9.5
Log calories from grains	0.011	1.0	0.004	0.4	0.037	3.4	0.030	2.8	0.071	8.0	0.065	7.5
Log calories from vegetables	0.088	4.6	0.063	3.5	0.221	12.6	0.188	10.9	0.204	12.3	0.176	11.0
Log calories from animal products	0.050	2.5	0.020	1.0	0.144	6.9	0.115	5.6	0.152	8.5	0.144	8.3
Log calories from other foods	0.007	0.6	0.016	1.4	0.016	1.3	0.010	0.8	0.030	3.1	0.024	2.6

Notes: Estimates based on data from the November 1998, June 1999, and November 1999 ENCEL survyes. Sample excludes 221 households reporting that no food was consumed within the home, and 7,165 households with caloric availability per person per day less than 875 kcal or greater than 4,768 kcal. Columns (A) contain impact estimates based on eligible households that received monetary benefits. Columns (B) contain impact estimates based on all eligible households without any reference as to whether the household received any benefits (see text for details).

Cells in gray color denote estimates siginficant at the 5% level

Table 5.3 — Dependent Variable: Log of Total Calories Available per Person per Day Controlling for Household Characteristics and Municipality Fixed Effects

Log calories	Survey round	Regressor	coeff.	t-value	p-value
Total	Nov-98	Treatment Locality (T)	0.001	0.07	0.94
		Eligible/Poor Household (E)	0.018	1.85	0.07
		Beneficiary Household (TxE)	0.012	1.09	0.28
		Log Consumption p.c.	0.296	60.10	0.00
	Jun-99	Treatment Locality (T)	0.025	2.35	0.02
		Eligible/Poor Household (E)	0.020	2.00	0.05
		Beneficiary Household (TxE)	-0.002	-0.15	0.88
		Log Consumption p.c.	0.285	58.92	0.00
	Nov-99	Treatment Locality (T)	0.030	3.49	0.00
		Eligible/Poor Household (E)	0.014	1.81	0.07
		Beneficiary Household (TxE)	0.013	1.34	0.18
		Log Consumption p.c.	0.349	73.76	0.00
From Grains	Nov-98	Treatment Locality (T)	0.002	0.12	0.91
		Eligible/Poor Household (E)	0.036	2.80	0.01
		Beneficiary Household (TxE)	0.009	0.57	0.57
		Log Consumption p.c.	0.259	39.00	0.00
	Jun-99	Treatment Locality (T)	0.035	2.33	0.02
		Eligible/Poor Household (E)	0.033	2.40	0.02
		Beneficiary Household (TxE)	-0.016	-0.96	0.34
		Log Consumption p.c.	0.254	38.05	0.00
	Nov-99	Treatment Locality (T)	0.040	3.36	0.00
		Eligible/Poor Household (E)	0.023	2.10	0.04
		Beneficiary Household (TxE)	0.007	0.54	0.59
		Log Consumption p.c.	0.300	46.27	0.00
From Vegatables	Nov-98	Treatment Locality (T)	0.000	-0.01	0.99
		Eligible/Poor Household (E)	-0.071	-3.18	0.00
		Beneficiary Household (TxE)	0.088	3.33	0.00
		Log Consumption p.c.	0.700	59.94	0.00
	Jun-99	Treatment Locality (T)	0.025	1.07	0.29
		Eligible/Poor Household (E)	-0.059	-2.75	0.01
		Beneficiary Household (TxE)	0.157	6.25	0.00
		Log Consumption p.c.	0.574	54.90	0.00
	Nov-99	Treatment Locality (T)	0.045	2.14	0.03
		Eligible/Poor Household (E)	-0.033	-1.70	0.09
		Beneficiary Household (TxE)	0.096	4.20	0.00
		Log Consumption p.c.	0.796	69.14	0.00

Table 5.3 — Dependent Variable: Log of Total Calories Available per Person per Day Controlling for Household Characteristics and Municipality Fixed Effects (continued)

Log calories	Survey round	Regressor	coeff.	t-value	p-value
Products		Eligible/Poor Household (E)	-0.074	-3.08	0.00
		Beneficiary Household (TxE)	0.088	3.13	0.00
		Log Consumption p.c.	0.731	57.26	0.00
	Jun-99	Treatment Locality (T)	-0.053	-1.92	0.06
		Eligible/Poor Household (E)	-0.081	-3.17	0.00
		Beneficiary Household (TxE)	0.153	5.04	0.00
		Log Consumption p.c.	0.657	51.05	0.00
	Nov-99	Treatment Locality (T)	0.050	2.23	0.03
		Eligible/Poor Household (E)	-0.006	-0.31	0.76
		Beneficiary Household (TxE)	0.032	1.30	0.20
		Log Consumption p.c.	0.876	69.16	0.00
From Other	Nov-98	Treatment Locality (T)	-0.008	-0.51	0.61
Foods		Eligible/Poor Household (E)	-0.027	-1.89	0.06
		Beneficiary Household (TxE)	0.015	0.89	0.38
		Log Consumption p.c.	0.223	29.75	0.00
	Jun-99	Treatment Locality (T)	-0.013	-0.82	0.41
		Eligible/Poor Household (E)	-0.016	-1.08	0.28
		Beneficiary Household (TxE)	0.012	0.70	0.49
		Log Consumption p.c.	0.246	33.65	0.00
	Nov-99	Treatment Locality (T)	-0.017	-1.31	0.19
		Eligible/Poor Household (E)	-0.020	-1.66	0.10
		Beneficiary Household (TxE)	0.025	1.79	0.07
		Log Consumption p.c.	0.263	37.11	0.00

Notes: Estimates based on data from the November 1998, June 1999, and Novemebr 1999 ENCEL survyes. Sample excludes 221 households reporting that no food was consumed within the home, and 7,165 households with caloric availability per person per day less than 875 kcal or greater than 4,768 kcal.

Table 5.4 — Impact of PROGRESA on Log Caloric Acquisition Controlling for Household Characteristics and Municipality Fixed Effects

Including the log of per capita consumption as a regressor

	Nov-98				Jun-99				Nov-99			
	(A)		(B)		(A)		(B)		(A)		(B)	
	Impact	t-value	Impact	t-value	Impact	t-value	Impact	t-value	Impact	t-value	Impact	t-value
Log total calories	0.013	1.8	0.009	1.3	0.024	3.1	0.015	2.0	0.043	7.0	0.038	6.4
Log calories from grains	0.010	1.0	0.004	0.5	0.019	1.8	0.012	1.1	0.047	5.6	0.042	5.2
Log calories from vegetables	0.087	5.0	0.066	3.9	0.182	11.2	0.148	9.2	0.141	9.4	0.118	8.2
Log calories from animal products	0.051	2.7	0.024	1.4	0.099	5.1	0.067	3.5	0.082	5.1	0.078	5.0
Log calories from other foods	0.007	0.6	0.016	1.5	-0.001	-0.1	-0.008	-0.7	0.008	0.9	0.004	0.4

Notes: Estimates based on data from the November 1998, June 1999, and November 1999 ENCEL survyes. Sample excludes 221 households reporting that no food was consumed within the home, and 7,165 households with caloric availability per person per day less than 875 kcal or greater than 4,768 kcal. Columns (A) contain impact estimates based on eligible households that received monetary benefits. Columns (B) contain impact estimates based on all eligible households without any reference as to whether the household received any benefits (see text for details).
Cells in gray color denote estimates siginficant at the 5% level

Table 5.5 — Impact of PROGRESA on Log Caloric Acquisition of Households with Heads Aged 60 or Older

Controlling for Household Characteristics and Municipality Fixed Effects

A: Excluding the log of per capita consumption as a regressor

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log total calories	-0.024	-1.4	0.17	0.022	1.2	0.22	0.039	2.7	0.01
Log calories from grains	-0.027	-1.2	0.25	0.013	0.5	0.59	0.043	2.3	0.02
Log calories from vegetables	0.016	0.4	0.69	0.098	2.5	0.01	0.153	4.2	0.00
Log calories from animal products	-0.004	-0.1	0.93	0.114	2.5	0.01	0.118	3.0	0.00
Log calories from other foods	-0.012	-0.5	0.65	-0.001	0.0	0.97	-0.008	-0.4	0.71

B: Including the log of per capita consumption as a regressor

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log total calories	-0.015	-0.9	0.35	0.013	0.8	0.44	0.031	2.3	0.02
Log calories from grains	-0.019	-0.8	0.40	0.005	0.2	0.84	0.037	2.0	0.05
Log calories from vegetables	0.042	1.1	0.28	0.076	2.1	0.03	0.135	4.1	0.00
Log calories from animal products	0.019	0.4	0.66	0.090	2.1	0.04	0.090	2.5	0.01
Log calories from other foods	-0.005	-0.2	0.86	-0.008	-0.3	0.78	-0.015	-0.8	0.45

Notes: Estimates based on data from the November 1998, June 1999, and Novemebr 1999 ENCEL survyes. Sample excludes 221 households reporting that no food was consumed within the home, and 7,165 households with caloric availability per person per day less than 875 kcal or greater than 4,768 kcal.
Cells in gray color denote estimates siginficant at the 5% level

Table 5.6 — Impact of PROGRESA on Log Caloric Acquisition of Households with Pre-School (age 0-5) Children Controlling for Household Characteristics and Municipality Fixed Effects

A: Excluding the log of per capita consumption as a regressor

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log total calories	0.027	2.5	0.01	0.044	3.9	0.00	0.082	8.6	0.00
Log calories from grains	0.018	1.4	0.18	0.033	2.3	0.02	0.075	6.2	0.00
Log calories from vegetables	0.120	4.8	0.00	0.256	10.7	0.00	0.244	10.9	0.00
Log calories from animal products	0.072	2.7	0.01	0.157	5.4	0.00	0.184	7.6	0.00
Log calories from other foods	0.028	1.9	0.06	0.039	2.6	0.01	0.044	3.4	0.00

B: Including the log of per capita consumption as a regressor

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log total calories	0.019	1.9	0.06	0.020	1.9	0.06	0.040	4.7	0.00
Log calories from grains	0.011	0.8	0.40	0.011	0.8	0.43	0.038	3.3	0.00
Log calories from vegetables	0.102	4.4	0.00	0.210	9.4	0.00	0.155	7.6	0.00
Log calories from animal products	0.058	2.3	0.02	0.105	3.9	0.00	0.085	3.9	0.00
Log calories from other foods	0.023	1.5	0.12	0.018	1.2	0.24	0.014	1.1	0.26

Notes: Estimates based on data from the November 1998, June 1999, and Novemebr 1999 ENCEL survyes. Sample excludes 221 households reporting that no food was consumed within the home, and 7,165 households with caloric availability per person per day less than 875 kcal or greater than 4,768 kcal.
Cells in gray color denote estimates siginficant at the 5% level

Table 5.7 — Impact of PROGRESA on Log Caloric Acquisition by the Education Level of the Spouse of Household Head Controlling for Household Characteristics and Municipality Fixed Effects

A: Education Level: Less than primary

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log total calories	0.006	0.6	0.56	0.024	2.2	0.03	0.031	3.2	0.00
Log calories from grains	0.002	0.1	0.92	0.024	1.5	0.13	0.033	2.6	0.01
Log calories from vegetables	0.055	2.0	0.04	0.137	5.3	0.00	0.133	5.7	0.00
Log calories from animal products	0.050	1.7	0.09	0.127	4.2	0.00	0.082	3.3	0.00
Log calories from other foods	0.018	1.0	0.30	-0.019	-1.1	0.29	0.002	0.1	0.90

B: Education level: Primary

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log total calories	0.016	1.6	0.12	0.023	2.1	0.04	0.057	6.6	0.00
Log calories from grains	0.014	1.0	0.32	0.011	0.8	0.45	0.064	5.4	0.00
Log calories from vegetables	0.127	5.3	0.00	0.242	10.9	0.00	0.146	7.1	0.00
Log calories from animal products	0.061	2.4	0.02	0.090	3.3	0.00	0.073	3.2	0.00
Log calories from other foods	-0.003	-0.2	0.84	0.019	1.2	0.23	0.019	1.5	0.14

C: Education Level: More than primary level

	Nov-98			Jun-99			Nov-99		
Gretaer than primary level	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log total calories	0.057	1.6	0.11	0.007	0.2	0.86	0.051	1.6	0.10
Log calories from grains	0.049	1.0	0.33	0.026	0.5	0.63	0.050	1.1	0.25
Log calories from vegetables	0.127	1.6	0.11	0.137	1.8	0.07	0.235	3.1	0.00
Log calories from animal products	-0.015	-0.2	0.86	-0.067	-0.7	0.47	0.272	3.7	0.00
Log calories from other foods	0.077	1.6	0.10	-0.055	-1.0	0.30	-0.010	-0.2	0.82

Notes: Estimates based on data from the November 1998, June 1999, and Novemebr 1999 ENCEL survyes. Sample excludes 221 households reporting that no food was consumed within the home, and 7,165 households with caloric availability per person per day less than 875 kcal or greater than 4,768 kcal.
Cells in gray color denote estimates siginficant at the 5% level

Table 5.8 — Calories from Processed Foods* and Tortillas by Survey Round in Poor Households

		Calories from Tortillas		Calories from Other Processed Foods	
		Means (standard deviation)	Percentage of household caloric availability	Means and standard deviation	Percentage of household caloric availability
November 1998	Beneficiary households	779 (471)	38.3%	83 (114)	3.9%
	Control households	757 (469)	38.2	77 (109)	3.6
June 1999	Beneficiary households	716 (525)	32.5	89 (148)	3.9
	Control households	703 (529)	33.3	70 (121)	3.2
November 1999	Beneficiary households	785 (498)	38.0	95 (142)	4.4
	Control households	808 (458)	42.5	79 (120)	4.0

*Includes: white bread, sweet bread, bread loaf (Wonderbread), noodles, crackers, breakfast cereal, cupcakes and soda

Source: ENCEL98O, ENCLE99J, and ENCEL99N household surveys. Sample does not include 221 households reporting that no food was consumed within the home or 11% of households with caloric availability per person per day less than or equal to 875 kcal or greater than or equal to 4700 kcal, or where the median locality price of oranges exceeded 100 pesos per kilogram. Controls included but not reported: log household size; proportion of household members in different age/sex demographic groups; characteristics of the household head (age, sex, marital status, education, occupation); selected median locality food prices (tomatoes, onions, potatoes, oranges, leafy vegetables, tortillas, corn, rice, beans, chicken, milk, eggs).

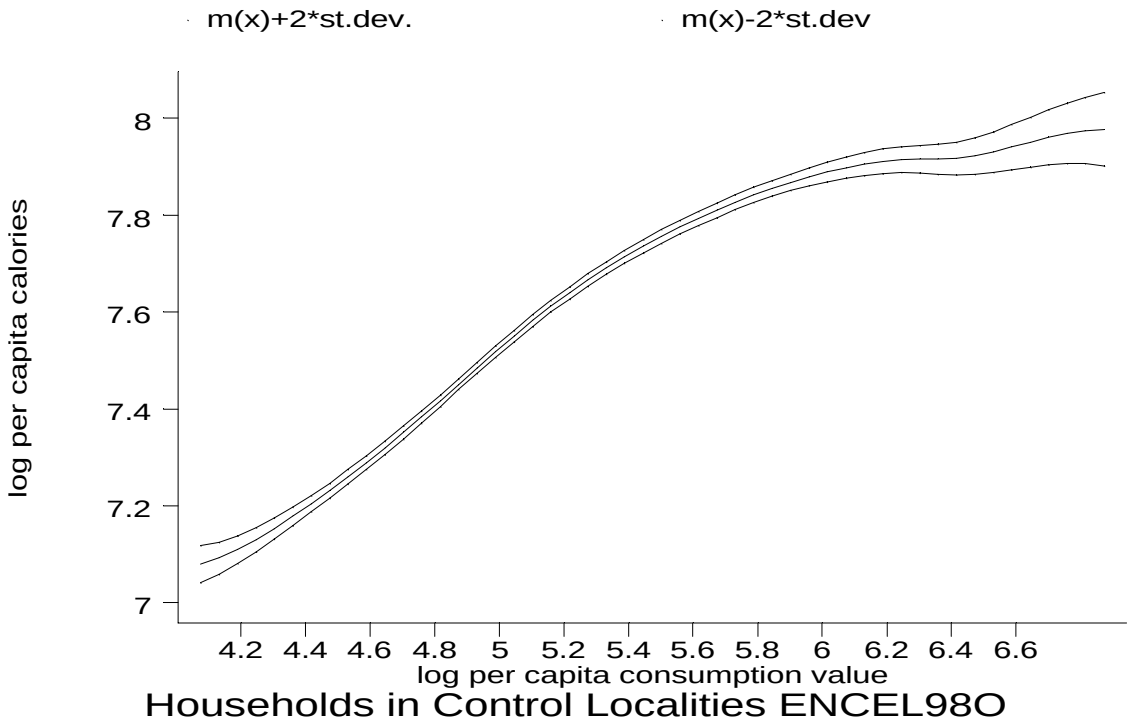


Figure 5.1

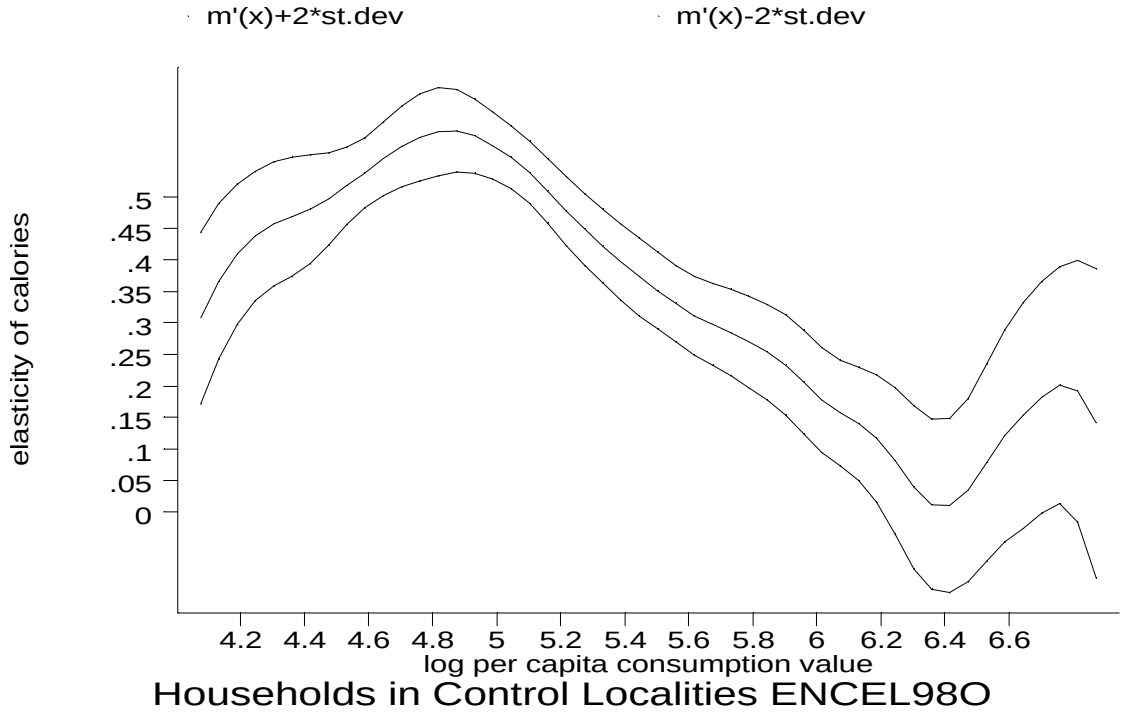


Figure 5.2

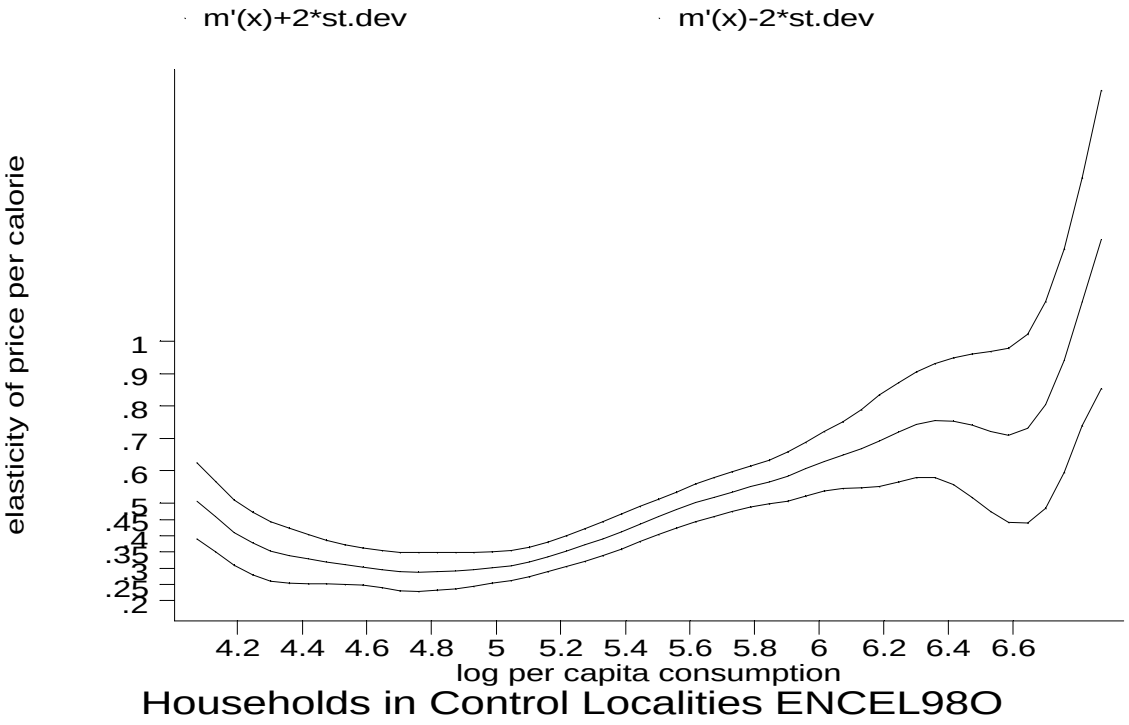


Figure 5.3

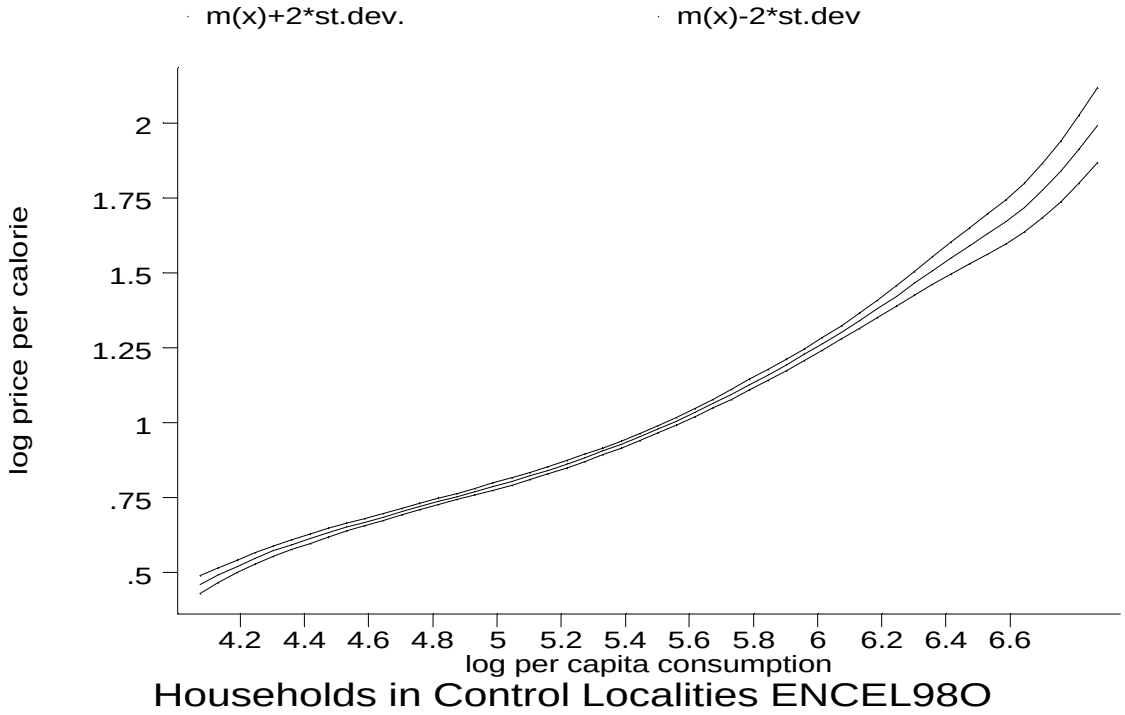


Figure 5.4

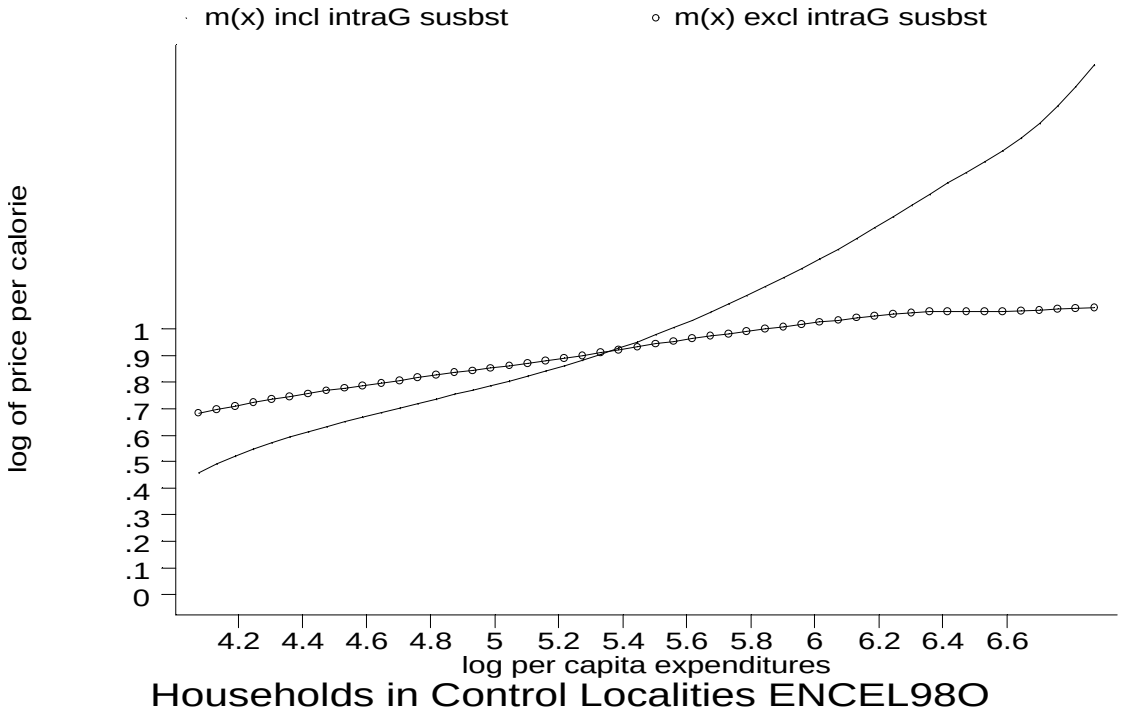


Figure 5.5

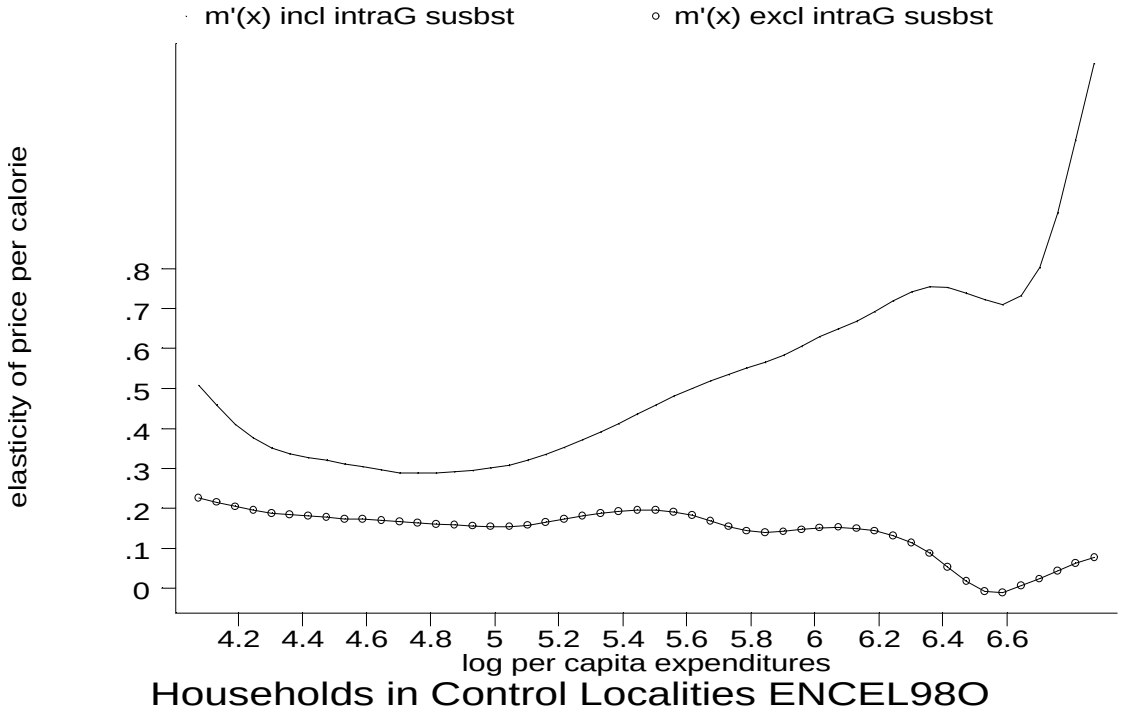


Figure 5.6

Table 6.1 — Average Median Locality Prices: Beneficiary vs Control Localities

Code	Food	Average Median Price per kg. Beneficiary Localities	Average Median Price per kg. Control Localities	Difference in Prices	Percentage Difference in Prices
Fruits and vegetables					
1	Tomatoes				
	Nov-98	44.2	45.3	-1.1	-2.4%
	Jun-99	21.9	22.6	-0.7	-3.0%
	Nov-99	24.9	24.3	0.5	2.2%
2	Onions				
	Nov-98	31.8	30.8	1.0	3.3%
	Jun-99	20.5	21.9	-1.4	-6.5%
	Nov-99	23.4	23.5	-0.1	-0.6%
3	Potatoes				
	Nov-98	32.5	32.7	-0.2	-0.5%
	Jun-99	25.2	26.8	-1.5	-5.8%
	Nov-99	25.5	25.3	0.3	1.1%
7	Plantains				
	Nov-98	18.5	21.3	-2.8	-13.0%
	Jun-99	15.4	18.6	-3.2	-17.3%
	Nov-99	15.6	15.4	0.2	1.2%
Cereals and Grains					
11	Tortilla				
	Nov-98	12.7	12.7	0.0	-0.1%
	Jun-99	13.4	13.5	-0.1	-1.1%
	Nov-99	11.5	11.1	0.4	3.4%
12	Maize Grain				
	Nov-98	11.4	10.4	1.0	9.4%
	Jun-99	9.6	8.6	1.0	11.3%
	Nov-99	10.9	9.5	1.5	15.4%
17	Pasta Noodles				
	Nov-98	48.7	47.1	1.6	3.4%
	Jun-99	45.3	48.2	-2.9	-6.0%
	Nov-99	45.5	60.4	-14.9	-24.7%

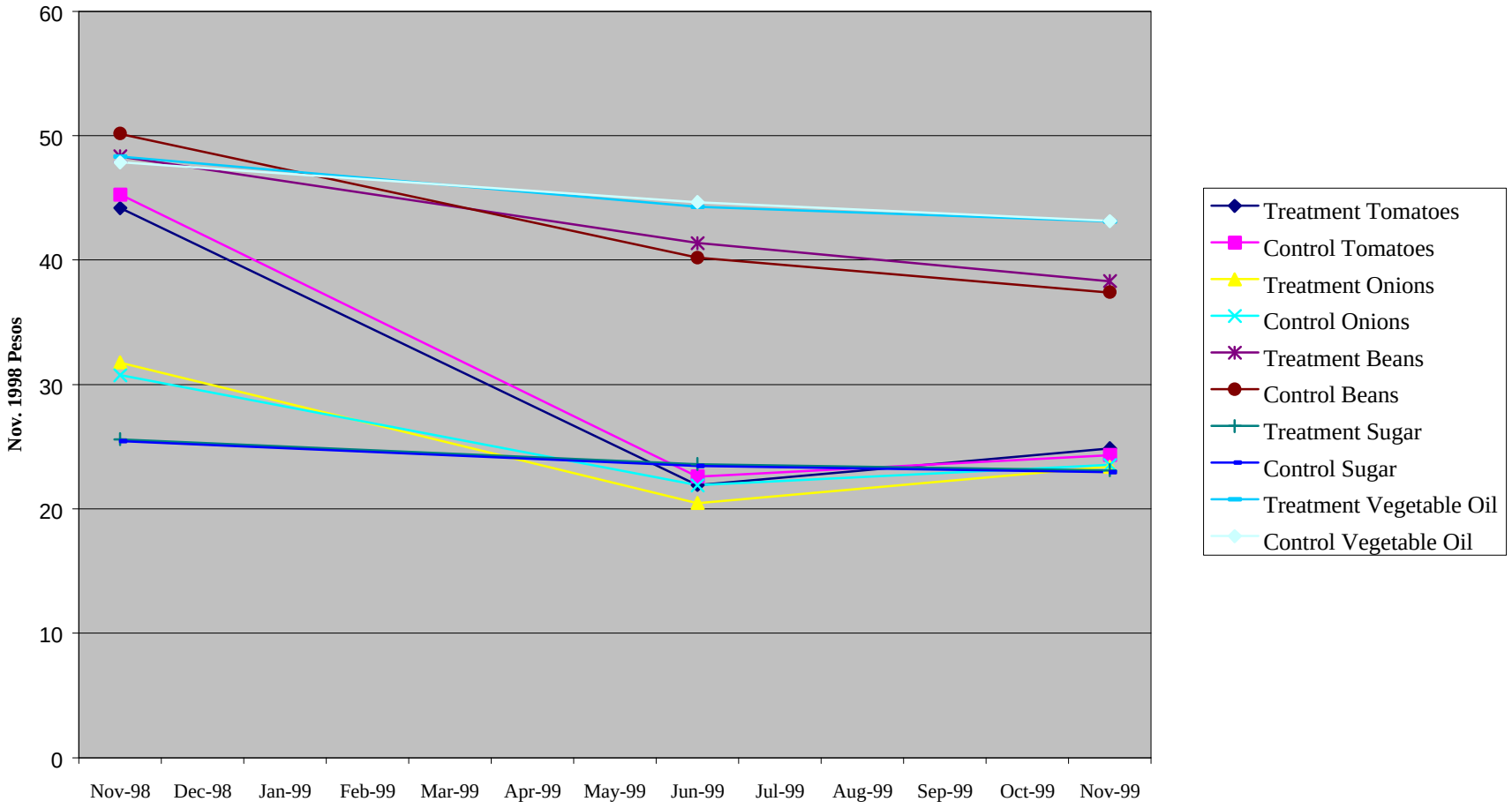
Table 6.1 - Average Median Locality Prices: Beneficiary vs Control Localities (continued)

Code	Food	Average Median Price per kg. Beneficiary Localities	Average Median Price per kg. Control Localities	Difference in Prices	Percentage Difference in Prices
18	Rice				
	Nov-98	32.0	31.4	0.6	1.9%
	Jun-99	29.3	29.4	-0.1	-0.2%
	Nov-99	28.1	28.2	-0.1	-0.5%
20	Beans				
	Nov-98	48.3	50.2	-1.8	-3.6%
	Jun-99	41.4	40.2	1.2	2.9%
	Nov-99	38.3	37.4	0.9	2.4%
Meat, Poultry, and Dairy					
22	Chicken				
	Nov-98	96.1	93.6	2.5	2.7%
	Jun-99	89.5	86.5	3.0	3.4%
	Nov-99	81.4	79.7	1.6	2.1%
27	Eggs				
	Nov-98	45.2	46.5	-1.2	-2.7%
	Jun-99	37.5	40.3	-2.9	-7.1%
	Nov-99	38.0	37.6	0.5	1.2%
Other Foods					
33	Coffee				
	Nov-98	93.1	108.3	-15.2	-14.0%
	Jun-99	87.6	85.5	2.1	2.4%
	Nov-99	115.8	99.1	16.7	16.9%
34	Sugar				
	Nov-98	25.6	25.4	0.2	0.6%
	Jun-99	23.6	23.5	0.1	0.6%
	Nov-99	23.1	23.0	0.1	0.6%
35	Vegetable Oil				
	Nov-98	48.3	47.9	0.4	0.9%
	Jun-99	44.3	44.7	-0.4	-0.9%
	Nov-99	43.1	43.1	0.0	-0.1%

Source: ENCEL98O, ENCLE99J, and ENCEL99N household surveys. Includes prices for the most widely consumed foods from 506 localities.

Figure 6.1

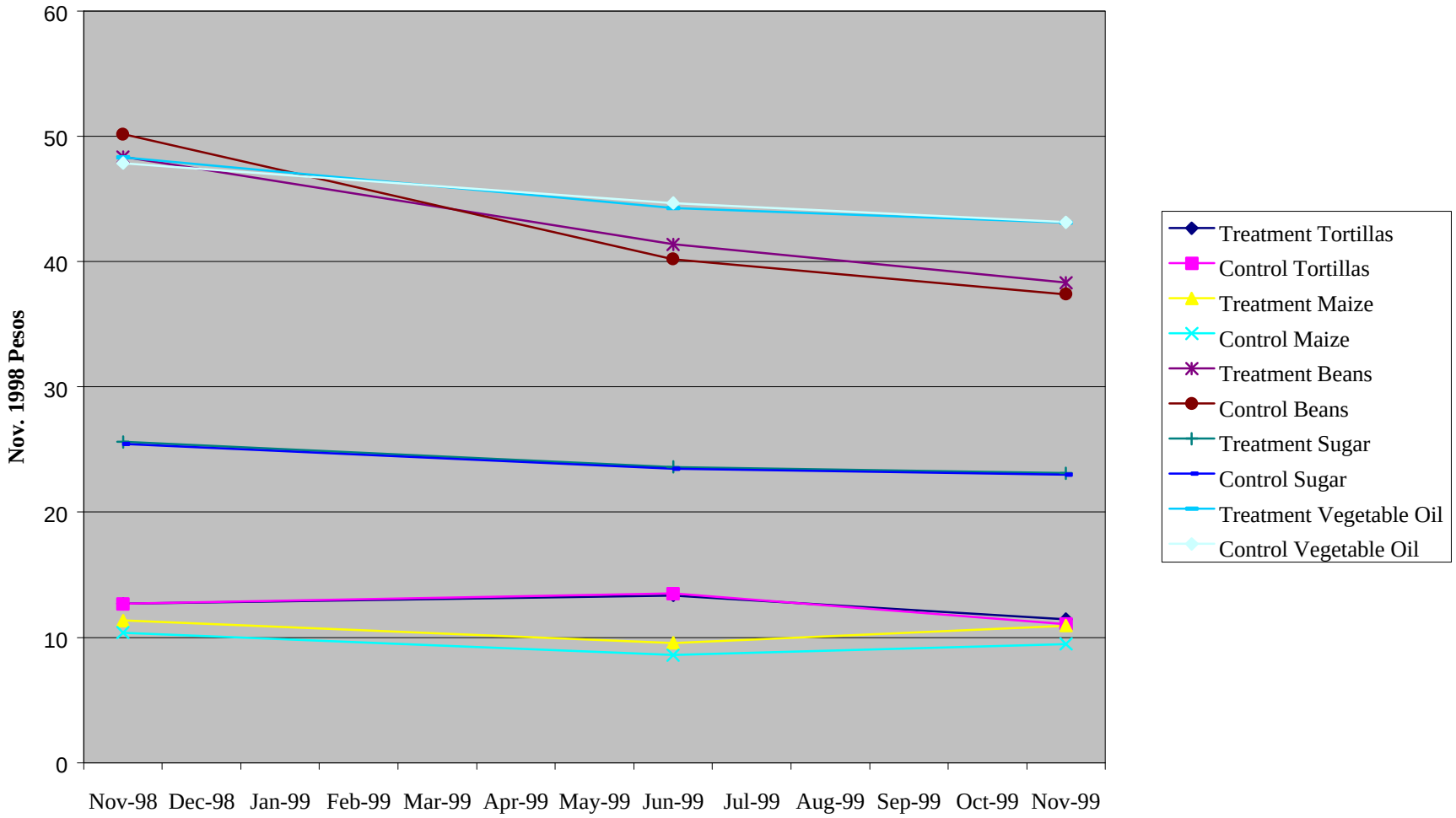
Average Median Locality Prices for 5 Most Consumed Foods:
Control vs Treatment Localities



Source: Table 6.1. At least 84% of households consumed each of these foods in all three survey rounds, and 71% of households consumed all 5 foods.

Figure 6.2

Average Median Locality Prices for 5 Largest Contributors to Caloric Availability: Control vs Treatment Localities



Source: Table 6.1. These 5 foods provide 84% of total household caloric availability.

Table 7.1 — Monthly Mean Household Expenditures on Nonfood Items: Poor Beneficiary and Control Households

		Beneficiary Households	Control Households	Difference	Percent Difference
Children's apparel	Nov-98	21.6	16.2	5.4	33.1%
	Jun-99	33.6	22.5	11.1	49.2%
	Nov-99	31.1	23.0	8.1	35.0%
Adult's apparel	Nov-98	15.3	14.4	0.8	5.8%
	Jun-99	28.5	23.7	4.7	20.0%
	Nov-99	22.4	18.6	3.8	20.3%
School expenses	Nov-98	20.2	20.3	-0.1	-0.5%
	Jun-99	18.4	16.6	1.8	10.6%
	Nov-99	23.0	23.7	-0.7	-3.0%
Medical expenses	Nov-98	32.0	35.8	-3.8	-10.6%
	Jun-99	27.2	30.8	-3.7	-11.9%
	Nov-99	22.8	24.5	-1.7	-6.9%
Energy	Nov-98	38.7	41.6	-2.9	-7.0%
	Jun-99	38.7	39.4	-0.7	-1.9%
	Nov-99	42.6	43.9	-1.3	-3.1%
Transportation	Nov-98	35.9	38.0	-2.1	-5.6%
	Jun-99	38.8	33.2	5.5	16.7%
	Nov-99	42.8	41.9	0.9	2.2%
Other nonfood expenditures	Nov-98	60.7	55.8	4.9	8.7%
	Jun-99	65.5	60.3	5.2	8.7%
	Nov-99	72.9	69.3	3.6	5.3%
All nonfood items	Nov-98	222.8	220.3	2.4	1.1%
	Jun-99	249.0	224.5	24.5	10.9%
	Nov-99	256.4	243.7	12.7	5.2%

Source: ENCEL98O, ENCLE99J, and ENCEL99N household surveys. Sample does not include 221 households reporting that no food was consumed within the home.

Table 7.2 — Impact of PROGRESA on Expenditures in Non-Food Including the Log of per Capita Consumption as a Regressor

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log (total exp non-food items per cap.)	-0.053	-2.9	0.00	0.041	2.2	0.03	0.027	1.7	0.09
Log (exp on child clothing and shoes per cap)	0.189	7.9	0.00	0.189	7.9	0.00	0.174	10.7	0.00
Log (exp on medicines per cap.)	-0.164	-3.0	0.00	0.021	0.3	0.74	-0.005	-0.1	0.92
Log (exp on transportation to school per cap.)	-0.078	-0.9	0.38	-0.053	-0.7	0.51	-0.184	-3.0	0.00
Log (exp on school contributions per cap.)	-0.020	-0.6	0.56	-0.112	-3.1	0.00	-0.101	-4.2	0.00

	Nov-98			Jun-99			Nov-99		
	Impact	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**	**Impact**	**t-value**	**p-value**
Log (total exp non-food items per cap.)	-0.061	-4.0	0.00	-0.025	-1.7	0.09	-0.071	-5.8	0.00
Log (exp on child clothing and shoes per cap)	0.039	1.5	0.12	0.157	7.0	0.00	0.105	6.8	0.00
Log (exp on medicines per cap.)	-0.133	-2.7	0.01	-0.027	-0.5	0.65	-0.062	-1.4	0.16
Log (exp on transportation to school per cap.)	-0.068	-0.8	0.42	-0.073	-1.0	0.33	-0.236	-4.3	0.00
Log (exp on school contributions per cap.)	-0.023	-0.7	0.50	-0.136	-3.8	0.00	-0.139	-5.8	0.00

Notes: Data used from the November 1998, June 1999, and Novemebr 1999 ENCEL survyes.

Cells in gray color denote estimates siginficant at the 5% level